Basics of Graphic Design in Photoshop. Textbook. 189 p.

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Basics of Graphic Design in Photoshop 2021

Iftikhar B. Abbasov

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Prof. Iftikhar B. Abbasov, is a specialist in computer engineering and industrial design at the Southern Federal University in Russia. He has numerous publications to this credit, focusing on the use of mathematical modeling and high-level computer programming for practical applications such as ocean exploration, coastal and aircraft engineering, and perception of images.

The textbook is intended for mastering the graphics editor Adobe Photoshop by design students and students of other arts and crafts. Mastering is presented in the form of specific exercises with phased implementation. The features of the editor are described in a compact form - from creating an image, editing it, color correction, to saving and printing. Exercises are performed on the example of author's images, creative works for self-fulfillment are given. The book will also be of interest to readers with an artistic taste who want to master computer graphics.

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Basics of Graphic Design in Photoshop 2021

Fourth edition, revised

Approved by the EMA of universities for education in the field of design, monumental and decorative arts as a teaching aid for students of higher educational institutions studying in the direction 54.03.01 "Design"

UDC 681.3.06

Abbasov I.B. Basics of Graphic Design in Photoshop 2021: A Tutorial. 2022. - 189 p.

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Exercises are performed on the example of author's images, creative works for self-fulfillment are given. The book will also be of interest to readers with an artistic taste who want to master computer graphics.

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INTRODUCTION

In today's rapidly changing world of computer technology, people who own a computer and have an artistic taste are in great demand. These people primarily include designers who should ennoble human life. This book is dedicated to the development of computer graphics, which has become a flexible and indispensable tool for the designer (along with traditional tools).

In accordance with the curriculum, students of directions 54.03.01 "Design" and 29.03.04 "Technology of artistic processing of materials" study the course "Computer graphics". When studying this course, students, along with mastering the lecture theoretical material, must acquire skills in image processing using modern raster graphics editors. Adobe Photoshop is used as such a program in this work.

Graphic editor Adobe Photoshop is developed by one of the leading companies in the field of computer graphics - Adobe (USA). The first version of the program appeared in 1990, later it turned into an industry standard in the field of creating, processing and editing raster images.

The latest version described in the manual - Adobe Photoshop 2021 is the result of its evolutionary development. Adobe Photoshop 2021 graphics editor is installed on Windows 10 operating system with an Intel (or AMD) processor, 64-bit version, 8 GB RAM, 2 GB video card and takes up about 4 GB of disk space.

This manual is a revised edition of the work: Abbasov I.B. Graphic design basics on a computer in Photoshop CS6. Proc. allowance. – M.: DMK Press. 2013. - 238 p. [1, 2]. The textbook uses many years of experience of the author as a teacher of computer graphics disciplines. The educational and methodological material presented in the manual has been successfully tested for 20 years at the Taganrog Technological Academy of the Southern Federal University. The textbook was the winner of the competition for the best scientific book of the National Education Development Fund (Sochi, 2008), the All-Russian Exhibition of Educational and Methodological Publications of the Russian Academy of Natural Science "Golden Fund of National Science 2009" (Moscow).

To complete the exercises, the tutorial is accompanied by a library of images that are posted on the book page of the publisher's website (https://dmkpress.com/). The images are divided according to the subject of the exercises in the form of lessons. All drawings and photos presented in the exercises are copyrighted (except for studio photos of models). https://dmkpress.com/catalog/computer/graphics/978-5-97060-940-8/

This manual is made according to the technology of step-by-step development: from creating a clean document to applying complex settings for commands and tools. Their development is carried out by specific exercises. It should be noted that in the exercises each step is described in sufficient detail.

However, in order not to limit the freedom of creativity, after describing the possibilities of commands and tools, works for independent execution are presented. The mastering of the course ends with the performance of an examination graphic work of a creative nature. To check the mastered material, control questions are also given.

The following topics are covered in the work:

- *Photoshop editor window, panels and palettes;*
- *basic concepts of raster graphics;*
- *creating a new image, setting units of measure;*
- *file formats for storing images;*
- *canvas and editing canvas parameters;*
- *changing the size and resolution of the image;*
- *creation and editing of layers;*
- *color models, channels;*
- *selection of areas of regular and arbitrary shape;*
- *transformation of selected areas;*
- *selection and creation of colors;*
- *fill and stroke areas;*
- *drawing tools and their settings;*
- *removal of image fragments;*
- *tone correction of images;*
- *color correction of images;*
- *creating a mask, alpha channels, layer mask;*
- *vector contours and figures;*
- *creation and editing of text;*
- *corrective tools;*
- *filters for effects and deformations;*
- *printing images;*
- *test questions.*

1. ADOBE PHOTOSHOP GRAPHIC EDITOR WINDOW

After launching the graphic editor Adobe Photoshop version 2021 and opening the document, a window appears on the screen, which is shown in Fig.1.1.

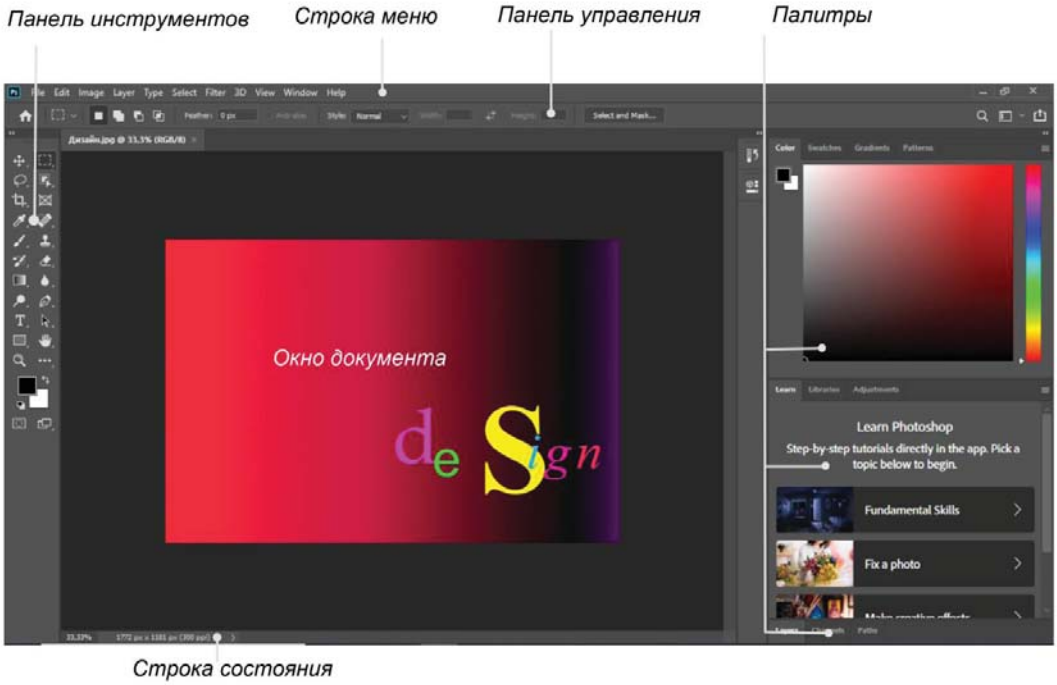


Fig.1.1. Window of Editor

This figure shows the Adobe Photoshop graphics editor window, the appearance of this window (interface) is similar to applications running on the Windows operating system and includes windows, menus, icons, icons, tooltips.

At the top, the editor window starts with a *menu bar*. To select the appropriate menu, click on its name with the left mouse button. From these names, the corresponding menus will drop down. Commands with a triangle at the end have a submenu that can appear if you hold the mouse pointer over it. To execute a command, move the mouse pointer over it and left-click.

Below the *menu bar* is the control bar for the *current tool*, its content depends on the selected tool. The *toolbar* is located on the left side of the workspace. The document window is located in the center of the screen, and *palette sets* are located in the right part of the window. At the bottom of the document window is the *status bar*. By default, the interface of the Adobe Photoshop editor version has a darkened view [1, 3]. According to the developers, a dark background helps users focus on a more contrasting document image.

The appearance color of the editor window can be changed using the **Edit/Preferences/Interface** command. The **Appearance** section offers four color options in the **Color Theme** field.

In this window, you can also select the language of localization, presentation of Adobe Photoshop. In the **Presentation** section in the **Language UI** window, select (or leave) the initial language **English**. In the language of the original development, programs work more consistently.

The **Tools** toolbar is displayed in one or two columns using the arrows in the panel header. Similarly, you can collapse or expand palettes using the **Collapse to Icons** button in the upper right corner. The location and set of palettes in the editor window depends on the task being performed: color correction, drawing, retouching, text typesetting, animation. All settings for the workspace of the editor window are located in the menu **Window/Workspace**.

The workspace is set to **Essential (Default)** by default. Here you can also return the workspace to its original default view with the command **Window/Workspace/Reset Essential**.

1.1. Content of Menu bar

The menu bar has the following content:

- **File** – working with files, creating, opening, viewing and saving documents, setting up and starting printing, importing and exporting documents, automatic processing, exiting the editor;
- **Edit –** undo and redo actions, editing, copying, deleting and pasting selected areas, spell check, stroke and fill, deformation and transformation of selected areas, setting new patterns and brushes, clearing the buffer, color control system, customizing menus and keyboard shortcuts , basic editor settings;
- **Image** – working with the image as a whole, color modes, tone and color correction, automatic color adjustments, resizing, canvas and image position, cropping, cropping and duplicating the image, channel processing, image analysis;
- **Layer** – working with layers, creating, duplicating, deleting and flattening layers, layer effects, grouping layers, distributing objects on related layers, layer mask, etc.;
- **Type** – work with typing, panels for working with fonts, creating an outline for text, converting to a three-dimensional stamp, rasterization, text deformation, setting language options, replacing and updating fonts;
- **Select** – working with selections, inverting and transforming selections, searching and selecting layers, compressing, expanding, feathering and smoothing selections, selecting areas of a given color, alpha channels, loading and saving a selection;

- **Filter** – commands for working with filters, image processing, Photoshop filters, entering a digital code in an image to protect copyrights, loading new filters;
- **3D** – ommands for working with volumetric images, opening, creating and editing layers with three-dimensional images, drawing and rendering textures;
- **View** – color gamut, print proofing settings, changing pixel aspect ratio, zoom and document viewing modes, displaying guides, grids, cross bars, snapping modes, creating and moving guides;
- **Window** – managing the appearance of the editor, selecting and editing a workspace, working with different documents, calling toolbars and floating palettes, a list of open documents;
- **Help** – help system.

Exercise 1.1. Opening a document

1. Before opening the documents, it should be noted that a set *of images* is attached to the exercises in this manual, which is located on the book page of the *publisher's website* (https://dmkpress.com/). herefore, you need to download a set of images called *Photoshop Lessons* to your computer. https://dmkpress.com/catalog/computer/graphics/978-5-97060-940-8/
   After installing these images, use the menu command **File/Open**.
2. The program will offer you to work with cloud technologies, for now we will choose the disk space of the computer. Open the *Photoshop Tutorials* folder. All the necessary images are in this folder, and they are distributed according to the topics of the lessons. Open the *Lesson 1* folder and select the file *Design. jpg*. Figure 1.1 shows an image from this file.

1.2. Toolbar

Adobe Photoshop editor is designed for professional work of a designer, artist. Therefore, the toolbar contains a set with which you can draw, color, select individual areas of the image, move and edit them, enter text, etc. To select a tool, you must click on its button and the tool will then become active. The toolbar is shown in Figure 1.2, on the left.

The tools are divided into the following four groups:

- selection tools;
- tools for cropping images and splitting into fragments;
- to create a comment and perform measurements;
- tools for drawing, editing and retouching;
- tools for creating vector outlines and text input;
- tools for navigation;

- tools for 3D operations.

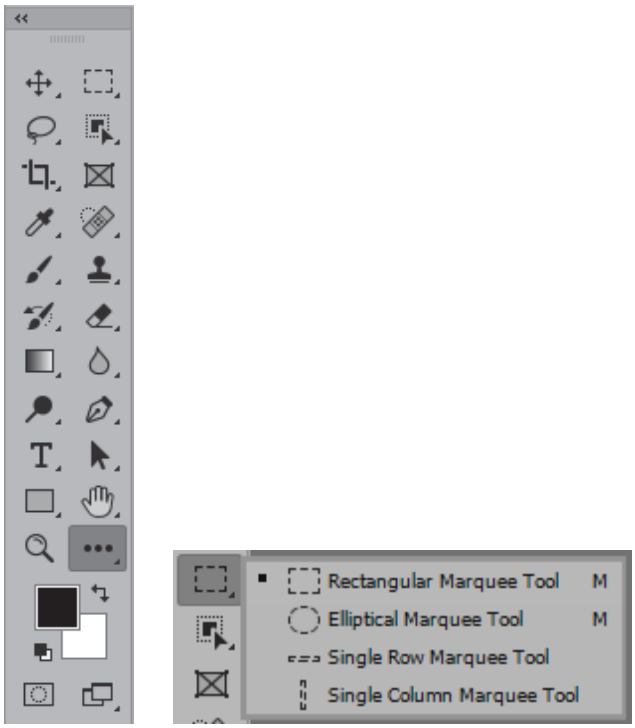


Fig.1.2. Toolbar and tools for selection of areas of the correct form

Not all buttons fit on the toolbar, so some tool groups are represented by only one button. If the button contains a black triangle in the lower right corner, then other tools are hidden behind it. To display these buttons and select the desired tool, click on the front button and move the pointer *slightly to the right*. A list of all the instruments in this group will drop out of the button.

For example, from a button **Rectangular Marquee**, you can display tools for elliptical and pixel selection (Fig. 1.2, right). In this case, the selected tool will remain visible, and the one that was previously visible will be hidden.

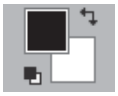
You can move the mouse pointer over the current tool to get a hint about the current tool and a tooltip for the functions of this tool will be displayed. To cancel this hint, you can uncheck the box in the menu. **Preferences/Tools/Use Rich Tooltips**.

To reconfigure the current toolbox, you can use the command **Edit/Toolbar**. Changes can be canceled in the dialog box with the command **Restore Defaults**. This command can also be called by the corresponding tool in the form of an ellipsis at the end of the toolbar.

You can remove or display the toolbar using the command **Window/Tools**. Consider the contents of this panel.

	Moving tool Move Artboard
	Tools for highlighting areas of regular shape: - Rectangular Marquee, - Elliptical Marquee, - Single Row Marquee, - Single Column Marquee.
	Freeform Selection Tools: - Lasso, - Polygonal Lasso, - Magnetic Lasso.
	Color selection tools: - Object Selection, - Quick Selection, - Magic Wand.
	Tool for cropping and cutting an image into fragments: - Crop, - Perspective Crop, - Slice, - Slice Select.
	Layer Mask Drawing Tool: - Frame.
	Tools for selecting, measuring color, measuring distances and angles, creating comments: - Eyedropper, - 3D Material Eyedropper, - Color Sampler, - Ruler, - Note, - Count.

	Retouching tools: - Spot Healing Brush, - Healing Brush, - Patch, - Content-Aware Move, - Red Eye.
	Painting tools: - Paintbrush, - Pencil, - Color Replacement. - Mixer Brush.
	Tools for copying parts of an image: - Clone Stamp, - Pattern Stamp.
	Tools for Restoring Previous Image States: - History Brush, - Art History Brush.
	Removal tools: - Eraser, - Background Eraser, - Magic Eraser.
	Tools for coloring selections: - Gradient, - Paint Bucket. - 3D Material Drop.
	Sharpening Tools: - Blur, - Sharpen, - Smudge.
	Brightness Control Tools: - Dodge, - Burn, - Sponge.

	Tools for drawing and editing vector paths: - Pen, - Freeform Pen, - Curvature Pen, - Add Anchor Point, - Delete Anchor Point; - Convert Point.
	Text creation tools: - Horizontal Type, - Vertical Type, - Horizontal Type Mask, - Vertical Type Mask.
	Tools for selecting vector paths: - Path Selection, - Direct Selection.
	Tools for creating vector shapes: - Rectangle, - Rounded Rectangle, - Ellipse, - Polygon, - Line, - Custom Shape.
	Pan Tools: - Hand, - Rotate View.
	Scale Tool: - Zoom.
	Toolbar editing tools: - Edit Toolbar.
	Tools for indicating the selected color: - Set Foreground Color, - Set Background Color.
	Editing in mode: - Edit in Quick Mask Mod).

	Tools to control the appearance of the editor window: - Standard Screen Mod, - Full Screen Mode With Menu Bar, - Full Screen Mode.

1.3. Palettes

When working with images, palettes are usually used, named after the artist's tools. Palettes that are often used together are combined into one set. To attach any palette to any palette group, you need to click on its label, drag it to the palette label and drop it into a new set.

Palette sets can be collapsed to their minimum icon sizes by clicking on the **Collapse to Icons** button in the upper right corner of the palettes panel (in the form of a double arrow), to return, you must click again. You can smoothly resize palettes by dragging any of its sides.

Each palette has a menu that controls how it works. To call this menu, click on the line sign in the upper right corner of the palette. Each individual palette is closed by clicking on the cross at the end of the title line (displayed for an individual palette). For example, if the **Color** palette is not on the screen, then it can be called using the **Window/Color** menu, Fig. 1.3. Commands for calling all palettes are in the **Window** menu.

So that the palettes do not interfere with viewing the picture, you can remove them all with the **Shift + Tab** key. The same key will return them to their place. The **Tab** key removes and re-displays all workspaces in general, except for the menu bar. To reset the palette layout (after the drag and drop mess), you need to refresh your workspace and run the command **Window/Workspace/Reset Essential**.

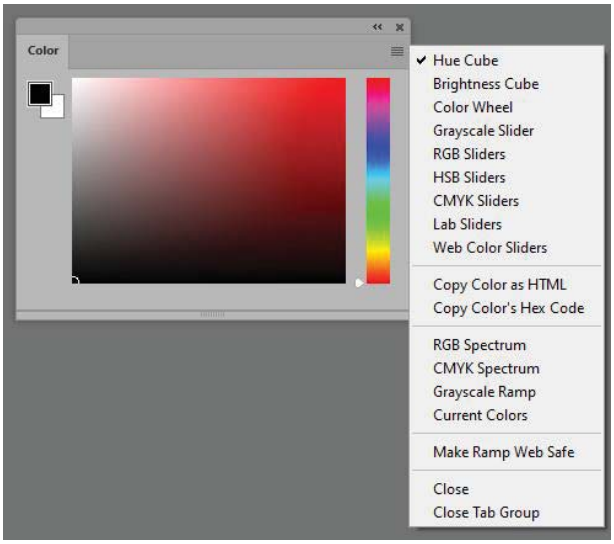


Fig.1.3. The **Color** palette and the contents of its menu

The Adobe Photoshop editor has the following main palettes:

- **3D -** for working with three-dimensional graphics,
- **Action** - operations to automate processing,
- **Adjustments** - color correction of images,
- **Brush** - selection and adjustment of the brush,
- **Brush Presets** - work with the selected set of brushes,
- **Channels** - use color and alpha channels,
- **Character** – setting parameters for text characters,
- **Character Styles** - creating a style of text characters,
- **Color** - creating a color in a specific color model,
- **Clone Source** - copy fragments from different images,
- **Histogram** - display the histogram of the current image,
- **History** - saving the states of the processed image,
- **Info** - display information about the selected area, cursor, color,
- **Layer Comps** - create a composition from layers for a quick transition
- **Layers** - creating and editing layers,
- **Measurement Log** - saves the data of measurements taken,
- **Navigator** - zoom and pan view,
- **Notes** - work with making notes,
- **Paragraph** - setting the parameters of text paragraphs,
- **Paragraph Styles** - create and save the style of paragraphs,
- **Paths** - output and editing of vector contours,
- P**roperties** - properties of adjustment layers and layer masks,
- **Styles** - use of different styles,

- **Swatches** - sets of various standard colors,
- **Timeline** - work on creating animation,
- **Tool Preset** - a set of settings for the used tool.

1.4. Control Panel

Tools can be customized using the control panel, which is located below the menu bar and has a different look for different tools. In Figure 1.1 you see the control panel for the **Move** tool. To show or hide the control panel, you can use the command **Window/Options**.

1.5. Status bar

The status bar (Fig. 1.1) is located at the bottom of the working window of the document. Here you can get general information about the document. The leftmost field displays the image viewing scale. The content of the second field from the left depends on what is selected in the status bar menu. By default, information about the size of the document is displayed here.

To open the status bar menu, click on the triangle to the right of the information field, as in Figure 1.4. You can display the following information:

- **Document Sizes**, to the left of the slash is the approximate file size in Photoshop format after merging it into one layer, to the right is the file size including all layers;
- **Document Profile**, image color profile;
- **Document Dimension**, information about image parameters;
- **Measurement Scale**, measurement scale;
- **Scratch Sizes**, to the left of the slash is the amount of memory occupied by all open documents, to the right is the total amount of RAM that Photoshop can use;
- **Efficiency**, if this value is less than 100%, then the program has to access the hard disk due to lack of RAM and image processing slows down;
- **Timing** - time spent on the last operation;
- **Current Tool** – name of the active tool;
- **32-bit Exposure** – exposure of 32-bit images;
- **Save Progress**, shows the progress of the process of saving the image as a percentage;
- **Smart Object**, information about smart objects is displayed;
- **Layer Count**, shows the number of layers in the image.

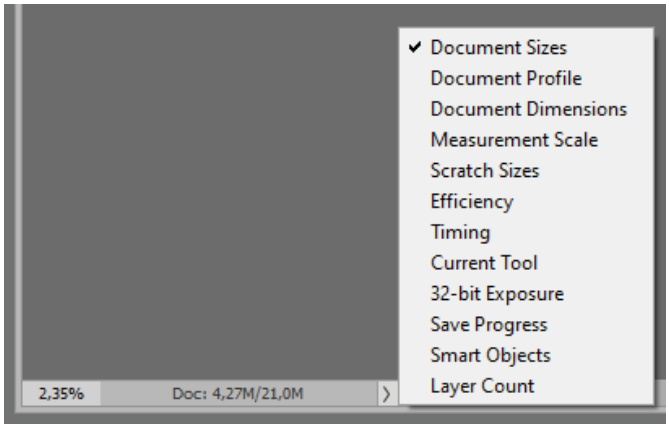


Fig.1.4. Status bar and its menu

Click on the information field. While the mouse button is pressed, you can get more detailed information about the image, you will see a plate with the size, resolution and color profile of the image.

After describing the interface of the graphical editor, let's create our own *classic workspace* that exists in earlier versions and is more familiar to experienced users.

Use the **Window** command to select palettes that we will use often in the future: **Navigator**, **History**, **Layers** (fig.1.5). With the **Edit/Preferences/Interface** select the lightest of the gray tones of the workspace coloring. Toolbars and controls should also be displayed **Window/Tools**.

To save the created workspace, run the command **Window/Workspace/New Workspace**. In the dialog box that appears, specify the name of the **Basic-1** working environment. After saving, a new **Basic-1** space will appear in the list of workspaces, this list is also constantly displayed at the end of the tool control panel (Fig. 1.5).

Fig.1.5. New workspace **Basic-1**

In the future, you can change the parameters of the workspace at your discretion (according to habits, preferences, depending on the task at hand). The new workspace we created is shown in Figure 1.5. You can restore the workspace settings using the command **Window/Workspace/Reset Basic-1**.

2. RASTER GRAPHICS

Before starting work with Adobe Photoshop, let's get acquainted with the basics of raster graphics. Graphic editor Adobe Photoshop works mainly with raster graphics, although it can handle vector paths as well. A raster image consists of pixels (from the English *pixels - an image element*) - multi-colored squares of the same size [2, 4, 5]. The computer remembers the colors of all pixels in a row in a certain order. Therefore, bitmap images require a large amount of memory to store. They are hard to scale and even harder to edit. To enlarge the image, you have to increase the size of the squares, and then the picture is stepped. To reduce the image, you have to convert several neighboring points into one or throw out extra points. As a result, the image is distorted, its fine details become blurred.

2.1. Image dimensions and resolution

The size of a bitmap is usually specified in [width] x [height] pixels, the size of a rectangular array. Geometric dimensions are specified in the appropriate units of length, with the next main parameter being the resolution of the raster image.

Resolution is the number of pixels per inch (or centimeter) in a bitmap. The physical size of a pixel differs between displays and printers, so in order to calculate the physical dimensions of an image, you need to know the resolution of the display device.

Laser printers are characterized by a resolution of 1200 dpi (dot per inch) or more dots per inch. Most monitors can work in different modes. Their standard screen sizes in pixels ppi (pixel per inch): 1024x768, 1280x1024, 1600x1200. If the dimensions of the image in pixels exceed the dimensions of the screen, this is not so scary, since all graphic editors can scale them, replacing several pixels with one pixel of an intermediate color.

The next major factor that affects the file size of a bitmap is the color of the pixel. The **Color** of a pixel is given by its *bit depth* (the number of bits per pixel). Information about the dimensions, resolution, and color profile of the image is saved to the file when it is written in the appropriate format.

2.2. Create a new document

To create a new document, execute the File/New command. In the extended dialog box (Fig.2.1) you can set the basic parameters of a bitmap image [3]. For this, there are blanks after choosing the scope of the created image: **Recent, Saved, Photo, Print, Art & Illustration, Web, Mobile, Film & Video**. Each section contains pre-made image parameter templates.

If desired, you can restore a shorter old version of the program interface for creating a new document, for this you need to run the command **Edit/Preferences/General,** in section **Option** check the box **Use Legacy "New Document" Interface**.

For this interface, select the **Photo** tab, in the right part of the dialog box, enter the file name in the **Name** field. In the left **Preset** field, you can select an image with standard parameters.

The Width field sets the width of the image, and the Height field specifies its height. In the scrolls adjacent to them, you can choose the units of measurement: pixels, inches, cm, mm, points, picas or columns.

The resolution is usually specified in pixels/inches, although pixels/cm (pixels per centimeter) can also be selected. Next, the color model and bit depth of the pixel in the field are selected. **Color Mode**.

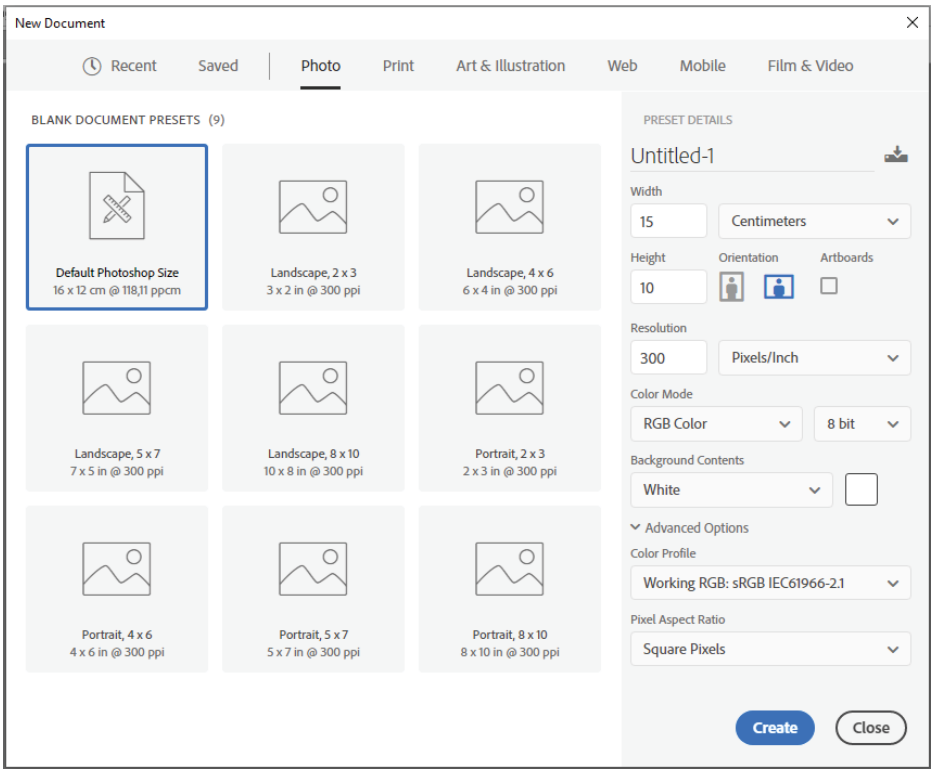


Fig.2.1. New document dialog box **New**

In the next field, **Background Contents**, the color of the background (substrate) of the image is selected. The default background color is set to white, you can also set **Background Color, Black**, Transparent, or any custom color you choose. Additional fields at the bottom of the dialog box set the image parameters with non-square pixels.

As an exercise, let's create a new document.

Exercise 2.1. Create a new document

1. Execute the **File/New** command.
2. Enter the name of the file in the Name field, for example, Fig.1.
3. In the **Width** field, enter the width of the image 15 cm, and in the adjacent scroll, select cm (centimeter) as the unit of measurement.
4. Similarly, in the **Height** field, set the height of the image to 10 cm.
5. In the **Resolution** field, set the resolution to 300, and in the adjacent scroll, select the pixels/inch unit.
6. In the **Color Mode** rollout, select the **RGB Color** mode.
7. In the Background **Contents section**, select the default line - **White**.

Click on the OK button and you will have a new document with a white backing.

Self-study

Create a bitmap with dimensions: width 20 cm, height 15 cm, resolution 100 pixels/inch, color mode CMYK, background color in shades of red (or any color other than white).

2.3. Graphic file formats

Along with the size, resolution, and color model of an image, the next factor that affects file size is the bitmap file format. The file format must be selected when saving a bitmap using the command **File/Save As**.

Format is a way of encoding graphic information [2, 4, 5]. Graphic file formats are divided mainly into raster, vector and universal. Raster formats are also divided into formats *with loss* of information and *without loss* of color information. Lossless compression methods include: RLE (run length encoding), LZW (Lempel-Ziv-Welch), ZIP, lossy compression is carried out in the JPEG algorithm.

Format PSD

The PSD (*Photoshop Document*) format is the native format of the Adobe Photoshop graphics editor. This is a raster format that allows you to save black and white, grayscale (gray), color images without data loss. The format supports image layers, alpha channels, vector paths, text inserts, color settings, print settings.

Format TIFF

The TIFF format (*Tagged Image File Format*) is the main format for exchanging documents between graphic editors without data loss. This format is opened by many raster and vector editors, by all publishing systems. Also used for exchange between IBM PC and Macintosh computers. The format preserves color with any bit depth, layers, alpha channels, vector inserts. It is the preferred format for documents intended for printing.

Format BMP

The BMP (*Bitmap*) format is a native format of the Windows operating system. It is supported by all graphic editors running under this operating system. It is used to store raster images, provides the ability to apply information compression using the RLE algorithm, the main disadvantage is the huge file sizes.

Format EPS

The EPS (*Encapsulated PostScript*) format belongs to the universal formats, supported by most vector and raster editors, as well as layout programs. Vector drawings are converted to this format before layout. The format allows you to save both vector and raster graphics.

Format PDF

The PDF (*Portable Document Format*) format was developed by Adobe for the electronic distribution of documents, is a universal format, used as the native format of the Adobe Acrobat editor. Supports raster and vector graphics, used in prepress.

Format GIFF

The GIFF (Graphic Interchange Format) format is a bitmap format widely used on the Internet. The number of colors is limited to 256, allows you to store multiple frames in one file to create GIF animation.

Format PNG

PNG (*Portable Network Graphics*) format, a raster format for storing graphic information using a lossless compression algorithm. This format was developed to replace the legacy GIF format, but does not allow saving animation. Designed primarily for web use and multiple graphics editing without loss of color information.

Format RAW

The RAW (from English "raw",) format is designed to save bitmap images without data loss. Many professional digital cameras save lossy frames in JPEG format at a negligible size, without loss of color information in TIFF format. The RAW format stores data captured in its original form by a digital camera matrix, but takes up several times less memory compared to the TIFF format.

Format JPEG

The JPEG (*Joint Photographic Expert Group*) format is a lossy bitmap format. Allows you to select the best balance between image quality (when compressed) and file size. Not recommended for printing applications. Used to compress photographic quality images in digital cameras, to view images on a monitor screen, via the Internet. Every time you save in this format, color information is lost, resulting in poor image quality.

Exercise 2.2. Saving a document

1. Use the **File/Open** command to open the *Design image.jpg* from the Lesson 1 folder (Fig. 1.1), the image bank is downloaded from the website of the book publisher: https://dmkpress.com/. https://dmkpress.com/catalog/computer/graphics/978-5-97060-940-8/
2. It should be noted that recently opened documents can be reopened with the command **File/Open Recent**.
3. Save this bitmap image in your folder in TIFF format without applying compression, the original image format is JPEG.
4. To do this, call the **File/Save As** command. In the dialog box, select your folder to store it. If necessary, you can specify a new file name.
5. In the same dialog box, in the **Format** rollout, select the TIFF graphic format. In the format options, alternately select the options without compression and data compression.
6. Compare the file sizes of the same image in the original JPEG format and in the new TIFF format (the difference between them will be an order of magnitude).

Self-study

Open any photo from the folder with lessons, in a separate folder, save it one by one in different formats. After saving, compare file sizes and image quality.

An unnecessary document can be closed by clicking on the "cross" button at the end of the title line of the document window or by executing the **File/Close** command. If you forgot to save the document, Photoshop will ask if you should save it. Click the **Yes** button to save it and close it, **No** to close it without saving, and **Cancel** to keep the document open.

2.4. Viewing a document

If the image is larger than the window when viewing, then it can be moved either using the scroll bars or using the **Hand** tool. To move the image in the desired direction, it is more convenient to use the **Hand** button. Select this tool and the mouse pointer will change to a hand. **Zoom** in on the image using the **Navigator** palette, click anywhere on the image, and drag it as you move a sheet of paper on a table. Until you release the mouse button, the sheet will follow the pointer.

A variation of this **Rotate View** tool is designed to work with 3D scenes. The tool allows you to rotate the image and view it from some angle.

You can use the **Zoom** tool to zoom in on an image. After you select this tool from the panel, the mouse pointer will take the form of a magnifying glass with a plus sign inside (by default). On the control panel of this tool below the menu bar, you can select the minus sign mode to zoom out. If you want to take a closer look at a section of the drawing, you must deselect the **Scrubby Zoom** check box in the control panel, click in one of the corners of this area and drag the pointer to the diagonally opposite corner so that a rectangle appears around the desired area. Then release the mouse button. The selected area will expand to fill the entire window.

To enlarge the entire drawing, place the mouse pointer in the center of the area of interest and click the mouse button. Each mouse click enlarges the drawing to the next scale from the standard set. The maximum magnification that can be obtained with this operation is 3200 %.

If you press the **Alt** key, the pointer will change to a magnifying glass with a minus sign inside. Now the same tool will shrink the drawing with each click. Thus, by pressing or releasing the **Alt** key, you can either increase or decrease the picture using the same tool.

To quickly switch to 100% zoom mode, double-click the **Zoom** button. By *double-clicking* on the **Hand** button, you will place the entire drawing in the window.

You can also use the following menu commands to scale the view **View**:

- **Zoom In** increases the drawing;
- **Zoom Out** reduces the picture to the next value from the standard set;
- **Actual Pixels** shows the image at 100% scale, one image pixel in this mode corresponds to one screen pixel;
- **Fit on Screen** scales the image so that it all fits on the screen;

- **Print Size** shows the image as it will be when printed.

The last three commands can be quickly executed using the buttons of the same name, which are located on the control panel from the **Hand** and **Zoom.**

If you need to remove the functional parts of the editor window when viewing, you can use the buttons on the toolbar:

- **Standard Screen Mode**;
- **Full Screen Mode With Menu Bar**;
- **Full Screen Mode**.

2.5. Palette Navigator

The Navigator palette is a fairly handy tool for changing the image viewing scale in the document window. At the bottom of the palette there is a slider that allows you to smoothly change the viewing scale (Fig. 2.2) and two buttons for stepwise zooming.

To demonstrate, open the *Kitten.jpg* image in the *Lesson 2* folder. The button on the right zooms in, the button on the left zooms out. To the left of them is the same scale field as in the status bar. You can immediately set the desired scale by entering it in this field. Most of the palette is occupied by the image thumbnail. When the image becomes larger than the document window, a red frame appears in the thumbnail to represent the document window. To scroll the image, you need to move the frame to the desired location.

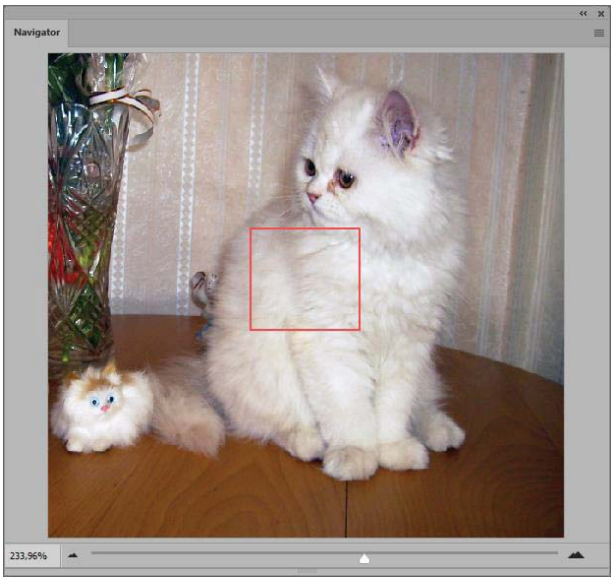


Fig.2.2. Palette **Navigator**

If your image is dominated by red tones, you can change the color of the frame using the palette menu by clicking the rows icon in the upper right corner of the palette. Select the **Palette Option** item in this menu and open the V**iew Box** rollout in the dialog box and select the desired one from the list of colors by clicking on it.

2.6. Working in different dialog boxes

The Adobe Photoshop editor allows you to work on multiple documents at the same time. Each document is located in its own window. Working with the image is done in the active window. To make a window active, click inside it or on its title bar, the title of the active window changes its color.

For convenience, you can arrange the windows so that you can see them all at the same time. This is what the menu commands are for **Window/Arrange**:

- **Tile All Vertically, Tile All Horizontally** - windows are placed next to each other vertically or horizontally;
- **2-up Horizontal, 2-up Vertically etc.** – windows are located depending on the selected layout and the number of open documents;
- **Cascade** - windows are arranged one below the other so that their titles are visible;
- **Tile** - windows are located next to each other;
- **Float in Window** - the document window is switched to free placement mode;
- **Float All in Windows** - windows of all open documents are transferred to the free placement mode;
- **Match Zoom** - aligns open documents according to the viewing scale;
- **Match Location** - aligns by location in the document window;
- **Match All** - aligns open documents by viewing scale and location;
- **New Window for ...** - creates a copy of the document dependent on the original (all changes and operations are displayed simultaneously on all windows).

At the bottom of the **Window** menu itself is a list of all open documents. Clicking on one of the names will take you to the corresponding window.

By default, all open documents are attached to a single workspace, title lines with names are located side by side. You can *detach any document* using the **Float in Window** command, or you can tear off the title line with the name from the workspace with the left mouse button pressed. You can reattach the document window by aligning the title bar with the bottom edge of the control panel when the document window becomes translucent.

Exercise 2.3. Viewing Documents

1. Open the image *Piotr.jpg* from the *Lesson 2* folder.

2. Use the command **Window/Arrange/New Window for Петр.jpg** to create three more dependent copies.
3. Use the command **Window/Arrange/Tile** to align open documents as in Figure 2.3.
4. By changing the viewing scale and the location of individual image fragments in the document window (with a scale of more than 100%), check the rest of the **Match** commands for ordering.

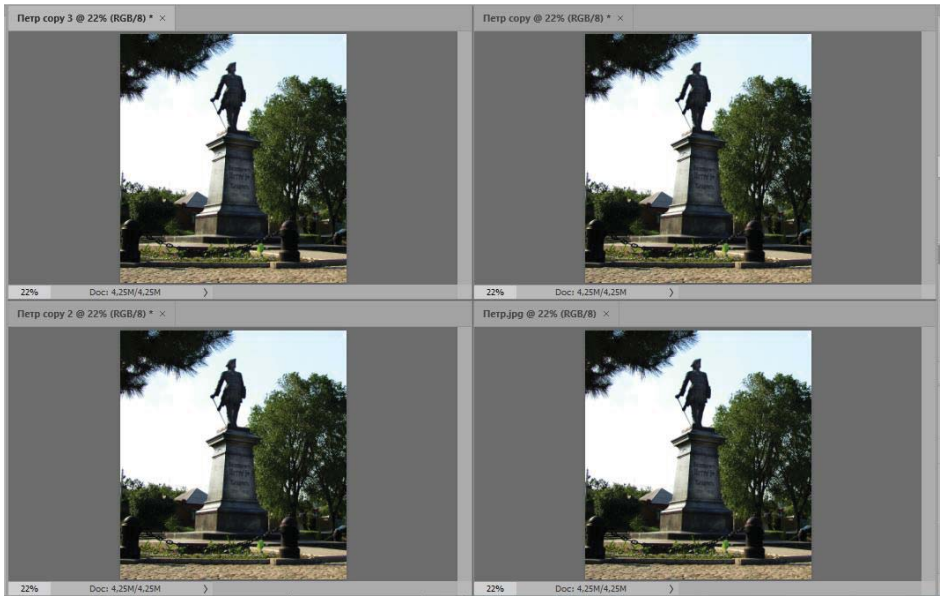


Fig.2.3. Window arrangement in modes **Tile**

2.7. Setting the units of measure. Rulers

When creating new images, you must also set the distance units. This data is used when creating a grid for printed products, where you need to mark up certain fields or take accurate measurements.

Distance units can be set using the command **Edit/Preferences/Units & Rulers**. In the **Rulers** rollout, select a new unit of measure: pixels, inches, centimeters, points, picas, or percent. Given our metric system, set the unit (or check the setting): cm (centimeters).

To carry out metric operations, coordinate rulers are often used, which appear above the document window and to the left of it (Fig. 2.4). They are not initially visible and can be displayed with the **View/Rulers** command. By default, the origin is in the upper left corner of the canvas. However, it can be dragged to any other place in the image.

Exercise 2.4. Measuring distances and angles

1. Open the image *Petals.jpg* from the folder *Lesson 2*. Select the **Ruler** tool (it is in the set with pipettes) and open the information palette with the command **Window/Info**.
2. In the upper left corner at the intersection of the rulers, you will see the origin icon (Fig. 2.4). Click on it and move the pointer to the center of the image. It will be followed by vertical and horizontal lines, denoting the coordinate axes.

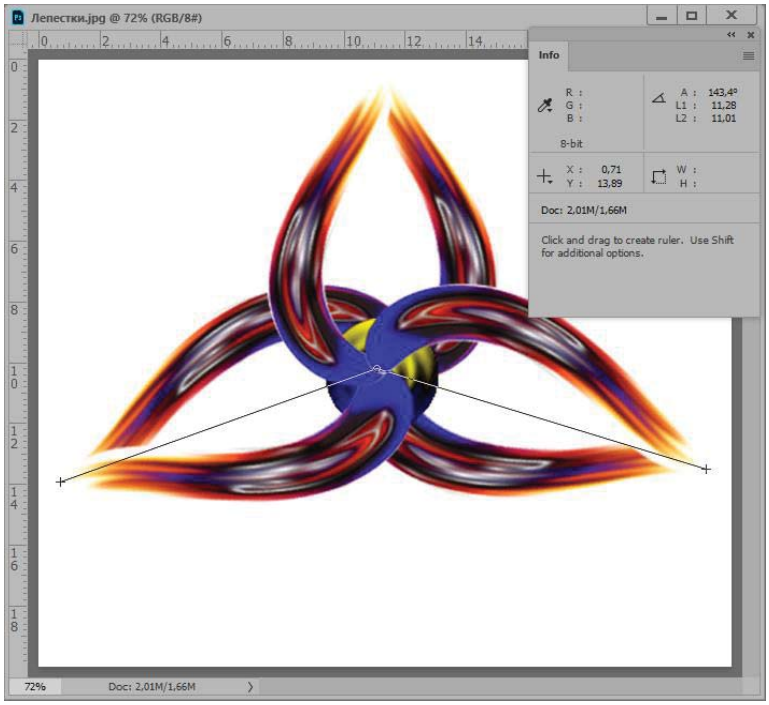


Fig.2.4. Measuring distances and angles

3. To return it to its original position (upper left corner of the canvas), double-click the origin icon.
4. Let's measure the angle between the petals of this figure. Click in the center of the image with the pointer, drag it to the right down (along the middle of the right petal) and release the mouse button. It will be followed by a straight line.
5. Look at the Info palette. The distance **L** between the points is equal to 11.39 centimeters, and the angle of inclination **A** of the segment to the horizontal axis is -17.2° (the values depend on the specific case and may differ from the values. In this case, the nodes of the constructed measuring segment can be moved independently of each other.

6. Now let's measure the angle between the two petals. We already have one side of the required angle, let's draw the second side. While holding down the **Alt** key, click at the start point of the first segment and extend the second ray to the left down the left petal, as in Fig. 2.4.
7. Now there are two distances **L1** and **L2** in the pointer palette. These are the lengths of the first and second segments. Number **A** - the angle between them.

The unit of measurement can be set (or checked) through the **Info** palette menu, or through the context menu of the coordinate crosshair sign, and you can also set the color model for measuring by color composition. At the bottom of the **Info** palette is information about file sizes and hints for using the advanced features of the current tool with the help of keys.

The measuring lines are only visible when the **Ruler** tool is selected. The information shown in the Info palette is also shown in the control panel of the **Ruler** tool. When constructing a new measuring line, the old lines disappear. To delete constructed segments, you can click on the **Clear** button on the control panel or move these segments outside the current document window.

2.8. Grid. Guides

To achieve the required accuracy of operations when editing fragments and drawing, a grid is usually used. To display it on the screen, execute the **View/Show/Grid** command (Fig.2.5).

By default, the grid lines go through every inch (72 points) and are divided into 4 divisions. You can change the grid spacing using the **Edit/Preference/Guides, Grid & Slices** command. Here you can set the grid sizes in the **Gridline every** field, the number of divisions is entered in the Subdivisions field. In the same place in the **Grid** section, you can set the color and style of the markup lines.

Guides are used to align objects along lines, to check horizontal and vertical lines. These are auxiliary lines that are not printed, like a grid. It is impossible to do without them when developing the original layout of any printed product. By default, guides are solid blue lines, they can be made dashed and changed in the same **Preferences** window, in the **Guides** section. To enable the mode of showing guides, you need to execute the command **View/Show/Guides**.

Smart Guides are designed for convenience when moving and transforming objects. They automatically appear on the screen in the form of temporary horizontal and vertical tracking lines (*it is recommended* to leave this mode permanently enabled for further work).

Manual guides can only be created when the coordinate rulers are visible. To create a horizontal or vertical guide, click on the corresponding ruler and drag

the pointer down. To move the guide, use the **Move** tool, click on it and drag it to another location. To remove a guide, drag it back onto the appropriate ruler.

The exact position of the guides can be set with the command **View/New Guide**. In the dialog box, the orientation of the guide is set: **Horizontal** or **Vertical**, in the **Position** field, the position of the guide is entered.

When selecting objects and in the process of drawing with various tools, you can turn on the snap to grid and guides mode, when the pointer or selection boundaries are attracted to the nearest grid node or to the guide. Snap mode allows you to align objects and text with absolute precision, or draw regular structures. Snap mode is enabled by the **View/Snap** command or **View/Snap to/Grid**.

Exercise 2.5. We draw ornaments

1. Open the image *Petals.jpg* from the *Lesson 2* folder.
2. Display the grid using the **View/Show/Grid** command.
3. To set grid options, call the **Edit/Preference/Guides, Grid & Slices** command. Set the **Gridline** every field to 1 cm, and the **Subdivisions** field to 1 for the number of divisions.
4. Set the snap to grid mode with the **View/Snap to/Grid** command.
5. For drawing, select the **Brush** tool with a standard diameter of 5 pix, the foreground color should be black, and the background color should be white (default).

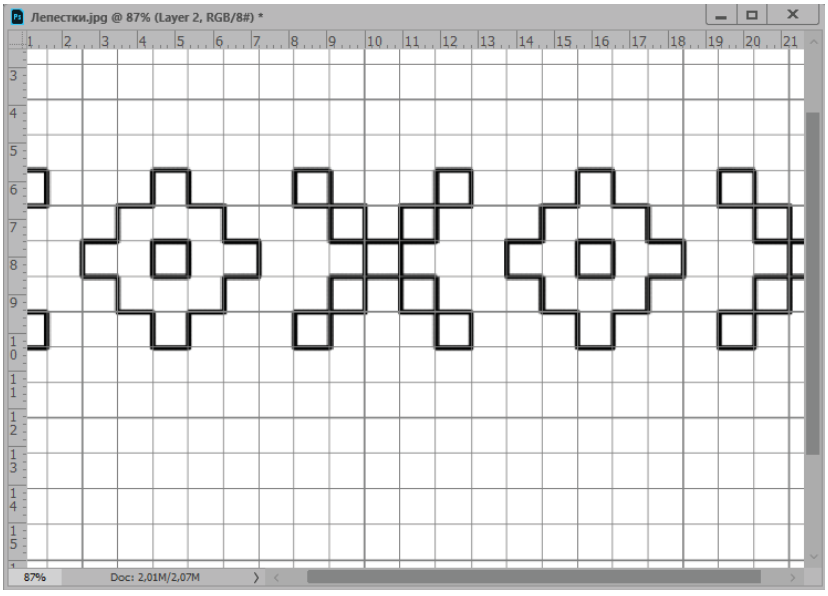


Fig.2.5. Drawing in snap-to-grid mode

6. To draw on a white sheet, fill this image with white, for speed, use the **Ctr + Backspace** key combination (the **Backspace** key is usually marked as a *left arrow*).
7. Next, using a brush, draw an ornament over the cells as in Fig. 2.5. To cancel an unsuccessful attempt, press the key combination **Ctrl + Z**.
8. Save your work.

Self-study

In snap to grid mode, draw the ornaments shown in Fig. 2.6, or others as you wish.

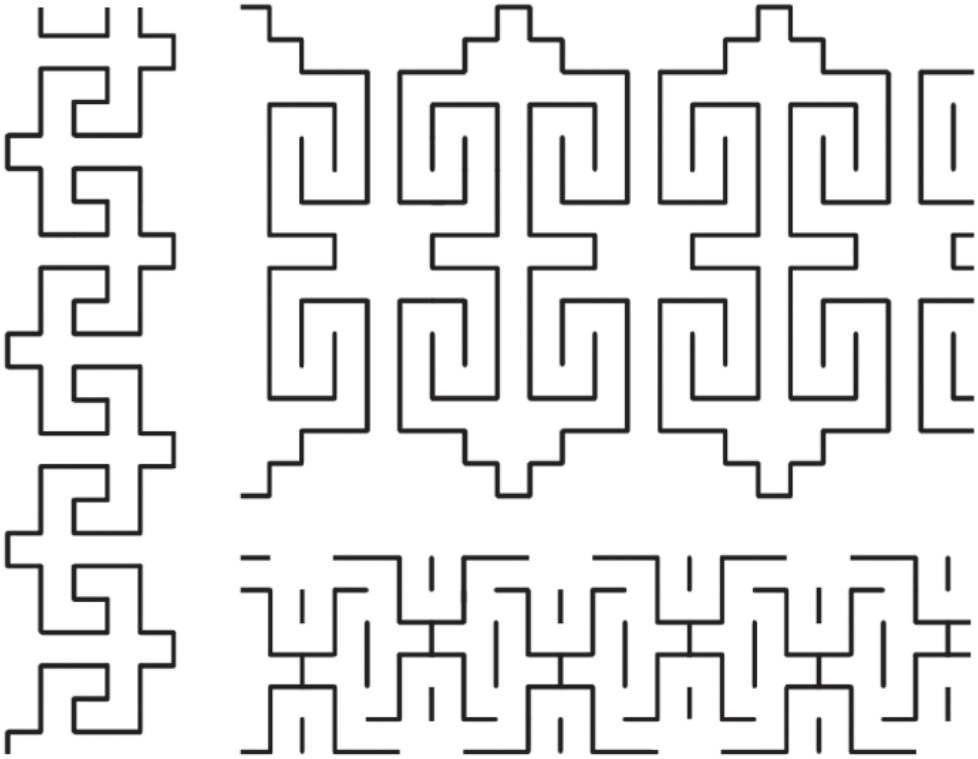


Fig.2.6. Ornaments

3. IMAGE PROCESSING

After the image is created, it is usually processed. Processing means: resizing and resizing, cropping, rotating, etc.

3.1. Resizing the canvas

When editing fragments of an image or to change a compositional solution, an additional field is often required. Adding additional areas occurs by increasing the size of the canvas on which the image is located. When opening or creating a document, the geometric dimensions of the canvas and the image are the same.

The **Image/Canvas Size** command is used to resize the canvas. The canvas is enlarged only by adding empty margins to it, and reduced by trimming the edges. Pixel sizes and their contents remain unchanged, so the structural image does not change in any way [1,6,7].

Exercise 3.1. Changing the canvas size

1. Before starting work, update the workspace using the command **Window/Workspace/Reset Basic-1**.
2. Next, open the *Moon.jpg* image from the *Lesson 3* folder.
3. To determine the size of the canvas, run the command **Image/Canvas Size**.

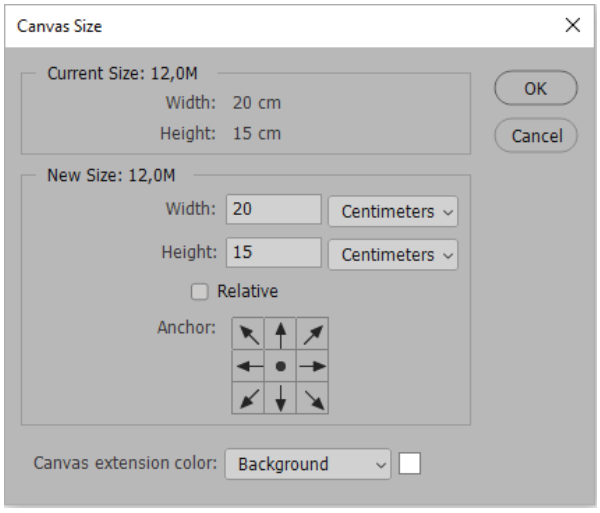


Fig.3.1. Dialog box **Canvas Size**

4. Increase the size of the canvas. To do this, in the dialog box (Fig. 3.1), set the new canvas sizes in the fields **Width** = 23 cm and **Height** = 18 cm.

5. When enlarging the canvas, you must specify the position of the old image on the new canvas. To do this, click in the desired square of the scheme. **Anchor.** If you click on the central square, then margins will be added on all sides of the image. And if you click on the upper left box, then the fields will be added only from the bottom and right.
6. The **Relative** checkbox allows you to set the added (rather than absolute) width and height values.
7. In the lower **Canvas extension color** field, the color of the new added part of the canvas is set, the background color is set by default. Similarly, the parameters are set when reducing the size of the canvas.

3.2. Resizing and resizing an image

When resizing the canvas, the image is only resized by cropping or adding margins. Image resizing occurs with a change in the image structure with the Image/Image Size command. The dialog box in Figure 3.2 is designed to change the resolution and size of the image.

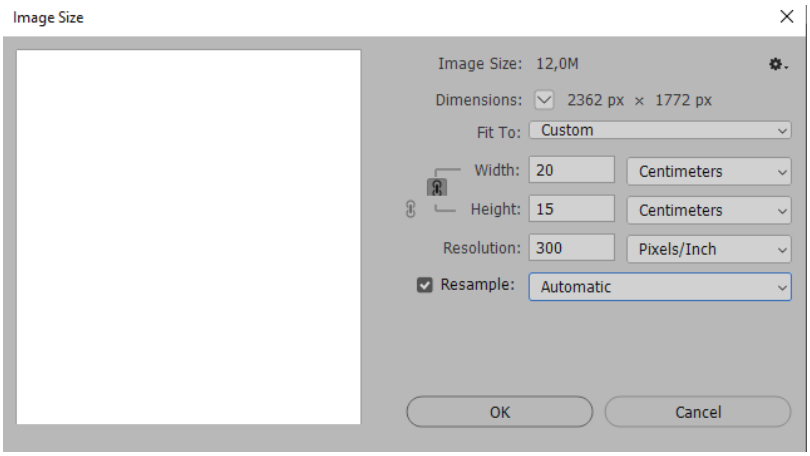


Fig.3.2. Dialog box **Image Size**

On the right side of the dialog box, in the **Dimensions** rollout, you see the current image dimensions in pixels, then in the **Fit to** rollout, you can select the size of a specific application template, then its geometric dimensions and resolution are presented. The unit of measurement can be selected in the adjacent scrolls on the right. The left part of the dialog box contains a window for viewing the current view of the image.

In the upper right corner under the menu icon, the **Scale Styles** checkbox is checked, which allows you to scale the styles applied in it when scaling the image. The chain icon provides proportional changes in width and height. When you change one size, all other sizes will be recalculated automatically.

The **Resample Image** checkbox is decisive when resizing or resizing an image. When the checkbox is unchecked, the number of pixels in the image does not change, and resizing occurs only due to the fact that the pixels themselves become larger or smaller, that is, only due to a change in resolution.

When the **Resample Image** checkbox is checked, pixels are recalculated (interpolation). The program removes extra pixels or adds new ones to fill in the empty gaps between new pixels.

To clarify the details of this procedure, let's do an exercise in which we proportionally reduce, and then again increase the size of the image.

Exercise 3.2. Image resizing

1. Continue processing the *Moon.jpg* image from the *Lesson 3* folder.
2. Execute the Image/Image Size command. A dialog box will appear on the screen, designed to change the resolution and size of the image (Fig. 3.2).
3. To compare the changes, duplicate the image twice with the **Image/Duplicate** command. Selecting the first duplicate.
4. In the dialog box, the image file size is 5.32 MB. Check that the option mode to keep proportion as a chain is set and the checkbox **Resample Image**.
5. Select the image size unit in pixels, enter 150 instead of 1575 in the **Width** field (for demonstration purposes). You will see that all dimensions have been recalculated, while the resolution value in the **Resolution** field has remained the same. The new file size is 49.2 KB. The size of the image file has been reduced due to the fact that some of the pixels have been removed. A tenfold reduction in linear size results in an almost hundredfold reduction in file size (from 5.32 MB to 0.0492 MB). Click the **OK** button.
6. Now we will increase the new image to the previous sizes. Let's do it in two different recovery modes.
7. Select the **Image/Image Size** command again. Set the **Width** field back to 1575. In the **Resample Image** rollout, select a method for interpolating when increasing the number of pixels in an image: the default **Bicubic** method. Click the **OK** button.
8. The image has been enlarged to its previous size, but its quality has noticeably decreased compared to the original image, it has become blurry, the file size has grown to the previous 5.3 MB.
9. For the second duplicate of the image, repeat the procedures for resizing, but at the same time select the **Nearest Neighbor** restoration method. Click the OK button.
10. Image enlargement was faster, but image quality deteriorated further. With a viewing scale of even 44%, you will see this difference between the processed duplicate and the original, as in Fig. 3.3.

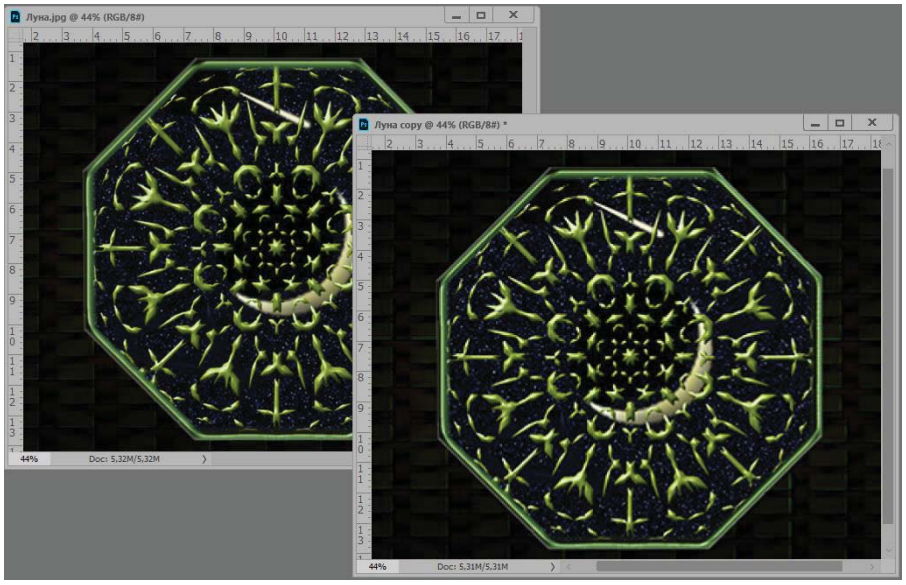


Fig.3.3. Result of image resizing

Let's consider why such changes occurred during processing. When the number of pixels is reduced, scaling occurs without much deterioration in quality, since only pixels are thrown out of the image according to a certain algorithm. The smallest changes in quality occur when proportionally reducing the number of pixels by 25%, 50% and 75%, when every fourth, every second pixel, or every three out of four pixels is discarded. At other coefficients, the colors of neighboring pixels are somewhat averaged, and the image is smoothed.

Increasing the number of pixels is a rather difficult (ambiguous) operation. The program must insert new pixels between the existing pixels, somehow calculating their colors. For this, the following interpolation methods are available:

- **Automatic** – the program selects the best method depending on the content of the image;
- **Preserve Details** - enhances the sharpness of the image in areas of small image details;
- **Preserve Details 2.0** - with this algorithm, detail is not enhanced, but sharpness is not lost when increasing;
- **Bicubic Smoother** - provides better color smoothing during interpolation;
- **Bicubic Sharper** - in this mode, the program averages the colors of eight neighboring pixels.
- **Bicubic** - in this mode, the program averages the colors of eight adjacent pixels, the method is the slowest, but the most reliable, although even it will not give good results with a large increase in the number of pixels;

- **Nearest Neighbor** - the color of one neighboring pixel is assigned to a new pixel, the method is the fastest, but less accurate;
- **Bilinear** - colors of four neighboring pixels are averaged, it works faster, but the result is average.

Therefore, you should avoid increasing the number of pixels in the image, especially a significant one, *by several times*. Now let's move on to changing the resolution in the mode with interpolation enabled. The resolution of an image is directly related to the device on which it will be played. In this regard, the problem often arises: how to achieve the same dimensions on different devices (monitors with different resolutions).

Exercise 3.3. Change image resolution

1. Reopen the *Luna.jpg* image from the *Lesson 3* folder.
2. Execute the **Image/Image Size** command. Set the **Resample Image** rollout to the **Bicubic interpolation** method, in aspect ratio mode.
3. In the **Resolution** field, enter 400 pixels/inch instead of the original 200 pixels/inch. Please note that the number of pixels in the image has grown to 3150 in width (twice), and the file size has grown to 21.3 MB instead of 5.32 MB (almost four times).
4. Click the **OK** button. The image has been enlarged, at the same viewing scales the image has become smoother compared to the original.

Self-study

For the opened *Moon.jpg* image, create three more duplicates. Alternately reducing the linear size in width by a factor of four for three duplicates, restore them to their original size using three different methods. Arrange all four windows using view commands and compare the quality of recovery methods.

3.3. Image cropping

To crop unnecessary parts of the image, change the composition of the frame and emphasize significant fragments, the cropping operation is used. Image cropping is carried out by the **Crop**, **Perspective Crop** tool. A similar operation is also performed by the **Image/Crop** command after selecting a rectangular area of the image.

For the **Crop** tool, the aspect ratio of the area to be cropped can be set at the start of cropping on the tool's control bar. To do this, you can set the modes in the **Ratio** window, or select the available ready-made proportions. **Straighten** mode allows you to select the angle of rotation of the frame in accordance with the direction of the specified vector.

Fig.3.4. Tool control panel **Crop**.

In the **Set the overlay** option window, you can select the types of the grid superimposed on the frame from the list. The **Golden Ratio** uses the **Golden Ratio** and **Golden Spiral grid** types.

The **Set additional Crop** option menu sets additional modes for this tool. By default, in cropping mode, the canvas moves relative to the frame, if you select **Use Classic Mode**, the frame will move along the canvas.

The **Enable Crop Shield** checkbox allows you to color the cropped part with a translucent color. To change the color of the coloring in the **Custom** mode of the **Color** window, click on the right square and select the desired color in the **Color Picker** dialog box. You can change the opacity of the fill by moving the slider in the **Opacity** field.

To set arbitrary sizes, place the pointer in the corner of the area of the image you need, click and drag it to the opposite corner. A dotted box will stretch behind it, showing the clipping path. By default, the part of the image that will be cropped is grayed out with an opacity of 55%.

After the frame appears, you can resize it and rotate it. You will see handles at the corners of the crop frame and at the midpoints of its sides. Place the pointer on the corner handle and it will turn into a double-sided diagonal arrow. Click and drag a corner of the frame to a different location.

When you place the pointer on a side handle, or just the side of the frame, it turns into a vertical or horizontal double-sided arrow. This means that you can drag the side of the frame up-down or right-left respectively.

Move the pointer inside the crop frame. It will turn into a big arrow. By clicking here, you can move the frame around the image without changing its size. In this way, you can more precisely choose which part of the image to leave.

If you move the pointer outside the crop box, it will change into a rounded double-headed arrow. Click and drag the pointer around the circle. The crop frame will rotate in the same direction. The center of rotation is a target point that is initially at the center of the crop box. You can move a point by clicking on it and dragging it to another location.

By default, the cropped parts of the image are deleted and are not saved in the file later, this mode corresponds to the **Delete Cropped Pixels** control panel checkbox. When creating an animation, sometimes you only need to hide the edges of an image, rather than removing them. To do this, you can uncheck the control panel box. In this cropping mode, you will see on the canvas only what is inside the cropping path, but the entire image will be saved in the file. This

mode is effective if the image consists of at least two layers or the background layer is missing.

If you move the image on the canvas with the **Move** tool, other parts of the image will be visible. To revert back to the original setting, select the **Delete Cropped Pixels** control panel checkbox.

The **Crop** tool not only lets you crop the canvas, but it can also expand the dimensions of the canvas. To do this, you need to drag the sides of the frame outside the canvas, the added canvas area will take on the background color.

The **Content-Aware Crop** checkbox turns on the mode of adding new sections of the image after the appearance of transparent corners during rotation, filling the empty space with the corresponding content.

Once the clipping path is finally selected, press the **Enter** key or click the checkmark at the end of the control bar. When you press the **Esc** key or select the button in front of the check mark (crossed out circle), the cropping outline disappears and no cropping operation is performed. The **Reset** button resets the specified settings for the crop frame.

And now let's move on to mastering the **Crop** tool by doing the following exercises.

Exercise 3.4. Leveling the Leaning Tower of Pisa

1. Open the *Tower.jpg* image from the *Lesson 3* folder.
2. Select the **Crop** tool. Set on the control panel in **Ratio** mode, in the **Set the overlay** option window select the **Rule of Thirds grid** type, in the **Set additional Crop** option menu leave the default modes.
3. In this exercise, we need to level the leaning Leaning Tower of Pisa. To do this, draw a rectangular clipping path around the tower.
4. Move the pointer outside of it and when it turns into a rounded double-sided arrow, rotate the contour according to Fig.3.5, on the left. In this default mode, the frame stays upright and the canvas rotates.
5. To switch to classic cropping mode, in the Set additional **Crop** option menu, set the **Use Classic Mode mode**. Try also changing the color and transparency of the crop area.
6. After checking the main modes of operation of the **Crop** tool, use the side and corner manipulators to adjust the frame size, as in Fig. 3.5, on the left.
7. To complete the operation, double-click inside the cropping path or click the button (tick) on the control panel. The image after cropping is shown in Figure 3.5, on the right. As you can see, the tower no longer falls, but is already on a slope.
8. Next, let's try the same operations with the **Content-Aware Crop** checkbox enabled, while we need to disable the **Delete Cropped Pixels** checkbox, as we will be adding new fields around the tower in the form of a patch of sky and grassy lawn.

9. Select the tower with a frame, rotate the tower to the left parallel to the vertical grid lines, and stretch the frame beyond the empty canvas field up, left and down. After completion, the program will calculate, and you will get a rather interesting result, the space around the tower will expand.

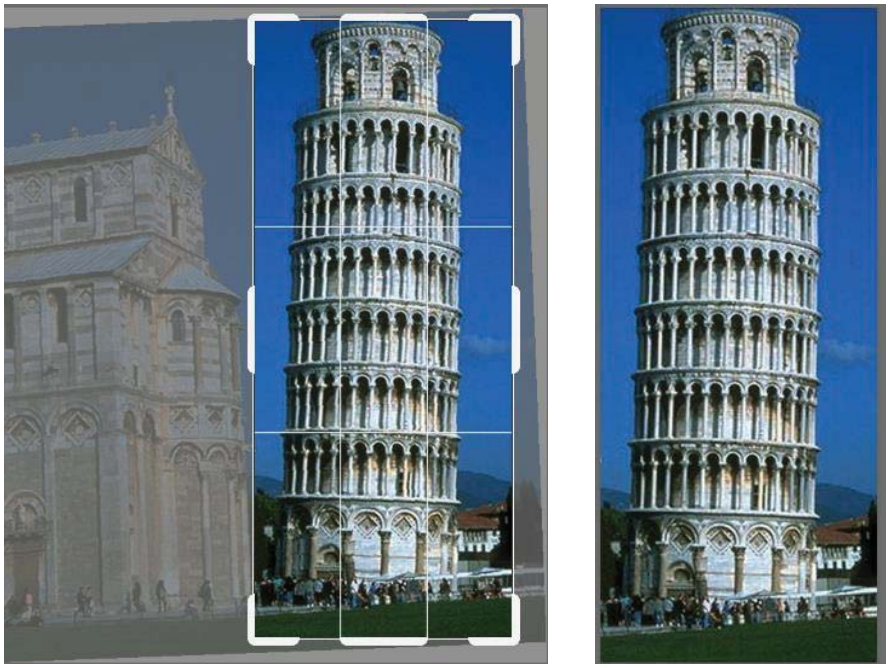


Fig.3.5. Cropping an Image with Rotation

The cropping tool has another feature that is usually used in images related to architecture. This is a perspective distortion of the frame, for this purpose a variation of this **Perspective Crop** tool is used. With this tool, you will be able to move the corners of the frame individually, independent of the other corners. This will set a non-rectangular area, which will be converted to a rectangular area after cropping. This will distort the perspective of the image.

The size of the area to be cropped can be set (fixed) either at the beginning of cropping on the tool's control panel or along a rectangular frame. For a fixed frame on the control panel, you need to set the width and height of the cropping outline in the **Width** and **Height** fields, as well as the resolution before selecting the cropping area. The **Show Grid** flag allows the cropping field to be covered with a grid. The geometry of the cropping area can be set both on the basis of the original rectangle, and by point-by-point construction of a quadrangular figure. Let's explore the capabilities of the **Perspective Crop** tool in the next exercise.

Exercise 3.5. Perspective Correction

1. Open the *Theatre.jpg* image from the *Lesson 3* folder.
2. Select the **Perspective Crop** tool. In this exercise, we will eliminate unwanted perspective distortion in the photograph of the building of the Taganrog Drama Theater. A.P. Chekhov, which is usually characteristic of wide-angle cameras.
3. Trace a rectangular clipping path around the theater building.
4. Next, drag the corners of the frame to get a trapezoid as in Figure 3.6 (left), with the sides of the frame almost parallel to the vertical lines of the façade.
5. Double-click inside the clipping path or press the **Enter** key. The result of this operation is shown in the same Fig. 3.6, on the right, where the perspective distortion is not so noticeable.

Fig.3.6. Cropping with perspective distortion

3.4. Trim command

When processing an image to remove solid or transparent areas around the edges, it is more convenient to use the **Image/Trim** command. In the dialog box

(Fig. 3.7, foreground), in the **Based On** section, you can select the color of the edges to be removed:

- **Transparent Pixels** - transparent areas will be removed along the edges of the image on all layers;
- **Top Left Pixel Color** – edge areas of the same color as the top left pixel of the image will be removed;
- **Bottom Right Pixel Color** - edge areas of the same color as the bottom right pixel of the image will be removed.

In the **Trim Away** section, the edges to be trimmed are set: **Top, Bottom, Left, Right**.

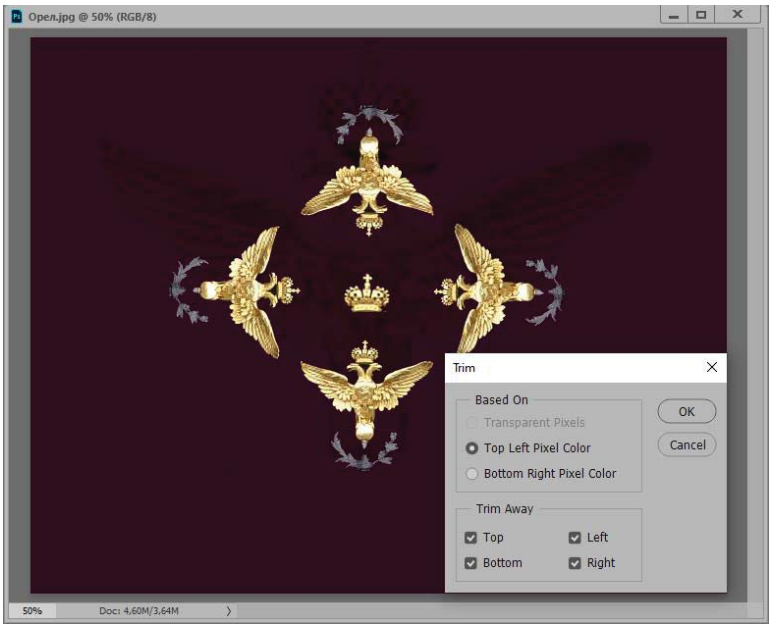


Fig.3.7. Image for cropping and command settings window **Trim**

Exercise 3.6. Image cropping

1. Open the *Eagle.jpg* image from the *Lesson 3* folder.
2. Execute the **Image/Trim** command.
3. Set clipping to **Top Left Pixel Color**.
4. Choose the trimming edges as you wish: on all sides, sides, bottom and top. The original image is shown in Figure 3.7, background.
5. Transparent pixels mode is not available in this image.
6. Try also cropping by **Bottom Right Pixel Color**.

3.5. Rotating and mirroring an image

When processing a scanned image or a digital photograph, it is often necessary to rotate them by a small angle or flip them by 900. The commands are used to rotate and mirror the entire image as a whole **Image/Image Rotation**:

- **180°** rotation;
- **90° Clock Wise** rotate 90° clockwise;
- **90° Counter Clock Wise** – turn 90° counterclockwise;
- **Arbitrary** - rotation by an arbitrary angle;
- **Flip Horizontal** - flip horizontally;
- **Flip Vertical** - flip vertically.

And now let's do an exercise in which we will correct the horizon line in the scanned photo.

Exercise 3.7. Horizon Line correction

1. Open the image *River.jpg* from the *Lesson 3* folder.
2. After scanning, the horizon line is tilted here. For comparison, create a horizontal guide line with the **View/New Guide** command and move it to the mirror of the river surface (perhaps it has already been created in the file).
3. Next, execute the **Image/Image Rotation/Arbitrary** command.
4. In the dialog box, enter in the **Angle** field the value of the angle by which the image should be rotated. Select the button next to it to indicate the direction of rotation: **°CW** - clockwise or **°CCW** - counterclockwise. Click the **OK** button.
5. The image is rotated and the canvas is enlarged accordingly (Figure 3.8). The edges of the image are now beveled relative to the canvas. To make sure the horizon line is positioned correctly, select the Move tool and drag the horizontal guide line to a new position.
6. To get rid of the white edges, crop by placing the cropping path inside the photo. Part of the image in the corners will disappear, and they will have to be sacrificed.
7. To study the next topic, leave the image open.

Rice. 3.8. Horizon line correction

Self-study

Apply the rest of the canvas rotation and flip commands: 900 rotations, 180° rotations, mirror reflections.

3.6. History Palette

If you accidentally make a mistake while working, do not be upset, everything is fixable in Adobe Photoshop. The program allows you to return to the past (to past image states). The last action can be undone by executing the **Edit/Undo** command or by pressing **Ctrl + Z** (we already used this combination in Exercise 2.5). After executing the **Undo** command, the corresponding **Redo** command appears, which will return the last undone operation back.

These two commands do not differ from the standard commands available in almost all graphic and text editors. However, they only cancel one action and no more. To undo more actions in Photoshop, there is a more flexible and convenient tool - the **History** palette (Fig. 3.9).

During processing, each action with the image is recorded in this palette. Each entry looks like the name of the operation or the applied tool, to the left of the name - a schematic image of the tool or the icon of the operation, as for cropping the previous image.

To return to the state obtained after performing an operation or using a tool, click on the line with this name in the palette. At the same time, saving the document between these lines does not matter.

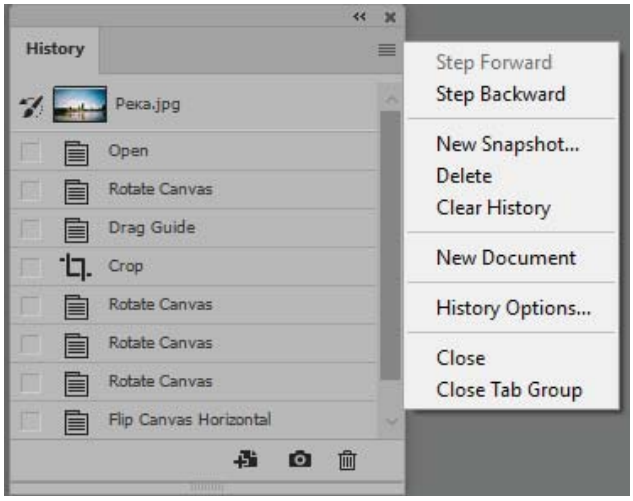


Fig.3.9. **History** palette with open menu

Menu commands are also used to call neighboring states **Edit**:

- **Step forward** – next state;
- **Step Backward** - the previous state.

The same commands can be found in the palette menu (fig.3.9). Here are commands that help clear the palette of unnecessary states:

- **New Snapshot** – creates a snapshot of a line;
- **Delete** - deletes the current line of the palette and all subsequent ones;
- **Clear History** - deletes all lines of the palette, except for the current one;
- **New Document** - saves the current state to a separate document.

By default, Adobe Photoshop remembers the last 20 states, but you can change this number in the **Preferences/Performance** window. To do this, enter a new number in the **History States** field. In principle, you can increase it to 1000 steps, but you need to keep in mind that extra steps take up RAM.

The best way to get around this limitation is to create a snapshot of the row. After completing any stage of work, apply the **New Snapshot** command in the palette menu. In the **New Snapshot** dialog box, in the **Name** field, enter the name of the snapshot; in the **From** rollout, you can select the method for recording information about document layers.

To quickly take a picture without prompting, click on the middle button (camera icon) at the bottom of the palette. This will create a snapshot with the current settings specified in the **New Snapshot** window with the snapshot number.

In both cases, a line with the name of the snapshot will appear at the top of the palette. To return the image to its "photographed" state, click on this line in the palette.

You can customize how you work with the palette by choosing different states recording modes. To call the settings window, execute the palette menu command **History Options**. In this window, you can set:

- **Automatically Create First Snapshot** - the first snapshot is created automatically when you open a document;
- **Automatically Create New Snapshot When Saving** - a snapshot is created when the document is saved;
- **Allow Non-Linear History** – when the checkbox is checked, the current states are deleted, when the checkbox is unchecked, all lower states at the end of the palette are deleted;
- **Show New Snapshot Dialog by Default** - when creating a new snapshot using the button at the bottom of the palette, a dialog box is called;
- **Make Layer Visibility Changes Undoable** - removes operations with invisible layers.

Exercise 3.8. Return by time

1. Using the example of an open document River.jpg, try operations for undoing and redoing actions, as well as creating snapshots and new documents of intermediate states using the **History** palette.

Self-study

The **View** menu contains a command to change the pixel aspect ratio for various video applications. Similar options are set when creating a new image using the **File/New** dialog box. Using the **View/Pixel Aspect Ratio** command, convert the *River.jpg* image into a panorama with different pixel size ratios (you can choose both standard video systems and set custom ratios). Visually check the non-square shape of image pixels using the **Navigator** palette.

4. LAYERS OF THE IMAGE

The advantages of computer graphics include the ability to place image fragments separately from each other. That's what image layers are for. To understand the purpose of the layers, it is necessary to imagine that the image fragments are located on separate transparent sheets. When laying sheets on top of each other, you can see a complete image. Sheets can be shifted, rotated, swapped - and each time the image will look different [1, 6].

All operations with layers (creation, deletion, reordering, merging, etc.) are controlled using the **Layers** palette, **Layer Comps** and the **Layer** menu bar command. Also, when you paste an object from the clipboard or drag a selection from another document, Adobe Photoshop automatically creates a new layer for that object.

Look at Figure 4.1, each object is on its own layer. In this chapter, we will cover the basic operations with layers, but in the future we will use them often, since layers are one of the main tools of Adobe Photoshop.

Fig.4.1. An image made up of layers

4.1. Palette Layers

Find the **Layers** palette, it is located in the lower right corner of the screen (Fig. 4.2). Each line of this palette is the content of one layer. It consists of a layer name that you can change, a thumbnail image of the layer that changes during editing, and a visibility indicator in the form of an eye.

Chain and padlock symbols may appear to the right of the name, indicating that the layer is linked or locked for any changes. Locking is done in the lock line at the top of the palette. Layers are linked using the chain icon in the bottom

control line of the palette. The size of the thumbnails is adjusted through the palette menu with the **Palette Options** line.

When creating a new document, it has only one layer - the background. This layer is called **Background** and has special properties. It is always at the very bottom of the layer stack and cannot be moved higher. Unlike other layers, it cannot have transparent pixels. The transparent areas of the layer are marked with a checkered background.

On the **Background** layer, a padlock is drawn on the right, indicating that the layer is locked. Unlike other layers, this layer cannot be moved entirely in the document window. All locks can be removed if you simply rename the layer, giving it any other name. To do this, double-click on its name while holding down the **Alt** key and enter a new name in the Name field.

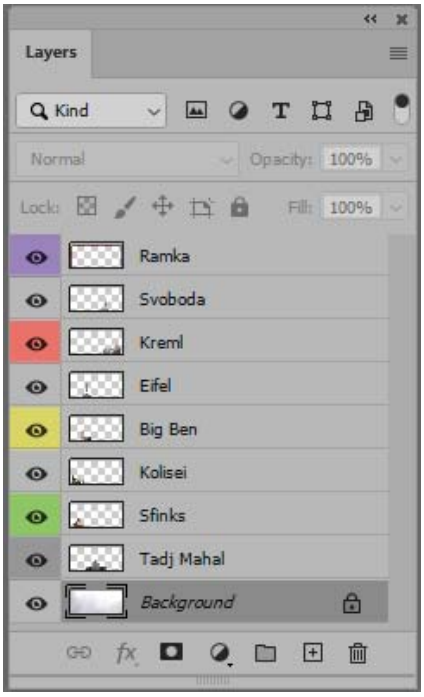


Fig.4.2. Palette **Layers**

The first column contains the layer visibility indicator. If it has an eye icon, the layer is visible; if it has a square, the layer is invisible. To make a layer invisible, click on the eye icon. To simultaneously turn off the visibility of neighboring layers, you can click on the top layer and drag the pointer down over all indicators. All of them will turn off at the same time, in the same way you can turn on all layers.

Any layer except the background layer can be made partially transparent. To do this, use the Opacity slider at the top of the palette. At values less than 100%,

objects lying on the lower layers will show through the object. The **Fill** slider adjusts the transparency of filled layers.

The **Mode** rollout sets the color mixing mode when applying one color to another. All changes can only be made in the active layer. The name of the layer will then appear in the title of the document window.

There is a more convenient way to select a layer using the **Move** tool. To do this, right-click on the object. A context menu will appear nearby with a list of all layers that have opaque pixels in that location. Click on the name of the desired layer and you can immediately work with it. Let's do some exercises in order to get a feel for what a layer is.

Exercise 4.1. Selecting the active layer

1. Update the workspace with the command **Window/Workspace/Reset Basic-1**, since we need a certain set of palettes.
2. Open the *Layers.psd* document from the *Lesson 4* folder.
3. Open the layers palette and drag it to the empty space of the working window. The content of the **Layers** palette is shown in Figure 4.2. The image contains famous architectural monuments of the world. Despite the fact that they are located in a certain way, overlapping each other, each of them is on a separate layer.
4. Select the **Move** tool and left-click on the name of the **Sfinks** layer, and then move the mouse pointer in different directions on the image. You will see the Sfinks move while **Kolisei** and **Big Ben** remain in place.
5. Now repeat the same, only for the next layer - **Big Ben**. This time only **Big Ben** moves while the **Sphinks** stay put.
6. To quickly select the contents of the layer, you can use the **Auto Select** mode on the control panel of the **Move** tool.
7. Next, click on the eye icon of the **Svoboda** layer. The image of the eye disappeared, and with it the Statue of **Liberty** itself in the document. To restore, turn on the layer eye.
8. To make the Statue of **Svoboda** partially transparent, set the **Opacity** slider (top right) to less than 100%. Then the part of the **Kremlin**, which is below this layer, will be visible through the statue.
9. Repeat the same operations with other objects.

Exercise 4.2. Layer blocking

1. In the same *Layers.psd* document, select the **Tadj Mahal** layer with the **Move** tool and move it in different directions. The **Taj Mahal** will move according to your command to wherever you wish (which the **Raja** himself could not dream of).

2. Turn on the move lock by clicking on the crossed arrows icon (the move sign) in the palette bar of locks. Now try moving the layer. Unfortunately, you will not be able to do this and a message will appear on the screen warning that the layer is locked. The padlock sign (rightmost) in the lock line enables all locks at once.
3. Select the **Brush** tool and draw something in front of the **Taj Mahal** fountain without releasing the mouse button.
4. Enable color pixel blocking by clicking on the brush icon in the block bar. Now try drawing again. You are unlikely to succeed. Therefore, we remove all blockages for further work.

4.2. Changing the order of objects

Objects on layers overlap each other in the order in which they appear in the layers palette: the top layer in the palette is on top of others and in the document. To change the stacking order of objects on top of each other, just swap the layers in the palette. To change the position of a layer in the palette, click on its name, drag up or down and drop on the name of the layer under which you want to paste it.

Exercise 4.3. Changing the order of objects

1. In the *Layers.psd* document, move the **Eiffel Tower** behind **Big Ben**.
2. In the layers palette, click on the name of the **Eifel** layer and drag it one line down, dropping it below the **Big Ben** line. Now you, like a patriotic Englishman, are admiring your clock, obscuring the French tower.
3. The same permutations can be performed using menu commands **Layer/Arrange**:

- **Bring to Front** moves the layer to the very top of the stack;
- **Bring Forward** changes the layer with the neighbor on top;
- **Send Backward** changes the layer with the bottom neighbor;
- **Send to Back** moves the layer to the bottom of the stack.

4. Repeat these operations with other objects.

4.3. Creating and deleting layers

In many cases, Adobe Photoshop automatically creates layers when you:

- transfer selected areas from another image into one document;
- paste objects from the clipboard;
- enter text with the **Type** tool;
- draw vector objects with the **Pen** tool or special tools for drawing vector shapes.

In addition, you can create a layer yourself with the **New Layer** palette menu command or the **Layer/New/Layer** menu command.

In the dialog box (Fig.4.3) enter the name of the layer, using the slider Opacity sets the degree of transparency of the layer. In the **Mode** rollout, the color blending mode is set (leave the Normal mode for now). In the **Color** rollout, you can select the color that will mark this layer in the palette. In the *Layers.psd* document, some layers are marked with colored lines. Layers are not labeled by default.

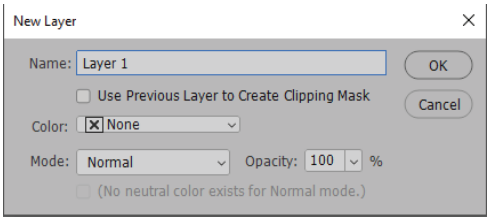


Fig.4.3. Dialog window **New Layer**

To create a new layer with the default settings (normal blending mode, absolutely opaque layer, name **Layer N**, where **N** is the layer number), just click on the **Create a new layer** control button at the bottom of the layers palette (Fig. 4.2). The new layer will appear above the active layer.

To transfer any object of a single-layer image to a new layer, first of all, you need to select it, and then you can do it in different ways. If you need to cut an object, you need to execute the command **Layer/New/Layer Via Cut**. To copy an object to a new layer, use the **Layer Via Copy** command.

You can move the object to a new layer via the clipboard. To do this, select it and execute the **Edit/Cut** or **Edit/Copy** commands. In the first case, the object is cut, and in the second, it is only copied.

To paste an object on a new layer, the **Edit/Paste** command is executed. The object from the clipboard is pasted in the center of the document window with automatic creation of a new layer.

You can move objects between documents by placing their windows side by side and dragging the selected objects with the **Move** tool. Whenever Photoshop itself creates layers for objects, it gives them the standard names **Layer N**, where **N** is the layer number.

To rename a layer, double-click on its name while holding down the **Alt** key, or execute the menu bar command **Layer/Rename Layer**. In the line with the name of the layer of the Layers palette, a new name is entered in the **Name** field.

Exercise 4.4. Move object to new layer

1. In the *Layers.psd* document, turn off all layers except for the **Eiffel**, select the **Rectangular Marquee** tool and select the entire tower diagonally using the outline frame.
2. Next, execute the menu command **Layer/New/Layer Via Cut**. A layer named **Layer 1** appeared in the layers palette.
3. Turn on all other layers. Select the **Move** tool and drag the tower wherever you want.
4. Now let's multiply the Statue of **Svoboda** (in order to return a copy to the French). Select the **Svoboda** layer, and execute the menu command **Layer/New/Layer Via Copy**. A layer named **Layer 2** appeared in the layers palette.
5. Using the **Layer/Duplicate Layer** menu command, any object can be duplicated, even the **Taj Mahal**. Then another layer will appear in the layers palette.
6. Unnecessary **Taj Mahals** you can delete using the menu command **Layer/Delete Layer** or drag the layer to the trash can icon in the bottom line of the palette. Remove unnecessary constructions in the layers palette. In this case, in the request window, you must click on the **Yes** button to confirm your intention.
7. To unlock the background layer, you can duplicate it, and it will become a normal layer. You can also make a **Background** layer from any layer.
8. All these commands are in the command menu **Layer/New ...** Delete the **Background** layer and create a new **Background** from any layer and vice versa.
9. The performed operations can also be carried out using the Layers palette itself. All commands are duplicated in the palette menu and on the bottom line as buttons. For example, to reproduce any layer, drag it to the button for creating a new layer.

Self-study

Select the contents of the **Kremlin** layer with the rectangular selection tool and use the clipboard command to copy and paste it as a new layer. Colorize layer contents.

4.4. Linked layers and layer sets

To perform common actions on several layers, it is more convenient to link them together, for example, to move them or transform them as a whole, or to align them horizontally or vertically. To link multiple layers together, select them and then click the chain icon at the bottom of the palette. When selected, a chain image appears on the thumbnails of the linked layers. To unlink a layer, just click the link chain icon at the bottom of the palette again.

Exercise 4.5. Moving Layers Together

1. Click on the layers palette on the **Kolisei** layer, making it active. To link it, for example, with the **Sphinx**, select them one by one while holding down the **Ctrl** key, then click on the chain icon at the bottom of the palette. A chain icon will appear on the layer thumbnails.
2. Select the **Move** tool and move this pair across the canvas. You will see that they move together.
3. Next, let's combine these linked layers into a group (if you wish, attach some other object to them).
4. This method is especially effective if the document has a lot of layers. Groups are usually kept private in the palette, so you don't even see the names of their constituent layers, you only see the name of the group. By clicking on a group name, you select the entire group.
5. Then you can treat it like a layer. If you need to change something in one of its layers, you expand the group and deal with the individual layers.
6. To combine related layers into a group, select them and execute the command from the **New Group** from **Layers** palette menu.
7. In the dialog box, you will see in the **Name** field the name of the set - **Group 1**, leave the rest of the set parameters as default. Next click **OK**.
8. A line with the name of the group will appear in the layers palette, and the names of the three layers will disappear (see Fig.4.4). To expand a group, click on the triangle to the left of the set name. Clicking on it again will close the group again. You will find the disappeared layers inside the group.
9. 9. Within a group, layers can be swapped in the same way as usual. To pull a layer out of a group, simply drag it to the place where you want to insert it among the regular layers. To attach a new layer to a group, drag its name inside the open group and drop it on the name of the layer under which you want to paste it.

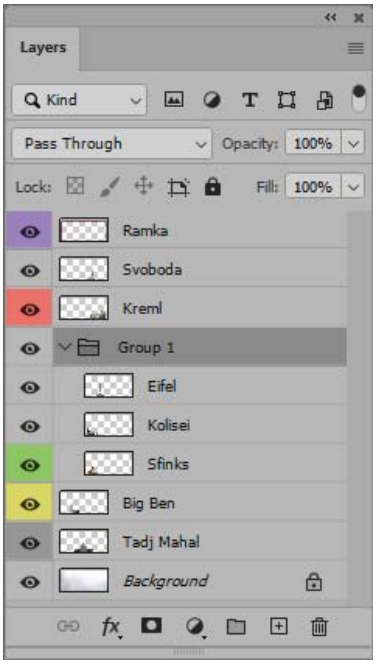


Fig.4.4. Open group in the palette **Layers**

4.5. Align and distribute linked layers

Objects on linked layers can be aligned to the active layer or to the selection. In addition, they can be evenly distributed vertically or horizontally. In order to align them relative to each other, select one of these layers in the layers palette and execute the menu command **Layer/Align**:

- **Top Edges**;
- **Vertical Centers**;
- **Bottom Edges**;
- **Left Edges**;
- **Horizontal Centers**;
- **Right Edges**.

Uniform distribution is done using the **Layer/Distribute** menu, which has exactly the same commands.

For the same purpose, you can use the buttons on the control panel by selecting the Move tool. The buttons have the same names, and their appearance is quite clear about how exactly they align and distribute.

Exercise 4.6. Aligning and distributing objects

1. In the open *Layers.psd* document, each object is on its own layer. Link all layers except background layer.

2. First, let's align the objects on the layers to the bottom edge of the canvas. Click the **Align Bottom Edges** button on the **Move** tool control bar.
3. Now distribute the objects so that their centers are at an equal distance from each other. Click the **Distribute Horizontal Centers** button.
4. Check other operations presented on the control panel of this instrument.

4.6. Layer Comps Palette

The **Layer Comps** palette is designed to work with multi-layered images, where you often have to work with the same groups of layers. This palette allows you to save the state of the image with enabled and disabled layers, with a change in the position of the layers, i.e. different compositions for a group of layers.

Exercise 4.6. Layer composition

1. Call the **Window/Layer Comps** palette for the open *Layers.psd* document.
2. Turn off the group of layers created in the previous exercise in the **Layers** palette.
3. Go to the **Layer Comps** palette, select the **New Layer Comps** command from the palette menu, in the dialog box you can set the name of the initial composition.
4. Go to the **Layers** palette, turn on the previous group, turn off a few arbitrary layers.
5. Return to the **Layer Comps** palette, select the **New Layer Comps** command from the palette menu again and set a new layer composition.
6. Alternately click on the rectangular visibility indicators of the two created variants of the layer composition of the **Layer Comps** palette. You will see that for each line the layer composition changes in the open document window (Fig. 4.5).

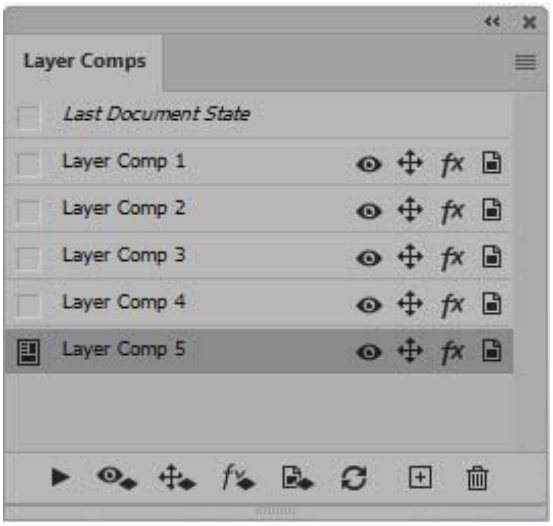


Fig.4.5. Palette **Layer Comps**

4.7. Filtering Layers

Adobe Photoshop now has the ability to filter layers by certain criteria. The need for this also arises when working with multilayer images. To work with filtering, turn on the **Turn layer filtering on\off** button in the upper right part of the **Layers** palette (Fig.4.2).

At the same time, in the **Kind** window, you can select the type of sorting from the drop-down list: **Name, Effect, Mode, Attribute, Color**. To the right of the **Kind** window are icons for filtering by the following properties:

- pixel transparency **Filter for Pixel Layers**;
- Adjustment layers **Filter for Adjustment Layers**;
- text layers **Filter for Type Layers**;
- vector shapes **Filter for Shape Layers**;
- types of smart objects **Filter for Smart Objects**.

Exercise 4.7. Filtering Layers

1. Open the *Layers.psd* document from the *Lesson 4* folder.
2. Turn on the **Turn layer filtering on\off** button.
3. In the **Kind** window, select the sort type from the drop-down list: **Name**. A window for entering the name of the layer will appear next to it, enter the first letter of the name you are looking for.
4. Given that the names of the layers in the palette are presented in the English layout, if you enter the letter **"k"**, then not only the **"Kreml"** layer will appear in the list, but also all layers containing this letter: **"Ramka"**, **"Kolisei", "Sfinks ", "Background"** (fig.4.6).

5. Select layers by other types of sorting, also use other search modes for layers using the filter icons.

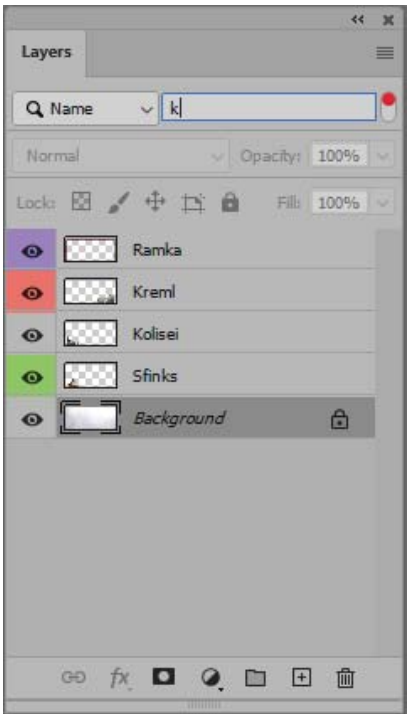


Fig.4.6. Filtering layers by name

4.8. Merging and deleting layers

Adding each layer increases the file size. Therefore, when some layers have become unnecessary, you need to merge them into one layer or delete them. To merge multiple layers into one, first select them. Then execute the **Merge Layers** command from the **Layers** palette menu.

It's even easier to merge the layers that are currently visible. To do this, simply execute the menu command of the **Merge Visible** palette. If you need to merge two adjacent layers, the **Merge Down** command is executed.

If you need to *merge together all the layers* of the image, including the background, that is, to make the image completely flat, the command from the menu of the **Flatten Image** palette is executed. *Usually this operation is performed when preparing an image for* ***printing*****,** because file volume after this operation is reduced in proportion to the number of layers

Exercise 4.8. Merging layers

1. Open the *Layers.psd* document from the *Lesson 4* folder.

2. There are nine layers in this document, including the background layer (Figure 4.2). The Adobe Photoshop editor spends 9.22 MB on it, we will assume that this image has already been finalized, it is necessary to print it.
3. Execute the **Merge Visible** or **Flatten Image** command from the **Layers** palette menu.
4. As a result, you will have one **Background** layer, where all the objects will be. The file size has decreased from 9.22 MB to 1.15 MB.
5. After merging, you will also need to convert the image to the appropriate color model and save it in a suitable format.

4.9. Setting a layer style

The layers palette also allows you to add styles to layers. This operation is performed by the Add a layer style control button at the bottom of the palette (Fig.4.2, ***fx*** sign) or by the **Blending Options** command in the palette menu.

At the top of this window there is a **Blending Options** section (Fig. 4.7). The layer style settings window will open immediately on the settings for the selected effect. You can turn off the display of any effect or all effects at once. To do this, click on the eye icon in the line of the corresponding effect of the layers palette. Effects created this way are hardcoded to the layer. All effects can be edited at any time after they have been applied. To do this, double-click on the Effects row of the selected layer.

The dialog box (Fig. 4.7) contains the following effects:

- **Bevel and Emboss**, is the most versatile effect that creates an imitation of a different relief;
- **Stroke**, creates a colored border of a given width around the object;
- **Inner Shadow**, creates a shadow inside the object, making it embossed;
- **Inner Glow**, creates a glow inside the object;
- **Satin**, creates an imitation of a shiny silk surface with complex shadows;
- **Color Overlay**, paints the entire object with a solid fill of the specified color;
- **Gradient Overlay**, fills the layer with a gradient;
- **Pattern Overlay**, fills with a pattern;
- **Outer Glow**, creates a glow around objects;
- **Drop Shadow**, sets the location of the shadow, its color, size, blur, etc.

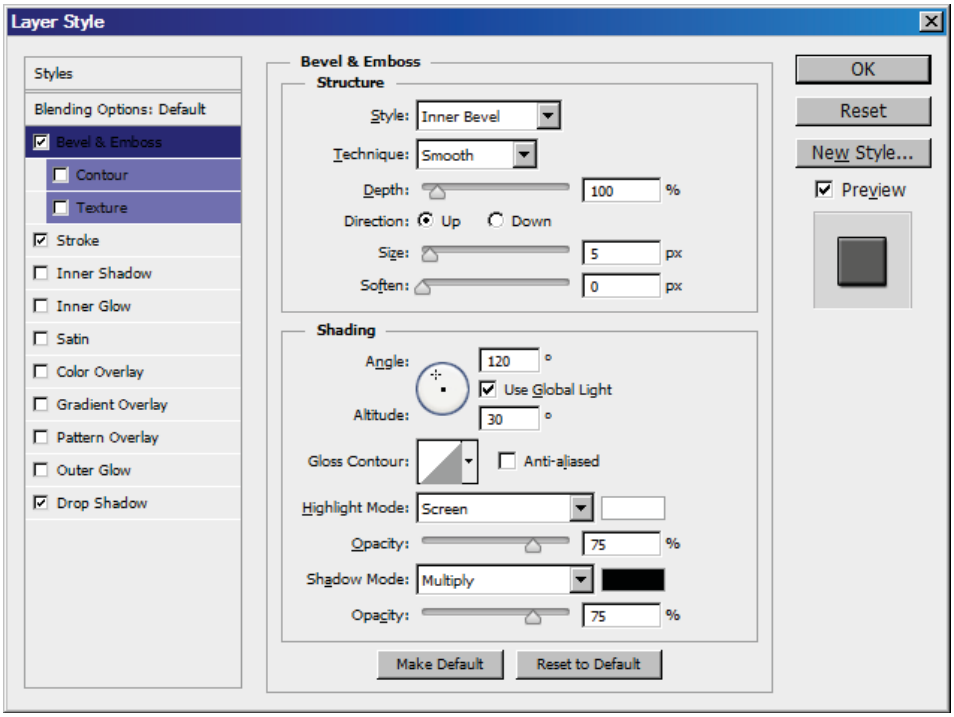


Fig.4.7. Layer style dialog box

Self-study

Using the **Layer style** window, check the effect of the effects described above on the example of the layers of the *Layers.psd* document from the Lesson 4 folder.

5. COLOR MODELS AND MODES

Let's move on to a very important and complex characteristic of an image, like *color*. An image can be *black and white* (that is, contain only two colors: white and black), *grayscale* (that is, contain different shades of the same color) and *color*. But the color image can be in a different color model. To choose the optimal color model or color mode, you need to have an understanding of the basics of color formation in computer graphics. The color of a bitmap pixel is determined by its bit depth.

5.1. Bit depth of color

Bit depth refers to how many bits of memory are allocated to store the color information for each pixel. The greater the color depth, the more shades can be displayed. So, in a monochrome black and white image, only one bit is allocated for each pixel: 2^1 – color can be either *black or white*.

The grayscale image uses 8-bit color depth, it is able to convey already 2^8, or 256, shades of color, from white to black (or any other color). Color images require even more memory. Depending on the color model, each pixel requires 2^8x2^8 $x2^8$, i.e. 24 bits for RGB and HLS models and 2^{8x4}, that is bits, for CMYK color model (8 bits for each primary color).

If the graphics are intended for screen viewing, how many colors the display monitor itself can convey begins to play a significant role, and this depends on the size of the computer's video memory in which the screen image is stored. Current versions of Adobe Photoshop allow you to work with images in which the pixel bit depth can be 16 and 32 bits. Increasing the bit depth of a pixel results in larger file sizes, but these images provide more tonal levels.

5.2. Color models

Depending on the application, different color models have been created: additive, subtractive and perceptual [2,4]. The additive models include the **RGB** color model, the subtractive models include the **CMYK** model, and the perceptual models include the **HSB** model.

Monitors use the RGB color model, which is based on three basic colors: red **(Red)**, green **(Green)** and blue **(Blue)**. The absence of all colors in this model gives black, and the presence of white.

In printing, the most commonly used color model is **CMYK**, based on four basic colors: cyan **(Cyan)**, magenta **(Magenta)**, yellow **(Yellow)** and black **(BlacK)**. In this model, the absence of all colors means white, the presence of black. A mixture of primary colors in equal proportions gives secondary colors for the respective models.

The primary and secondary colors of the **RGB** and **CMYK** models are shown in Figure 5.1, and are located in the *Model.jpg* image from the *Lesson 5* folder.

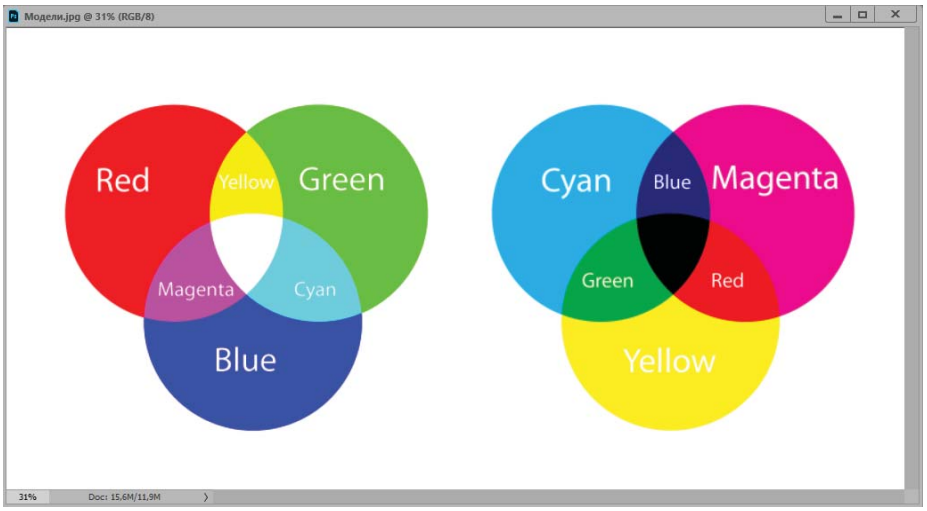


Fig.5.1. Primary and secondary colors of **RGB** and **CMYK** models

The **CMYK** and **RGB** palettes have different color gamuts (ranges of colors) that can be reproduced. The color gamut of the **RGB** palette is much wider than that of the **CMYK** palette. Therefore, some of the colors you see on your monitor screen can only be approximated by the printer.

In addition, Adobe Photoshop supports the **Lab Color** color model. This universal model allows you to get almost any color available to the human eye. Its colors look exactly the same on the monitor and on the printer. Adobe Photoshop uses this model to translate an image from one model to another.

When color correcting images, Adobe Photoshop uses the **HSB** and **HLS** perceptual models. In these models, the color is determined by three parameters: **Hue, Saturation** and **Brightness** or **Lightness**. **Hue** indicates the position of a color on the color wheel. **Saturation** reflects its intensity. The more saturation, the more saturated the color becomes. The smaller it is, the more faded, gray it becomes. Luminance reflects the amount of light passing through a transparent color object in the **HLS** system and the amount of black in a color for the **HSB** model. The greater the brightness, the closer the color to white, the lower it is, the darker the color. At minimum brightness it turns black.

To print an image, you must select the **CMYK** palette, and to display *on the screen*, the **RGB** palette is preferable.

5.3. Color channels

When 24 or 32 bits are assigned to each pixel, they are divided into three or four groups of 8 bits each. The bits of one group make up a channel, with an 8-bit color depth, an image can contain 256 shades of color, from white to black. Thus, we can consider that each channel is a monochrome halftone image (it is also called a gray scale image), and the final full color image is made up of three or four halftone images.

Each color model has its own channels. For example, in the **RGB** model, one channel describes the red component, the second - the green and the third - the blue component of the color. The **CMYK** model has four channels: cyan, magenta, yellow, and black. There are three channels in the **Lab** model, one of them describes the brightness **L**, and the other two describe the variables **a** and **b**.

By default black and white, grayscale, duplex and indexed palette images have only one channel, **RGB** and **Lab** images have three channels, and **CMYK** images have four channels. However, you can create additional channels in the form of alpha channels, which are necessary to store complex selections in documents.

5.4. Channel Palette

To view an image in different channels and to work with channels, use the **Channels** palette (Fig.5.2). To call it on the screen, execute the **Window/Channels** command. To view the color channels, open the *Flower.jpg* image from the *Lesson 5* folder.

In the left column of the palette there is a channel visibility indicator in the form of an eye icon. By default, all channels are enabled and you see a full color image with all channels mixed together. You can view the image in one, two or more channels. To return to showing all channels, click in the visibility indicator of the top line with the name of the color model (RGB, CMYK, Lab). To make one channel active, click on the line with its name.

For example, select the **Red** channel (this image is in the RGB color model) and you may see only a grayscale halftone instead of a reddish image. Don't worry if you suddenly think you're *hallucinating*. I can assure you that it is not.

In order to restore normal color perception, you must execute the following **Edit/Preferences** command and on the Interface tab check the **Show Channels in Color** checkbox.

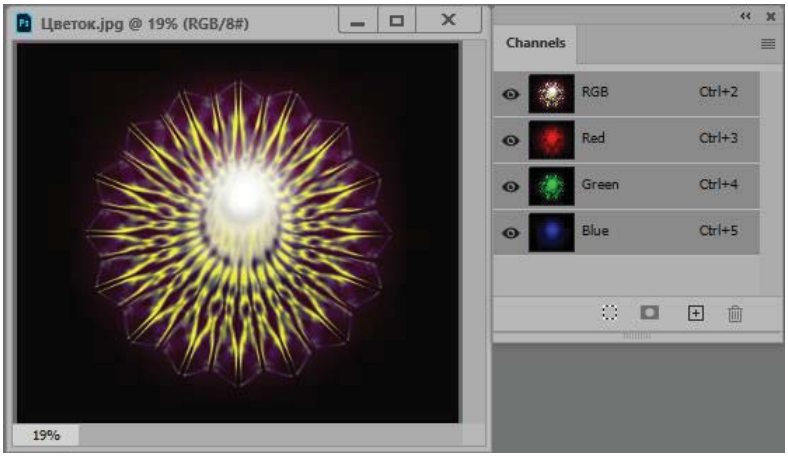


Fig.5.2. Palette **Channels**

However, this is not always convenient, since it is much more difficult to work with color halftone images: details are less distinguishable and eyes get tired faster. When viewing two or more channels, the image will always appear in color due to color mixing. When mixing channels, the secondary colors that appear are shown in Fig. 5.1.

By selecting channels one at a time, you can adjust them independently of each other. You can grayscale not a full color image, but only one channel if it looks better than the full color image after grayscale. Information about other channels will be lost.

5.5. Color modes

Color modes are the implementation of a color model within a particular graphics editor. To convert an image to another color model, use the **Image/Mode** command and then select the desired mode in the submenu:

- **Bitmap** - black and white image;
- **Grayscale** - halftone image, or image in gray scale;
- **Duotone** - duplex, that is, a halftone image to which one more color has been added (although a four-color option can also be selected here);
- **Indexed Color** - indexed colors;
- **RGB Color** - RGB mode;
- **CMYK Color** – CMYK mode;
- **Lab Color** – Lab mode;
- **Multichannel** - multichannel mode, when each channel exists separately, without mixing.

If the command is grayed out, then the current mode is not available. For example, a color image cannot be converted to black and white; you must first

convert it to grayscale. Some commands are executed with confirmation of color loss information.

If the conversion from the **RGB** palette to **Lab** and vice versa does not lead to loss of color information, then the same cannot be said about the conversion from **RGB** or from **Lab** to **CMYK**. The **CMYK** color gamut is much smaller, and moreover, it depends on specific models of printers or phototypesetters. You will notice how bright colors fade, and some shades may change. Therefore, it is preferable to transfer to this palette before printing itself.

Exercise 5.1. Color modes

1. Refresh the workspace using the **Window/Workspace/Reset Basic-1** command.
2. Open the document *Flower.jpg* from the *Lesson 5* folder.
3. Duplicate the image with the **Image/Duplicate** command and place it next to the original image.
4. Click on the title of the duplicate and open the Channels palette. This image is in the **RGB** model, respectively, contains three channels, the file size is 6.71 MB.
5. View the content of each channel. Then turn on pairs of color channels (eyes) in order to get an image in tones of secondary colors: yellow, blue and purple.
6. Turn on all channels. To convert an image to the **CMYK** color model, run the following **Image/Mode/CMYK Color** command, and you may notice some fading in the yellow tones. You can compare the colors of the duplicate and the original.
7. In the **CMYK** color model, the image consists of four channels, the file size is already 8.94 MB, since one more channel has been added.
8. View the content of each channel. Then turn on color channels in pairs in order to get an image in tones of secondary colors in this model (Fig. 5.1): red, blue and green.
9. Turn on all channels. Convert the image to the **Lab Color** color model by executing the **Image/Mode/Lab Color** command.
10. View the contents of each channel and their pairings. The **Lightness** channel contains only luminance information, the **a** and **b** channels contain different color ranges of the color wheel. The file size is 6.71 MB because there are three channels.
11. Go back through the History palette to the line **CMYK Color**. Convert the image to the Multichannel color model using the **Image/Mode/ Multichannel** command. The image consists of four independent channels, and the file size is 2.24 MB (this is the size of one channel).
12. Return to the line **Open** palettes **History**. Convert the image from the **RGB** color model to the **Multichannel color** model in the same way. The image

consists of three independent channels (colors from the **CMY** model), the file size is again independent of the number of channels, and is 2.24 MB. Also notice how much the hue of the background color has changed.

Exercise 5.2. Converting to halftone modes

1. Open the *Flower.jpg* document from the *Lesson 5* folder.
2. Open palette **Channels**. Let's convert this image from **RGB** model to grayscale grayscale with **Image/Mode/Grayscale** command.
3. After executing the command, the program will need your consent to the loss of color information. After confirming in the channels palette, you will find only one gray channel. Pay attention to the file size, it has decreased from 6.71 MB to 2.24 MB. A threefold decrease is associated with a decrease in the number of channels.
4. Convert the image to duplex mode with the **Image/Mode/Duotone** command.
5. In the dialog box, in the **Type** rollout, you can select the number of color inks (up to four **Quadtones**) and adjust the duplex curve to the left of the color sample window.
6. One channel with the name of the selected number of colors will appear in the channels palette. The file size has not changed and does not depend on the number of colors.
7. This model is used to prepare an image for poster printing, usually no more than two colors are used in practice. Increasing the number of colors leads to the resulting brown color.
8. Using the **Monotone** mode in the **Type** rollout, you can tint gray images or photos with one color.

5.6. Indexed Colors

Color depth characterizes the amount of memory for each pixel. Each color when shown on the display is decomposed into three components: **R** - red, **G** - green and **B** - blue. Thus, the pixel color information is divided into three channels, that is, into parts that reflect the brightness of each component.

At an early stage in the development of computer technology, displays were mainly used that were unable to display more than 256 colors, then there was another way to store color information - indexed colors. In this mode, for each pixel, only its index is stored, or a number in a palette of 256 colors common to the entire graphic file. When exporting to this model, the colors that are present in the original full-color image are selected, which makes it possible to achieve quite normal color rendering.

The file size is significantly reduced when indexed colors are used. Although the need to use this method disappeared with the disappearance of old displays,

the Internet appeared, and in connection with this, it became necessary to minimize file sizes in order to reduce the time for transferring them over the network.

You can convert a grayscale image or an image in the **RGB** model to indexed colors. When translating a color image, a dialog box appears (Figure 5.3, left), in which the conversion parameters are defined. If the image has more than 256 colors, then some of them are discarded during conversion. Adobe Photoshop uses various palettes for this: **Local, Exact, Uniform, Custom, Adaptive, System (Windows, Mac OS)**.

By selecting the **Custom** type in this rollout, you will be able to manually edit the palette in the **Color Table** dialog box (Figure 5.3, right), selectively replacing some colors with others or choosing one of the standard palettes. This table is called by the command **Image/Mode/Color Table**.

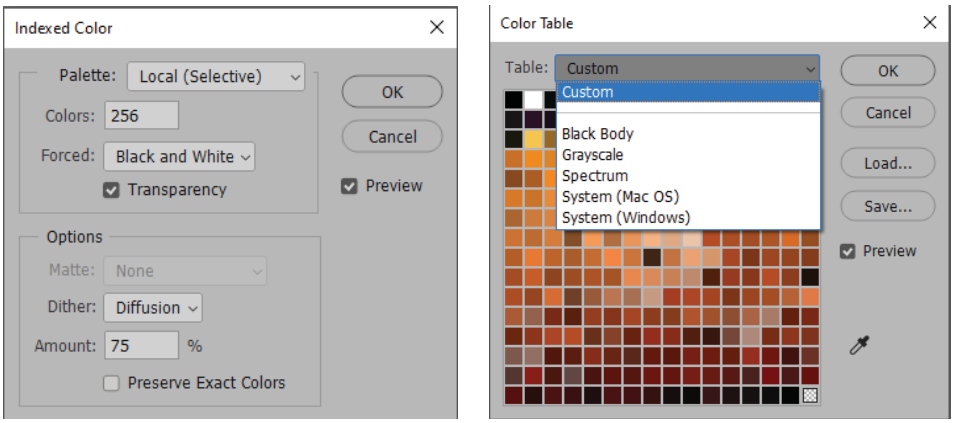


Fig.5.3. Indexed Palette Settings Window and Color Tabl

In the **Table** rollout, you can select one of the standard indexed palettes: **Black Body** - a set of colors emitted when a black body is heated, **Grayscale** - a gray scale, **Spectrum** - the spectrum of sunlight, **System** - two standard system scales for **Windows** and **Macintosh**.

To change the color manually, click on the corresponding square, select the desired color in the **Color Picker** window. When indexing a color image, you can simultaneously convert it to a gray scale and replace it with a scale with a color transition between any two colors.

As an exercise, let's convert an image from an **RGB** model to a grayscale image and then tone it by replacing the grayscale with shades of other colors.

Exercise 5.3. Toned Sunset

1. Open the *Sunset.jpg* image from the *Lesson 5* folder.

2. Duplicate the image. For a duplicate, run the **Image/Mode/Grayscale** command. The image will turn gray halftone, but we will try to restore these colors.
3. Convert it to an indexed scale with the command **Image/Mode/Indexed Color**.
4. Call up the color table with the **Image/Mode/Color Table** command. The table consists of 256 colors (squares). Click on *the upper left* color square and drag the pointer to the *opposite corner* of the table, thus selecting all the squares.
5. After that, the **Color Picker** window will appear on the screen to select two new colors. First you have to replace the top color i.e. black. Click, for example, in the dark orange part of the narrow vertical spectral scale, then in the left square box, click on any dark red hue. Click the **OK** button. The image will be filled with a solid color.
6. Now in the same window, select the end color of the transition. Choose a light *yellow color* in the left square box. Click the **OK** button.
7. If you have the Preview check box checked, the image will immediately be repainted in shades of *orange-red*, becoming tinted.
8. Compare the resulting image with the original, so you can tone any gray image. The result is shown in Figure 5.4, also in the *Sunset tinted.psd* file in the *Lesson 5* folder.

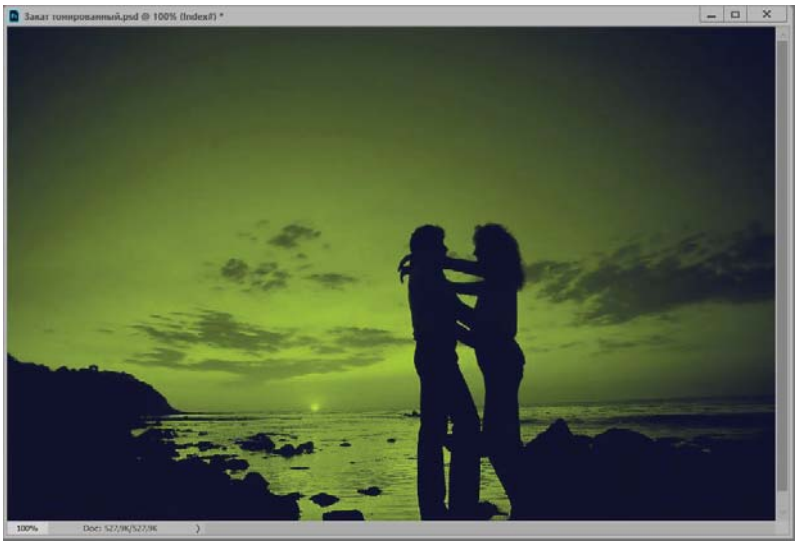


Fig.5.4. Toned image

Self-study

Tint the *Sunset.jpg* image based on the standard **Black Body** indexed color table from the **Table** rollout, and also try a combination of dark blue with yellow color in the custom palette (or any other combination you like).

5.7. Monochrome image

Only a grayscale image can be converted to a *monochrome* black and white image, after which the file size is significantly reduced (especially if the image is a graphic image). It should be noted that halftone images are printed using a halftone screen, i.e. gray tones in raster printing are transmitted only using black ink.

The entire image is divided into square raster cells, consisting of several pixels. The darker the tone, the more black pixels in the raster cell and vice versa. The cells line up in lines inclined at some angle. These lines are called raster lines. Black pixels can be grouped within a cell in the form of lines, circles, diamonds, etc., forming a halftone dot. The shape of this dot can also be selected when adjusting the raster.

To convert a gray image to black and white, execute the **Image/Mode/Bitmap** command. In the dialog box (Fig.5.5) the transformation parameters are set. In the **Output** rollout of the **Resolution** section, enter the resolution of the target output device.

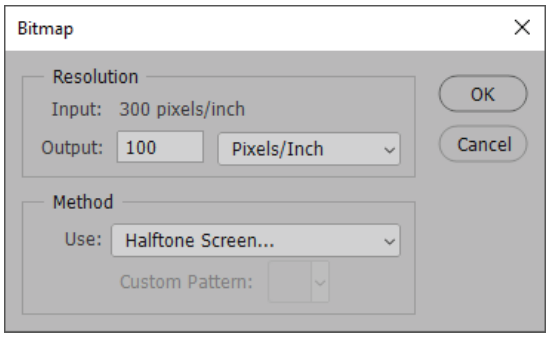


Fig.5.5. Convert to Monochrome Dialog Box

- In the **Method** rollout, the conversion method is selected:
- **50% Threshold**, all pixels whose brightness exceeds 50% turn white, the rest turn black;
- **Pattern Dither** - black and white pixels in a raster cell are arranged in a standard geometric pattern;
- **Diffusion Dither** - black and white pixels in a raster pattern are arranged randomly;
- **Halftone Screen** - this mode gives a wide range of options for setting the raster parameters: lineature, tilt angle, shape of the halftone dot;

- **Custom Pattern** - a ready-made raster pattern is selected.

Exercise 5.4. Convert to monochrome image

1. Open the *Portrait.jpg* image from the *Lesson 5* folder.
2. This sketch is *"brought"* out of the right spot with the drawing tools. Convert it to grayscale with the **Image/Mode/Grayscale** command.
3. Execute the **Image/Mode/Bitmap** command to convert to black and white, this will reduce the file size by several orders of magnitude due to one bit depth.
4. In the **Output** rollout, from the Resolution section, enter the resolution of the target output device, for example, 100 dpi (pixels per inch). The higher the resolution, the better the quality of the monochrome image.
5. In the **Method** rollout, select the **Diffusion Dither** method. Click the **OK** button.
6. Go back to the gray image in the **History** palette by clicking on the **Grayscale** line. During transformations, the size of the document window will change.
7. Now we will again convert the gray image to monochrome, but using a halftone screen.
8. Run the **Image/Mode/Bitmap** command again. This time in the **Method** rollout select **Pattern Dither** first, then **Custom Pattern** and **50% Threshold.** At the same time, after each transformation on the **History** palette, we return to the gray image by clicking on the line Grayscale.

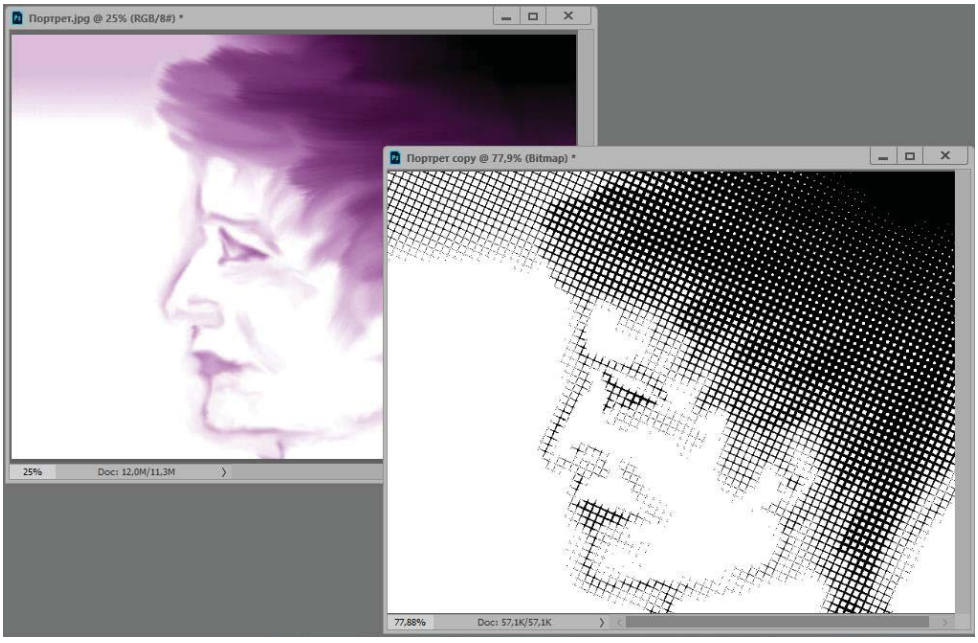


Fig.5.6. Original and monochrome black and white image

9. Call the dialog box again and select the **Halftone Screen** method. In the dialog box, in the **Frequency** rollout, enter the raster lineature, that is, the number of raster elements per inch, set **50 lines/inch**. The greater the difference between resolution and lineature, the more shades a monochrome image can convey.
10. In the **Angle** field, leave the angle at **45°**. This is the standard angle of inclination of the raster lines.
11. In the **Shape** rollout, select the shape of the halftone dot. You can choose: **Round, Diamond, Ellipse, Line, Square, Cross**. Select **Line**, click the **OK** button.
12. If you look at the resulting image at a scale of 200% or 400%, you will see how the raster works. You will see lines at a **45°** angle.
13. Figure 5.6 on the right shows a monochrome image with the following parameters: *resolution 100 dpi, Halftone Screen method, Frequency 10, angle 25°, Cross*).

Self-study

Convert portrait to black and white image in **Halftone Screen** mode with **Frequency** *20 lines/inch*, *300 scanline* angle and different halftone dot shapes.

6. SELECTION OF AREAS

In the Adobe Photoshop editor, most of the operations, as well as all the drawing and editing tools, operate only within the selected area. For example, if you select the **Paintbrush** tool and want to paint the entire image, you can only do so within the selected area.

6.1. Selecting an area of regular geometric shape

To select areas of the correct geometric shape, there are four tools that are collected under one button in the upper left corner of the tool palette (Fig. 6.1).

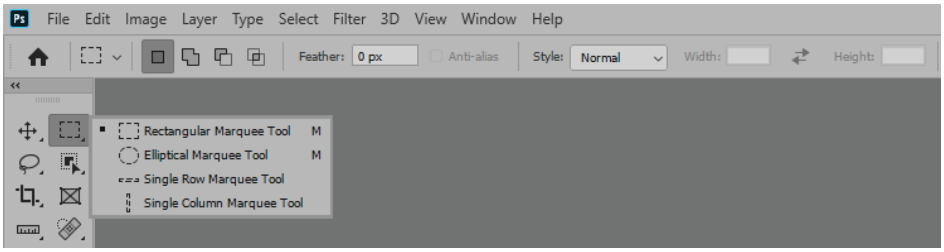


Fig.6.1. Tools for highlighting areas of regular shape

The first one selects a rectangular area, the second selects an elliptical area, the third selects a row one pixel high, and the fourth selects a column one pixel wide.

To stroke a rectangular area, select the **Rectangular Marquee Tool**. Set the pointer to the corner of the future rectangle, click and drag it to the opposite corner. Similarly, elliptical selection is carried out with the **Elliptical Marquee** tool.

When making selections, next to the selected area, there is an information panel indicating the dimensions, where **W** is the width, **H** is the height of the selected area in centimeters. This panel allows you to control the size and ratio of the selection rectangle.

If you press the **Shift** key while selecting areas, the *rectangle* will turn into a *square*, and the *ellipse* into a *circle*. If you press the **Alt** key, then the selection will not be extended from the corner, but from the center. To move an unfinished selection, use the *spacebar*. While it is pressed, the area can be moved, release it - you can further stretch or shrink the selected area

Exercise 6.1. Geometric selections

1. Update the workspace with the command **Window/Workspace/Reset Basic-1**.

2. pen the *Wing.jpg* image from the *Lesson 6* folder.
3. Use the **Rectangular Marquee** and **Elliptical Marquee** tools to select the square and circle coming from the center, and also try to move them during the selection process with the spacebar.
4. Next, select a line of the image with a height of one pixel. To do this, select the **Single Row Marquee** tool. Click on any part of the image and a dotted line ("*marching ants*") will stretch across the entire image. You can zoom in on the image and you will see a double dotted line highlighting exactly one pixel.
5. A one pixel wide column is selected in the same way, just click on the **Single Column Marquee** tool.
6. To remove the selection, click in the document window outside the selected area with the same tool or execute the **Select/Deselect** menu command.
7. Try the modes below for the **Rectangular Marquee** and **Elliptical Marquee** tools.
8. Also turn on the selection mode using masking in the **Select and Mask** rollout, choosing an appropriate brush size to select the shape.

The control panel of the **Rectangular Marquee** and **Elliptical Marquee** tools (Fig.6.1, in the upper part) contains rectangular buttons for performing logical operations to add, subtract, and intersect selected areas. The **Feather** rollout sets the border blur mode. The **Style** rollout defaults to **Normal**. Until now, you have been working in this mode, and you have determined the size of the area yourself. The other two modes impose some restrictions on the size of the area, which depend on the setting.

By selecting the **Fixed Ratio** mode, you can set the ratio of the sides of the rectangle or the axes of the ellipse. You will only get rectangles or ellipses with the given aspect ratio, no matter how you move the pointer. With a ratio of 1:1, you will always get a *square* or a *circle*.

The third **Fixed Size** mode allows you to select an area of strictly specified dimensions. This is useful when you need to select several identical areas. The dimensions of the selected area are displayed in the Info palette in the lower right corner.

In the next scroll of the **Select and Mask** control panel, you can use the selection of objects similar to the masking mode (detailed in a separate chapter). After pressing, the masking mode is turned on, with the choice of the size of the brush for the selection, confirmation is required to complete the operation, and the mask is converted to a selection.

Sometimes, to create, for example, a frame around an image, you need to select the entire image. This can be done with the Rectangular Marquee tool or with the **Select/All** command. Consider the selection process in the following example.

Exercise 6.2. Feathering and highlighting an image

1. Stretch the window of the open *Wing.jpg* document so that empty margins appear around the canvas.
2. Select the **Rectangular Marquee** tool.
3. Outline the image with a rectangle obviously larger than the canvas. In this case, the selection will not spread beyond the canvas.
4. A shimmering dotted line will appear exactly on the border of the canvas - the image is selected. To deselect, click on an empty field in the document window or execute the **Select/Deselect** menu command. Next, set the feathering mode.
5. Select the **Elliptical Marquee** tool, in the **Feather** rollout, set the value of the border blur mode 20 pix.
6. Select the central part of the image. Using the **Edit/Copy** and **Edit/Paste** commands, paste the selected area into the given image through the clipboard.
7. A new layer will appear in the **Layers** palette containing a selected fragment with blurry edges, as in Fig. 6.2 (lower right corner). In order to see it, select the Move tool, and move the pasted fragment from the center of the image.
8. The fuzzy edge technique is often used in image processing. To return the **Rectangular Marquee** tool to normal mode, in the **Feather** rollout, reset the border blur mode value.

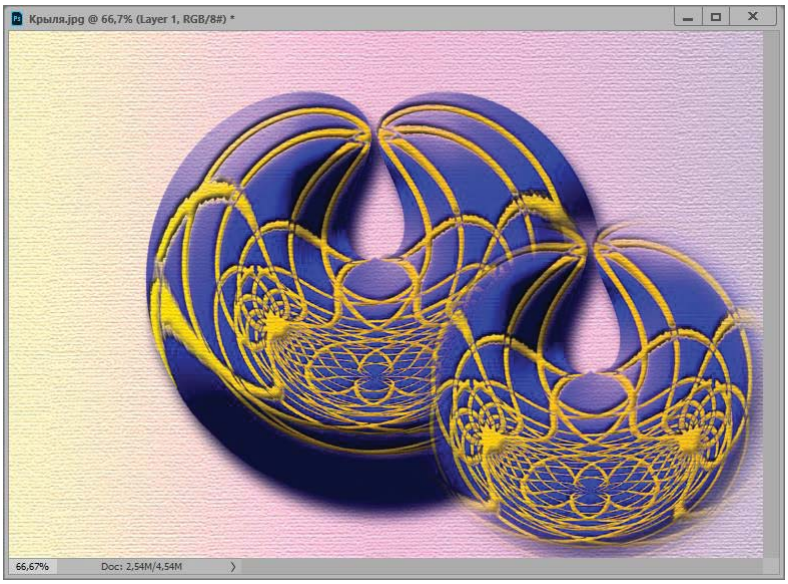


Fig.6.2. Fragment with blurry borders

Self-study

Select *one pixel* of the image in *three ways*, using the geometric selection tools in different modes.

6.2. Freeform area selection

To select areas of arbitrary shape, there are three tools located under one **Lasso** button (Fig. 6.3). With the **Lasso** tool, you can manually trace a selection area of any shape. To do this, click on the image and move the pointer without releasing the mouse button. It will be followed by a line that repeats the movement of the mouse pointer. *To return* to the starting point in case of random deviations, return the pointer (without releasing the mouse button) to the last "*correct*" place and press the **Del** key.

It is possible to match the end and start points, although this is not required. If you do not complete the line, the end and start points of the curve will automatically be connected by a straight line segment.

It is quite difficult to draw a line with the mouse. It's easier to trace the desired area with the second tool in this series: **Polygonal Lasso**.

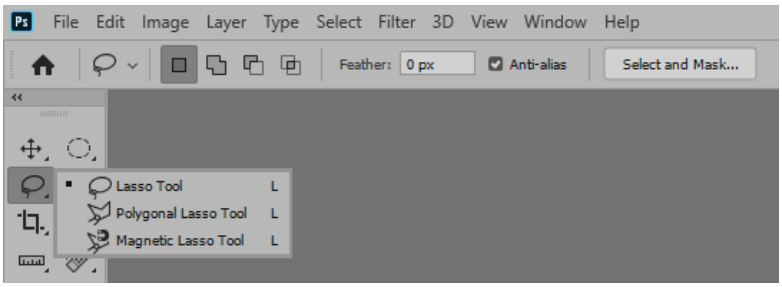


Fig.6.3. Freeform selection tools

Exercise 6.3. Polygonal Lasso

1. Open the *Wing.jpg* image from the *Lesson 6* folder.
2. Select the **Polygonal Lasso** tool.
3. Click the start point of the region at the top of the shape and drag along its edge. It will be followed by a thin straight line. When it starts to move away from the edge of the area, click the left mouse button. This point of the pointer path will be fixed.
4. Move the pointer again along the edge of the area. Now the thin straight line does not come from the starting point, but from a fixed one. Click again to anchor the end of another line.

5. Remove the last fixed point (let's say we put it in the wrong place). Press the **Del** key. The point has disappeared and the previous point is now linked to the pointer. Put a new point in the right place.
6. Thus, clicking in different places, bring the pointer almost to the starting point. The last time you need to click exactly at the starting point. You will know that you have entered it by the appearance of the pointer: a *circle* will appear next to the lasso image. Instead, you can also end the selection by double-clicking anywhere. The last point will automatically connect to the start point with a line.

It's even better to use the **Magnetic Lasso** tool to precisely stroke an object, but keep in mind that it only works well for an object located on a contrasting background. The work of the tool is based on the ability of Adobe Photoshop to find places of greatest contrast. You trace the object without trying to be particularly precise, and the program searches the "corridor" along which the pointer passed within the given limits, finds the place of greatest contrast and draws a border there.

Now let's look at the configuration of this tool. On the control panel, the Width rollout sets the width of the corridor in which the program is looking for a border. The larger the object and the more contrast it has, the more you can set this width, and the easier and faster you can outline the object. The maximum width is 256 pixels, the minimum width is 1 pixel. For low-contrast objects, you need to reduce this width to a few pixels and lay the path for the magnetic lasso more carefully.

In the **Contrast** field, select the minimum contrast between colors so that the program considers it a border. The default value is 10%.

The **Frequency** value determines how often the program places fixed points. The larger the object and the flatter its border, the larger this value can be made.

The masking mode in the **Select** and **Mask** control panel also works for all varieties of lasso.

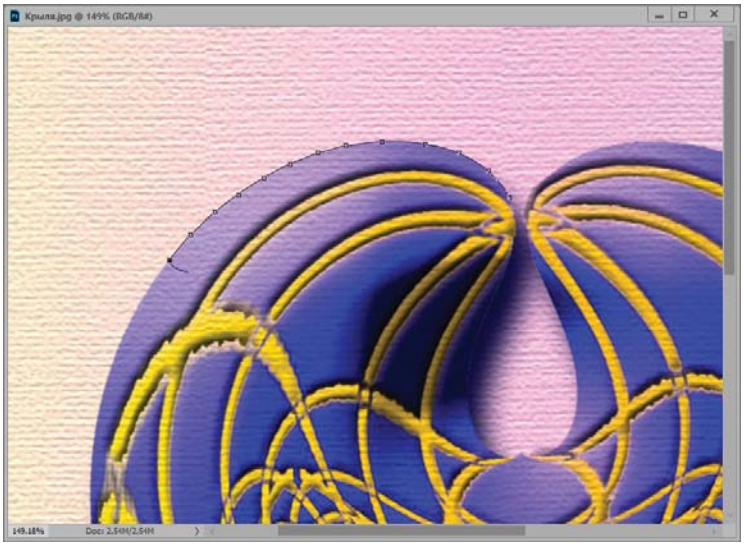


Fig.6.4. Using the magnetic lasso

Exercise 6.4. Magnetic lasso

1. Let's continue with the *Wing.jpg* image.
2. Select the **Magnetic Lasso** tool.
3. Click exactly on the border of the object with the background. The program put the first fixed point there (Fig.6.4).
4. Release the mouse button and move the pointer along the edge of the object. You see a black line trailing behind him. At some distance from the first point, a second black square appeared, and the first became hollow. Hollow points are already fixed, you can only delete them one by one, starting from the end, by pressing the **Del** key.
5. As you move the pointer, more and more points appear on the line. If the program drew the boundary inaccurately, return the pointer to the place where it went wrong, and put a point there yourself by clicking the left mouse button.
6. After tracing the entire object, place the last point exactly on the first one (a hollow circle will appear next to the pointer) or double-click the left mouse button.

6.3. Logical operations with regions

The selection of areas of complex shapes or several areas at the same time is not complete without logical operations: addition, subtraction and intersection [1,3,6]. These button operations are available on the selection toolbar. Consider first the inversion of selections, this operation is also often used.

If it is necessary to select several objects of non-uniform color on a uniform background, the background is usually selected, and then the command is executed **Select/Inverse**. After that, multi-colored objects are highlighted.

New Selection

To select a single area (also at the beginning of any selection), use the **New Selection** mode on the control panel.

Addition of areas

To select several areas at the same time, you can turn on the area addition mode by clicking the **Add to selection** button on the control panel. A **"+"** sign appears next to the selection pointer in this mode. This is useful when adding small fragments of an object to a selection. To return to the normal selection mode (when you select a new area, the old selections are removed), click on the **New Selection** button.

Subtraction of areas

Click the **Subtract from Selection** button on the control panel. In this mode, the new selected area is subtracted from the already selected area. This mode is useful when you need to select an area with a hole inside. A "-" sign appears next to the selection pointer in this mode.

Intersection of regions

Click the **Intersect with Selection** button on the control bar. In this mode, only the common part of the new and previously selected areas remains selected. An "x" appears next to the selection pointer in this mode.

In the case of editing selected areas, selection transformation is also used. To switch to the free transformation mode of the selection, you can execute the **Select/Transform Selection** command. Next, the selected areas are transformed. To complete the transformation, click the checkmark button on the control panel. To cancel the transformation, click on the button with a crossed out circle.

Next, we will perform an exercise using logical operations. You will need the extra Shift and space keys for this exercise, this exercise is more for improving your selection technique

Exercise 6.4. Logical (Boolean) operations on selection

1. Open the file *Marquee.jpg* from the *Lesson 6* folder.
2. **Select the Elliptical Marquee** tool. Turn on the **New Selection** mode by clicking on the corresponding button on the control panel. Select the outer border of the oval shape on the left, before that, do not forget to restore the **Feather** rollout to 0 pix.
3. It is recommended to use the spacebar for precise border selection. It allows you to move the selection until the left mouse button is released, i.e. operation not completed. It is necessary to alternate these manipulations until the exact selection of the outer borders of the figure.

4. Next, switch to the **Subtract from Selection** mode. Select the inner part of the figure on the left, it will be subtracted and an inner hole will appear in the figure. So, one figure is selected.
5. To add a shape on the right, select the **Rectangular Marquee** tool and go to Add to selection mode. Otherwise, the built selections will disappear, you can use the **History** palette to return to the previous states.
6. Draw a rectangle around the central rectangular part of the vertical cruciform figure, and then using the **Elliptical Marquee** tool, select the entire figure in different modes. The exercise is not easy, but if you have patience, you will succeed, the result of the selection is shown in Fig. 6.5. Good luck to you!

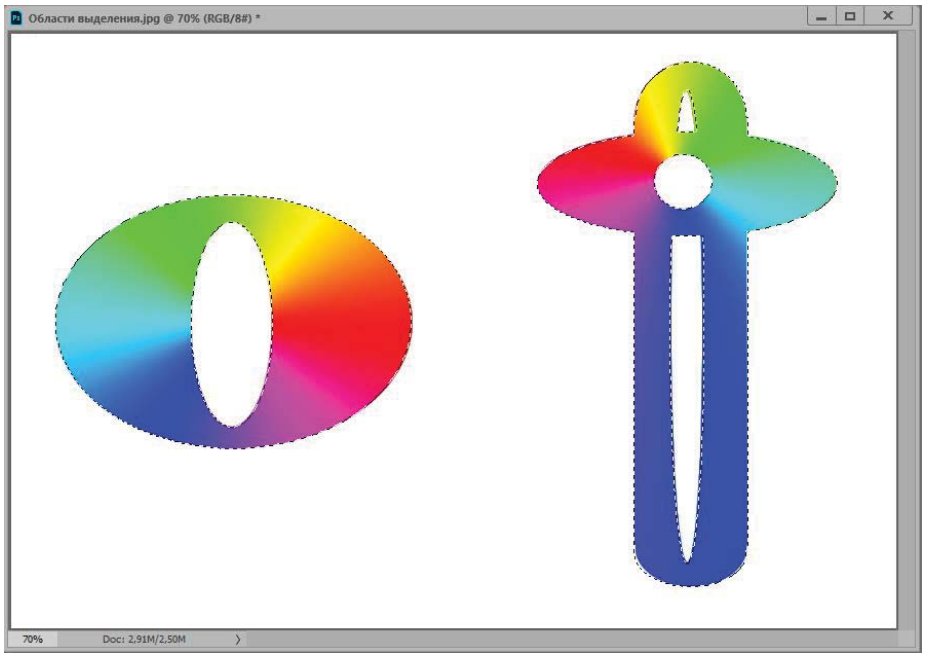


Fig.6.5. Logical operations on areas

Exercise 6.5. Operations on the border of the region

1. If you need to add a background strip to the selected object, you can expand the selection by a specified number of pixels. To do this, execute the **Select/Modify/Expand** command and enter the expansion value in pixels in the dialog box: 10 pix.
2. Expansion is made in all directions. The outer borders have expanded, while the inner openings have shrunk. The expansion is performed on all selected areas simultaneously.
3. To compress the selection area, use the **Select/Modify/Contract** command and enter the value in pixels: 5 pix.

4. Next, to smooth the selections, call the **Select/Modify/Smooth** command and set the radius: 30 pix.
5. Using the **Select/Modify/Border** command, select a narrow area along the perimeter of the selected area. In the dialog box, set the width of this area in the Width field to 10 pix.
6. You can use the **Select/Modify/Feather** command to feather the selected areas. Set the size of the feather to your liking.
7. To transform the constructed selection, use the **Select/Transform Selection** command. Try rotating and resizing the selection with the corner and side handles.

6.4. Magic wand

Areas that are uniform in color can be easily selected using the lasso, but fine detail or very complex objects can be selected with the more appropriate **Magic Wand, Quick Selection,** and **Object Selection** tools.

The **Magic Wand** tool allows you to select areas based on color parameters. It is enough to click the wand inside the object, as it will select all adjacent areas of a color close to it. You can turn on the mode when it selects all the pixels in the image with the specified color. The selection result largely depends on the tool settings, mainly on the **Tolerance** parameter. This parameter determines the range of tones of the specified color to highlight. In the **Sample Size** window, the dimensions of the area for choosing a color are set.

Selection with the **Quick Selection** tool is performed by stroking the required area with a brush (the size is set on the control panel). The **Set Brush Angle** window displays the angle of rotation of the brush according to the setting of the original brush for the selection. In various modes, you can add or subtract to the selected area. The **Auto-Enhance** mode helps to expand the selection to neighboring homogeneous areas. The Select subject button allows you to highlight an object or shape, it is especially effective for a solid background. The **Select and Mask** button works similarly for other selection tools.

The **Object Selection** tool is designed to quickly select individual objects on a uniform background, while you can set the area as a rectangular selection, or select an arbitrary area using the lasso.

Let's perform an exercise in which we select with the help of a magic wand areas in tones of the same color.

Exercise 6.6. Magic wand

1. Open the *Piglet.jpg* document from the *Lesson 6* folder.
2. You will see a "*charming*" pink object. Let's try to highlight some parts of this object (to your taste). To do this, select the **Magic Wand** tool and click on the middle of the back (circle, Fig. 6.6).

3. After a short time, which was required by the program for calculations, the adjacent part of the object stood out - a flickering dotted line appeared around it. Even if the object seems to be monochromatic, it is not entirely true, it has some shades. So, not the whole pink object stood out, but only a certain part of it, although at first glance it is almost a solid pink color.
4. Take a look at the control panel, the default value in the **Tolerance** rollout is 32. Increase it until the entire object is selected (approximately 72).

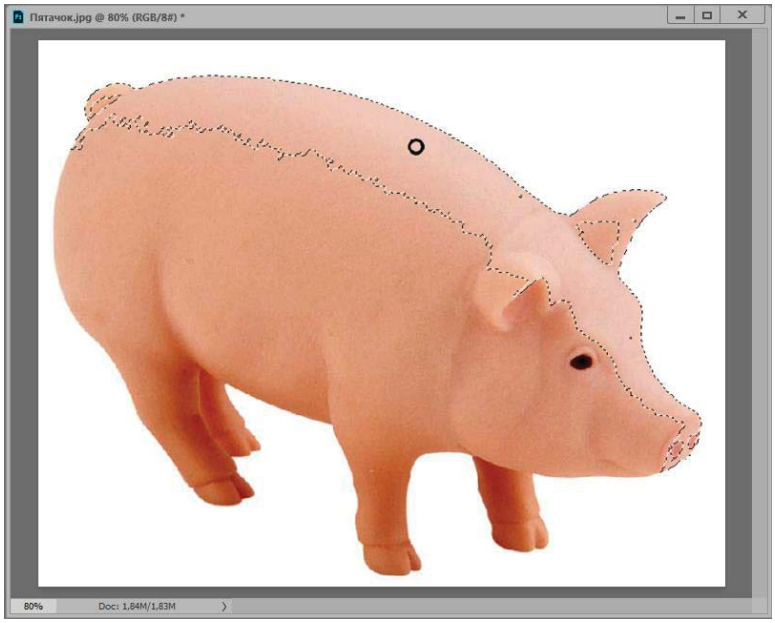


Fig.6.6. Selection with a magic wand

5. The Control Panel check box is set to **Contiguous**. This means that Photoshop selects only one non-breaking area. The program checks for pixels adjacent to the pixel you clicked on. Finding pixels of the same color among them, it checks their neighbors, and so on. When it detects that the selection is surrounded by pixels of a different color, the search will stop.
6. Uncheck the **Contiguous** checkbox and click again with the magic wand in the same place. Photoshop now checks all the pixels in the image, whether they border on the first pixel or not. As a result, all areas are selected, and even individual pixels of the same color.
7. By default, the **Sample Size** window is set to **Point Sample** color. Variants of color averaging in the 3x3 area are possible; 5x5; 11x11; 31x31; 51x51; 101x101 pixel. Try to select the original area with a sample size of 51x51 pixels, the selection area will increase.
8. Next, use the **Select subject** button on the control panel, to do this, remove all previous selections, the program will automatically select the exact figure

of the object after a while. With the Select and Mask button, you can use the masking mode to make a selection.

Let us consider in more detail the criteria for selecting the appropriate areas using tolerance. Its value can range from 0 to 256. The number 256 should be familiar to you from previous exercises. This is the number of shades that a grayscale image with a bit depth of 2^8 can convey.

When the program compares the colors of adjacent pixels, it is actually comparing their brightness across all channels. If the difference between the brightness of the pixels is less than the tolerance, it considers them to be the same color.

By default, the magic wand only analyzes the pixels of the current layer. If you want to process all layers, check the box **Sample All Layers**.

Exercise 6.7. Quick selection and object selection

1. Remove all selections for the *Piglet.jpg* document with the **Select/Deselect** command.
2. Select the **Quick Selection** tool, move it along Piglet's back. When pressed again, the tool enters the **Add to Selection** mode.
3. Select the **Subtract from Selection** mode. Swipe over the selected area, the selected pixels along the brush path will be subtracted.
4. Click the **Select and Mask** button, in the dialog box, you can set various options to customize the selection in the mask mode.
5. Select the **Object Selection** tool, with the help of a rectangular box you can select the entire shape of the object.
6. Next, we will use the selection of the object against a more complex background. Open document *Klodt.jpg* from folder *Lesson 6*.
7. You will see an athlete with a horse, the work of the famous sculptor *Klodt von Jurgensburg* on the *Anichkov Bridge in St. Petersburg* (third composition).
8. Using the **Object Selection** tool, select the figure without the pedestal with a rectangle. After some rendering time, perhaps not the whole sculpture will be selected, as in Fig. 6.7, repeat the selection with other rectangle sizes. You can refine the resulting selection using the previous tools.

Fig.6.7. The selection of sculpture as an object.

Self-study

Use the magic wand to select the entire *Piglet* shape with two clicks with the magic wand. As a hint: use the context menu with invert mode. To highlight the sculpture in the *Klodt.jpg* document, this process will take longer.

6.5. Additional selection modes

The control panel of many selection tools contains an **Anti-aliased** checkbox. In this mode, in places where the selection border runs slanted, smoothing is slanted, so that the steps of the sloping line become less noticeable.

The **Select** menu contains a few more commands that act like a magic wand. The **Grow** command works like the **Magic Wand's Contiguous** mode. Unlike a magic wand, you do not have to click once again in addition mode. Before executing the **Grow** command, select with any tool the part of the object that contains all the necessary shades, and then execute this command.

The **Similar** command does the same as the magic wand when the **Contiguous** checkbox is unchecked, that is, it finds the specified colors in the entire image.

The Subject command automatically selects the most visible objects in your image. This command is also present in the **Color Based Selection Tools** control panel. It is recommended for highlighting portrait images with detailed hair highlighting.

6.6. Moving and copying selections

When working with the selection tools, if the pointer is inside the selection in the primary selection mode, it will turn into an arrow with a white rectangle. Click and drag the selection to a different location. If you have multiple areas selected, they will all move at the same time.

When the selection is moved, the image itself remains unchanged. When moving the selected area, a piece of the image "transfers" to a new place, and a "hole" remains under it, which is painted with a background color.

After we have learned how to select areas, we will proceed to the actual editing of the image. The simplest operation with a selection is moving or copying it.

The Move tool is used to move selected areas. For ease of navigation, you can check the **Show Transform Controls** checkbox on the control panel. A bounding box will appear around the selected area or around several selected areas - a dotted rectangle with handles in the corners and midpoints of the sides. You can use the arrow key to move the area one pixel at a time. The accuracy of movement can be controlled with the **Info** palette.

When moving the selected fragment of the image, the original area is colored with the background color. To copy a selection with the **Move** tool, *hold down* the **Alt** key while dragging.

You can transfer the selected area from one document to another by placing them side by side. With this transfer, a new layer is automatically formed, and all transferred objects are on different layers. In addition, you can copy selected areas to the clipboard and paste them from there into another document using the commands from the **Edit** menu: **Copy** and **Paste**.

To delete the selected area, you can execute the **Edit/Clear** command or press one of the keys: **Del** or **Backspace**. If the document has one background layer, the selected area will be filled with the background color. On other layers it becomes transparent.

Exercise 6.8. Destruction of the Necker cube

1. Open *Cube.jpg* file. from *Lesson 6* folder.
2. You see a 3D object from a series of impossible objects - the *Necker cube* (look at the intersecting edges). Let's try to destroy this object by superimposing fragments of the background on it (Fig. 6.8).

3. To do this, first select the **Elliptical Marquee Tool** and select (upper, left) the nodal ball with a little margin.
4. Keeping the original tool in New Selection mode, place the pointer inside the selection, it will turn into a white rectangle with an arrow, click and drag the selection to the part of the background on the left.
5. Copy the background below the selection and place it on top of the balloon. **Select the Move** tool. Hold down the Alt key, click inside the selection and drag the patch onto the ball, and the ball will disappear. Without the **Alt** key, your original area will turn into a "hole" of the background color.
6. Hide the rest of the nodal balls in the same way, copying fragments of a closely spaced background onto them. Also use the **Rectangular Marquee** tool for rectangular patches and try to destroy this cube.
7. The same operations can be performed using clipboard Edit commands. But at the same time, note that in this case, you will create patches in the form of a new layer. With the Move tool, background patches are created without creating a new layer.

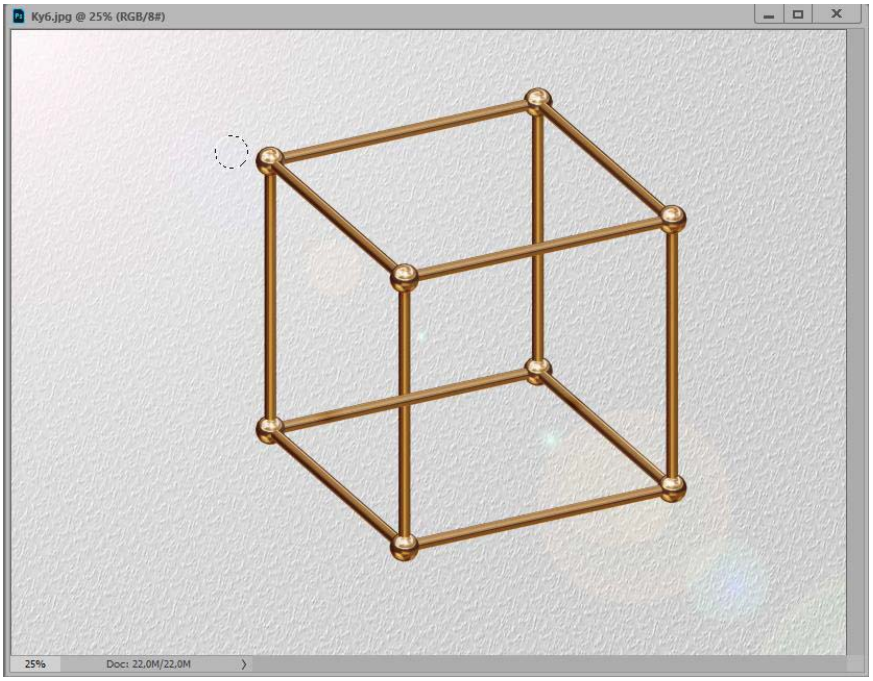


Fig.6.8. Destruction of the cube by copying the background

7. TRANSFORMATION OF A SELECTED AREA

After selecting an area, you can scale it, rotate it, mirror it, skew it, distort it, and change its perspective. All these operations are performed by the **Edit/Transform** menu commands.

Calling any transformation command turns on the mode when no actions other than transformation are possible. You can only move from one transformation to another by selecting it from the menu. During the transformation, you only see the area changes in preview mode. The image doesn't actually change until you click the control panel's checkmark button or press the **Enter** key.

In the transformation mode, a bounding frame with manipulators appears around the selected area, and a dot in the form of a target appears in its center. This is a fixed point. Select any of the transform commands and look at the control panel (Fig. 7.1).

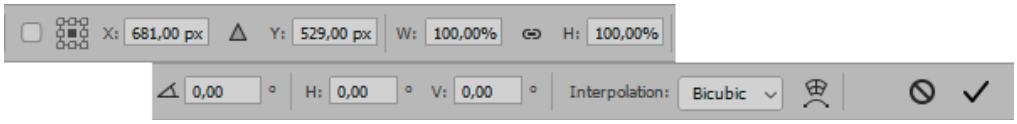


Fig.7.1. Control panel in transformation mode

On the left side of the panel, you see a diagram of the bounding box of the selected area. The fixed point is marked with a black square. To place a fixed point in an arbitrary place, drag it on the image itself. It can even be moved outside the selected area.

The control panel reflects all actions with a selection area, so you can control them, and more precisely control the transformation by entering numerical values in the corresponding fields.

The **Edit/Transform** command has the following transform options:

- **Scale,** scaling the selected area;
- **Rotate**, rotation of the selected area;
- **Skew,** skew the selected area;
- **Distort,** distortion of the selected area;
- **Perspective**, perspective transformation;
- **Warp**, distortion using a dimensional grid;
- **Rotate** 180^0, rotate 180^0;
- **Rotate 90^0 CW**, rotate 90^0 clockwise;
- **Rotate 90^0 CCW**, rotate 90^0 counterclockwise;
- **Flip Horizontal**, mirroring horizontally;
- **Flip Vertical,** mirroring vertically.

To exit the transformation mode, click on the button with a crossed out circle or press the **Esc** key. At the end of the control panel, in front of this button, there is a button for the free transformation mode and overlay in the form of a grid.

During transformation, the original dimensions of objects change, pixels are recalculated using well-known interpolation methods. These methods can be selected in the **Interpolation** window of the control panel.

And now let's move on to specific transformation operations.

7.1. Scale and Rotate

To increase or decrease the selection, use the **Scale** command from the **Edit/Transform** menu. Resizing is done by moving the handles of the bounding box. By dragging the handles in the middle of the sides, you can change only the width or only the height of the area. To change both dimensions, drag the corner handles. To maintain the proportions of the area, hold down the **Shift** key or turn on the "chain" button on the control panel between the width and height values.

Rotation is performed by the **Edit/Transform/Rotate** command. When a bounding box appears around the area, position the pointer outside the area. It will take the form of a rounded double arrow. Click and drag the pointer in a circle around a fixed point. The marker frame will rotate in the same direction. To rotate the selection with great precision, enter the rotation angle value in the control panel.

Exercise 7.1. Scaling and rotating an area

1. Open the *Peaches.jpg* image from the *Lesson 7* folder.
2. Select one of the peaches according to your taste, use the magnetic lasso or the **Object Selection** tool to select it (I choose the central one, Fig. 7.2).
3. Hold down the **Alt** key and copy the peach with the **Move** tool. Execute the **Edit/Transform/Scale** command. A bounding box appeared around the selected area.
4. To resize the object proportionally, drag the corner handle of the bounding box while holding down the **Shift** key (or by clicking the chain icon in the control panel).
5. Click inside the selection (the pointer will turn into a black arrow) and move the object to another location. When you are satisfied with the result of the transformation, click on the checkmark button on the toolbar or press the **Enter** key.
6. To scale the object numerically, enter its width and height in the **W** and **H** boxes next to the scale icon on the control panel. A number without a unit of measurement is perceived by the program as a percentage. If the button for maintaining proportionality is enabled, then when you enter one value, the second value is recalculated automatically.

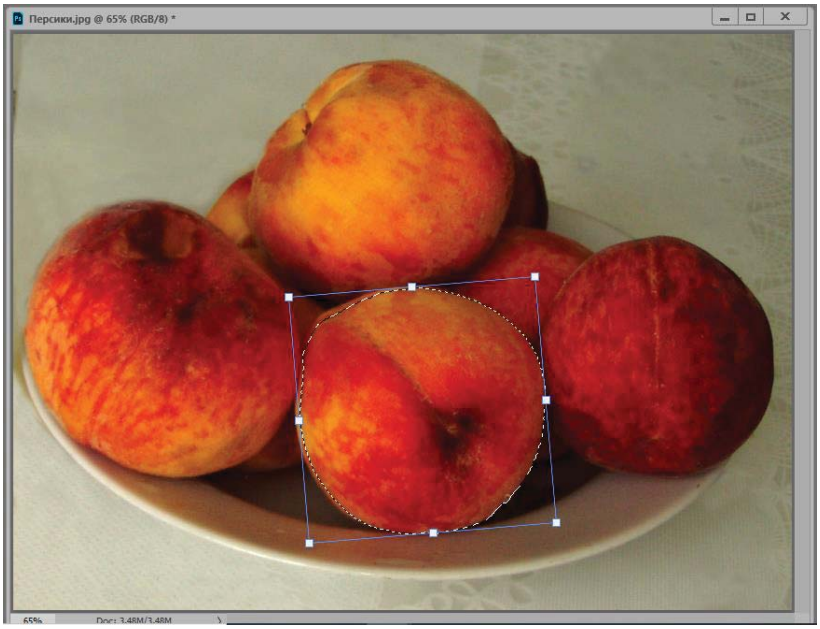


Fig.7.2. Scale and rotate a selection

7. To rotate the selected peach, run the **Edit/Transform/Rotate** command.
8. Position the pointer outside the frame and when it turns into a double-headed arrow, rotate the frame to the desired angle.
9. Resize the peach proportionally to your taste (depending on your appetite). Position the pointer inside the frame, click and drag the peach to the desired location.
10. To apply the performed transformations to the image, click on the checkmark button on the control panel. You have an appetizing peach of a pleasant size.

7.2. Skew and area distortion

The **Skew** command is used to skew an area. You can skew along the horizontal axis, vertically or simultaneously along two axes. Manipulators warp the object vertically and horizontally. If you drag the corner handles, the frame will no longer be a parallelogram and the object will be distorted.

When executing the **Distort** command, you can drag any of the bounding box handles in any direction. Accordingly, you can give the object almost any shape.

And now, as an exercise, we will distort the selected peach.

Exercise 7.2. Butterfly from peach

1. Without removing the selection from the peach (or going back through history), execute the **Edit/Transform/Skew** command.
2. Click and drag the middle and corner handles of the bounding box. You can move them strictly horizontally or vertically.
3. For more convenient distortion, run the command **Edit/Transform/Distort**.

Fig.7.3. Distorting of selected peach

4. In this mode, you can drag any of the handles in any direction. Drag one of the node handles in the opposite direction. By moving and turning, you can make a butterfly out of a peach, as in Fig. 7.3. Press the **Enter** key to commit the completed transformations.

7.3. Perspective transformation

The **Perspective** command allows you to change the bounding box in such a way that its opposite lines converge at one point [3, 6, 7]. Thus, the object is distorted according to the laws of perspective. The median manipulators of the bounding box in this mode move the entire side as a whole. Corner arms move two corners simultaneously in opposite directions. To master these techniques, let's do the exercise.

Exercise 7.3. Perspective distortion of the aircraft

1. Open the *Airplane.jpg* file from the *Lesson 7* folder.
2. Select the plane with the selection tools (magic wand, lasso, and preferably with no background between the wings).
3. Copy it via clipboard (**Edit/Copy, Edit/Paste**) to create a new layer.
4. Next, execute the **Edit/Transform/Perspective** command. Pull the top left corner of the bounding box up. The lower right corner will move down the same distance (lower left, Fig. 7.4). To complete the transformation, click on the checkmark button on the control panel.

Self-study

Complete the original image with a few more planes as in fig. 7.4 (background).

Exercise 7.4. We're flying back

1. In order for the selected plane to fly back, execute the **Edit/Transform/Scale** command.
2. A bounding box has appeared around the selected area. You can swap the right and left sides of the bounding box while maintaining proportionality.
3. The same result can be achieved by entering a negative value of -100% in the W field on the control panel.
4. This operation is easier to perform with the **Flip Horizontal** command.
5. To enter the aircraft into the "dead loop" use the rest of the commands to turn and reflect.

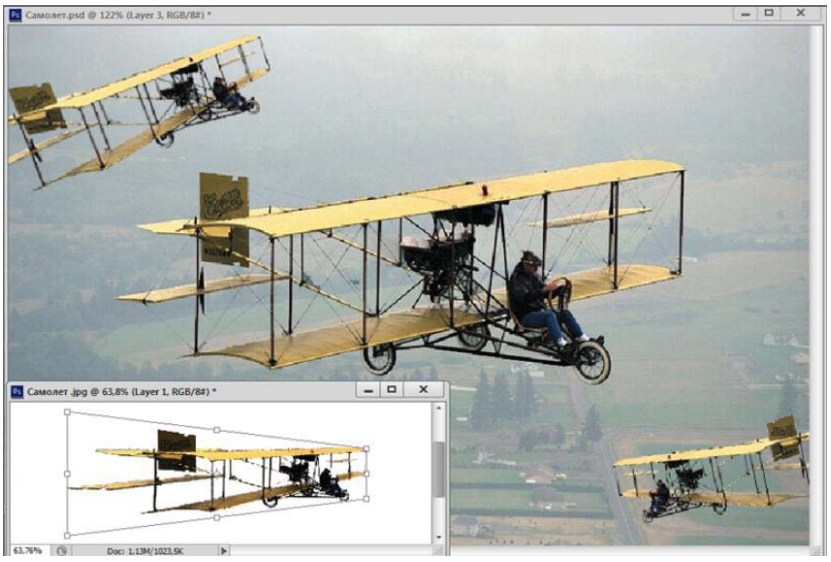


Fig.7.4. Perspective distortion of the aircraft

7.4. Complicated curvature

In the graphic editor Adobe Photoshop, the possibility of complex transformation has appeared, which allows you to overlay flat images on various three-dimensional objects. This operation is performed by the **Edit/Transform/Warp** command. The command allows you to transform both raster images and vector paths. The icon of this transformation is constantly

located at the end of the control panel in the form of a grid for any transformation.

When performing this transformation, a grid with handles of control nodes is superimposed on the object. The central part of the grid moves through the cells.

Exercise 7.5. Estragon with foam

1. Open the *Estragon.psd* file from the *Lesson 7* folder.
2. There are two layers in this document: wine glass and bitmap text. Ignore the color of the contents of the glass and the foam, you can create a lot of amazing things in Photoshop. We have to impose text on a glass with a curved surface.
3. Select the text label layer and execute the **Edit/Transform/Warp** command.
4. A grid will be superimposed on the text (Fig.7.5), using anchor points, stretch the grid to the glass. Each node has two tangent handles. Internal cells move with the involvement of neighboring cells.
5. In addition to the user mode, on the control panel in the **Warp** window, you can select the type of deformation from the standard set of warp shells.
6. After finishing the transformation, press the **Enter** key. The color of the text may also not be quite suitable for the tarragon drink.

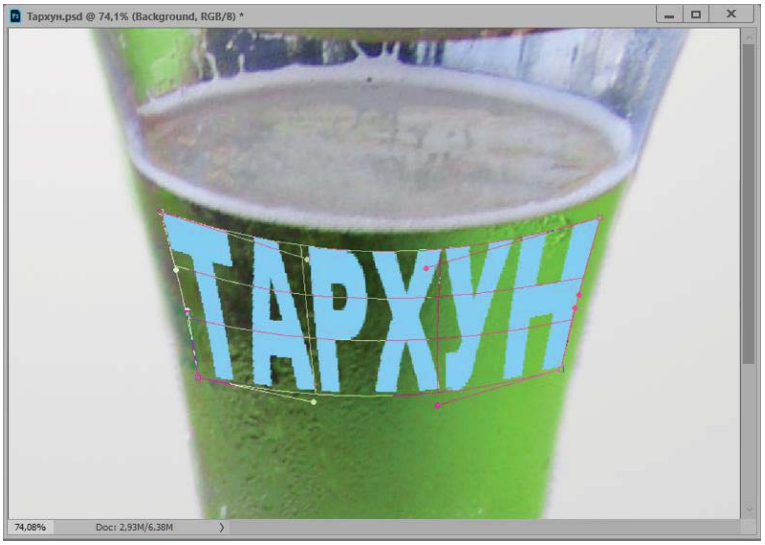


Fig.7.5. Overlaying the inscription with a complex curvature

7.5. Mesh-based warp

In the Adobe Photoshop graphics editor, there is also the possibility of a complex curvature of an object based on the imposition of a certain grid. This

operation is available with the **Edit/Puppet Warp** command. To transform the image, a grid is automatically built on which you can place anchor points and move parts of the object around these points, or transfer these points.

On the control panel in the **Mode** window, you can select three object deformation modes:

- **Default**;
- **Rigid** for strong levels of deformation;
- **Distortion** to switch to warp mode.

In the **Density** window, you can set the mesh density. The **Expansion** slider controls the ratio of the ambient mesh involved.

Exercise 7.6. Curvature on a grid

1. Return to the previous *Estragon.psd* image from the *Lesson 7* folder.
2. Let's try to overlay the same text using the **Edit/Puppet Warp** command.

Fig.7.6. Mesh-Based Lettering Curvature

3. The pointer in this mode will turn into a button to fix the position of the object parts. Install the first button on any letter of the inscription covered with mesh. After the second fixed point, you can move parts of the sign using the grid or change the position of the previous set point.
4. "Pin" the rest of the text using this mode (for example, as in Fig. 7.6), try also changing the deformation mode in the **Mode** window, the density and involvement of the mesh.

7.6. Free transformation

To perform multiple transformations, it is more convenient to use the **Edit/Free Transform** command. In this mode, you can perform any of the previously described transformations. You can use the **Shift** key to maintain proportions when scaling. When the pointer is outside the bounding box, it takes the form of a rounded double arrow. The **Ctrl** key allows you to move each anchor point separately.

For mirror reflection, you need to swap the opposite sides of the overall frame by dragging one of them over the other, grabbing it by the middle manipulator. To skew the area, drag the middle frame handle while holding down **Ctrl+Shift**.

Exercise 7.7. Free transformation

1. Select any object from previous images.
2. Execute the **Edit/Free Transform** command.
3. While holding down the Shift key, drag the top corner handle away from the center to slightly increase the proportions of the object.
4. Place the pointer outside the frame, for example, above its top edge. When it becomes a double-sided circular arrow, rotate the object.
5. To skew, press **Ctrl+Shift** and then click and drag the middle handle.
6. Hold down the **Ctrl** key and click on the corner handle and drag it to a new location.
7. Click on the control panel checkmark to complete the transformation.

Self creative work

After mastering the operations of selection, copying and transformation, create a creative work in the form of a collage, as in Fig. 7.7. To do this, use the original image with a rose. The image files are located in the folder *Lesson 7*: *Rose.jpg* and *Bouquet1.jpg*, *Bouquet2.jpg*. You can also use any other image as a source image, as well as apply your own compositional solutions for a collage (static or dynamic composition). When moving, it is recommended to use the **Smart Guides** mode.

Creative reference data: image width 15 cm, height 10 cm, resolution 300 pix/inch, color model RGB, background color other than white.

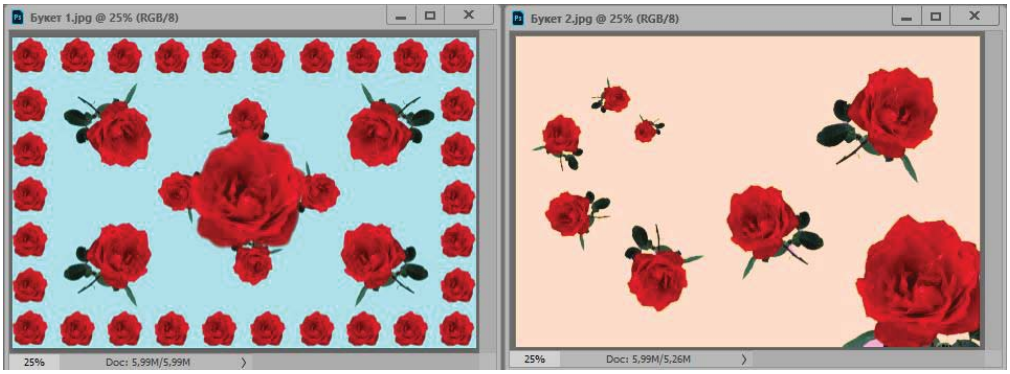


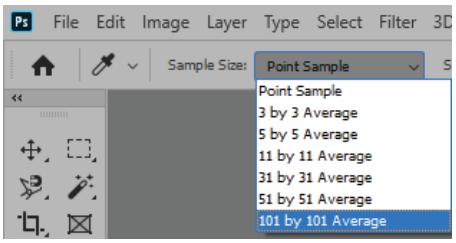
Fig.7.7. Compositional patterns of roses

8. CREATING THE COLOR. FILLING AREAS

In this chapter, we will look at color selection issues, as well as commands and tools for filling areas. The toolbar contains indicators of active colors. The front square is the **Foreground Color** indicator, the back square is the **Background Color** indicator.

The icon in the upper left corner (in the expanded panel) returns the default colors: black is the foreground color, white is the background color. The round arrow in the corner swaps them. Consider the possibility of choosing other colors in the Adobe Photoshop editor [1, 3, 6].

8.1. Choosing and creating a color



Color selection is done using the **Eyedropper** tool. If you click anywhere in the image with this tool, the foreground color indicator will change to the color of the pixel you clicked on.

If you move over the image without releasing the left mouse button, the primary color indicator will change color all the time. In the **Sample Size** rollout of the control panel, the **Point Sample** mode is selected by default. To enable averaging the color of neighboring pixels, you need to select one of the lower lines: averaging over a square of 3 by 3 pixels, up to 101 by 101 pixels.

To create a color, click on the primary color indicator, and the **Color Picker** window will appear on the screen (Figure 8.1, left). At the bottom right, you can select the color creation method in the respective models: **HSB, RGB, Lab, CMYK**.

The **HSB** perceptual color model is the most intuitive when choosing a color. It contains three components: **Hue, Saturation** and **Brightness**. **Hue** is a spectral color (red, orange, yellow, green, etc.); **saturation** - color intensity; and brightness determines the amount of light passing through the transparent colored outline. As a rule, in computer graphics, the colors in this model are given on the color wheel. In this case, the spectral hue is set by an angle and varies from 0° to 360°, the saturation corresponds to the radius and varies from 0 to 100%, the **brightness** varies within the same limits.

Click the **H** button to select this model. By moving the slider along the vertical color scale, you can smoothly change the hue of the composite color. In the color box on the left, you'll see the colors produced for that hue at different brightness and saturation values. To select a color from the color field, click on it. A marker will appear at this location, marking the current color.

The current color is reflected in the upper part of the square to the right of the scale. Below for comparison - the previous color. Please note that when you

smoothly change the color in some ranges, one or two icons with squares at the bottom appear next to this square from time to time.

A triangle with an exclamation point inside warns that the given color is outside the **CMYK** color gamut and cannot be adequately printed. In the box next to it is the closest color from the **CMYK** model. Clicking on it will select a safe color.

The cube icon warns that the color is not a web-safe color and will not display correctly in some browsers. A suitable color is suggested in the box.

If you select the **RGB** model, the color bar will reflect the intensity of the selected base color. Each of the primary colors varies from 0 to 255, i.e. with the number of shades 256 at a bit depth of 2^8. In order to select a spectrally pure red color, you must set the following parameters in the counters: **R=255, G=0, B=0**.

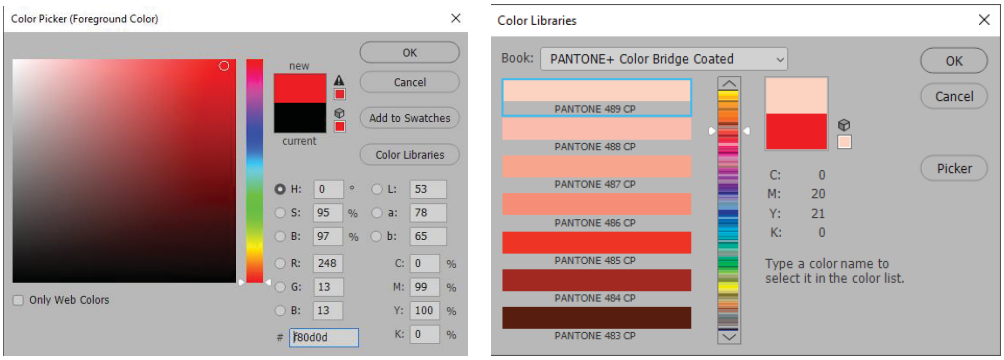


Fig.8.1. Color selection window **Color Picker**

In the **Lab** color model, the color is specified by the **a** and **b** components in the range from -128 to 127, the **L** component determines the brightness component of the color from 0 to 100%. Usually the components **a** and **b** divide the color wheel into two ranges.

In the **CMYK** color model and in order to select pure cyan, the following parameters must be set in the counters: **C=100%, M=0%, Y=0%, K=0%**. Other primary colors are set in the same way.

If you paid attention, then the color in computer graphics can be set (and reproduced in another device) knowing only the numerical values of its components. This moment is very helpful for people with distorted color perception (especially men with color blindness).

In the color selection window, using the **Color Libraries** button, you can access libraries of standardized spot and compound colors (Figure 8.1, right). In the **Book** window, a set of a specific color library is selected. The composition of each standard color is presented in **CMYK** and **Lab** models. You can use printed color charts and have an accurate idea of how your chosen color will look when printed.

Exercise 8.1. Color creation

1. Open the *Primary Colors.jpg* image from the *Lesson 8* folder.
2. In this image (Fig. 8.2), 6 primary colors of the **RGB** and **CMYK** models are presented. As you can see, the same color has different shades depending on the color model (belonging to the inscriptions). In **RGB**, they are brighter, unlike the **CMYK** model.

Fig.8.2. Primary colors in **RGB** and **CMYK** models

3. Check the composition of colored spots. To call up the **Color Picker** dialog box, click on the base color indicator. Click with an eyedropper on the color spots one by one (in composition, they may not be entirely accurate due to overwriting of the file and color model).
4. To select a spectrally pure green color in the **RGB** model, set the parameters: **R**=0, **G**=255, **V**=0. Click **OK**. For comparison, set a pure green color in the **CMYK** model with the following parameters in the counters: **C**=100%, **M**=0%, **Y**=100%, **K**=0%.
5. In the square to the right of the scale, compare the shades of the created greens. Create the rest of the primary colors in the same way.

8.2. Color and Swatches Palettes

To select a color, you can also use the **Color** and **Swatches** palettes (Fig. 8.3). They can be called with the **Window/Color** command. In the upper left corner of the **Color** palette, you see the same active color indicators as in the toolbar.

Another way to select a color in the Color palette is to click anywhere on the color bar at the bottom of the palette. By default, these are the component **RGB** models, but you can select other models from the palette menu. The commands located at the top of the menu control the operation of the sliders, at the bottom of the menu the model of the color scale is selected.

Notice the black and white stripes on the right side of the palette window. They allow you to select white and black colors if you do not want to reset the selected foreground and background colors on the toolbar.

The **Swatches** palette contains some set of frequently used colors where you can save your favorite colors so that they are always at your fingertips. To select one of the colors of the catalog as the main one, you need to click on it.

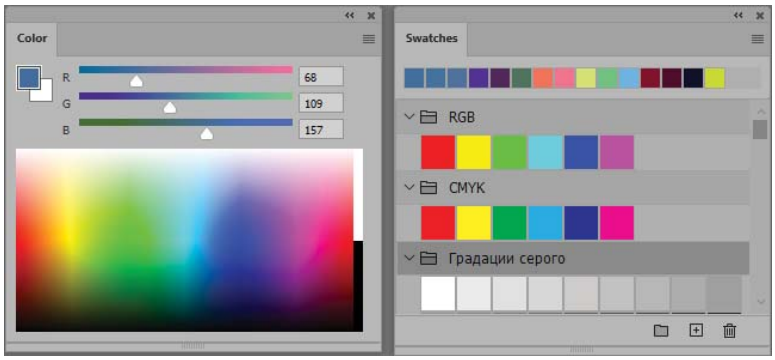


Fig.8.3. Palettes **Color** and **Swatches**

To update a catalog, select the appropriate catalog from the menu. The modes of displaying color samples (with the name) are also configured there. In the menu you will find many directories with the names of the standardized color libraries. Use the menu bar to restore default color swatches **Restore Default Swatches**.

Exercise 8.2. Color catalogs

1. Open the **Swatches** palette and place it on a free field.
2. Enter the palette menu, select sets of standard libraries: **RGB, CMYK**, **Grayscale** and other ready-made sets.
3. In order to see the weight of the catalog of standard colors, stretch the palette diagonally to the right and down. To restore the default directory, select the menu bar **Restore Default Swatches**.

4. Outside the palette, the pointer turns into the **Eyedropper** tool and click on your favorite color (from any image). The new color will appear on the selected line of the library.

8.3. Filling areas

After we have already learned how to choose and create colors, we can begin to put this knowledge into practice. Let's look at the commands for filling and stroking areas. It should be clarified that the fill is the coloring of the inside of the area, and the stroke is the colored line around the area.

Areas are filled with the **Edit/Fill** command, or with the **Paint Bucket** and Gradient tools. The **Fill** command fills the entire selection with a color or pattern.

In the dialog box, use the Use rollout to select a color or fill pattern: **Foreground Color, Background Color, Color, Content Aware, Pattern, Black; 50% Gray** and **White**.

When you select a pattern fill at the bottom, the **Custom Pattern** scroll is activated, and when opened, a palette of patterns appears. The **Opacity** field sets the transparency of the coloring.

In the **Mode** rollout, you can select a variety of blending modes. They are also used for all the drawing, adjustment and blending tools of the various layers of an image.

8.4. Color Blending Modes

Different blending modes allow you to create subtle, sometimes unexpected color effects. The new paint can modify the old paint according to a certain mixing algorithm. In this version of the Adobe Photoshop editor, there are the following color blending modes:

- **Normal** - replaces the previous color without blending;
- **Dissolve** - the new color is distributed between the pixels with the old color;
- **Behind** - used for multi-layered images with a transparent background;
- **Clear** – old paint cleaning mode;
- **Darken** - only those pixels that are lighter than it are replaced with a new color;
- **Multiply** - the new color is multiplied by the old one, the result is always a new color, darker than the original colors;
- **Color Burn** - the darker the new color, the greater the darkening;
- **Linear Burn** - the components of each color channel is darkened;
- **Darker Color** - remains the darkest color when mixed;
- **Lighten** – only pixels that are darker than the new color are replaced with the new color;
- **Screen** - a lighter shade than both original colors is obtained;

- **Color Dodge** - the image is brightened depending on the new color and old colors;
- **Linear Dodge** - the color of the lower pixels is lightened to the brightness of the new color;
- **Lighten Color** - remains the lightest color when mixed;
- **Overlay** - increases the contrast and saturation of the image;
- **Soft Light** - old colors are muted and shifted towards the new color, the contrast is reduced;
- **Hard Light** - the same effect, but the colors shift more towards the new color;
- **Vivid Light** - color changes the contrast of the previous color;
- **Linear Light** - color changes the brightness of the original color;
- **Pin Light** - lightens or darkens the lower color depending on the brightness of the new color;
- **Hard Mix** - dark color bleaches light colors, darkens dark colors;
- **Difference** - new and old colors are replaced by the difference between them;
- **Exclusion** - a similar effect, but giving a less contrasting image;
- **Subtract** - layer darkening mode, the blending color is subtracted from the old color;
- **Divide** – the negative of the new color is subtracted from the old color;
- **Hue** - the old color is replaced by a new hue, the brightness and saturation remain the same;
- **Saturation** - the saturation is taken from the new color, while the hue and brightness remain the same;
- **Color** - only brightness remains from the old color, saturation and hue are taken from the new color;
- **Luminosity** - only brightness is taken from the new color, hue and saturation remain the same.

Exercise 8.3. Fill with color blending

1. Create a new document with a white background.
2. Select a tint of cyan as the foreground color and a tint of pink as the background color.
3. Create a rectangular selection with the appropriate tool and fill it with the foreground color.
4. Next, create an elliptical selection crossing the rectangle, as in Figure 8.4.
5. Call the command for filling **Edit/Fill** and fill the elliptical area in different modes with pink background color.
6. ***Do not forget,*** *before each new fill, you need to go back* through the history to the elliptical selection line.
7. After checking all the blend modes, you will feel their difference and the resulting effects.

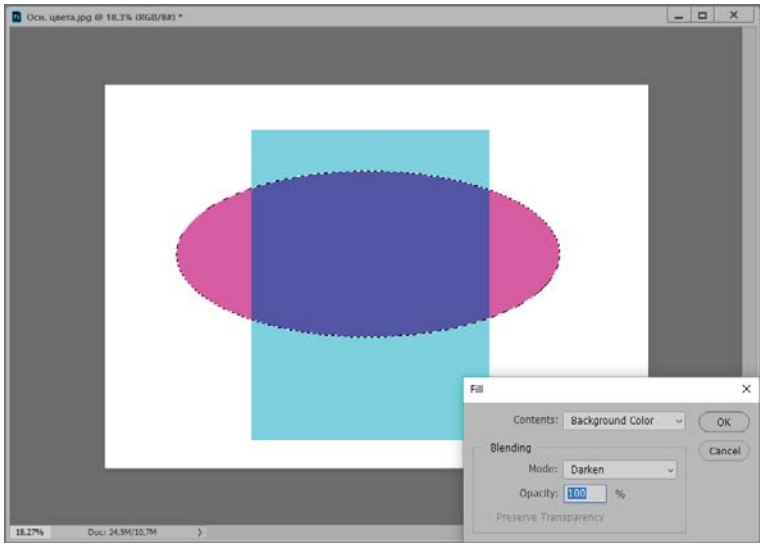


Fig.8.4. Fill with different color blending modes

Self-study

Using the fill command, create an image similar to the image in Figure 8.2 *Primary Colors.jpg*. To do this, you need a document with a white background, then build an elliptical selection on a new layer. Select a pure red color in the RGB model, fill the elliptical selection. Create a new layer and repeat this operation for other primary colors. The curious will be able to find the same colors ready-made in the palette with the color catalog.

8.5. Paint Bucket Tool

The **Paint Bucket** tool paints adjacent areas based on the color of the specified pixel. The principle of operation resembles a magic wand (**Tolerance** parameter), and the rest of the setting does not differ from the settings of the **Fill** window.

In the **Opacity** field of the control panel, you can control the opacity. The **Mode** scroll controls the blending modes of the new and old colors.

Exercise 8.4. Piglet with a tattoo

1. Open the familiar *Piglet.jpg* document from the *Lesson 6* folder.
2. Decorate this pink creature. To do this, select the color for the tattoo to your liking in the main color selection box.
3. Draw a selection line with the **Lasso** tool.

4. Select the **Paint Bucket** tool, on the control panel set the mode to Contiguous and click inside the selection.

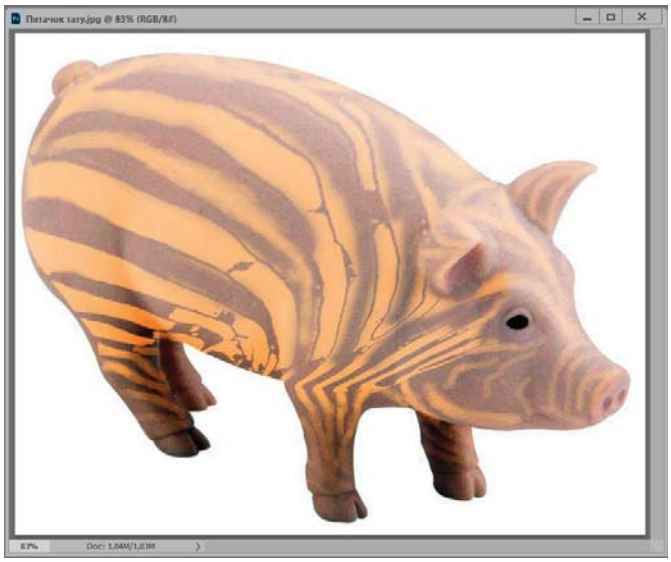


Fig.8.5. Coloring with the **Paint Bucket** tool

5. The strip will be colored, since the fill is limited to the selected area, we got one colored strip.
6. Next, create a new strip and paint in the same way. To enhance the effect, you can try different color blending modes when painting (as well as other tools).
7. As a result of your efforts, **Piglet** will be able to take on the war paint of a wild boar, for example, as in Fig. 8.5. This image is in the *Lesson 8* folder called *Piglet Tattoo.jpg*.

8.6. Gradient fill

Let's move on to more complex fills. A gradient fill looks very impressive, which is a smooth transition between two or more colors. Instead of one of the colors, transparency can also be used.

The gradient transition between colors is created by the **Gradient** tool in the direction you specify by swiping the gradient vector. The direction of this vector determines the orientation of the gradient, and its start and end points define the beginning and end of the color transition.

To draw a gradient vector, click at the start point of the transition and drag the pointer to its end. The vector does not have to be entirely inside the image, part of it or even both ends can protrude beyond the edges of the image.

To select the desired type of fill, you must click on the corresponding button on the control panel: linear gradient, radial gradient, angular gradient, reflected gradient, rhombic gradient (Fig. 8.6, left).

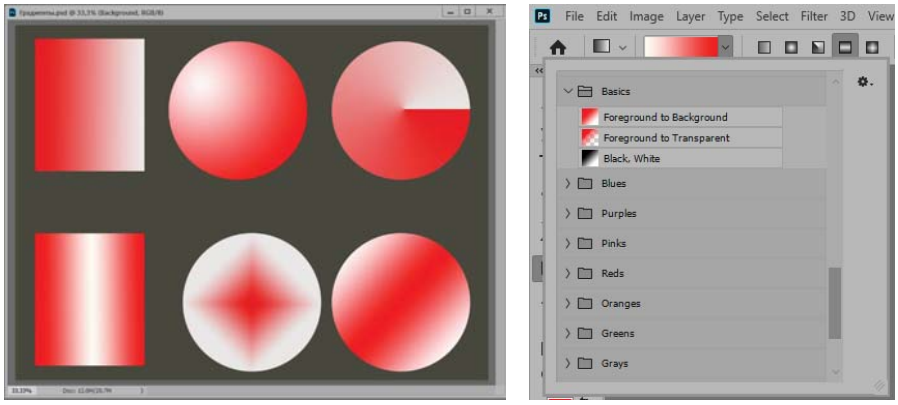


Fig.8.6. Different types of gradient fills and a gradient palette

The **Opacity** field sets the degree of transparency of the gradient fill, and the **Mode** rollout sets the color blending mode.

The Reverse checkbox swaps the fill colors by 180^0. If the Dither checkbox is enabled, then when creating a gradient, a color raster is used at the border of two shades, which prevents stripes from appearing in this place when printed. Checking the Transparency checkbox allows you to work with gradients that have transparent areas. If there is no selected area in the image, the fill fills the entire document, in the case of a selected area, only it is filled. Also, if there are multiple areas, the fill fills them all as if they were one area.

Open the rollout next to the current gradient box in the control panel. At the same time, a palette of gradients will appear on the screen (Fig. 8.6, on the right). Here are different styles of gradients that differ from each other in the colors involved in them, the number and distribution of color transitions.

Review the names of these gradients by hovering over them. You will see that most of them use specific colors.: **Black, White, Red, Green, Foreground to Background**. Several other names mention the word **Transparent.** These are gradients where transparency is used instead of one of the colors, usually white. To prevent these transparent areas from being replaced with white, and you need to check the **Transparency** checkbox in the control panel.

Exercise 8.5. Gradient fill

1. Create a new document with a white background.
2. Select a tool for rectangular and elliptical selections and create an appropriate gradient filled area, as in Fig.8.6.

3. Select **Black, White** as the gradient style, check the **Reverse** icon. Fill the selected areas one by one, moving the selection to a new place.
4. Try isolating the white background and filling it with a more eye-catching gradient style.

To create a new gradient, click on the gradients rollout (on the window itself). In this case, the **Gradient Editor** dialog box will appear on the screen (Fig. 8.7). At the top of it, you will see all the gradients from the current palette and you can choose any of them as the basis for creating a new gradient. To do this, just click on the desired square. In the **Name** field, you must enter a name for the new gradient.

Below is a ruler where you can control the appearance of the gradient by creating, moving and changing the color of the markers. The color markers are located below the ruler. Between the markers are midpoints - small rhombuses, indicating the place where two adjacent colors are mixed equally. They become visible only when the adjacent color marker is activated.

At the top of the ruler are the transparency markers. Markers and midpoints can be dragged and the distribution of colors in space changes. If you combine the middle point and the marker, then the border between the colors will become sharp in this place. To set a marker or midpoint more precisely, you can enter their location numerically in the Location field at the bottom of the window.

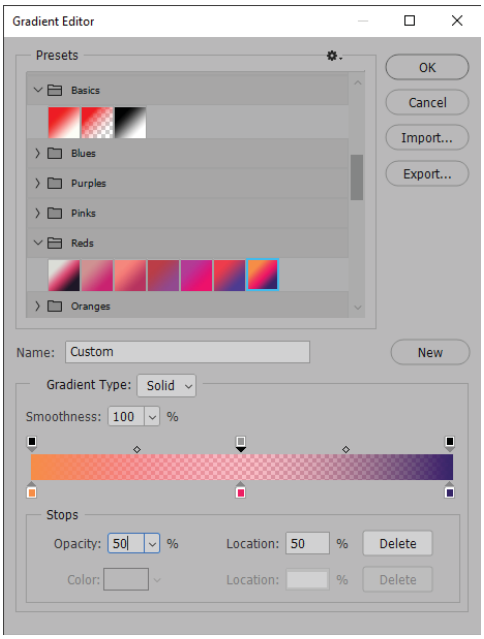


Fig.8.7. **Gradient Editor** window

A marker can be assigned a foreground, background, or any other color by clicking on a color sample through the **Color Picker** window. To edit the transparency marker, click on it once, and then enter the desired opacity value in the **Opacity** field, as in Figure 8.7.

To create a color marker, just click in the right place at the bottom of the ruler, and to create a transparency marker, at the top of the ruler. To delete an unwanted marker, click on it and then on the Delete button. And now let's create a new patriotic gradient fill.

Exercise 8.6. Creating a patriotic gradient

1. Select the **Gradient** tool with a document open.
2. Double click on the **Gradient Scroll** to open the **Gradient Editor**.
3. Select a standard gradient with four bottom color markers in the palette.
4. Specify the colors of the stripes through the selection window: white, blue, red, in the order in which these colors are located on the national flag of Russia.
5. In order to make the borders sharp, move the white marker to the 33% position to the right, and move the blue color there. We combine them, creating a sharp border between white and blue.
6. Similarly, create a blue-red border. You can use another marker if necessary.
7. As a result of your efforts, you will get a new gradient, as in Figure 8.8. Save the new gradient with the appropriate name in the gradient palette.
8. Fill the open document with a new gradient from top to bottom, choosing a linear fill type. Try also to create two more new gradients: with smooth borders and with transparent stripes.

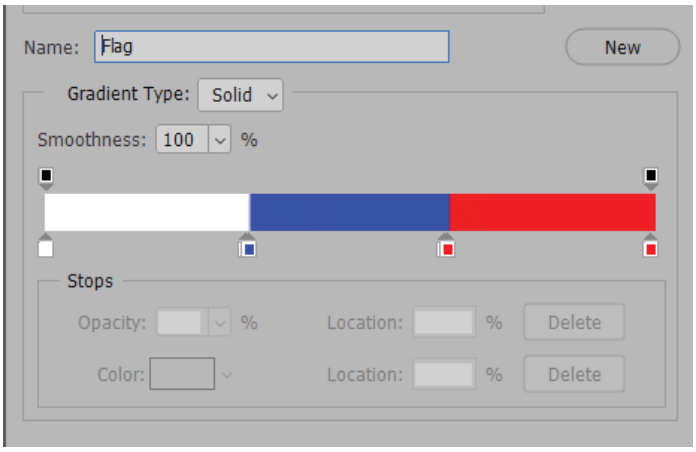


Fig.8.8. New gradient in the form of the flag of Russia

Self creative work

As a creative challenge, try to create an image using a gradient fill (more brush and finger tools), as in Figure 8.9. This image is in the *Lesson 8* folder called *Sunset in Durso.jpg*.

Fig.8.9. Seascape based on gradient fill

8.7. Stroke area

You can outline the selected area using the **Edit/Stroke** command. In the dialog box (fig.8.10, left) the stroke thickness is set in the **Width** field. The **Color** field defaults to the base color.

If you want to stroke in a different color, click on the color box. Using the **Color Picker** window, you can set any other color.

The Blending section contains the **Mode** and **Opacity** blending options for the old and new colors.

In the **Location** section, you can choose how the stroke should be positioned in relation to the border of the selected area. In Fig.8.10, on the right, all three modes are used for the elliptical region:

- **Inside** - the entire stroke is inside the selected area;
- **Center** - the border of the area is located in the center of the stroke;
- **Outside** - the entire stroke is outside the selected area.

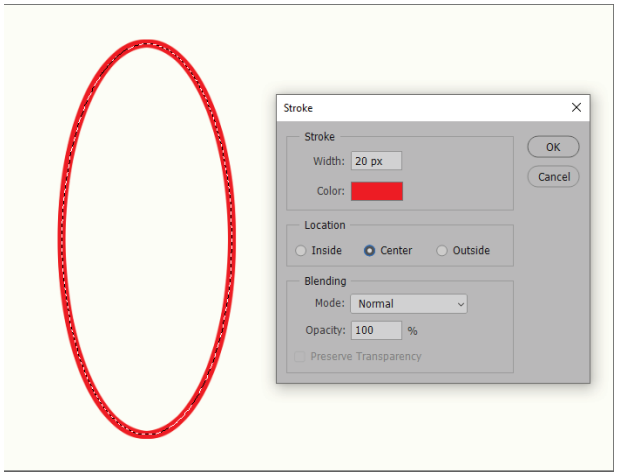


Fig.8.10. Stroke Adjustment Window and Apply Stroke

Let's do an exercise to create a path using a selection stroke.

Exercise 8.7. Stroke and fill selection

1. Create a new document with a white background.
2. Using the **Rectangular** and **Elliptical** Selection Tools, create a compound shape (using Boolean operations) in the style of an *Egyptian cross* (or other shape) using a lasso (Figure 8.11).
3. For a stroke, execute the **Edit/Stroke** command. In the dialog box, set the thickness of the thin stroke.
4. Select the position of the outline relative to the selection. Click the **OK** button.
5. To fill the selection, as in Fig. 8.11, use the appropriate command.

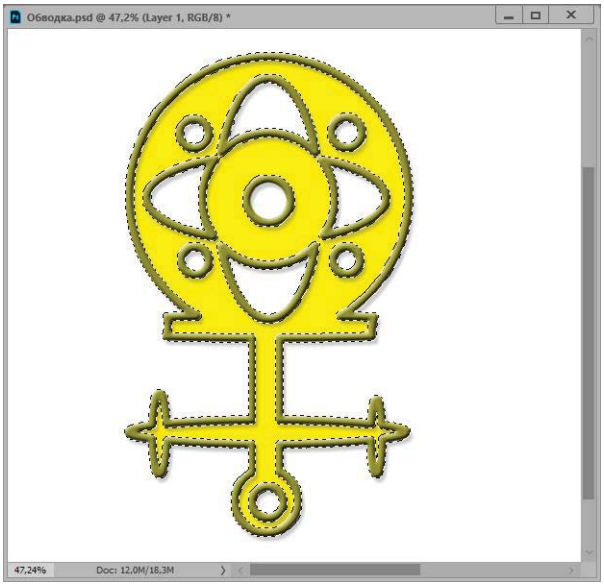
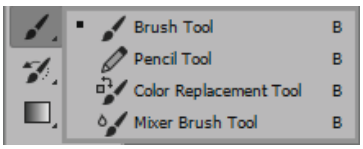


Fig.8.11. Stroke and fill selection

9. TOOLS FOR PAINTING AND REMOVING

9.1. Painting tools



Using the painting tools, you can draw freeform lines and textures. There are the following tools for drawing: **Brush** (also **Airbrush** mode for the brush), **Pencil, Color Replacement, Mixer Brush** [3,7].

The **Brush** and **Pencil** tools use the main color when drawing, but create lines of different textures. Drawing with these tools is like drawing with real tools on a piece of paper. Click and hover over the canvas. The line will exactly repeat all your movements.

Drawing tools have common working methods. If you need to make part of the line straight, release the mouse button at its beginning and, holding down the **Shift** key, click at its end. Then you can continue drawing in the usual way. In order to draw a polygon in this way, click at its first point, and at the rest - while holding down the **Shift** key.

If you draw a line while holding down the **Shift** key, it will go strictly horizontally or vertically. If then, releasing this key, move the line away from the chosen direction, then each time you press **Shift**, the line will return to it. To make it clear to you what we are talking about, do the following exercise.

Exercise 9.1. Fossil fish

1. Refresh the workspace with the **Window/Workspace/Reset Basic-1** command.
2. Create an image with a white background.
3. Select the ellipse with the **Elliptical Marquee** tool (Fig.9.1, right) and fill it with a light tone and deselect it.
4. Set the default colors, that is, black for the base. Select the **Pencil** Tool. It should be emphasized that this line must be drawn in one motion without releasing the mouse button.
5. Holding down the **Shift** key, drag the pointer from point 1 to point 2. The line will be drawn strictly horizontally.
6. At point 2, release **Shift** and move the pointer along the edge of the ellipse.
7. At point 3, press the **Shift** key again, but keep moving the pointer along the ellipse. You see that the line does not go at all where you are leading the pointer (that is, along the contour of the ellipse), but continues the first horizontal line.
8. At point 4, release the **Shift** key and move the pointer further, the line will again follow the pointer along the outline of the ellipse.

9. In the same way, continue to draw the entire line to the end, shown in Fig.9.1. Try the same technique for a vertical line.

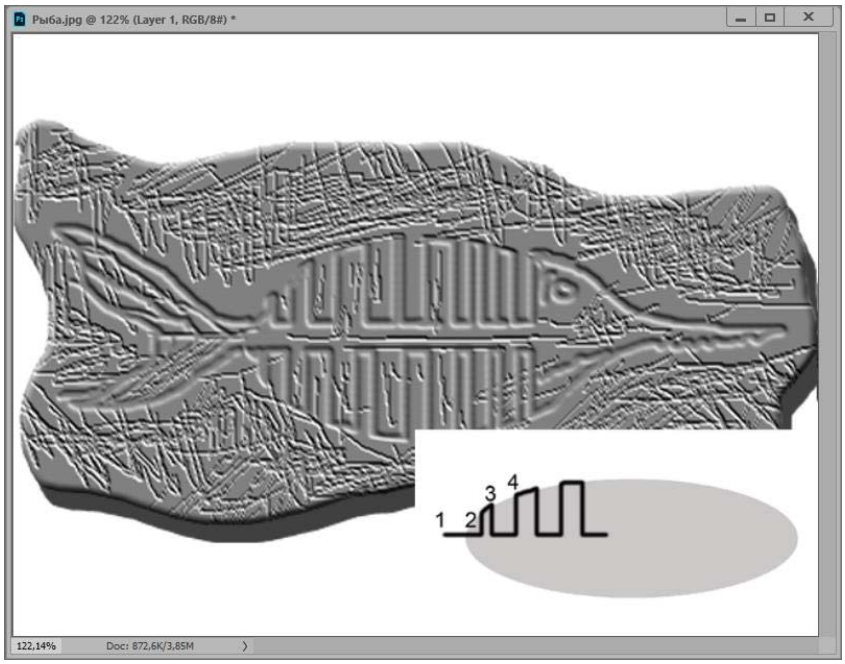


Fig.9.1. Drawing with the **Shift** key

Self-study

Based on the considered method, an image of a fossil fish was created in Fig. 9.1, the background (the document is located in the *Lesson 9* folder called *Fish.jpg*). For this, another relief filter was used. Try to create an image like this.

9.2. Brushes palette

The shape of the brush is selected in the brush palette. Open the **Brush Preset** window on the brush control panel (Figure 9.2, left). In this window, you can select the type of standard brush and change its size in pixels. Each line contains an image of a brush. The pencil has a similar setting, but its lines have sharper edges.

Brushes differ not only in size, but also in shape. Among them there are brushes with round clear or blurry edges, as well as special sets in the form of a butterfly, snowflake, leaves, etc. All these sets are located in the **Brush Preset** rollout menu, where you can also restore the default set with the **Reset Brushes** command.

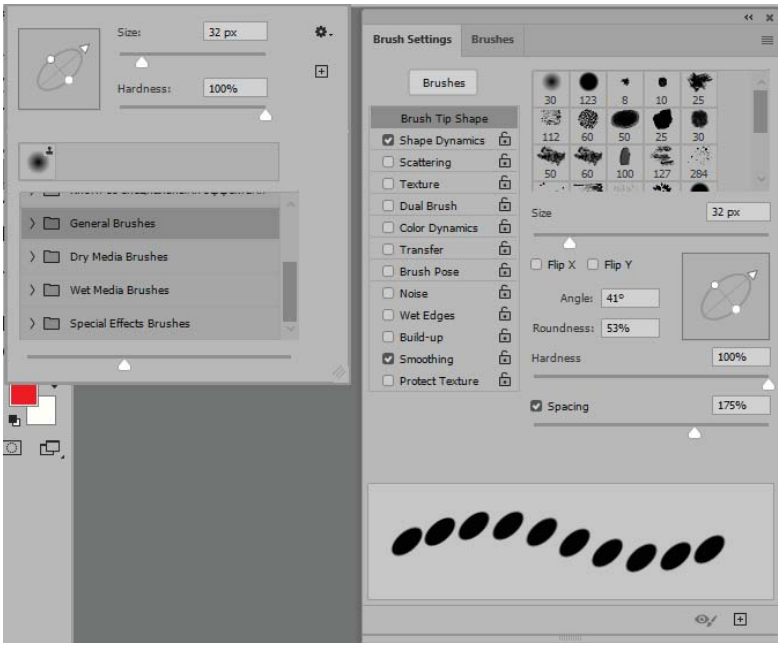


Fig.9.2. **Brush** Palette and **Brush Editing** Window

The corresponding parameters are set in the **Mode and Opacity** rollouts. The **Flow** parameter sets the percentage of ink concentration. The button with the image **Airbrush** allows you to use the brush in airbrush mode, if you hold the airbrush at one point, the spot will begin to blur. The button on the control panel **Set symmetry options for Painting** allows you to set different symmetry modes for the shape of the brush.

Next to the brush selection window in the **Control Panel** is the **Brush** palette icon. It can also be called from the **Window** menu. After clicking on it, a palette of brushes will appear, this palette is shown in Fig. 9.2, on the right. In the **Brush Presets** tab, you can select the size and type of standard brushes.

You can edit existing brushes and even create your own and save them to the palette. To edit a brush, first select it, and go to the **Brush Tip Shape** line, as in Figure 9.2. In the dialog box, you can control the following options for the round shape brush:

- **Size** - brush size;
- **Hardness** - controls the blurring of the brush;
- **Spacing** - sets the interval between intermittent forms;
- **Angle** – angle of inclination of the ellipse;
- **Roundness** - the ratio of the sides of the ellipse.

You can control the parameters either by entering numerical values in the fields, or by moving the sliders. To give the brush an oval shape, click on one of the diametrically located points in the image of the ellipse and drag it closer to

the axis. To set an angle, click on the axis of the circle with an arrow and rotate it to the desired angle. There are other settings for brushes with non-circular shapes. In the brush set, you can also choose an airbrush separately. Once you've set the brush to your liking, you can paint with it. Through the menu, you can write a new brush to the palette.

Exercise 9.2. Selecting and creating a brush

1. Create a new document.
2. Select a rectangular area in it almost the entire canvas. Select the **Brush** tool with default colors.
3. Open the brushes palette with the **Window/Brushes** command, and select any brush.
4. Click outside the selected area with the pointer and move the pointer, without releasing the mouse button, across the entire canvas. Note that the line is only visible inside the selected area.
5. Activate the pencil and airbrush mode in turn, choosing the same brush for them. Draw with them and compare the resulting lines at different magnifications.
6. Press the **Del** key to quickly clear the selected area of the canvas from everything drawn and try painting with other brushes.
7. To create a new brush, select the **Brush** tool, select a soft brush from the brush palette.
8. Flatten the brush to give it an oval shape. Click on the top point of the circle and drag it down. Click anywhere on the resulting ellipse and rotate it.
9. Paint with a brush. Click it on a blank area of the document to see the shape of the brush stroke. If it's small, increase its diameter with the **Diameter** slider and paint again with the brush on the canvas.
10. If the brush suits you and you want to write it to the palette. Then go to the palette menu, select the **New Brush** line and in the dialog box set the name of the new brush.

Brushes with different shapes are found in the **Brushes** tab menu of the **Brushes** palette: **General, Special Effects, Assorted Brushes, Calligraphic Brushes** and others. To download a new set of brushes, just click on its name and confirm the download. To restore the original palette used by default, select the **Restore Default Brushes** command.

When working with large brushes, the fact that the pointer is smaller than the line itself often interferes. You can set the pointer to look like a brush stroke. This makes it much easier to draw or edit an image. The shape of the brush display can be selected with the command **Edit/Preferences/Cursors**.

9.3. Painting with strokes

Each of the drawing tools has its own individual setting option. For the brush, these are modes in the **Wet Edges** brush palette, for the pencil, the **Auto-Erase** checkbox. If you set it, then when you click again on an already drawn line, it will draw not the main color, but the background color, that is, as if it deletes what has already been drawn. For the brush, you can turn on the **Wet Edges** checkbox, when the drawing turns out to be as if drawn on wet paper.

For all drawing tools, you can set the paint dissolution mode. At the same time, real drawing with a brush, drawing with a stroke is modeled. To set the mode, select the **Shape Dynamics** line in the brush palette. In the **Control** window, under the first **Size Jitter** slider, set the fade mode to **Fade**. In the spinner next to it, set the length of the stroke.

In the **Transfer** line of the brush palette in the **Control** window, under the **Opacity Jitter** slider, select the Fade mode and set the start of opacity in the counter next to it.

You can set the brush to a two-color mode (“dirty brush”), when the color of the line gradually transitions from the active color to the background. In the **Color Dynamics** line under the **Foreground/Background Jitter** slider in the **Control** window, select the **Fade** mode, and in the counter next to it, set the color transition distance. To enable this mode, check the **Apply Per Tip** checkbox at the top of the tab.

Exercise 9.3. Brush with strokes

1. Create a new document 15x10 cm, 300 pix/inch.
2. Select a foreground color in red tones, a background color in cyan tones.
3. Select the **Brush** tool, open the brushes palette and choose a soft *45 px* brush.
4. Hold down the **Shift** key and draw a straight line. At the same time, the brush draws continuously, which is not entirely natural.
5. To create a stroke, select the **Shape Dynamics** line in the brush palette. In the **Control** window, under the first Size Jitter slider, set the fade mode to **Fade**. In the counter next to it, set the stroke length to 60.
6. 6. Holding down the Shift key, draw a second straight line under the first line, the line is already in the form of a “tail”, you get a stroke.
7. To set the "dirty brush" mode, go to the **Color Dynamics** line of the brush palette. Under the **Foreground/Background Jitter** slider in the **Control** window, select Fade mode, in the spinner next to it, set the color transition distance to 30. Also check the **Apply Per Tip** checkbox at the top of the tab.
8. Hold down the **Shift** key and draw a third line from the bottom. The brush will create a stroke of the original length, but with a transition from red to blue in the middle of the stroke.

9. For the stroke transparency mode, similarly select the necessary settings in the **Transfer** line under the **Opacity Jitter** slider with an opacity length of 45.
10. Check out the rest of the brush palette modes.

Exercise 9.4. Creating a new brush "Double-headed Eagle"

1. The Adobe Photoshop editor allows you to create a new custom brush from any filled path or stroked area.
2. Open the image *Eagle.jpg* from the *Lesson 3* folder. In this image, select one eagle with a magic wand (or other suitable tool).
3. Create a new layer and outline the selected area (the shape of the double-headed eagle) with a thin outline using the **Stroke** command.
4. To create a brush from this path, select the command **Edit/Define Brush Preset**, you can set the name in the dialog box.
5. You will find this brush at the end of the list of the standard set of brushes. Figure 9.3 shows examples of using this brush in various modes.

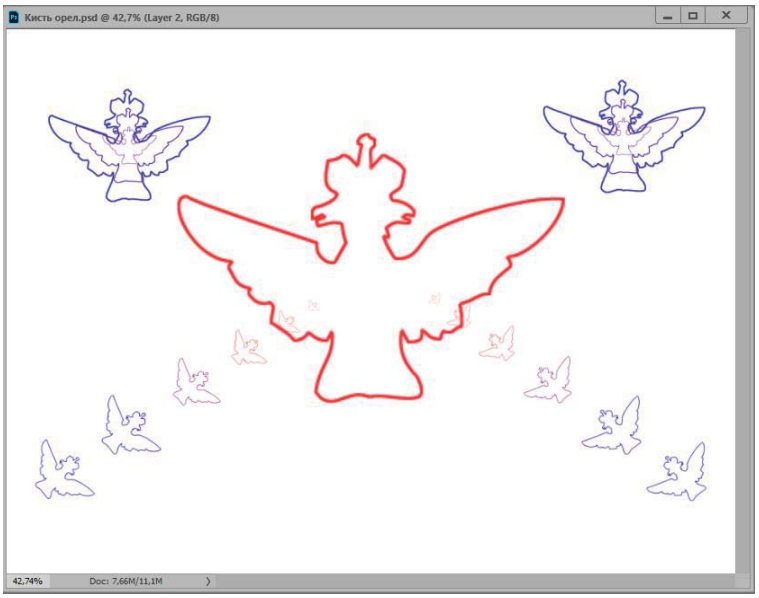


Fig.9.3. New brush "Double-headed eagle"

Self-study

Using a brush in different modes, draw the images shown in Figure 9.4. These images are located in the **Lesson 9** folder named **Rug.jpg** and **Flower Brush.jpg**. I wish you patience and success!

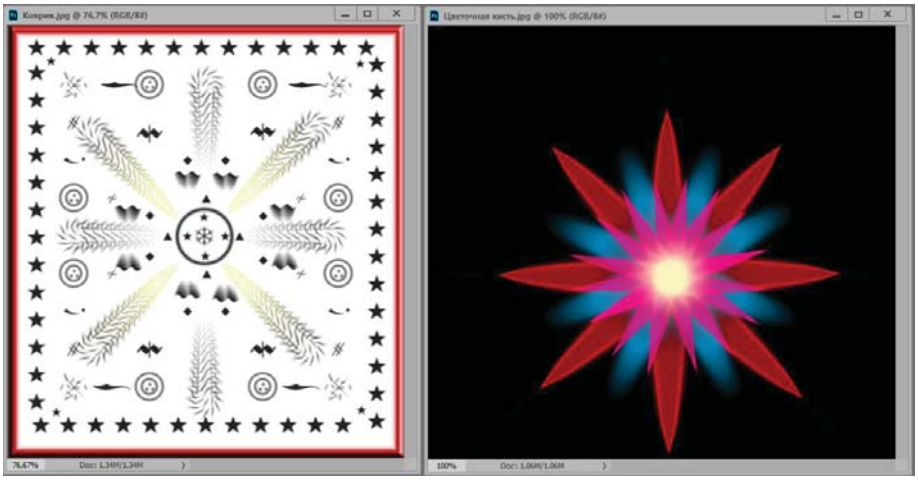


Fig.9.4. Rug and flower created with brush

9.4. Color replacement tool

The brush and pencil set includes the **Color Replacement** tool. This tool allows you to replace a color in an image with the base color, taking into account the blending mode.

On the toolbar in the **Mode** rollout, color blending modes are set: **Hue, Saturation, Color, Luminosity**. Sampling icons define color capture modes: **Continuous, Once, Background Swatch**.

In the **Limits** rollout, options for replacing the captured color are set: **Discontiguous** - the color is replaced everywhere, **Contiguous** - the color is replaced only in adjacent areas, **Find Edges** - preserves the border between colors.

The **Tolerance** counter sets the number of shades of the selected color as a percentage.

Exercise 9.5. Blue tomatoes

1. Open the *Blue Tomatoes.jpg* image from the *Lesson 9* folder.
2. The image consists of two frames: on the left, the tomatoes are ripe, red, on the right, the same tomatoes, but not quite inspire confidence in color.
3. To make the tomatoes colorful, select the **Color Replacement** tool.
4. Set the main color to black, set the following parameters on the control panel: brush size 50 pix, set **Color** in the **Mode** rollout, **Continuous** mode in the **Sampling** icon, **Contiguous** in the **Limits rollout**, **Tolerance** value within 50%.

5. Paint over red tomatoes with a brush, they will turn gray. To dye a tomato blue, set the base color to a shade of dark blue.
6. Repaint the rest of the tomatoes in other colors (Fig. 9.5). Try changing the color blend mode. The result will be different from the original color.

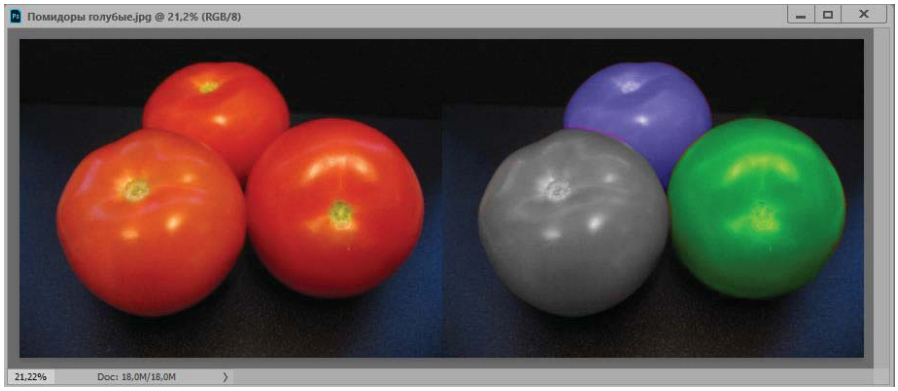


Fig.9.5. Repainting a tomato

9.5. Blending brush

The **Mixer Brush** tool, when working, corresponds to a real painting technique, mixes colors on a canvas, combines the colors of a brush, substrate, uses paints of different humidity.

On the toolbar in the **Current Brush Load** window, color selection modes are set: **Load Brush** from color samples, **Clean Brush** to remove paint from a brush. Subsequent icons execute commands: **Load and Clean**. The list of the blending options window presents various combinations of the brush: from cold dry **Dry to wet Moist**, from wet **Wet** to very wet **Very Wet**.

The **Wet** slider controls the amount of paint the brush takes from the canvas. The **Load** slider determines the amount of ink loaded into the tank. The **Mix** slider controls the proportion of canvas ink to tank ink. At 100% all paint is drawn from the canvas, at 0% all paint is drawn from the tank.

Check the described features of the **Mixer Brush** tool in a new document, it is advisable to use a blank white sheet and compare the results with a transparent layer.

This tool is the most suitable for creating computer painting using a graphics tablet.

Self-study

With the help of a brush, draw the image shown in Figure 9.6. This image is located in the *Lesson 9* folder called *Strokes.jpg*, some filters were used during the execution.

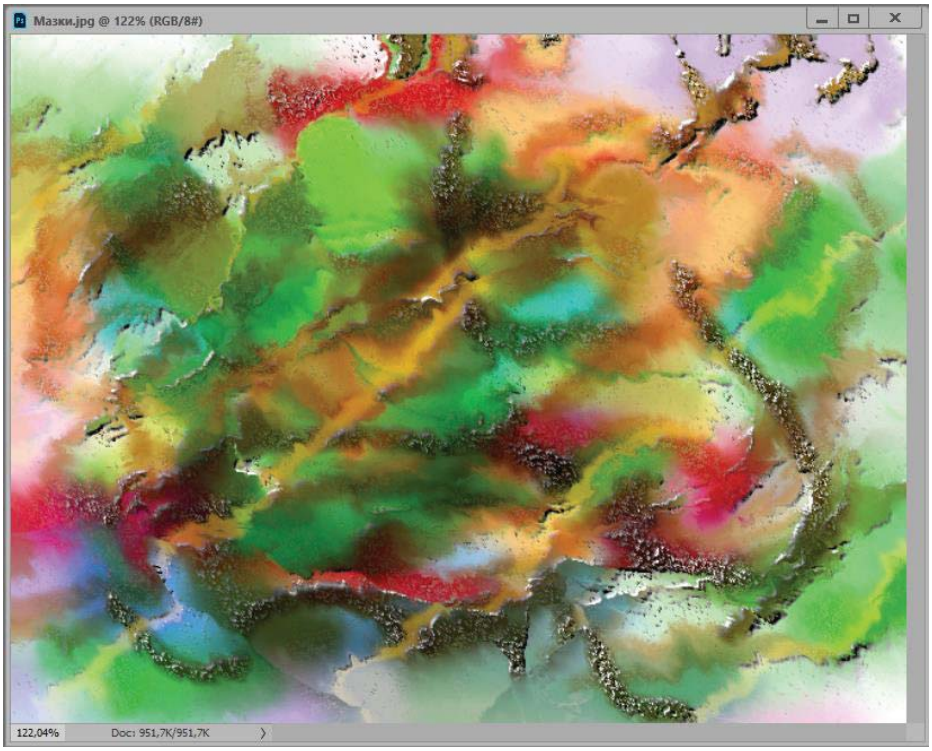
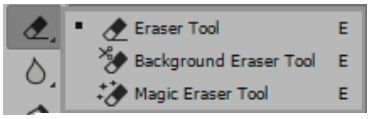


Fig.9.6. Painting brushstrokes on canvas

9.6. Removing image fragments



Three tools are used to remove image fragments:

- **Eraser** - draws with a background color in a single-layer image, makes the deleted pixels transparent on other layers;
- **Background Eraser** - makes pixels transparent, works in the background removal mode while maintaining the main color;
- - **Magic Eraser** - makes all pixels of a given color transparent or colors them with a background color.

The **Eraser** tool is used to remove small or complex portions of an image. Deletion consists in the fact that the pixels that the eraser has passed over are painted with a background color or become transparent. The background color is only used when deleting in a single layer image.

The eraser can draw like a brush, pencil or airbrush. In addition, it can remove the image in square blocks. The eraser mode is selected in the **Mode** rollout: **Brush, Pencil, Block**, there is also an **Airbrush** mode at the end of the line. The opacity value is set using the **Opacity** slider. In all modes, you can erase the

image to the state recorded in the **History** palette. To do this, click on the brush icon corresponding to the protocol line, check the **Erase to History** checkbox, and then drag the eraser over the image. The button on the control panel **Set symmetry options for Painting** similarly sets the brush shape symmetry modes.

When working in brush, pencil or airbrush mode, you can control the dissolve mode using a well-known brush palette.

Exercise 9.6. Erase with an eraser

1. Open the *Still Life 1.jpg* image from the *Lesson 9* folder.
2. Using the lasso, select the daffodils (grabbing the background) and copy them through the clipboard. This automatically creates a new layer for the selected colors.
3. Next turn off the background layer. Select the **Eraser** tool. Set the **Opacity** to 100%.
4. In the brush palette, select a 13 pix brush and move it over the background to leave only the flowers (Fig. 9.7).
5. Select a small brush in the palette and zoom in on the image view several times.
6. Select the Erase to History check box and click in the **History** palette to the left of the Paste line to display the **Healing Brush** image.
7. Drive carefully along the lane where the background used to be. The background will start to recover.

Fig.9.7. Using the **Eraser** tool

The **Magic Eraser** tool works in the same way as a magic wand: it finds pixels of the same color you clicked on and colors them with the background color or makes them transparent, depending on the layer.

The setting of the magic eraser is similar, you can change the range of shades in the Tolerance scroll. Colors are checked and replaced only in the adjacent area if the **Contiguous** check box is checked, or in the entire image if it is cleared. Only the current layer is processed if the **Sample All Layers** checkbox is unchecked, and all visible layers if it is checked. The **Opacity** parameter, like for a regular eraser, controls the amount of color erasing.

The **Background Eraser** tool is more flexible. It also compares the colors to the color of the clicked pixel and makes the pixels of that color transparent, but only inside the brush. As a rule, it is used to process the edges of objects.

To compare tones during erasing only within an adjacent area, select Contiguous in the **Limits** rollout, and **Discontiguous** across the entire image. In the **Find Edges** mode, the comparison is made in the adjacent area, but the contrasting edges of the object are better preserved.

Unlike the **Magic Eraser**, the **Background Eraser** can be moved and not just clicked. At the same time, sampling of the color to be removed can be done in several modes, which can be selected in the **Sampling** icons:

- **Continuous** – sampling is continuous;
- **Once** - the color sample is taken only once;
- **Background Swatch** - no samples are taken, colors are compared with the current background color.

When working with the **Background Eraser**, you can turn on the mode in which the foreground color remains the same, even if it is in the center of the pointer. To do this, check the **Protect Foreground Color** box.

Let's do an exercise that uses all three erasers.

Exercise 9.7. Updating the bouquet

1. Open the images *Still life 1.jpg* and *Still life 2.jpg* from the *Lesson 9* folder. You need to update the spring bouquet by adding yellow daffodils to them.
2. Repeat the operations for copying daffodils. Paste them into the *Still Life 2.jpg* image.
3. Remove the background with a magic eraser, the tolerance value in the Tolerance field is 12, the **Contiguous** checkbox is unchecked. A brown border remained around the flowers and leaves, but it cannot be removed by simply increasing the tolerance, otherwise the dark green shades of the stems will disappear (Fig. 9.7, left).
4. In the **History** palette, take a snapshot of the image in case you screw something up and have to start all over again.
5. Zoom in to see the edges of the daffodils better. Select the **Background Eraser** tool.

6. Set the Limits rollout to **Contiguous**, the tolerance value to 50%, select the **Sampling: Background Swatch** mode. Also check the **Protect Foreground Color** box.
7. Select the color of the daffodils as the main color, and the color of the border around them (background color) as the background color.
8. Select a soft 9 pix brush and eraser around the edges of the flowers to remove all the dark border around.
9. You will have to be more careful with the leaves. Reduce the tolerance to 20% and change the foreground color to the color of the leaves and remove the rest of the background.
10. Next, using the transform operation, reduce the size of the daffodils to 170% and insert them into the tulip vase.
11. If everything went well for you (which I have no doubt), then you will get the result in the form of the image in Fig. 9.8, on the right. Compare old and new bouquet.

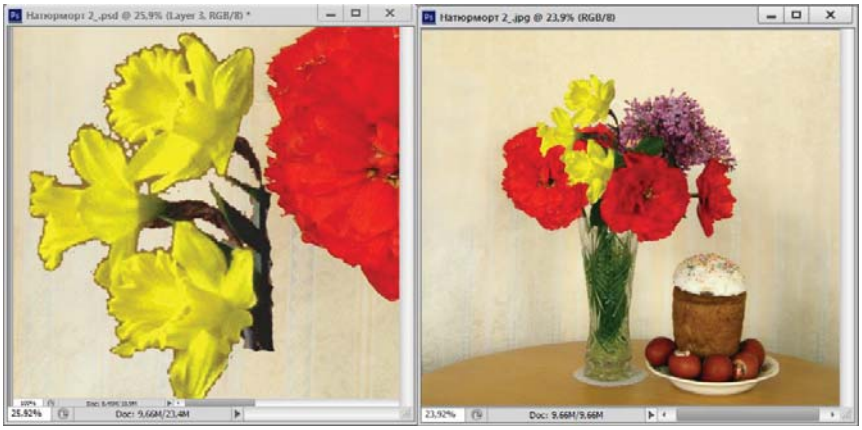


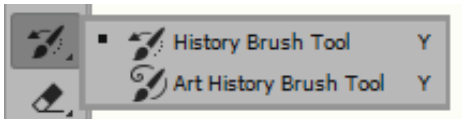
Fig.9.8. Using erasers to update the bouquet

9.7. Automatic border removal

In the previous exercise, it was very difficult for us to remove the dark border, since the flower had a complex indented shape due to its small petals and denticles on the leaves. In simpler cases, when transferring an object selected with feathering, only individual pixels go with it to a separate layer, which form a thin border.

To remove such a border, there are automatic methods. To remove the border, the **Layer/Matting** commands are intended: **Remove Black Matte, Remove White Matte**, if the edge pixels are of other colors, then the **Defringe** submenu. On the example of selected daffodils, you can check the effect of this command.

9.8. Healing brushes



If you need to restore a fragment that has been deleted or painted over with a different color, then you can use restoring brushes:

- **History Brush** – returns colors to pixels from the selected record of the history protocol;
- **Art History Brush** - does about the same thing, but can stylize an image by changing colors in it and adding swirls, lines and other decorative elements.

Healing brushes paint with the same brushes as the painting tools. Brushes are selected and edited in the brushes palette. The **History Brush** tool allows you to restore individual fragments of an image, as if you were removing the top layer of paint with a brush, and an old image is shown from under it.

The **Art History Brush** tool does the same thing, but "artistically", that is, it adds swirls, lines and other decorating elements to the standard brush stroke, depending on the brush stroke style selected in the **Style** rollout: **Tight (Shot, Medium, Long) , Loose, Dab, Tight Curl, Loose Curl**. The **Artistic Healing Brush** is used to create special effects.

Setting it up largely repeats the setting of a regular brush, but there are differences. In the **Area** field, enter the area of the artistic stroke. The larger the area, the more curls and lines will be in the stroke. With the **Tolerance** slider, you can control the deviation of colors from what is recorded in the history log. If you set the precision to a low value, the stroke will be done in multiple colors. The lower the accuracy, the more these stroke colors will differ from the color that was actually.

Exercise 9.8. Impressionist still life

1. Open the *Still Life 3.jpg* images from the *Lesson 9* folder. We will turn this image into an Impressionist painting (with large strokes).
2. To do this, select the **Art History Brush** tool.
3. Set the following parameters on the control panel: brush size - 10 pix; opacity - 100%; style - **Loose Curl**; area - 50 pix; tolerance - 0%.
4. With this setting, you can feel like a real impressionist. Turn your photo into a canvas, with big strokes.
5. The result is shown in Figure 9.9, and is located in the *Lesson 9* folder called *Impression.jpg*. Advanced impressionists can try brushes with other strokes, as in the picture.

Fig.9.9. Impressionist work

10. TONE CORRECTION OF IMAGES

10.1. Histogram of the image

Tone correction consists in the redistribution of light and shadow between pixels, that is, in adjusting the brightness and contrast of the image. It can be done on both grayscale and color images, but we'll start with grayscale images, which are easier to master.

The quality of a grayscale image can be determined from the brightness histogram [1, 3, 6]. Since a halftone image consists of shades of the same color, all its pixels differ from each other only in brightness.

An image *histogram* is a graph where the horizontal axis represents brightness levels from 0 to 255, and the vertical axis represents the number of image pixels (Fig. 10.1, bottom right). The part of the range that is used in an image is called its tonal range.

Fig.10.1. Histogram of gray scale

The leftmost point of the histogram corresponds to zero, and the rightmost point corresponds to the maximum possible brightness. The wider the tonal range, the more detail the image can convey and the higher its quality. Conventionally, the tonal range is divided into three parts. The left part corresponds to the dark parts of the image, the right part corresponds to the bright parts, between them there are midtones. An ideal image contains pixels of all shades. The photograph (Fig. 10.1) has practically no light or dark tones, it is too gray. To correct it, it is desirable to expand the tonal range.

To see the histogram of an image and perform range correction, run the **Window/Histogram** command. In order to convert the dialog box to a more informative form (as in Figure 10.1), select the **Expanded View** and **Show Statistic** lines from the palette menu.

In the **Channel** rollout, you can select the name of the channel whose histogram you want to view. For a gray scale image, there will be only one **Gray** channel. The following information is displayed below the histogram:

- **Mean** – average value of brightness;
- **Standard deviation** - average deviation from the average;
- **Median** - the middle of the tonal range of the image;
- **Pixels** - the number of pixels in the entire image or in the selected area.
- On the right, information is displayed about the place in the histogram where you hold the pointer:
- **Level** – brightness level at the pointer position;
- **Count** - the number of pixels with a given brightness level;
- **Percentile** - the number of pixels with levels no greater than the current one as a percentage of the total number of pixels in the image.

You can see the statistics for the brightness range. To do this, click at the start point of the range and drag the pointer along the horizontal axis. The range will be highlighted as the pointer advances. All this time, the current information about the selected range is displayed on the right side of the display. In the Level line you see two values: the start and end levels of the selected range.

10.2. Stretching the tonal range

One way to tone correction is to stretch the tonal range. To do this, the lightest and darkest tones, which are represented by too few pixels or not at all, are discarded on the brightness axis. The darkest of the remaining tones (called the *black dot*) is replaced by black (with zero brightness), the lightest is replaced by white (called the *white dot*). The brightness of all intermediate tones are recalculated according to the old curve. You need to manually adjust the midtones to preserve image details.

To adjust, run the **Image/Adjustments/Levels** command. A dialog box will appear in front of you (Fig. 10.2), in the **Channel** rollout, you can select a custom channel or the top line with the name of the color model (all channels): **RGB, Red, Green, Blue, Luminosity, Color**. Consider setting up a practical example.

Exercise 10.1. Stretching the tonal range

1. Open the *Palace.jpg* image from the *Lesson 10* folder (Fig.10.2) and run the **Image/Adjustments/Levels** command. Since this is a gray scale image, you do not need to select a channel.

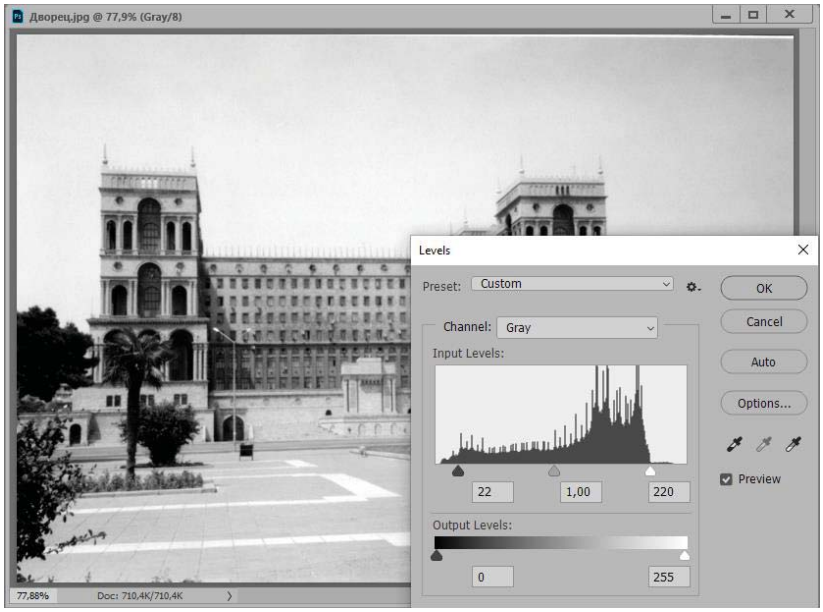


Fig.10.2. Tonal Range Correction

2. In the Input Levels fields, you see the values of the input levels, that is, the boundary brightness levels. At the beginning of the setting, they are equal to 0 and 255. In the middle field, the midtone brightness is measured in conventional units and can vary from 0 to 10. By default, it is 1.
3. Check the **Preview** box to see the changes in progress.
4. First, let's set the black point of the image. Click on the left slider (it's black) and drag it to the right, where there is already a noticeable amount of pixels up to the input level - 25. The whole image darkens slightly. You can not move the slider, but enter the desired value in the left field **Input Levels**.
5. Now set the white point of the image by moving the right white slider to the left, as in Fig. 10.2, on the left, up to the input level value of 220. The image brightened again and became more contrast than before.
6. Now you can slightly adjust the midtones without touching the border of the range anymore. To do this, move the middle gray slider in different directions and select its optimal position.
7. Click the **OK** button. Open the **Levels** window again and see what the histogram of the image has become after correction (it has stretched over the entire range).

You can stretch the range automatically by clicking on the Auto button in the **Levels** window. Automatic correction is always done in the midtones, meaning the range is cut off on both sides. For color images, this type of correction is

performed for each channel. At the same time, the remaining channels are automatically adjusted so that the color of the image does not change.

On the right side of the **Levels** window, you see three buttons. With their help, you can specify white, black and gray points directly on the image. To do this, first click on the corresponding button, and then in the darkest or brightest place in the image. The middle button (grey dot) only works in color images. It allows you to specify a neutral gray tone.

To cancel the entire setting and return to its beginning, press the **Alt** key. The Cancel button you are using will be replaced by the **Reset** button. With a significant stretching of the tonal range, dips may appear in the histogram (the histogram becomes similar to a comb). There is nothing wrong with that, as long as they are not too big.

Self-study

Using the **Histogram** palette, try to determine the number of pixels in the Palace.jpg image with a brightness level of 206.

10.3. Narrowing the tonal range

By stretching the range, we increased the contrast of the image. Sometimes we face the opposite task - to reduce the contrast. This is especially necessary if the image is intended for printing. In this case, very dark and very bright places in the images turn out badly. To adjust the tone, you can also use the bottom **Output Levels** slider of the **Levels** window.

Exercise 10.2. Narrowing the tonal range

1. Open the *Embankment.jpg* image from the *Lesson 10* folder (Fig. 10.3) and select the **Image/Adjustments/Levels** command.

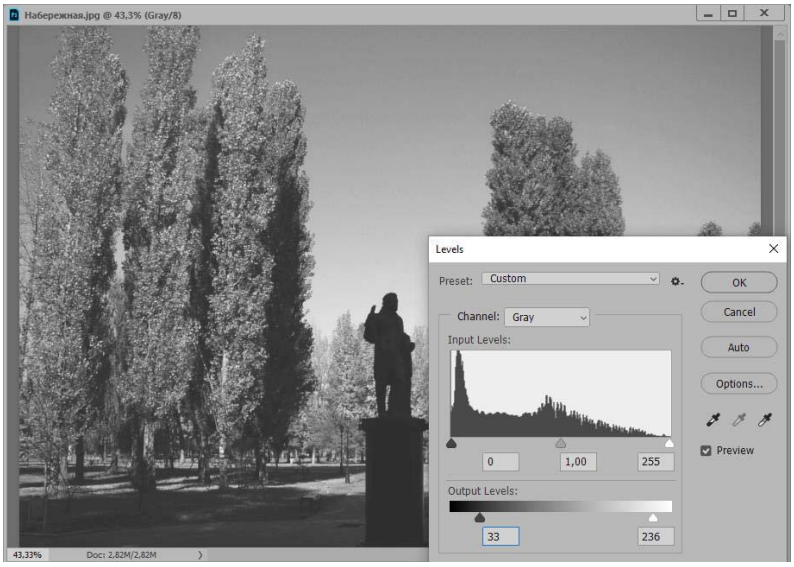


Fig.10.3. Narrowing the tonal range

2. The image is quite contrasting due to the black contour of the monument. To brighten the darkest parts of the image and darken the lightest ones, move the black and white **Output Levels** sliders, as in the dialog box in Fig. 10.3 (33 and 236).
3. 3. The image has become less contrast. Adjust the midtones with the intermediate slider to make the relief of the monument more distinct. Click the **OK** button.

Self-study

Use the **Image/Shadows/Highlights** command to adjust the dark and light tones in the *Embankment.jpg* image. **Shadows** and **Highlights** sliders allow you to set the level of correction.

10.4. Finding the white and black dot

For correct adjustment, it is important to accurately determine the black and white point of the image. You can define black and white points in the **Image/Adjustments/Levels** window.

Move the right white slider to the left until the entire image is white except for the darkest parts of the image. Remember these places. Next, move the left black slider to the right until almost all of the image is black except for the lightest details. Remember these places too, this is the white dot of the image.

Exercise 10.3. Black and white point correction

1. Open the document *Palace.jpg* from the *Lesson 10* folder. You already know it. We will adjust this image again with the help of anchor points.
2. To do this, execute the **Image/Adjustments/Levels** command. Define *black and white dots*. The black dot is in the tree branches on the left side, and the white dot is on the road strip in the foreground. Remember these places.
3. Select the black eyedropper and select the black point, and select the white point with the white eyedropper. You will get (almost) the same result as in exercise 10.1.
4. You will get interesting options if you select other places as black and white points (by clicking just at random in different places).

10.5. Tone Curve Correction

Another way to change the characteristics of halftone images is to adjust the tone curve. Working in the Levels window, you could only influence the placement of the darks, highlights, and midtones. In the **Curves** window, you can selectively change the brightness at individual points of the histogram (Fig. 10.4).

To call this window, select the **Image/Adjustments/Curves** command. This window contains the tone curve. The input brightness levels (initial) are plotted along the horizontal axis, and the output brightness levels (after correction) are plotted along the vertical axis. By default, the graph is a straight line **X=Y**, that is, the output level at all points is equal to the input. To display the extended mode, click the **Curve Display Option** button.

If you move the pointer over the chart, then the coordinates of the pointer on the chart are displayed below: **Input** and **Output**. Under the curve and to the side of it are the gray scales that show the location of dark and light tones on the graph. For the **RGB** color model, dark colors are at the bottom left (brightness 0) and light colors (brightness 255) are at the top right. For the **CMYK** model, the reverse arrangement is used, you can switch modes using the **Light**, **Pigment/Ink** checkboxes under the scale in advanced mode.

The field in which the graph is drawn is marked with a grid. To make it smaller, click on it while holding down the Alt key or click on the corresponding grid display buttons under the scale. In the dialog box, by default, the image histogram is superimposed on the scale with the curve. At the bottom of the dialog box, you can turn off the histogram overlay mode.

For color images, in the **Channel** rollout, you can select a custom channel or the top line with the name of the color model. In the latter case, the total brightness of all channels will be corrected. When adjusting one color channel, the rest are adjusted automatically so that the color of the image does not change.

At the top of the dialog box, in the **Preset** rollout, you can select standard tone correction presets. When selecting individual modes, the image tones are automatically corrected.

Exercise 10.4. Correction of brightness levels

1. Open the *Curve Correction.jpg* image from the *Lesson 10* folder.
2. Select the **Image/Adjustments/Curves** command. Turn on **Extended Mode** with the **Curve Display Option** button. Use the **Light** checkbox to select the **RGB** mode.
3. Let's repeat the operations in the previous exercises. First, let's expand the tonal range. To do this, click on the upper right point of the diagonal line, the pointer will turn into crossed arrows. Move the point to the left one cell. The image becomes brighter.
4. Click on the lower left point of the straight line and move the point to the right also by one cell. The image contrast increases as the straight line becomes steeper.
5. Now let's narrow down the tonal range by cutting off the darkest and lightest places. To do this, move the top point of the diagonal down two cells, and the bottom point of the diagonal up two cells.
6. The slope of the straight line decreased and, as expected, the contrast also decreased. If you combine the end points of the diagonal at the same level with the central horizontal axis of the grid, the entire image will become solid gray.

The Curves window has almost the same buttons as the **Levels** window. Using the **Auto** button, you can automatically stretch the range in both directions. **Eyedropper** buttons allow you to specify black, white and gray points (the latter only for color images) directly on the image itself. When the **Alt** key is pressed, the **Reset** button appears *to return* to its original state.

Next, let's move on to the correction, which cannot be done using the levels adjustment. There are certain places in every image where it is especially important to change the contrast or brightness. To achieve this, you need to move the individual points of the curve, changing the brightness for a specific range of tones.

This can be done in two modes, switching between them using the buttons: smooth curve mode, in which only individual points move, the curve between them is automatically curved so as to remain smooth; freehand curve drawing mode, in which the entire curve or part of it is drawn with a pencil. The curve in this case can be arbitrary.

Consider the first mode, since it is more gentle. To fix the brightness of some part of the curve, click in this place on the graph. A point will appear on it and this place will be fixed with further automatic changes to the curve.

To change the brightness of any interval, click in its middle and drag the created point up or down. In total, up to 16 points can be created on the curve, their position can be further adjusted. You can activate several points at once by clicking on them while holding down the **Shift** key. This will allow the entire curve segment to be dragged.

To delete an unnecessary point, click on the **Del** key. The endpoints of the tone curve cannot be deleted. To *determine the location of individual tones* on the curve, click and move the pointer over the image, a round dot will move along the graph. It marks the range of the curve in which the brightnesses corresponding to this detail are located.

The hand icon **Click** and **Drag in Image to Modify the Curve** allows you to directly distort the curve. In this mode, you need to click and move the pointer up or down on different parts of the image, the curve will move itself according to the direction of movement. Now let's put these techniques into practice.

Exercise 10.5. Changing the shape of the tone curve

1. Returning to the *Curve Correction.jpg* image with the **Curves** window open, Fig.10.4.

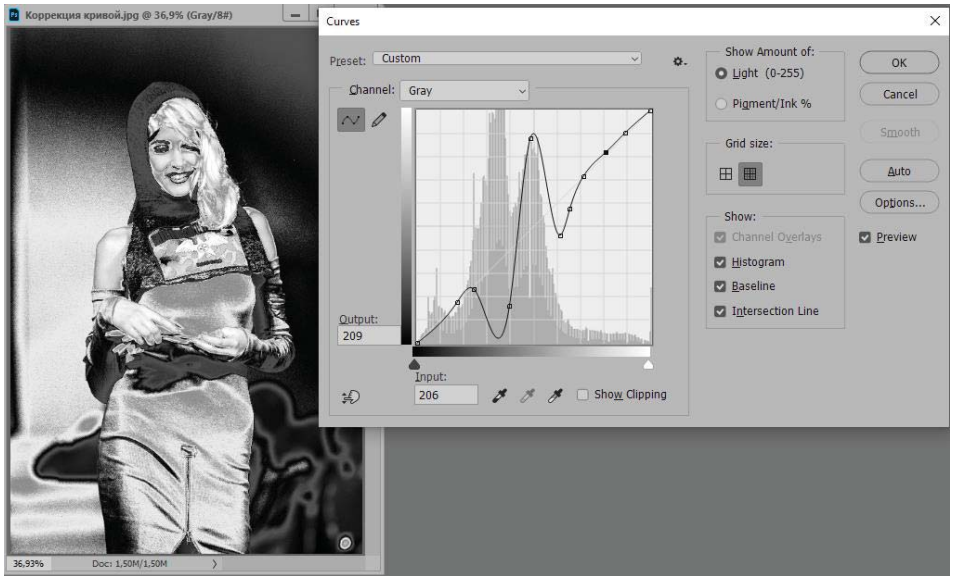


Fig.10.4. Adjusting the **Tone Curve**

2. Turn on **RGB** specific grayscale mode as shown.
3. Drag the eyedropper over areas you like, such as the model's face. The tone of the face is in the range 160 - 255. Click on these points on the curve to fix them.

4. After that, you can move the rest of the curve, the changes will not particularly affect the face.
5. Turn on the **Direct Curve Distortion** mode with the **Click and Drag in Image to Modify the Curve** icon. Click and drag the pointer up and down on other areas of the image, the curve will distort according to the movements of the pointer.
6. You can try other options, for example, as in Fig. 10.4, the result will also be good.

In the **Curves** dialog box, there is a freehand curve mode called **Draw to Modify the Curve**. In this mode, you can freehand draw a curve in any area. This is done in the same way as when drawing with the **Pencil** tool, that is, by moving the pointer while holding down the mouse button. The old piece of the curve at this point is erased. You can generally draw the entire curve by hand. To then smooth the resulting curve, click the Smooth button in the dialog box.

Self-study

Try drawing a curve using the **Draw to Modify the Curve** freehand drawing mode with different humps and valleys and see how interesting it can change the original image. Also check out the different modes of standard tone curve correction in the **Preset** rollout of the dialog box.

11. COLOR CORRECTION

To correct the brightness and contrast of color images, you can use the discussed **Levels** and **Curves** dialog boxes. Color correction must take into account the color model of the image. With an increase in contrast, channel imbalance may occur [1, 3, 6]. In this case, color spots will appear in the image, and some colors will become unnatural. This can be avoided by working in the **Lab** color model.

Exercise 11.1. Color Correction

1. Refresh the workspace using the **Window/Workspace/Reset Basic-1** command.
2. Open the image *Color correction.jpg* from the *Lesson 11* folder.
3. We will check all subsequent descriptions of commands from the **Image/Adjustments** menu using this image as an example.

If the image requires only a slight adjustment in brightness and contrast, this can be done using automatic, rather crude methods.

One of them is using the **Brightness/Contrast** command from the **Image/Adjustments** menu. This command applies the same adjustment to all pixels in an image, and it doesn't work on individual channels. It cannot achieve good results in difficult cases, moreover, it can lead to loss of image details. Therefore, you must use this command with caution. Adjustment is made in the dialog box using the **Brightness** and **Contrast** sliders.

Let's say the image has acquired a red tint. Color imbalance can also result in patches of color in some areas. In this case, there is no point in trying to remove them by separating these places.

Typically, color balancing is performed on the image as a whole. The basic principle of color balancing is the weakening of the "extra" color or its compensation by adding the opposite color.

The first method is used for light saturated images, and the second for dark images. To decide which color to add or remove, the color wheel will help us.

To balance colors, there are special dialog boxes **Color Balance** and **Hue/Saturation**. In the first window, the total color brightness for all channels is adjusted, and in the second window, you can change the saturation, hue, and brightness for individual colors. The **Replace Color** command allows you to replace one color with another in an entire image.

After coarse balancing is done using one of the above methods, fine balancing can be done using the **Selective Color** command. This command allows you to adjust the percentage of base components for individual colors..

11.1. Color Wheel

Open the *Color Wheel.jpg* image from the *Lesson 11* folder. Opposite each other are opposite (complementary) colors: green and magenta, yellow and blue, red and cyan. Each of the colors can be obtained by mixing neighboring ones. For example, cyan can be obtained by mixing green and blue, and magenta by mixing blue and red.

If an excessive red tint appears in an **RGB** image, you can remove it by adding the opposite blue color. But there is no blue color in the **RGB** system. You need to replace it by mixing the two available colors - two channels: Green and Blue.

Conversely, in order to remove magenta in a **CMYK** model, you can add a mixture of cyan and yellow, thus obtaining the opposite of magenta green.

Exercise 11.2. Creating a color wheel

1. Create a new document with a white background.
2. Draw a circle selection.
3. Fill the circle with a **Spectrum** style angular gradient, or create according to the hues of the color wheel.
4. Check the location of the primary and opposite colors.

When correcting colors, it is very important to understand in which direction the color shift occurred, which is not always clear to the eye. An objective criterion can be a color measurement at a point whose color is numerically known. Typically, neutral gray areas of the image are used for this. The brightness of all components of this color should be equal. If any of them is larger, then there is a color shift. You can also focus on such neutral colors as the color of human skin, which usually lies in the range (R=200÷240, G=140÷180, B=115÷190).

To measure colors and track their changes, use the Info palette with the **Eyedropper** and **Color Sampler** tools. As you move the pointer over the image, the Info palette displays color information for the current pixel.

The **Color Sampler** tool is configured in the same way as an eyedropper: in the **Sample Size** rollout, you can take readings from one pixel, get averaged data from a 3x3 square or 101x01 pixels. To put a label, you just need to click in the image with this tool.

11.2. Point color balancing

With the help of the **Levels** window, you can perform very simple, but often very effective, color balancing on a gray, white, or black point. To do this, one of these colors must be present in the image. When balancing on a gray point,

Adobe Photoshop will correct the colors so that the brightness of all channels at this point becomes the same. When balancing by the white point, the brightness of all channels at this point will be brought to the maximum, and by the black point - to the minimum.

Another way to balance color is to change the brightness of individual color channels. This can be done in the **Levels** and **Curves** windows. As with halftone images, tone curve correction allows you to make finer adjustments. As a rule, to remove some kind of color shift, it is enough to attenuate one or two channels. As an example, let's balance the image in the following exercise.

Exercise 11.3. Arbitrary gray point definition

1. Open the *Color correction.jpg* image from the *Lesson 11* folder (fig.11.1). Let's try to clarify the natural color of the skin.
2. Call up the Levels window.
3. Double-click the gray dot button. Pick a human skin color (in pinkish hues) in the **Color Picker** window with values around R=220, G=160, B=150. Click the OK button.
4. Now click on different parts of the model's skin. The colors of the image will take on a more natural look.
5. The result can be quite unexpected depending on the color of a particular pixel, while the histogram will automatically adjust.

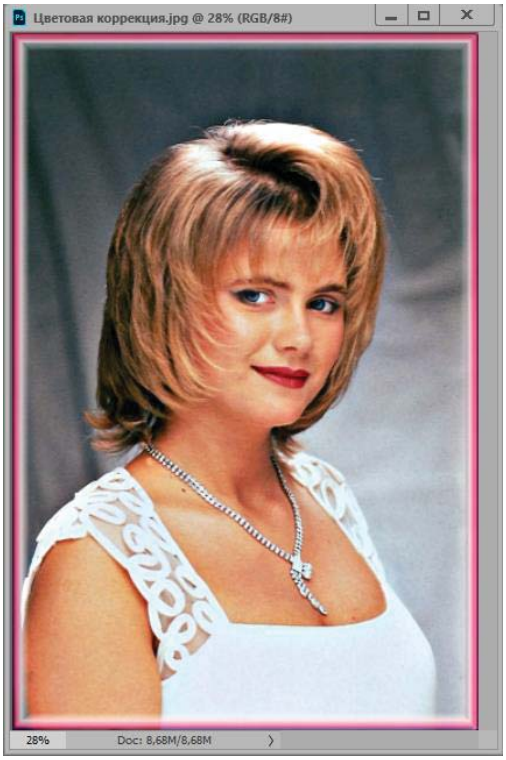


Fig.11.1. Image for correction

11.3. Color Balance window

Now let's move on to special dialog boxes that allow you to almost automatically adjust the balance of colors in an image. To call the **Color Balance** window (Fig.11.2, left), execute the **Image/Adjustments/Color Balance** command. This setting works only with the total brightness of the channels.

In the **Tone Balance** rollout, select the tones whose setting is of primary importance to you: **Shadows**, **Midtones**, or **Highlights**. Check the **Preserve Luminosity** box. In this case, Adobe Photoshop will try to keep the old brightness values when balancing the color.

The essence of the setting is to move the sliders towards the color that needs to be added. As you can see, opposite colors from the color wheel lie on the same straight line here. By adding one color, you subtract the opposite. Color changes in the red, green, and blue channels are reflected in the **Color Balance** fields. When working in the **Lab** model, there will be only two fields here: **a** and **b**, since the brightness **L** does not change.

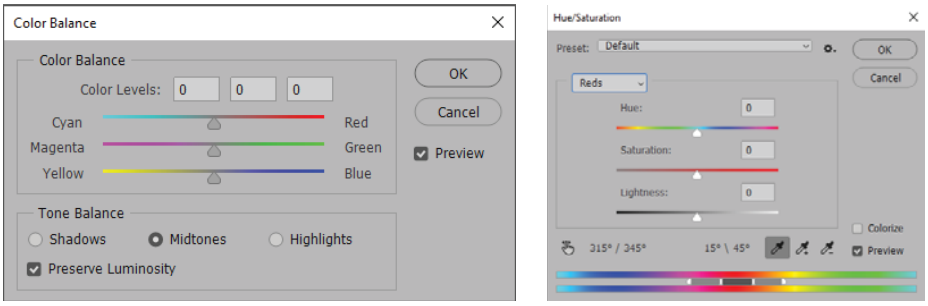


Fig.11.2. **Color Balance** and **Hue/Saturation** Dialog Boxes

Self-study

Try this command on the example of the last image to achieve the same results as in the previous exercise.

11.4. Adjusting Hue and Saturation

To open the **Hue/Saturation** window (Fig.11.2, on the right), execute the **Image/Adjustments/Hue/Saturation** command. In the edit rollout, a standard hue range is selected. You can freely move the slider on the shade scale and select an area of any width. The main thing is to choose at least some range, and not the Master mode, in which all colors are edited at the same time.

The hand icon at the bottom of the **Click and Drag in Image to Modify** window turns on the mode of direct color change by image areas.

At the bottom of the window, you see two color bars. The shades of colors are arranged on them in the same order as on the color wheel. The leftmost and rightmost color are the same. The upper color bar is the shades before correction, the lower one is after correction. As soon as you have selected any standard color range, a slider appears between the bands in the center of this range (Fig. 11.2).

The dark gray inside of the slider is the area of hues that need to be adjusted. It is surrounded on both sides by vertical range limits and by default occupies a 30° arc on the color wheel. By moving the stops, you reduce this area, thereby reducing the number of shades that will be affected by further correction. By pushing them apart, you increase this number.

In order to avoid sharp bands between the corrected color and neighboring areas, neighboring color shades are also corrected, but to a lesser degree. These areas are also delimited by white triangles.

Move the **Hue, Saturation, and Lightness** sliders to edit the selected area on the hue bar. With the first slider, you replace one shade with another. By changing the saturation, you make the color more or less intense. By changing the brightness, make it lighter or darker.

At minimum saturation, the color becomes gray. At minimum brightness, black is obtained, at maximum brightness, white. Hue change is measured by the angle of movement on the color wheel.

Exercise 11.4. Hair recoloring

1. Open the *Tint.jpg* image from *the Lesson 11* folder (Fig. 11.3).
2. As you can see, this photo shows girls with different hair colors. We will try to recolor the blonde on the right (although you can choose another girl).
3. Select the hair with some selection tool. After that, call the adjustment window with the **Image/Adjustments/Hue/Saturation** command.
4. Set the color of the hair, it's mostly light yellow, so select the color **Yellows** in the color edit rollout.
5. Move the **Hue** slider to the left as in Figure 11.3 to make the hair purple (or whatever you like).
6. Move the **Saturation** slider to the left to make the color less saturated. You can also adjust the brightness a bit. As a result, we carried out an expensive painting rather quickly and at no particular cost. Click OK.

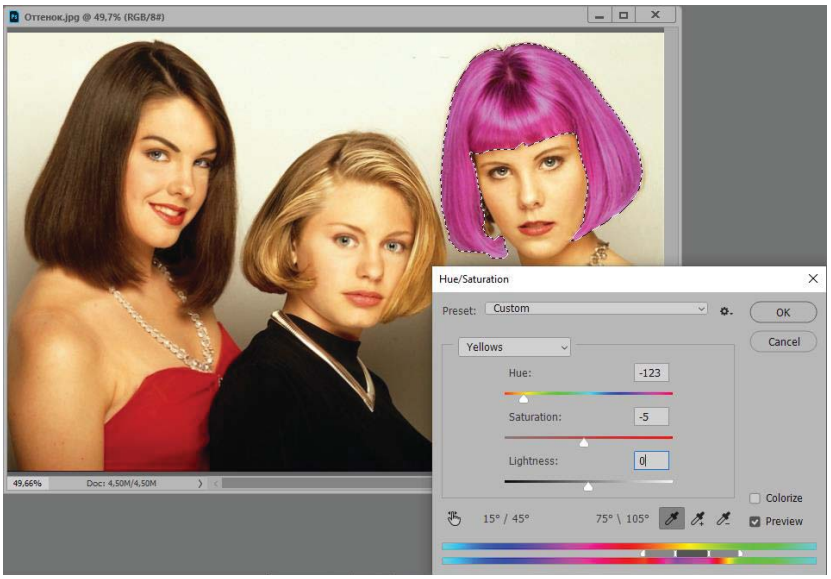


Fig.11.3. Hair recoloring with dialog box

Hue/Saturation

By selecting the **Master** line in the color editing rollout, you get the ability to smoothly control the entire color gamut of the image, as well as change the saturation and brightness of all colors at the same time. As you move the **Hue**

slider, the two color bars move relative to each other. All shades from the upper scale are replaced by those shades that are located directly below them on the second scale. All colors change in the same way.

In the **Hue/Saturation** window there is an option to tone gray images. To do this, enable the **Colorize** checkbox.

Independent work "Dance of Flowers"

Try toning the *Tint.jpg* (or other) image. Also open the *Fluffy colors.jpg* image from the Lesson 11 folder. This image contains all the colors from the color wheel. In the **Hue/Saturation** window, move the Hue slider smoothly across the entire scale and watch the iridescent "dance of fluffy flowers".

11.5. Selective color

One of the flexible ways to control individual colors is the **Selective Color** dialog box (Fig. 11.4). It is used after coarser color correction has been performed. The setting in this window is based on the **CMYK** palette, but it can be used not only for images intended for printing, but also for **RGB** images.

To open the window, select the **Image/Adjustments/Selective Color** command. The principle of color editing is to add or subtract a certain amount of dyes to the selected base color. The rest of the base colors remain unchanged.

In the Colors rollout, the range of colors to be edited is selected. You can choose here all basic colors of the **RGB** and **CMYK** model, as well as white and neutral colors. Next, use the **Cyan, Magenta, Yellow** and **Black** sliders to add or remove the appropriate dyes from the selected color.

Additions are measured as a percentage, the method of addition varies depending on the method, which is set by the **Method** switches:

- **Relative** – the given percentage is added to the initial value;
- **Absolute** - the specified percentage is simply added to the original value.

Let's do an exercise on editing individual colors. Use the color wheel to understand how colors are added and subtracted.

Exercise 11.5. Impressionist pills

1. Open the *Impressionist Pill.jpg* image from the *Lesson 11* folder (fig.11.4).
2. Change the color of the yellow vitamins. Select **Yellows** from the **Colors** rollout.
3. To make the capsules green, turn on the absolute method and add cyan to the composition by moving the **Cyan** slider to the right.
4. To make them orange, you need to add red or reduce the content of the opposite red blue. Move the **Cyan** slider all the way to the left. But, this may affect the color of the remaining tablets.

5. Next, choose any pill you like, for example, red. Let's give it a pearly sheen. Select the red color in the **Colors** rollout - Reds. Select the relative method and add 70% magenta. If 100% magenta is removed, red becomes yellowish.
6. Now let's make the white pill blue. Select **Whites** from the top rollout. Be sure to select the absolute method. Move the **Cyan** slider slightly to the right.
7. Perhaps, after our manipulations, they will no longer treat the diseases for which they were intended. However, this is not the main thing and it is best not to get sick. Click the **OK** button.

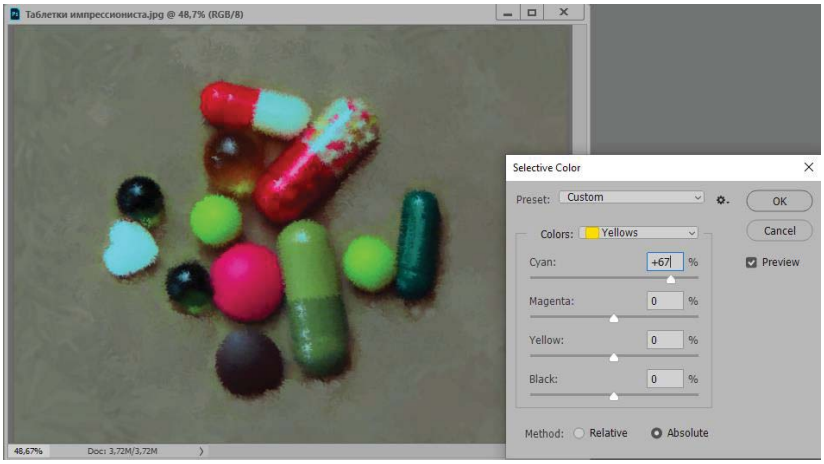


Fig.11.4. "Substituting" tablets with the **Selective Color** window

11.6. Channel mixing

Using the **Channel Mixer** window (Fig. 11.5), you can correct the image by changing the color of one or even all channels. To call this window, select the **Image/Adjustments/Channel Mixer** command.

In the **Output Channel** rollout, the channel to be edited is selected. With the sliders in the **Source Channels** section, you can increase the contribution of each channel to the edited channel by moving the sliders to the right, or decrease it by moving them to the left. The exact composition of the colors in this section depends on the color model of the image. Negative values add a channel opposite in color (see color wheel).

When the **Monochrome** checkbox is checked, the setting is applied to all channels at the same time, so that the result is a grayscale image. If this checkbox is first unchecked and then set, then you will get another option for toning the image with one color. In the **Preset** rollout, you can select standard toning presets, taking into account the brightness components of various colors. The **Constant** slider adds a white or black channel to the image.

Exercise 11.6. Rose or cabbage

1. Open the *Rose.jpg* image from the *Lesson 11* folder (Fig. 11.5). In the photo, the red color between the rose petals is solid, resulting in an unnatural look. Let's try to reduce the influence of red.
2. Select **Image/Adjustments/Channel Mixer**.
3. In the **Output Channel** rollout, select the **Red** channel. Decrease its content by moving the **Red** slider to the left up to 80%. The brightness of the color will decrease.
4. Add 10% green and blue channels each by moving the **Green** and **Blue** sliders to the right (Fig. 11.5). For the final adjustment, it is desirable to add a little black to the red with the previous commands.
5. If you remove the red channel completely, you will get a turquoise "cabbage".

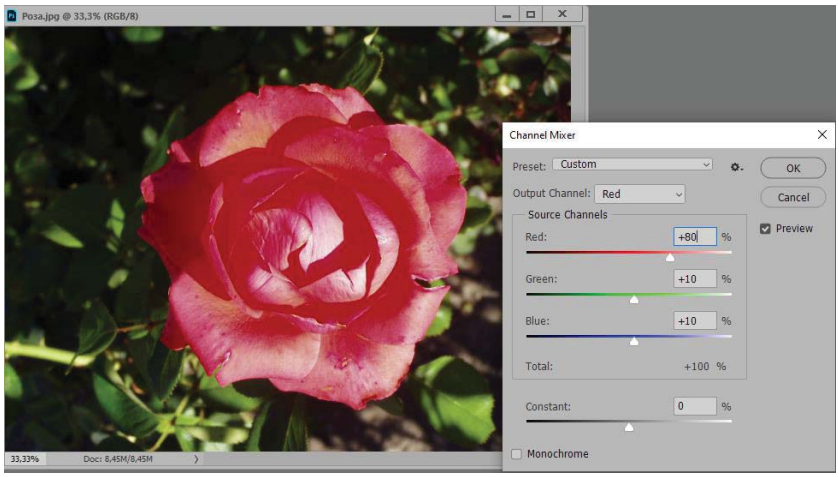


Fig.11.5. Applying the **Channel Mixer** window

Self-study "Blue Orange"

To realize creative fantasies, try creating new orange varieties (Fig. 11.6). Open the *Orange.jpg* image from the *Lesson 11* folder. You will see quite appetizing oranges. Use the **Channel Mixer** to try lime, grapefruit, lemon, and the new variety "**Blue fruit**". It may well be that it will not be very appetizing. New varieties of orange are presented in the image *Oranges new.jpg*. I wish you success in creating new varieties.

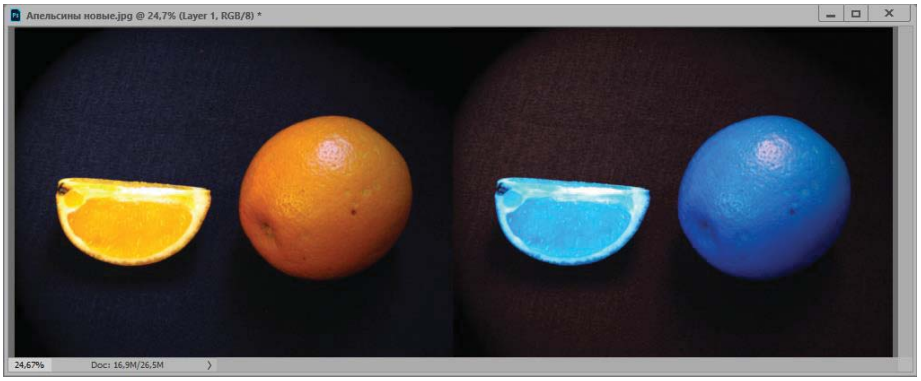


Fig.11.6. Transformation orange

11.7. Color replacement

The **Replace Color** command from the **Image/Adjustments** menu creates a temporary selection around the given colors and then replaces them with other colors. The dialog box of this command (Fig. 11.7) is in many ways similar to the **Color Range** command window from the **Select** menu.

In the preview window in the center of the dialog box, you can see either selected parts of the image or the entire image in color. You can select one of these modes using the switches under the viewport: **Selection** - the first mode, Image - the second mode.

To select the color to be replaced, you must click on it with the eyedropper. The color can be selected both on the image itself and in the preview window.

Depending on the specified **Fuzziness** parameter, the program finds either exactly this color, or colors close to it in the entire image or only in the selected area. As in the **Color Range** window, this parameter can be smoothly manipulated during selection, thereby selecting larger or smaller areas.

On the right are three buttons with pipettes for different logical operations: addition and subtraction. Having selected the desired color ranges, you can adjust them using the **Hue, Saturation, Lightness** sliders. Consider the possibilities of this command.

Exercise 11.7. Blouse color change

1. Open the *Color Replacement.jpg* image from the *Lesson 11* folder.
2. Select and change the color of the girl's blouse, the blouse is still red.
3. To do this, select the **Image/Adjustments/Replace Color** command.
4. Select the **Selection** radio button to see the selection in the preview window.
5. Select the left (regular) pipette. Click on the blouse. Part of the blouse will be highlighted, in order to highlight the whole blouse, increase the Fuzziness

value to 90. Unfortunately, the lips will also fall into the company with the blouse, leave them.

6. Check the **Preview** box to see how the color setting will be reflected in the image.
7. Move the **Hue** slider to the left to -105 (Fig. 11.7) to replace the red with blue. The blouse looks good at the same time, but the blue lips do not look very attractive (in my opinion). Therefore, you have a choice, make them the way you like them best.
8. Next, adjust the saturation and brightness of the color.
9. Click the **OK** button.

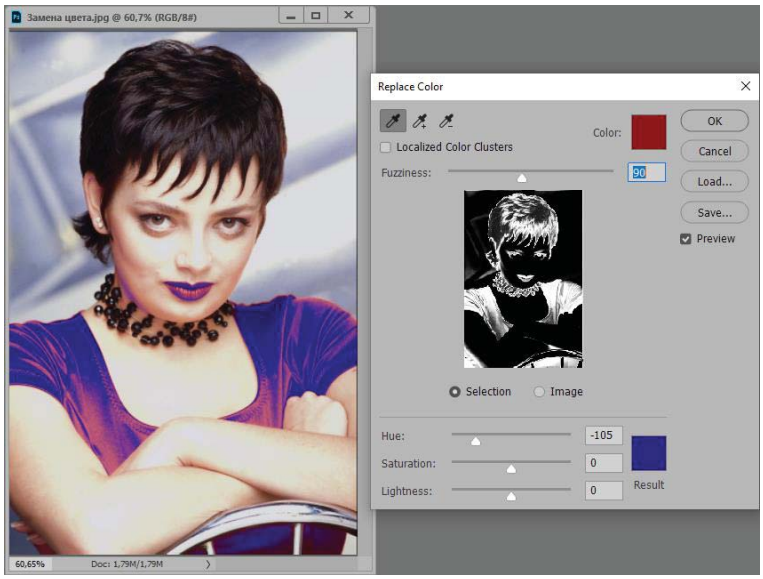


Fig.11.7. Using the **Replace Color** window

11.8. Special color settings and effects

Let's take a look at the rest of the **Image/Adjustments** menu commands that are used to correct and create special color effects. To test the effect of these commands, open any images from the *Lesson 11* folder.

The **Exposure** command sets the exposure level of the image, similar to the exposure time of a camera film.

The **Vibrance** command controls the saturation level of the color tones in an image.

The **Black & White** command is used to reduce the saturation of all colors in an image. It allows you to adjust the contribution of each color and tint the image. It also allows you to make presets when converting a color image to grayscale.

The **Photo Filter** command is designed to simulate the use of photo filters. The dialog box contains numerous standard filters (warm, cold, deep) and individual color filters.

The **Color Lookup** command is used when coloring objects in a 3D scene using various standard algorithms.

Using the **Invert** command, the colors in the entire image are reversed, i.e. red is replaced by cyan, green by magenta, and so on. This command can be used to turn black and white scanned negatives into positives. For a color negative, this command is not enough, since the color negative has an orange base.

The **Posterize** command leaves the specified number of colors in the image. When you run this command, you specify the number of brightness levels in the dialog box. The lower the number of levels, the more pronounced the effect on color photographs.

The **Threshold** command is used to determine the darkest and lightest areas of an image. This command converts all colors to white or black, depending on the brightness threshold. It can be used for more complex operations.

The **Gradient Map** command allows you to add a gradient fill to an image while maintaining the original tones. Selecting and adjusting the gradient type gives access to the Gradient Palette.

The **Shadow/Highlight** command is used to adjust the exposure of photographs. This operation is usually required for photographs taken in low light conditions.

The **High Dynamic Range (HDR) Toning** command is designed to color correct 32-bit images that have a wide dynamic range of tones.

The **Desaturate** command gives a color image the appearance of a grayscale image. The brightness of the pixels does not change. Although the image looks like a grayscale image, it remains in color and all color image settings can be applied to it.

The **Match Color** command allows you to change the color of the current image to the color of the sample image. To do this, you need to open both images, and specify a sample image in the corresponding scroll.

The **Equalize** command distributes pixel brightness levels evenly over the entire range from white to black. It finds the lightest pixels and makes them white, the darkest ones black. And then evenly redistributes the brightness between the rest of the pixels.

11.9. Change color by sample

The **Match Color** command allows you to change the color of the current image to the color of the sample image. To do this, you need to open both images, and specify the sample image in the corresponding scroll.

To check the settings, open the images *Green apples.jpg* and *Fluffy colors.jpg* from the *Lesson 11* folder. Call the **Match Color** command, select the second image in the Source rollout, as in Fig. 11.8. The result is shown on the right, the image became more shaded due to the black background and contrasted in color. Can use other images to get unexpected results.

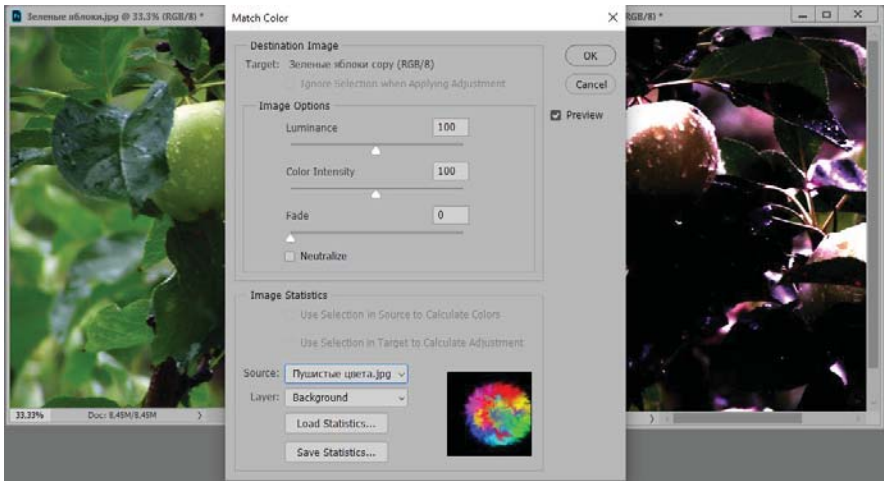


Fig.11.8. Repainting in **Match Color**

11.10. Correction with layers

The above settings can be applied to both regular layers and special adjustment layers. Such layers do not contain any objects, they "remember" only what correction should be performed on the underlying layers. The original layers themselves do not change in any way, all the pixels on them are safe and sound. So you can delete one adjustment layer at any time and create a new one with different properties. This gives you the freedom to experiment with settings without fear of losing image information forever.

For almost every dialog box we've worked with, you can create your own layer. The most interesting thing is that you can turn off each of these settings and watch them in any combination and in different color blending modes.

To create a new adjustment or fill layer, click the **Create New Fill** or **Adjustments Layer** button at the bottom of the **Layers** palette. Select the fill layer type from the drop-down menu: **Solid Color, Gradient, or Pattern**. The types of adjustment layers correspond to the names of the commands we have already worked with: **Levels, Curves, Color Balance**, etc.

Exercise 11.8. Create Adjustment Layers

1. Open the image *Correction layer.jpg* from the *Lesson 11* folder (fig.11.9).

2. Create a **Levels** layer by clicking on the button to create an adjustment layer and choosing Levels from the menu. In the dialog box, click the **Auto** button to automatically adjust the tonal range.
3. Create a **Curves** layer and make the image more contrast in the midtones.
4. Create a **Color Balance** layer and for the midtones reduce the amount of red and add some yellow (by moving both sliders to the left).
5. Create a **Hue/Saturation** layer. Replace the red lettering on your robe with green or orange. To do this, select **Reds** in the top rollout and move the **Hue** slider to the right. And for blue colors add a little saturation.
6. Add further adjustment layers of your choice. Click on the visibility indicators for different adjustment layers to see how the image will look with different combinations of settings. Turn on different layer blending modes as well.

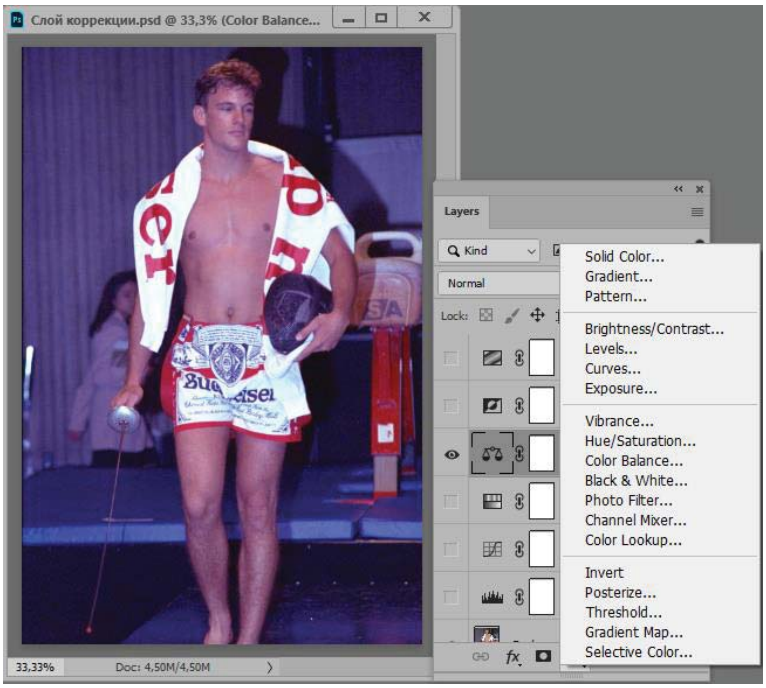


Fig.11.9. Adjustment layers

11.11. Correction of 16 and 32 bit images

The latest versions of the Adobe Photoshop editor allow you to process not only 8-bit, but also 16-bit and 32-bit images. Such images contain several times more color information, which allows for tone and color correction in a wide range [1, 3]. Consider the possibilities of color correction with images having a color depth greater than 8 bits per channel.

Exercise 11.9. Correction of 16-bit images

1. Open the *Mandarin.psd* image from the *Lesson 11* folder (Fig. 11.10).
2. The image has a 16-bit color depth. This image needs toning range expansion.
3. To compare changes in histograms, duplicate the image and convert its color to 8-bit depth.

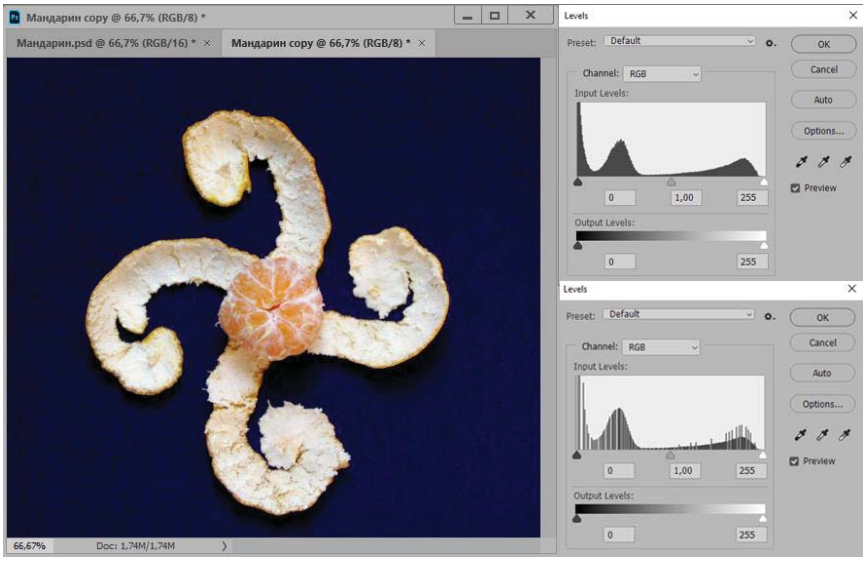


Fig.11.10. Histograms of 8 and 16-bit images

4. Bring up the **Levels** window for the duplicate, click on the Auto button to expand the tonal range automatically.
5. Go to the original image with 16-bit depth, perform the same extension on this image.
6. Select the duplicate image and call the **Levels** window again to check the histogram after expansion. It will have obvious breaks due to the lack of some tones (Fig. 11.10, bottom right).
7. Check the histogram for the 16-bit original, it is shown in Figure 11.10, top right. As you can see, it does not have any special gaps, since with such a color depth the image has a fairly large dynamic headroom.

11.12. Features of performing color correction

Any of the corrections made can be loosened immediately after its application and set to a different blending mode. To do this, you need to execute the **Edit/Fade** command. By adjusting the position of the **Opacity** slider, you can

weaken the correction to the desired degree. In the Mode rollout, you can select the blending mode of the corrected pixel color with the pixel colors of the original image.

Now that you have mastered the commands for color correction of images, you can consider the whole process of correction as a whole. First of all, it is necessary to take into account the *setting of the monitor* for adequate display of colors. Otherwise, you may not recognize your work on another monitor.

First, it is desirable to determine, using the histogram, in which key (tones) the image should be, and evaluate its quality. Next, you adjust the tonal range depending on the task. If the image is intended for printing, it is recommended to get rid of the darkest and brightest tones that do not print well.

Next, you can proceed to color correction: evaluate color deviations (human skin, fruits, grass, etc.). Use the pipette to determine the exact color shift parameters.

Then proceed to color correction: balance and saturation of colors, selective refinement of individual colors, mixing channels. If necessary, you can apply special color effects.

12. MASKS AND ALPHA CHANNELS

If there are selected areas, all operations on the image are performed only inside the areas. The remaining parts of the image are protected from influences, that is, "masked". In order not to select areas of complex shape each time in the image, the selected area can be saved as a mask in the source file. Masks are stored in alpha channels. Alpha channels are special channels for storing selections and are found in the channels palette [1, 3].

12.1. Creating Alpha Channels

Masks are saved as a grayscale image, where white is the selection and black is the masked portion of the image. Feathering and other partially selected places are represented in the mask as gray halftones.

To save the current selection in a new alpha channel, you can execute the **Select/Save Selection** command or click on the **Save Selection as Channel** button at the bottom of the **Channels** Palette. By default, the new channel is named Alpha 1.

To save the selection in the existing alpha channel, in the dialog box (Fig. 12.1) in the **Document** rollout, the name of the document is selected. In the **Channel** rollout, select the name of the channel to which you want to record the new selection. To record to a new channel, select the **New** line. In this case, in the **Name** field, you can give it a name other than the standard name.

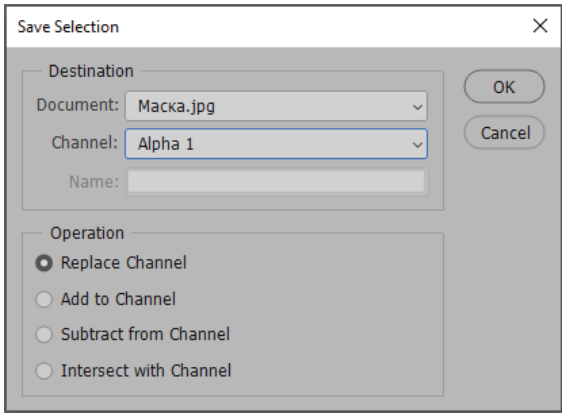


Fig.12.1. Save to alpha dialog box

When writing a selection to an existing alpha channel, select the recording method by clicking the corresponding radio button:

- **Replace Channel** - a new selection is written in place of the old one;
- **Add to Channel** - new selection is added to the old one;
- **Subtract from Channel** - the new selection is subtracted from the old one;

- **Intersect with Channel** - the area of intersection of the old and new selections is written to the alpha channel.

Exercise 12.1. Save Selection

1. Refresh the workspace using the **Window/Workspace/Reset Basic-1** command.
2. Open the *Mask.jpg* image from the *Lesson 12* folder (Fig. 12.2, left).
3. With the help of a magic wand, highlight the background behind the girls.
4. Open the **Channels** palette with the **Window/Channels** command. While it has three channels: red, green and blue.
5. Click the **Save Selection as Channel** button. **Alpha 1** channel added to the palette.

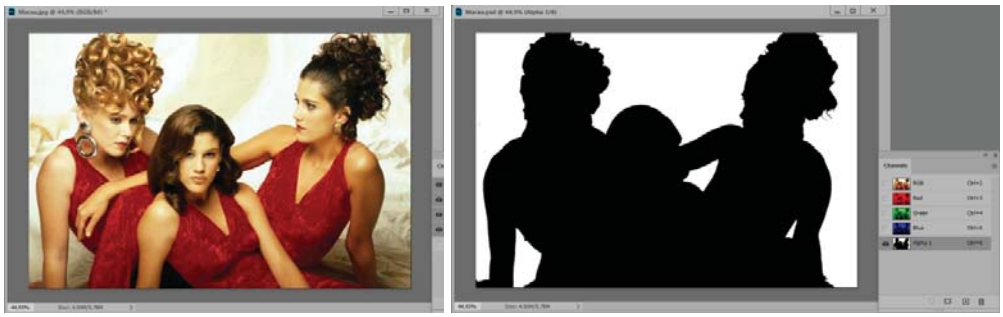


Fig.12.2. Save selections in alpha channel

6. By default, the alpha channel is not visible. Enable its display simultaneously with other channels by clicking on the visibility indicator in its line. In this mode, the masked part of the image is shown in translucent red. This color is selected by default for all alpha channels.
7. Now, on the contrary, turn off the display of all channels except the alpha channel (Fig. 12.2, on the right) or activate it by clicking on the channel name. You will see a white selection and a black masked area.
8. Remove the selection by executing the **Select/Deselect** command.
9. Select the hairstyle of the girl on the right using the polygonal lasso. Click the **Save Selection as Channel** button to save it to the new **Alpha 2** channel.
10. Now we will add the same selection to the first alpha channel. Execute the **Select/Save Selection** command.
11. In the **Channel** rollout, select **Alpha 1**. Click the **Add to Channel** button. Click the **OK** button. Activate the alpha channel to make sure the girl's hair is added to the white background.

The next time you open the document with the mask saved, you won't have to select the same area from the beginning. You can simply download it. To do

this, select the line with the alpha channel in the channels palette and click on the **Load Channel as Selection** button or execute a similar command from the **Select** menu. Since you have activated the mask channel, you need to return to normal operation by clicking on the top line of the channels palette.

To create a new alpha channel, you can click the **Create New Channel** button at the bottom of the channels palette. To delete an alpha channel, select it in the channels palette and click on the **Delete Current Channel** button.

12.2. Quick Mask Mode

Recording each new selection as an alpha channel will increase the file size. The program allows you to work with a selection as with a mask, without creating a permanent alpha channel. To do this, use the fast masking mode. To switch to this mode, click the **Edit in Quick Mask Mode** button on the toolbar (below the color picker).

When switching to this mode, a temporary alpha channel is created with the name **Quick Mask** and writes the selection there as a mask. Painting with black enlarges the masked area, painting with white enlarges the selected area. Painting with gray or any other color creates a translucent area.

After returning to the normal editing mode by pressing the quick mask button again, the mask is again converted to a selection, and the temporary channel is automatically deleted.

Exercise 12.2. Editing Selections

1. Open the *Mask.jpg* image from the *Lesson 12* folder.
2. Select any of the models in the image and zoom in as we will be working on highlighting the hairstyle.
3. Use the lasso tool to randomly select the entire hairstyle.
4. Click the Edit in **Quick Mask Mode** button on the toolbar. Everything, except for the selected area, was covered with a standard translucent red mask (Fig. 12.3).
5. To control the transparency of the red color, double-click on the **Edit in Quick Mask Mode** button, in the **Quick Mask Option** dialog box that appears, set the parameter value (Fig. 12.3).

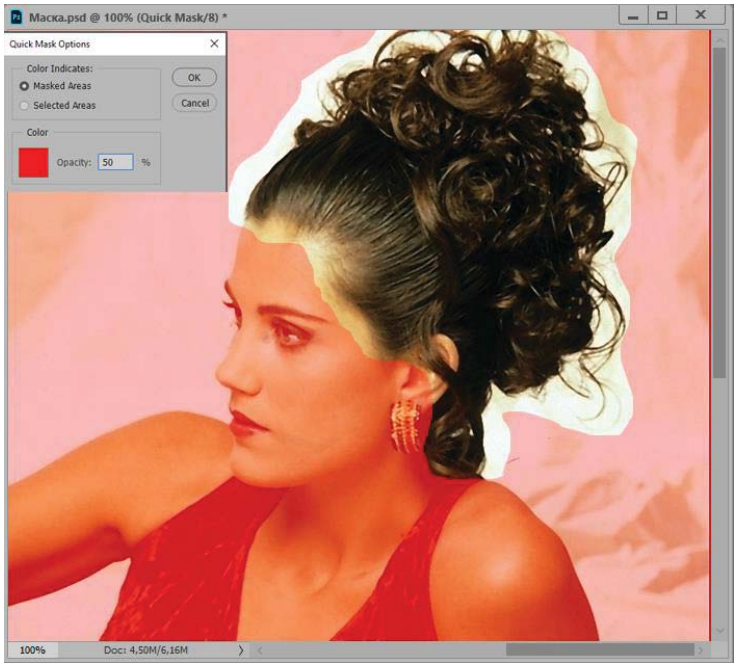


Fig.12.3. Editing in Quick Mask Mode

6. Next, select the **Paintbrush** tool. By default, the active primary color in this mode is black.
7. With a soft brush, paint over the unselected areas on the border of the hair with the background. A soft brush will help you make the border semi-transparent to save the hair. What you paint is immediately covered with a reddish mask.
8. If you painted over something extra, select the **Eraser** tool and use a soft brush to erase these places (or change the brush color to white). The red film in them will be removed, and the image will regain its former, bright appearance. In this way, you can select the entire hairstyle by individual hairs, which would not be easy with other selection tools.
9. Check the quality of the selection by temporarily returning to normal editing mode by clicking again on the original toolbar button.

12.3. Color masks

Masks can be created not only for geometric areas, but also for specified colors. In this case, all pixels of the image, the colors of which are included in the specified range, fall into the mask. To select areas for a given color range, there is a **Select/Color Range** command that allows you to almost automatically create a complex mask, which then requires only a little refinement. This command works similar to the **Replace Color** adjustment command.

Most of the **Color Range** dialog box is occupied by the preview window. Below it are two selection mode switches. In the Selection Preview rollout, you can choose how the selection is shown: **Grayscale, Black Matte, White Matte, Quick Mask, None.**

The **Select** rollout sets the **Sampled Colors** color selection mode or other primary colors. In the color probe mode, you click with the eyedropper in the right places, and the program finds similar colors throughout the image. The width of the color range is set by the **Fuzziness** parameter. On the right are three buttons with pipettes for logical operations with selected areas. By checking the **Invert** checkbox, you will create an inversion of the selected area.

Exercise 12.3. Selection of color ranges

1. Open the *Mask.jpg* image from the *Lesson 12* folder.
2. Select the **Select/Color Range** command. In the **Select** rollout, choose **Sampled Colors**.
3. In the **Selection Preview** rollout, select **Quick Mask** (Fig. 12.4).
4. Turn on the **Selection** switch to see selected areas (white on black background) in the preview window.
5. Click in the document window on the dresses, and some of them will be selected. In the viewer window they will be white, and in the document window this place will be cleared of the red film.
6. Click the middle dropper button **Add to Sample**. Now the new selected areas will be added to the old selection. Click a few more places. Try adding a **Fuzziness** value.
7. Select the **Grayscale** mode in the **Selection Preview** rollout to better see what is selected and what is not. Click in the remaining unselected areas to select those colors as well.
8. Select **White Matte** in the same rollout. In this mode, you can better see if extra colors stand out. To subtract unwanted areas, reduce the Fuzziness value so that they disappear. Click the **OK** button.

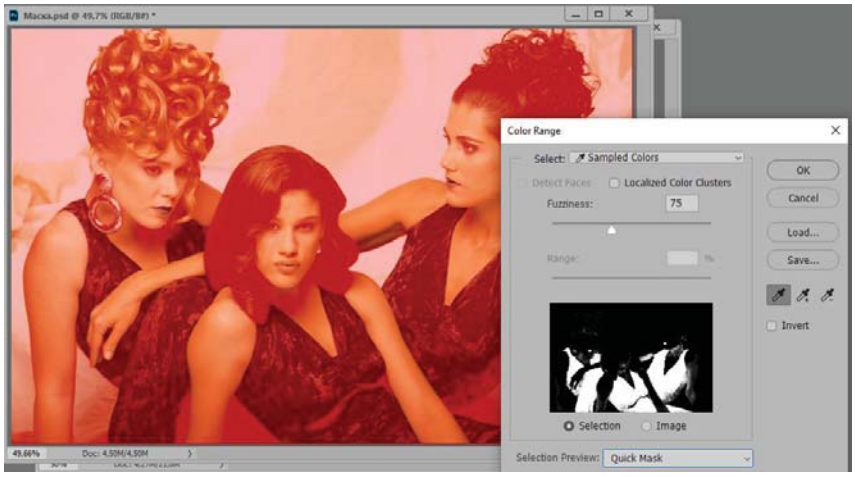


Fig.12.4. Create a color mask

12.4. Layer mask

When transferring a new fragment to a document, a new layer is automatically created only within the selected boundaries, and neighboring objects are lost. If you need to add a part of the original background around the fragment, you will have to repeat the operation again. But you can transfer the entire original background to a new layer and view it through the mask window. This is a special mask that is attached to its own layer and is called a layer mask.

A layer mask is created using the **Add Layer Mask** button at the bottom of the layers palette. This automatically creates an alpha channel to store it. To delete a mask, first activate it by clicking on its thumbnail and then click on the **Delete Layer** button at the bottom of the layers palette.

The **Edit/Paste Special/Paste** Into command creates the mask automatically. It is used to paste an image from the clipboard into a selection. The selected area itself becomes the mask. As an exercise, let's put a painting canvas in a frame. The **Paste Special** command option also has the ability to place an object outside the selection boundaries.

Exercise 12.4. Putting the canvas in the frame

1. Open and place the *Maiden's Tower.jpg* and *Frame.jpg* images from the *Lesson 12* folder side by side. We will try to frame the canvas with the oil painting.
2. Select the weight of the canvas with the tower, the command to select the entire document and copy it to the clipboard.
3. Moving on to the *Frame.jpg* image, select the rectangular inner part of the frame where we will insert the canvas.

4. Execute the **Edit/Paste Special/Paste Into** command. At the same time, the program, as usual, created a new layer for the copied object, but in addition, it automatically created a layer mask for it in the layers palette. The rectangle you selected has become a mask (Fig. 12.5, layers palette). The layer mask here is not related to the layer itself, so you can move them around independently.
5. Select the **Move** tool and move the canvas inside the frame to better position it. Click **OK**.

Fig.12.5. Layer mask for canvas

12.5. Masked Layer Groups

Another way to mask layers is to group multiple layers together. In this case, the bottommost layer becomes the mask for the other layers in the group. Where it is transparent, the rest of the layers are hidden, where it is opaque, everything is visible. This method is often used for text to fill it with some kind of texture.

To group two layers, move the pointer to the border between the layers in the layers palette and click on it while holding down the **Alt** key. All layers of the group, except for the bottom one, are shifted to the right in the palette, and a *downward-pointing arrow* appears next to them. The name of the bottom layer is underlined.

Exercise 12.5. Grouping layers

1. Open the *Grouping.psd* files from the *Lesson 12* folder.
2. There are three layers in the original *Grouping.psd* document: a background layer, a layer containing text and an image with **Gillette** text (layer palette, Fig. 12.6). Please note that the inscription is in black letters.
3. On top of all layers are cute sphinx cats in the *Grouping.psd* image. Group this layer with the text layer.
4. To do this, select the top layer **Layer 1**, press the **Alt** key and, without releasing it (when the corner arrow appears), click on the border of the two layers in the palette.
5. Now the text and cat layers form a masked group. Cats are visible only in the place of alphabetic characters (Fig. 12.6). Move the top layer with cats as you like. You can remove the mask by similarly clicking again on the border of the layers.

Fig.12.6. Masked layer group

Self-study

Based on the *Grouping.psd* image, create a new group of masked layers by choosing a new layer from another image instead of the cat layer.

13. VECTOR PATHS

Repeated editing of raster images (especially photographs) leads to a gradual deterioration in their quality. These shortcomings are absent in vector graphics. A vector drawing is remembered as a set of geometric shapes - contours, presented in the form of mathematical formulas [4, 5]. To proportionally increase the object, it is enough to change the scaling factor. In this case, no distortion will occur when the image is enlarged or reduced. You just need to rotate it, skew it and perform other transformations.

To make working with images more flexible, the Adobe Photoshop editor also has elements of vector graphics. Vector paths and shapes are stored and processed on special vector layers. They do not depend on the image resolution in any way. When exporting to raster formats, vector paths and shapes must be converted to a raster look, but in Photoshop documents they can be freely edited, changing their shape and size. Vector objects can be imported into vector editors, saved in PDF format and printed on Post Script printers.

13.1. Drawing paths and shapes

A contour is usually understood as a figure or area obtained using logical operations of addition, subtraction and intersection of individual lines. Any contour consists of a certain number of reference points connected by straight or curved lines - segments. It can be closed and open.

The outlines themselves are invisible, but you can set the stroke and fill for the areas selected by them. The fill is the color of the inner area of the path. It can be solid, gradient or patterned. A path can have a fill and stroke weight.

Paths are drawn using the Bezier curves method. This curve is of the third order, its form is determined by the nodal points and control tangents (Fig. 13.1). Depending on the tangents, the anchor points can be smooth or angular.

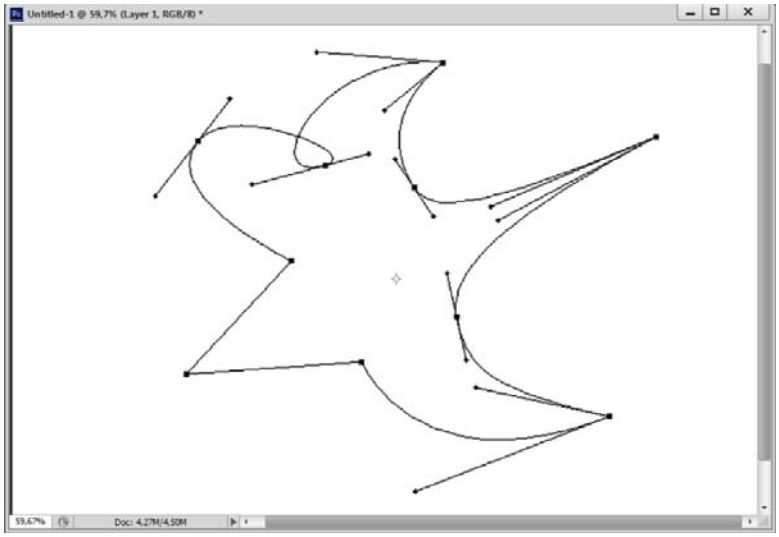


Fig.13.1. Bezier curve with different types of anchor points

To draw Bezier curves, as a rule, the **Pen** tool is used (Fig. 13.2, on the left), with which you yourself place *Bezier points* and adjust the curvature of the line in them using the curvature manipulator, tangents. To create very complex paths, you can use the **Freeform Pen** tool, which allows you to draw freehand. Then the program itself will convert the drawn line into *Bezier curves*.

Simple shapes such as a rectangle, ellipse, star, etc. are easiest to draw using special tools that are located on the toolbar under the **Rectangle** tool (Fig. 13.2, on the right).

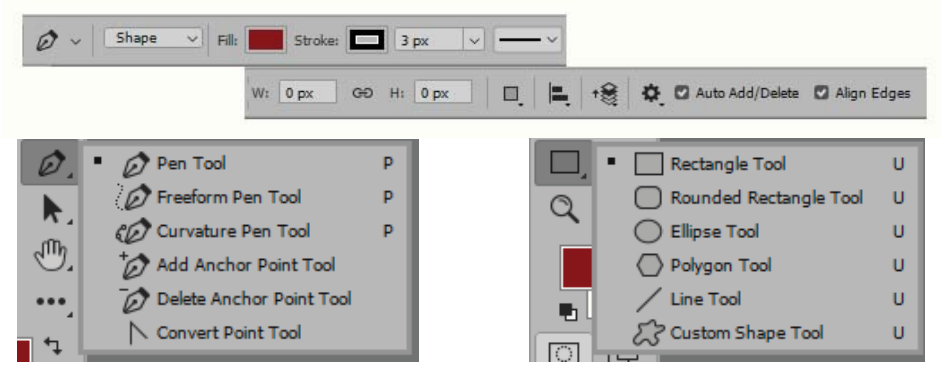


Fig.13.2. Control panel for drawing and **Pen** tools

You can draw with a pen and special tools as invisible vector contours, as well as colored vector shapes. The drawing mode is selected in the **Tool Mode** rollout on the control panel, which appears there when any drawing tool is selected (Fig. 13.2, above).

Select Path mode from the rollout to draw invisible paths. The **Shape** mode creates a new fill layer with the current foreground color on which you will draw the shapes. When working with special tools, there is also a third mode nearby: **Pixels**. This mode creates a colored bitmap shape filled with the foreground color. In this mode, you can set the color blending mode and layer opacity.

Before you draw, in the **Fill** rollout, you can select one of the preset styles for the fill layer to immediately get shapes with shadows, halos, gradients, pattern fills, and more.

In the **Stroke** rollout, you can set the thickness of the stroke of the constructed path and the type of the stroke line. The dimensions of the bounding rectangle of the vector figure are also set here. The following buttons are used to select operations with contours: intersection, alignment, ordering.

When drawing invisible paths, the program remembers the path configuration in the **Paths** palette. On her own, she can remember only one circuit, which is called the worker. This is a temporary loop. After closing the document or when creating a new path, it is cleared. In order for you to be able to use the created path the next time you open the document, you must save it in the Palette of Paths and give it a name.

Invisible paths themselves are not reflected in the image in any way, but they can be converted into selections, and they can be filled and stroked. When converted to a selection, the outline becomes bitmapped and loses its resolution independence.

Vector colored figures have a rather complex structure. When creating a new colored shape, a special raster layer of the desired color is created for it - the fill layer. The shapes you draw for this layer will be stored in the **Paths** palette as a shape clipping path for the layer.

After at least one shape is drawn on the layer, using the control panel, you can add or subtract new areas from the shape, as well as handle their intersections in different ways.

Let's do an exercise to get a feel for how to draw in different modes in practice, and to understand what happens.

Exercise 13.1. Drawing paths and shapes

1. Refresh the workspace using the **Window/Workspace/Reset Basic-1** command.
2. Create a new document 10x15 cm, 300 pix/inch in **RGB** palette. Open the **Paths** and **Layers** palettes and position them so that the document doesn't obscure them.
3. Select the **Custom Shape** tool. Set the **Paths** mode in the **Tool Mode** rollout in the **Control Panel** to draw an invisible path.

4. Open the **Custom Shapes** set by clicking on the triangle to the right of this box in the **Control Panel**. There are different sets of custom shapes, select any shape in it (for example, a heart) and click on it.
5. Click in the document window and move the pointer diagonally down. When the path is the right size, release the mouse button. Look at the Palette of Contours (Figure 13.3, top right). The line **Work Path** appeared in it, and in it a thumbnail image of the new contour. Now this contour is active (the line in the palette is highlighted).

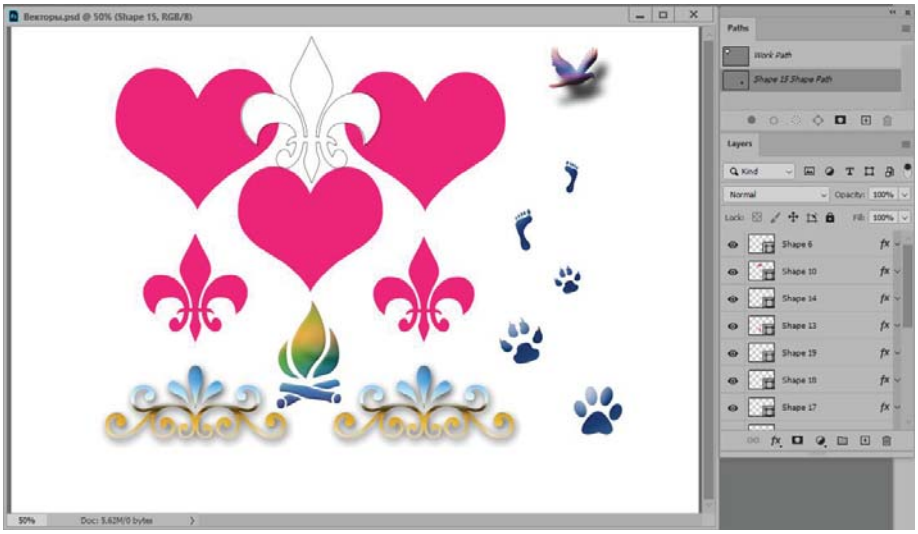


Fig.13.3. Drawing vector paths and shapes

6. Click on a blank palette box below the active row. Thus, this contour ceased to be active in the palette, and it disappeared in the document. Click on this line again - a heart has appeared, since you have made the work path active again.
7. Click on an empty field of the path palette, select another path in the custom shapes palette and draw it. You can see that this is immediately reflected in the working layer thumbnail. There is now a new contour, and the heart, unfortunately, is gone. You can see the disadvantage of working with a temporary work path: it only remembers the last thing you drew on it.
8. Now let's draw a colored shape. Choose a bright primary color.
9. Click on an empty field of the contour palette to remove the activity of the working layer. Select **Shape Mode** from the **Control Panel** and a new shape. Draw it in the document window.
10. Look at the paths palette. There appeared the line **Shape 1 Shape Path**. A new layer appeared in the layers palette (Fig.13.3, bottom right), it is called the same as the new line in the contours palette - Shape 1.

11. Select **Pixels** mode, and create raster layers with custom shapes. These shapes are bitmaps.

Self-study

Using different fill modes and styles, create your composition from custom shapes.

13.2. Pen drawing

Contours of arbitrary shape are drawn with the **Pen** tool. To do this, click at one point, then at another, at a third, and so on. Thus, you have created several reference points, and the program will automatically connect them with line segments. To create a closed contour, the last point must be placed exactly in the place of the first point of the contour (according to the type of the pointer in the form of a hollow circle).

Curved lines can be drawn using the same tool, but it is somewhat more difficult, so we will describe this operation in detail using an example. Place the pointer in the form of a pen on a blank area of the document, press the left mouse button and, without releasing it, move the pointer straight up.

You can see that from the anchor point you created, there are guide lines that are tangent to the curve at that point. At their ends are control points.

Control tangents are aids to drawing curves and are often referred to as curvature handles. The curvature manipulator determines the tangent to the curve, and the length of its handle determines the radius of curvature at that point (fig.13.1).

A point is smooth if two tangent branches lie on the same line. Tangents, consisting of two branches, lead to corner points. The corner point handles can be angled to each other, and you can rotate both points independently.

On the control panel, when the **Auto Add/Delete** checkbox is checked, you have the ability to add and delete points in the already drawn part of the contour while drawing. Click on any non-end point and it will be deleted, and adjacent points will be connected by a segment whose curvature depends on their handles.

Drawing with the **Freeform Pen** is similar to drawing with a pencil on paper. Anchor points are placed automatically, regardless of you. But you can edit them later, after you finish drawing the outline.

The **Curvature Pen** Tool allows you to draw a curvilinear contour using anchor points; by default, a polyline is drawn with a regular **Pen**.

Exercise 13.2. Drawing with a Freeform Pen

1. Select the **Freeform Pen** tool, set the **Shape** mode in the control panel.

2. Click and move the pointer without releasing the mouse button - "without taking your hands off". Draw, thus, some kind of contour (for example, a figure with pleasant outlines, fig. 13.4).
3. To continue the line, click at any end point and move the pointer further. To draw a closed path, move the pointer to its first point and release the mouse button.
4. To build curvilinear contours, use the **Curvature Pen** Tool.

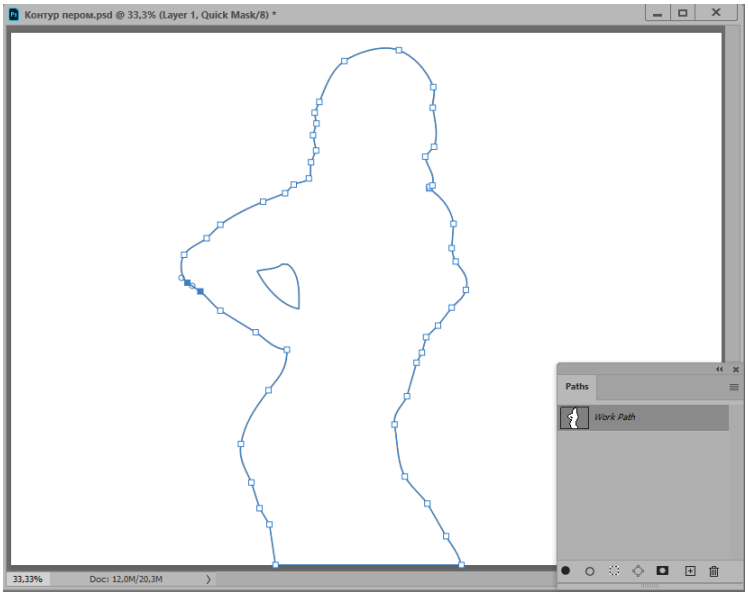


Fig.13.4. Drawing with the **Freeform Pen**

On the control panel, the **Magnetic** checkbox enables magnetic pen mode. This mode resembles a selection with a magnetic lasso. The magnetic pen only works well for objects placed against a contrasting background. The work of the tool is based on finding places of greatest contrast.

Exercise 13.3. Magnetic pen or rabbit in a "tiger" skin

1. Open the document *Rabbit y.jpg* from the *Lesson 13* folder.
2. Select the **Freeform Pen** tool. Check the **Magnetic** box in the control panel.
3. Click exactly between the beautiful bunny ears. There appeared the first fixed point in the form of a square. Line color and thickness can be set in the control panel's **Set** option.
4. Release the mouse button and move the pointer along the outline of the fluffy bunny image. You can see that there is a line behind him. At some distance from the first point, a second square appeared, and the first one

became hollow. Hollow points are already fixed, you can only delete them one by one, starting from the end, by pressing the **Del** key.

5. As you move the pointer, more and more points appear on the line. If the program drew the boundary inaccurately, return the pointer to the place where it went wrong, and put a point there yourself by clicking the left mouse button.
6. Having circled the entire hare along the contour, place the last point exactly on the first one (a hollow circle will appear next to the pointer) and click the left mouse button.
7. The path you drew is only stored as a temporary work path for now. If you close the document now, it will be lost.
8. Open the **Paths** palette (Figure 13.5). There is only one Work Path line so far. Execute the **Save Path** palette menu command and enter a name for the path (for example, *"Rabbit" or "Tiger"*). Click the **OK** button.

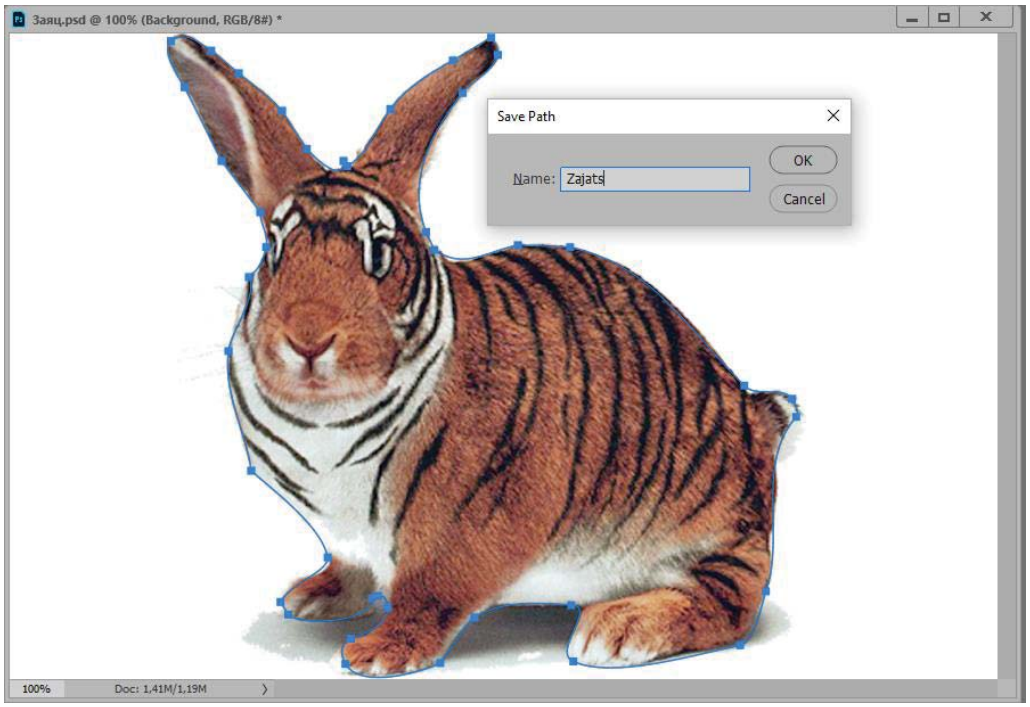


Fig.13.5. Draw with the **Magnetic Pen** tool

13.3. Drawing with special tools

Special tools are used to draw standard paths and shapes. You can select them on the toolbar (fig.13.2). To draw a rectangle with straight or rounded corners, select the **Rectangle** or **Rounded Rectangle** tool. Set the pointer to the top

corner of the future rectangle and drag the pointer down diagonally. When the rectangle reaches the desired size, release the mouse button.

Ellipses are drawn in exactly the same way as rectangles, but with a different **Ellipse** tool. When the **Circle** button is enabled, a circle will be drawn.

To draw a regular polygon, select the **Polygon** tool. In the **Control Panel**, in the **Sides** field, enter the number of sides for the polygon. At the same time as setting the size of the figure, you can rotate it.

To draw a star with this tool, open the tool docker at the end of the control panel. Check the box **Star** and then **Indent Sides by** and enter the depth of the star's rays next to it. It is expressed as a percentage of the outer radius. In the **Radius** field, enter a radius value if you want to draw fixed size polygons or stars.

To draw a line, select the **Line** tool. The mouse pointer will change to a cross. Click anywhere on the canvas and drag the pointer in the desired direction, a straight line will follow.

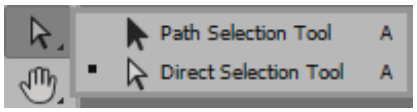
On the control panel, in the **Weight** field, enter the thickness of the straight line. To draw a straight line with an arrow, open the **Tool Options** window. Check the **Start** box to create an arrow at the beginning of a line **and/or End** at its end. In the **Width** and **Length** fields, specify the width of the arrow and its length in relation to the line thickness. In the **Concavity** field, specify a value that reflects the degree of concavity of the arrow base.

By selecting the **Custom Shape** tool, you can use a palette of standard shapes or those that you have created yourself. To open the palette, click on the triangle next to the **Shape** rollout in the **Control** Panel.

By clicking on the triangle to the right of the tool buttons on the control panel, you can make adjustments to the selected shape in the dialog box: **Unconstrained, Defined Proportions, Defined Size, Fixed Size, From Center**.

You can save any of the paths or clipping paths you've created as a custom shape set. To do this, you can select the **Define Custom Shape** command from the context menu, this shape will appear at the end of the list.

13.4. Selection and transformation of paths



To select a path as a whole, use the **Path Selection** tool.

If you click it on the contour line, then all its anchor points will be visible. With the same tool, you can drag the outline to another location, as well as copy it by moving it while holding down the **Alt** key. To remove one or more path components, select them and press the **Del** key.

Paths and their individual components can be scaled, rotated, mirrored, skewed, and distorted using the transform command.

The **Direct Selection** tool is used to select individual anchor points and segments.

Let's try to highlight the contours and their elements in practice.

Exercise 13.4. Path selection tools

1. Open the familiar *Rabbit.jpg* image (Fig. 13.5).
2. Use the **Magnetic Pen** to select the hare.
3. Open the Paths palette and select the **Path Selection** tool. Click on this line. All anchor points of the contour became visible as squares.
4. Make a copy of the outline. To do this, click on it while holding down the **Alt** key and move it to the side. The old circuit remained in place, and you have a new hare in your hands. Remove the selection by clicking on a blank field.
5. Select the **Direct Selection** tool. Click on the path segment between the two anchor points. All points became visible as hollow squares. This means that none of them is selected. But at two points of the segment, the handles of the manipulators became visible: one handle at each point.
6. Click with this tool on the anchor point. She became black, therefore, she is selected.
7. Now let's select several points at once. The best way to do this is with a frame. To do this, click above and to the left of all the desired points and move the pointer down diagonally. When all these points are inside the rectangle, release the mouse button.
8. Points that are difficult to fit into the frame, select while holding down the **Shift** key, clicking on them in turn, and move them to the side.

The **Add Anchor Point** and **Delete Anchor Point** tools are intended for creating and deleting anchor points (Fig. 13.2, left). To add an anchor point, click at that location on the path with the first tool, and to delete a point, click on it with the second tool. If you select a segment and press the **Del** key, the segment will disappear, but its anchor points will remain unchanged.

The **Convert Point** tool is used to convert a smooth anchor point to a corner point and vice versa (Fig. 13.1), which allows you to change the curvature of the path at a particular point.

Closed paths can be easily converted to selections, and selections to paths. To do this, you can select the **Make Selection** command from the path palette menu.

It should also be noted that to convert vector shapes and contours to raster objects, you should type the command **Layer/Rasterize/Shape**. After that, you can carry out any operations with them.

Self creative work

Try converting the vector path of the hare in the previous exercise to bitmap selection, edit the whiskers and rasterize the path. You can fill the hare with a pattern or other fill.

As a creative challenge, try also creating a pattern, a composition of vector shapes, and a landscape from the custom shapes shown in Figure 13.6. The originals of these images are located in the *Lesson 13* folder under the names *Vector Pattern.jpg*, *Vector Composition.jpg* and *Winter Landscape.jpg*.

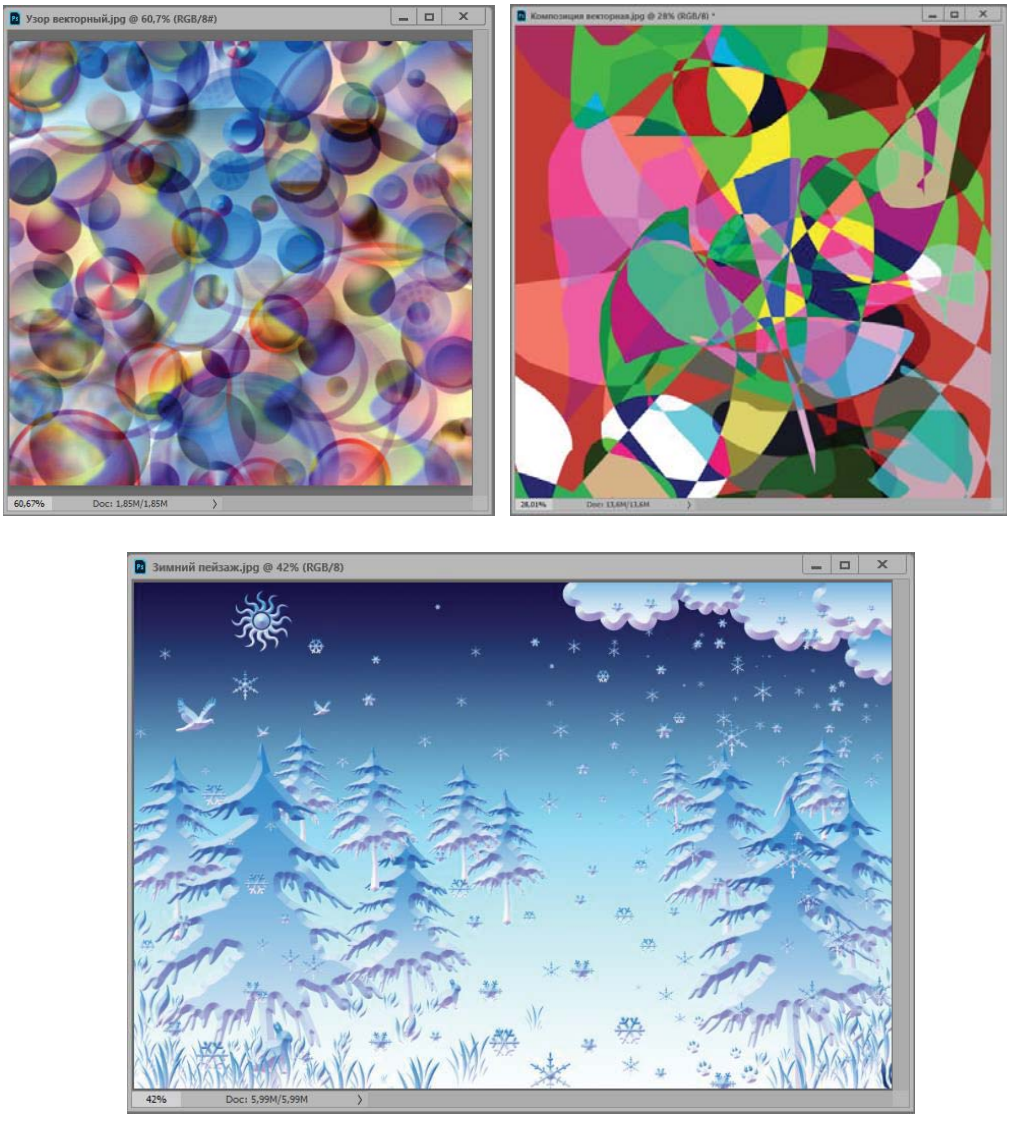


Fig.13.6. Images based on vector shapes

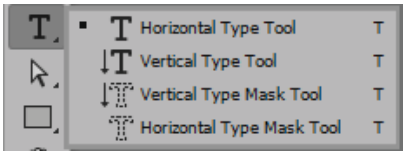
14. TEXT ENTERING AND EDITING

The Adobe Photoshop raster program is not designed to process a large amount of text, however, it has a fairly wide range of text input and editing capabilities. Working with text has its own characteristics here. On the one hand, the program uses bitmap fonts, i.e. as you zoom in, you'll see steps that are typical of raster objects.

On the other hand, it remembers the entered text in vector form and uses vector paths to edit it. Moreover, the program can export vector fonts to EPS and PDF formats, as well as print them on Post Script printers [1,4].

Text is created and edited on special text layers, so editable text is saved only in formats that support layers: native PSD, TIFF, EPS, and PDF. Text layers are converted to bitmap before exporting to other formats.

14.1. Entering text



The **Type** tool is designed to work with text. Adobe Photoshop provides two modes for entering text. You can start typing anywhere in the document by clicking the pointer there. This input mode is called point input. The text is entered in this mode horizontally or within one line.

In the second mode, a rectangular area of a given size is immediately selected for text - a text block. In this mode, the text is automatically formatted, that is, it is broken into lines within the boundaries of the block. You can arbitrarily resize the block, the text inside will be formatted automatically, according to the width of the block.

When filling a block with text, an overflow icon in the form of a square with a plus appears in its lower right corner. In both modes, text can be entered either horizontally or vertically. When you type vertical text into a text block, the columns appear from right to left, as written in Chinese or Japanese.

Text input tools can be divided into two groups:

- **Horizontal Type and Vertical Type,** text blocks with horizontal and vertical position of characters, the text is saved in a separate layer;
- **Horizontal Type Mask and Vertical Type Mask,** text blocks in the form of a selection (mask) are created in the current layer, after filling the selection become bitmap text.

Exercise 14.1. Entering dotted text

1. Create a new document with a white background.
2. Select the **Type** tool. The pointer has become a crossed-out **I,** the insertion pointer.

3. By default, the **Horizontal Type** mode is enabled.
4. Click anywhere on the page, a flashing vertical bar will appear here - the cursor with the text. As you type, the characters you enter will appear.
5. On the control panel, you can select character attributes: typeface, style, size, etc.
6. Enter some words. Finish entering text by clicking on the checkmark button on the control panel.
7. Look at the layers palette (Figure 14.1, bottom right). A layer with a "**T**" icon appeared in it. The layer name represents the beginning of your text (if the selected fonts are installed in the operating system).
8. Finish entering text by pressing the **Enter** key.

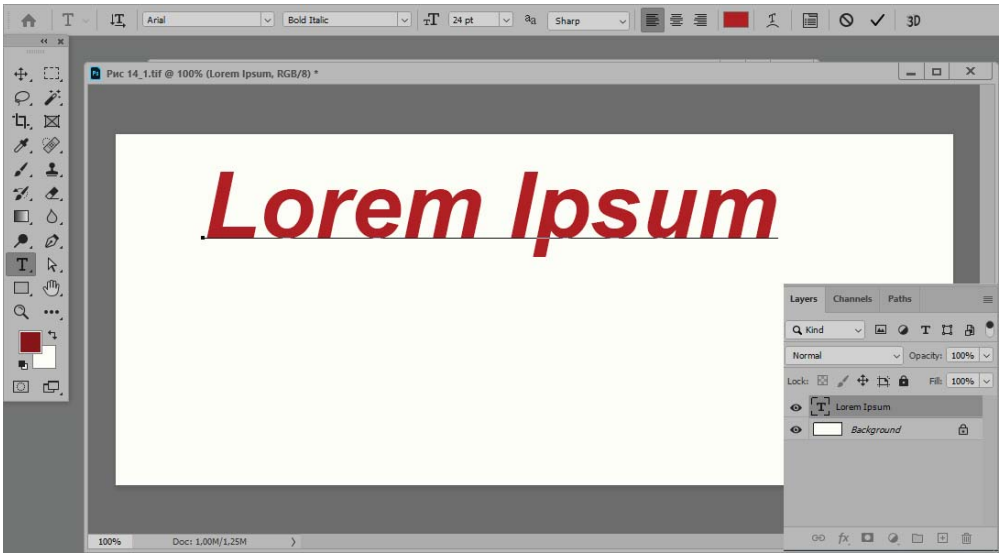


Fig.14.1. Control panel and layers palette when entering text

Exercise 14.2. Create a text block

1. Select the **Type** tool.
2. Click in the document window and drag the pointer diagonally down. A frame will follow. When it is the right size, release the mouse button. The cursor blinks in the upper left corner of the frame, you can enter text there.
3. Enter text. Note that it automatically wraps to a new line when you reach the right border of the text block.
4. If the text does not fit into the block, you can immediately increase it. On the block outline frame, you can move the size limiters.
5. Finish entering text by clicking on the control panel checkmark button or by pressing the **Enter** key. Check the layers palette for another text layer.

By clicking in the document window with the **Type** tool, you switch to the text input and editing mode. In this mode, you can only work with this text and nothing else. If you click the checkmark button, the text remains in the document. If you click on the button with a crossed out circle instead of a check mark (similar to the transformation mode), all entered text will be deleted.

A separate text layer is created for each text block or point text. When entering text in masking mode, entering new text deselects the old selection, so the old text will disappear unless you save it in an alpha channel or color it in one way or another.

Exercise 14.3. Text - mask or write in Japanese

1. Select the Vertical Type Mask tool and the font **WP Japanese** (or another if the specified font is not available).
2. Click in the document window and create a text block. The document was covered with a red film, characteristic of masks. Write something in **Japanese** (with the **Shift** key pressed).
3. Figure 14.2 shows vertical text formatted from right to left (let the **Japanese** forgive us for bad grammar).
4. When finished entering and editing, click the checkmark button. The entered text now exists as a selection.
5. Select the color of ripe cherries as the main color and fill the selected hieroglyphs on a new layer.

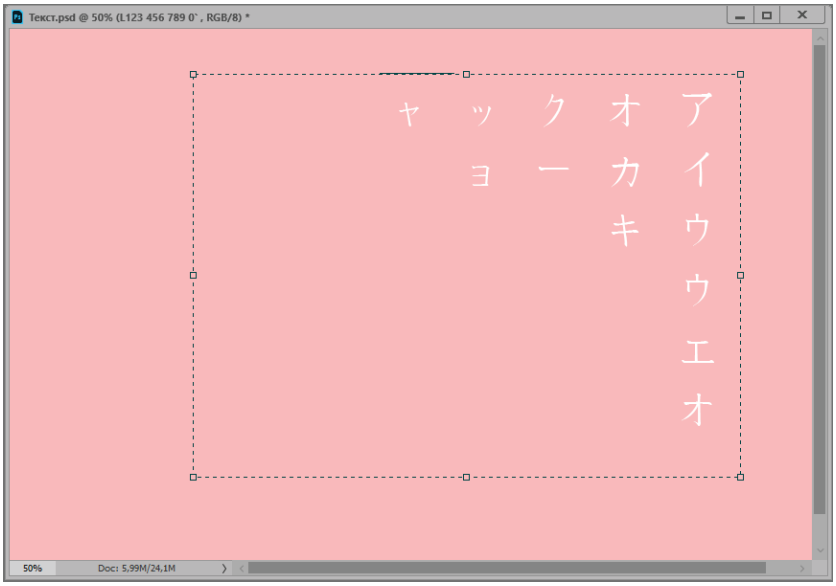


Fig.14.2. Entering text in mask mode

he text block in the form of selections can later be converted into a working vector path using the **Paths** palette. You can edit these paths as **Bezier** curves, edit existing fonts, create your own font. The task of creating an original font sign becomes relevant when *developing logos as part of a corporate identity*.

14.2. Transforming and editing a text block

You can change the size of a text block or transform it, both during the text input process and after that. To do this, select the text layer corresponding to it in the layers palette and click the **Type** tool inside the text.

You can use all the commands from the **Edit** menu to transform text layers, with the exception of the **Distort** and **Perspective** commands.

In edit mode, only the **Type** tool and some menu commands are available to you. To delete text fragments, you can use the familiar **Del** and **Backspace** keys. Just like in text editors, here you can copy the selection to the clipboard and then paste it in another place or application. Through the clipboard, you can copy and paste text from other Windows applications, only as a bitmap layer.

To format text, you need to change the default attributes: select a font and size, set indents, etc. Text attributes can be controlled using the control panel or the **Character, Paragraph** palettes (Fig. 14.3).

To call this palette, click on the **Palettes** icon in the **Control Panel** or select from the **Window** menu.

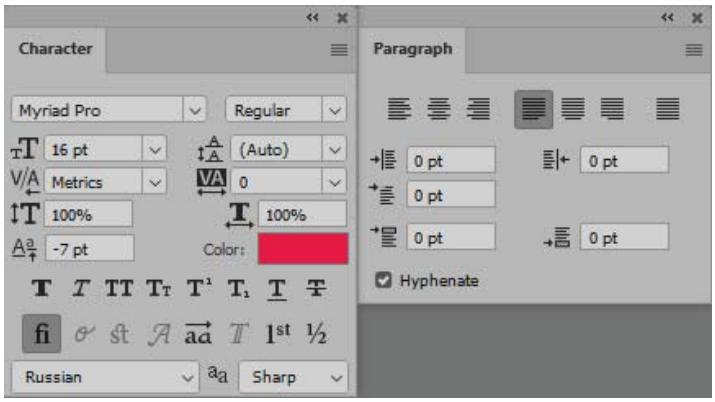


Fig.14.3. **Character** and **Paragraph** Palettes

Typeface and size

In the **Font Style** rollout, you can select the font style, if it is provided for this typeface. Possible options: **Regular, Bold, Italic, Bold Italic**.

Leading

Leading is the distance between lines, or, more precisely, the height of a typed line, which is the sum of the height of the letters (point size) and the empty

spaces between the lines. Select a section of the line. The height of the highlight is the height of the dial string. Leading is set in the **Leading** rollout. When **Auto** is selected, the leading value is calculated as a percentage of the largest line size, by default it is 120%.

Tracking and kerning

Tracking is the adjustment of the inter-character spacing in an array of text depending on the size of the characters, and kerning is the manual adjustment of the distance between two specific characters so that they do not seem stuck together or parted (in large size headings). The kerning value is set in the **Kerning** rollout of the symbol palette. To set tracking, select the text, and then set the required value in the **Tracking** field. In addition to manually adjusting kerning, you can use the values set in the **Metrics** typeface itself.

Baseline shift

By shifting the baseline, you can lower or raise characters relative to the line. To perform a shift, enter the shift value (measured in current units) in the **Baseline Shift** field of the symbol palette. Positive values correspond to a shift up, negative values correspond to a shift down.

Character Width and Height

Character width is measured as a percentage of the normal width. To change the character width, enter the desired value in the **Horizontally Scale** field. Similarly, in the **Vertically Scale** field, you can enter the vertical stretching scale for the font.

Character color

By default, text is colored with the current foreground color, but you can always change the color. To do this, select the symbols whose color you want to change, click on the colored **Color** box in the symbol palette, or select a different color on the control panel.

14.3. Editing text layers

After creating text layers, you can perform the same operations on them as on regular layers (move, duplicate, change the order of their overlap, transform). In addition, you can change the orientation of the text, bend the text along specified paths, and convert it into a work path.

There are some restrictions for text layers - not all tools and commands can be applied to them (for example, drawing tools and filters). To do this, you need to rasterize the text layer, that is, turn it into a regular raster layer. However, after that, *the text ceases to be editable* and becomes a regular bitmap fragment. To rasterize a text layer, select it in the layers palette and choose the menu command **Layer/Rasterize Type**.

Text blocks can be deformed, bend the text along the given contours. To do this, select the text layer in the layers palette and click the **Create warped text**

button on the control panel. In the dialog box, you can select: arc, wave, flag, shell, fisheye, etc. (Fig. 14.4, right).

The **Horizontal Distortion** slider changes the bend along the horizontal, that is, one side of the text box after the bend becomes wider than the other side.

The **Vertical Distortion** slider changes the bend along the vertical, i.e. the top of the text box after the bend becomes wider than the bottom, or vice versa. A warped text block *cannot be scaled or transformed*. To return the text to its original rectangular shape, select the **None** line in the **Style** rollout in this dialog box.

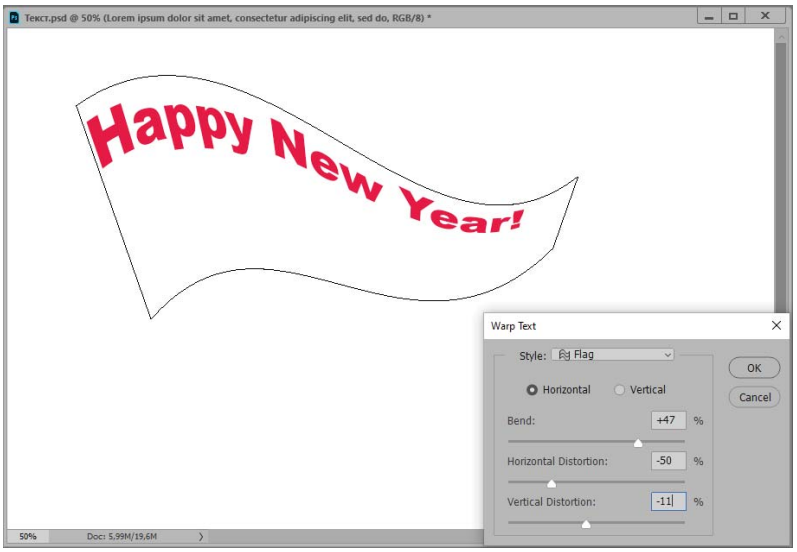


Fig.14.4. Text warp

14.4. Positioning text along an arbitrary path

In addition to deformation along standard contours, sometimes it is required to position the text along a curved contour. In popular vector programs, the arrangement of text along an arbitrary path is quite common. This technique can also be performed in Adobe Photoshop.

Exercise 14.4. Text along a curved line

1. Create a new document.
2. Select the **Pen** tool and draw an arbitrary open curvilinear contour (Figure 14.5, second line from the top).
3. Select the **Type** tool. Bring the pointer to the beginning of the curved line, it will turn into a cursor with a dash, as in Figure 14.5, top line.

4. Click and then type in dotted text. To expand a text string (when a plus sign appears on the right side), you can use the **Direct Selection** tool. After typing the required text, complete the operation.

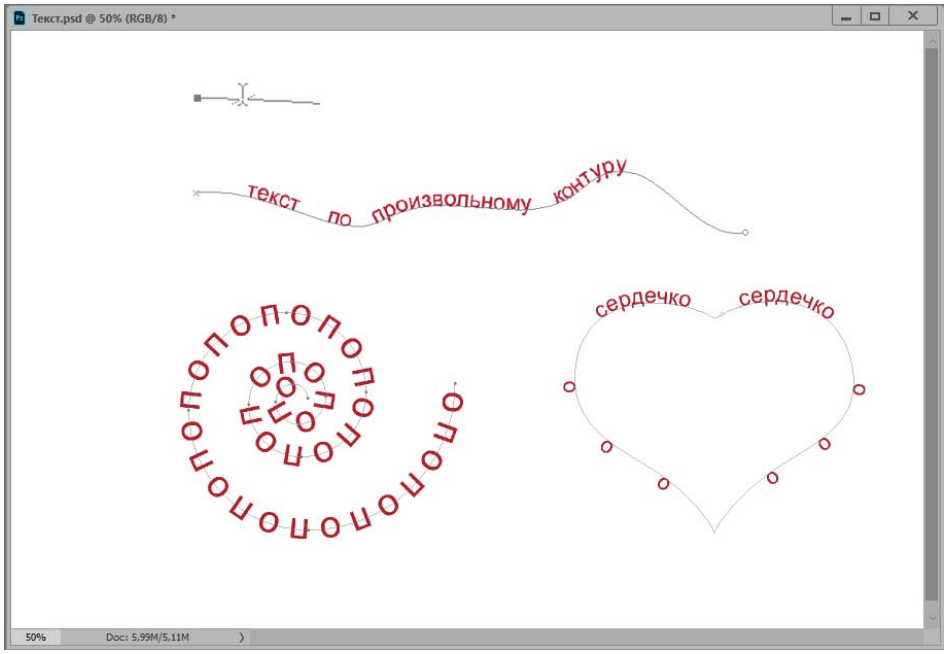


Fig.14.5. Arranging text along arbitrary paths

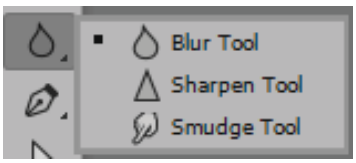
Self-work "Spiral beads"

Create text inserts based on vector paths, in the form of a heart, a spiral with beads, etc., as in Fig. 14.5, below.

15. CORRECTION TOOLS

To improve the quality of images and restore photos in Adobe Photoshop, there are tools for retouching and correction. [1, 3, 6].

15.1. Blur and sharpen tools



Minor defects in photos are more conveniently corrected using the **Blur** and **Sharpen** tools. The first one increases sharpness, the second one reduces it.

These tools are configured in the same way as brushes. On the control panel, you can select the brush size for them, in the palette, select a soft or hard brush.

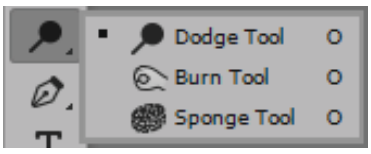
Using the **Strength** slider, you can control the intensity of the tool's impact. The larger this value, the stronger the effect.

The **Mode** rollout selects the blending mode of the original pixel color and the color obtained as a result of the calculation. When working with the **Sharpen** tool, it is convenient to use the **Luminosity** mode so that as a result of the correction you will not get colored noise.

The next tool is more familiar to smudging when working with real paintings. The **Smudge** tool smudges pixels in the direction of travel, as if you were running your finger over fresh paint. The greater the pressure, the more the paint smears.

In addition to the setting that is common to all retouching tools, it has two checkboxes. When the **Simple All Layers** checkbox is checked, the finger smears the colors of all visible layers. When the **Finger Painting** checkbox is checked, the stroke starts with the current base color.

15.2. Toning tools



The **Dodge** and **Burn** tools allow you to tone-correct an image in small areas. For them, you can also choose the size and type of brush, the same blending modes as for the adjustment tools.

In the **Range** rollout, you can select specific ranges of brightness by tones for adjustment: **Shadows, Midtones and Highlights**. The **Exposure** rollout sets the degree of impact of the tool. These tools are often used to remove unwanted highlights or shadows.

The **Sponge** tool performs local color correction on an image. The intensity of the impact is determined by the **Flow** parameter, and the size of the treated area is selected by the size of the brush. This tool has two modes of operation, which can be selected in the Mode rollout. In **Saturate** mode it increases color

saturation, in **Desaturate** mode it decreases it. For halftone images, the sponge increases or decreases the contrast of the image.

Exercise 15.1. Corrective and toning tools

1. Open the *Shadow.jpg* image from the *Lesson 15* folder.
2. Select the **Blur** tool, increase the pressure to 80% ÷ 90% and try to blur the blue shadows (fig.15.1).
3. Select the **Sharpen** tool with a soft brush, set the blending mode to **Luminosity**. Run the brush over the brown shadows.
4. Select the **Dodge** tool with a soft brush and work on the center of the cell with pink shadows. Also lighten the edges of the black box of shadows.

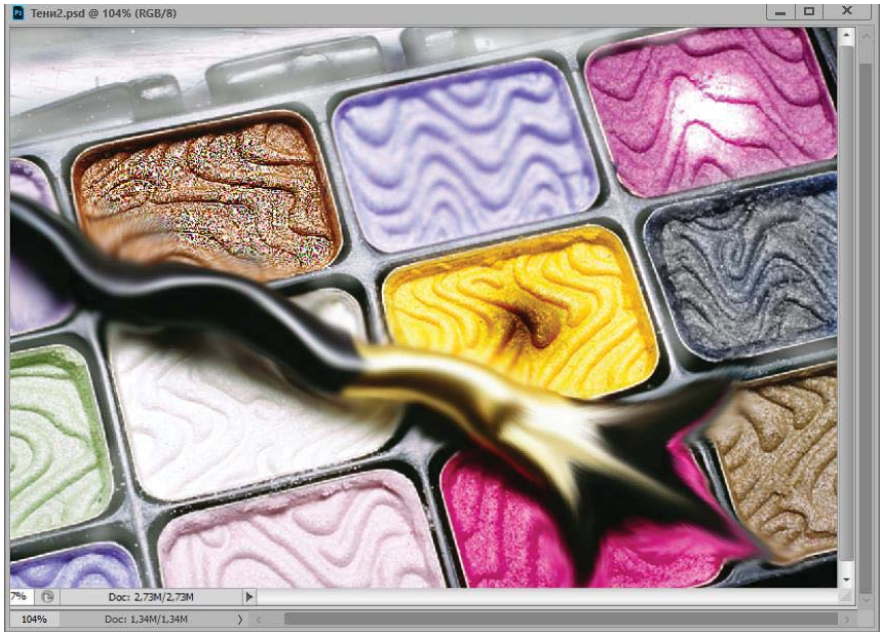


Fig.15.1. Using tinting and corrective tools

5. Now select the **Burn** tool, and "burn" the cell with yellow shadows, as in Fig. 15.1.
6. Select the **Sponge** tool, turn on the **Saturate** mode, set the pressure to 50%.
7. Sponge over the yellow shadow to make it more saturated. In **Desaturate** mode, desaturate the nearby blue shadows.
8. Select the **Smudge** tool, select a soft brush for it, set the pressure to 50%. Change the brush into another tool, as in Fig. 15.1.

Self-study "Female portrait"

The **Smudge** tool is often used when creating artwork in this editor, try to create a artwork like in Figure 15.2 (if you have time, patience and skills). The female portrait was made from memory with brush and finger tools. The original image *Portrait female.jpg* is in the folder *Lesson 15*.

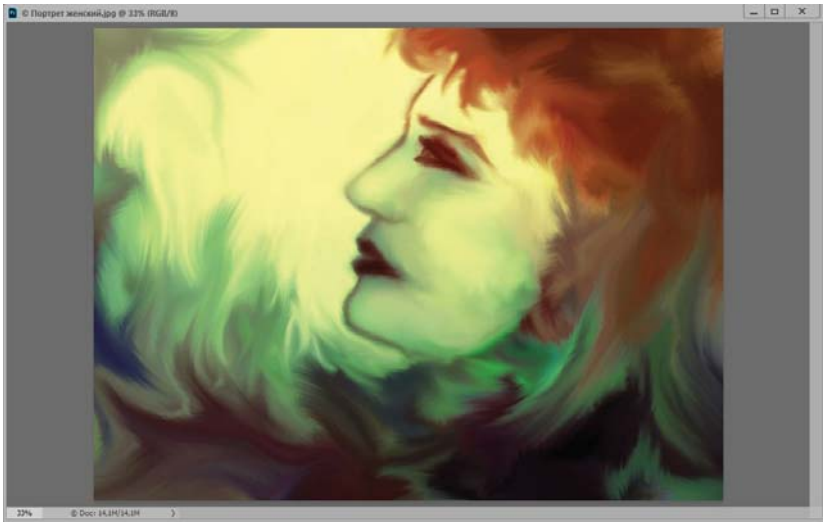
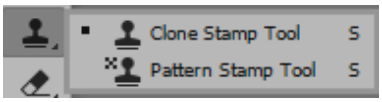


Fig.15.2. Finger portrait of a woman

15.3. Fragment Cloning Tools



When restoring old photos, it is often necessary to create patches to restore damaged fragments. This can be done using special tools - stamps.

The **Clone Stamp** tool allows you to paint not with color, but with fragments from another place or from another image. It can work in two modes: with alignment and without it.

To enable the alignment mode, check the Aligned checkbox. In addition to the size of the brush, you can set its opacity; at values less than 100%, the old fragment will show through the applied drawing. In the **Mode** rollout, you can select blending modes, as for a regular brush. The **Flow** parameter sets the percentage of the cloned fragment that "flows" from the brush. The remaining parameters are similar to the previous tools.

To start cloning an image using a stamp, you must specify the location you want to copy. To do this, click, holding down the **Alt** key, at the point that will be the *"anchor*". This dot can be in the same image or in a different image. If you now click elsewhere and paint a line of any shape with the brush, a path of the same shape will be reproduced leading from the anchor.

When cloning with alignment, you see two cursors at once. One shows where you are currently drawing the line, and the second cursor shows where the

location currently being copied is. If this place does not suit you, move the "anchor". In unaligned mode, each time you click in the image to start a new line, the copy moves so that its anchor is at that point. This way you start copying from the same place every time.

Exercise 15.2. Cindy without a birthmark

1. Open the *Cindy.jpg* image from the *Lesson 15* folder.
2. The photo shows one of the famous models (Canadian Cindy Crawford). The model has a mole above the upper lip. We will try to give her a plastic surgery to remove this mole (I hope she would not be offended, especially since we will do it painlessly and without free of charge).
3. Select the **Clone Stamp** tool. Select a 9 px soft brush and set its opacity to 50%. Check the **Aligned** checkbox.
4. Select a transplant site at the bottom right. Click on it while holding down the **Alt** key. You have anchored.
5. Now click on the mole and swipe a few times until it disappears. During copying, you can change the position of the anchor.
6. The result of plastic surgery is shown in Fig. 15.3. For comparison, look at the background, where Cindy is still with a mole.
7. With this tool, you can also smooth out wrinkles in older models. Good luck with your plastic surgery!

Fig.15.3. Cindy's mole removal

The second tool in this set, **Pattern Stamp**, allows you to draw with patterns from the **Pattern Palette**. You can also create your own pattern. To create a new pattern, select a rectangular area of the desired texture and select the **Edit/Define Pattern** command.

This tool can also work with or without alignment. In the align mode, when painting, a structured periodic texture is obtained. Without alignment, the texture is chaotic and more natural. Impressionist flag smudges pattern when applied.

Exercise 15.3. Bedspread in the style of Gustav Klimt

1. Open the *Sleeping.jpg* image from the *Lesson 15* folder.
2. The image shows a sleeping model, we will try to cover her with a flat floral patterned bedspread in the style of the *Viennese artist Gustav Klimt*.
3. Select the **Pattern Stamp** Tool, soft brush 45 px. Uncheck the **Aligned** checkbox, select a flower pattern from the set of natural shapes in the pattern scroll menu.
4. Then everything is up to you: choosing the appropriate floral patterns (or any others to your taste), cover the sleeping girl with your veil, as in Fig. 15.4. The original image is in the folder *Lesson 15*.

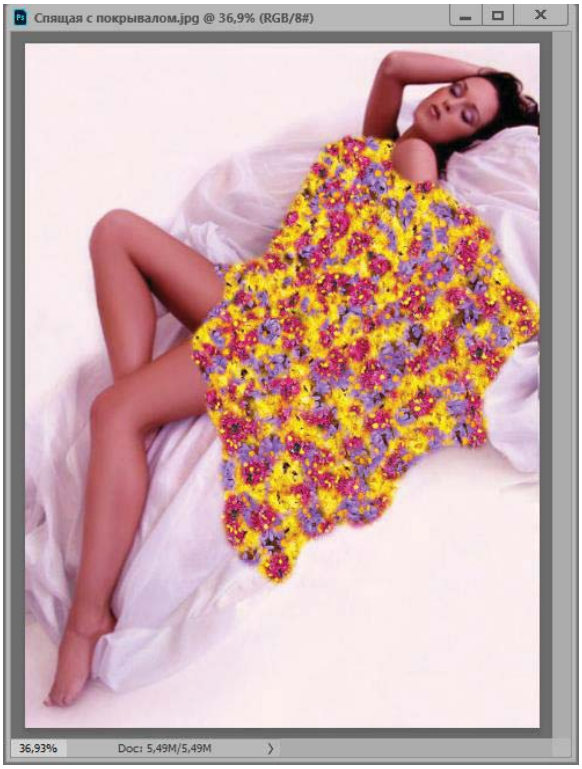


Fig.15.4. Floral bedspread

15.4. Tools for customized copying

For retouching photos in the latest versions of the program, another set of tools has appeared. The **Spot Healing Brush** tool is designed to correct minor image errors (scratches, spots, dots, etc.). The tool replaces errors based on the color characteristics of the background on which they are located. In addition to the known settings, the control panel contains a choice of retouching mode: **Proximity Match**, **Create Texture**, **Content-Aware**.

To work with this tool, you do not need to select a copy area, just click on the background area with a spot, and automatically after analysis, the program will convert the spot into a background color. This tool is not recommended for use in place of a clone stamp, as it works correctly, only for small background spots.

The **Healing Brush** and **Patch** tools automatically adjust the color of the copied area depending on where it is applied. The **Healing Brush** tool works similarly to the **Clone Stamp** by specifying the area to be copied by pressing the **Alt** key. However, when working, it takes into account the texture, color, tone of the corrected area. On the control panel, the operating modes are selected: **Sampled** and **Pattern** - for filling with a decorative fill.

The **Patch** tool copies the selected area, adjusting it to match the tone and color of the blending area. To do this, you need to select the area to be copied, and by clicking on it again, move it to a new location. In the **Destination** mode, the selected area is superimposed on a new location. In Source mode, the overlay area remains within the original selection. In Content-Aware mode, creates a patch from image fragments.

The **Content-Aware Move** tool allows you to move a fragment or fill a selected fragment with new content. In Move mode, moves the selected objects to a new location, filling the previous area with background content. In **Extend** mode, copies objects to a new location. In the Adaptation window, you can set the accuracy of the operation.

The **Red Eye** tool allows you to quickly repaint the red color of the pupil when photographing in rooms with dim lighting, since in such conditions the pupils are quite dilated. To work, just click on the red pupils themselves, they are automatically adjusted. Let's try the work of these tools on the example of the following exercises.

Exercise 15.4. Photo restoration

1. Open the *Museum.jpg* image from the *Lesson 15* folder.

2. This is a scanned photograph of the *Taganrog Town Planning Museum* taken in the last century. The museum was built according to the project of the architect *F. Shekhtel* (similar to the *Yaroslavl* railway station in *Moscow*).
3. There are scratches, stains on it, also to restore its original appearance, the hanging wires of the tram line interfere with the museum. In this exercise, we will try to remove the errors and these wires in the foreground.
4. To remove small spots against the sky, it is optimal to use the **Spot Healing Brush** tool.

Fig.15.5. Restored photograph of the museum

5. Choose a soft brush of 6 pixels for it, in the **Proximity Match** mode, remove small spots and scratches on the sky background. Increasing the brush size can lead to incorrect analysis of the background on the borders of fragments.
6. You can try to remove the wires with the same tool, but it is better to use the **Clone Stamp** or **Healing Brush** tool for this purpose.
7. Choose any retouching tool and restore your photo. In addition to the wires, it is desirable to remove the pole in the left corner, the result is shown in Fig. 15.5.

In the next exercise, we'll look at how the **Patch** tool works to propagate food in the form of baked potatoes around a warm campfire.

Exercise 15.5. Grilled potatoes

1. Open the *Coal.jpg* image from the *Lesson 15* folder.

2. To add potatoes to the ones on the charcoal, select the Patch tool. In Destination mode, select the top fruit with part of the background and transfer it to new coals, as in Fig. 15.6.

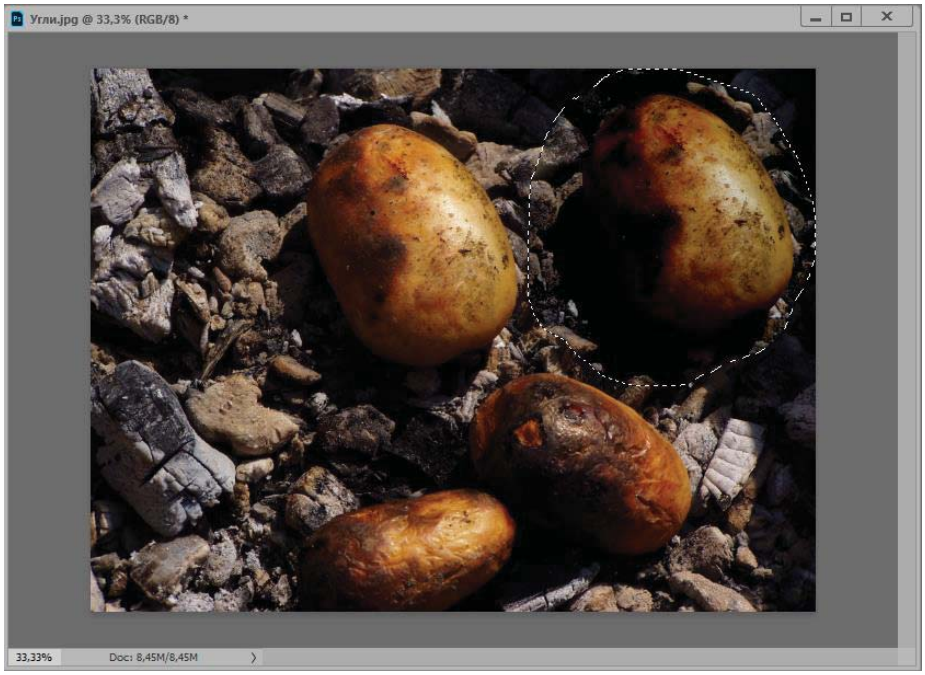


Fig.15.6. Adding potatoes

3. Some time after the analysis, the program will fulfill your desire. Depending on the background color, it may be necessary to shade light shades after transfer.
4. In **Source** mode, you can lose cooked potatoes by covering them with coals. Therefore, be careful, add further the required amount of baked potatoes to your liking.

Consider the following exercise using the **Content-Aware Move** tool and a similar operation using the **Edit/Fill** command.

Exercise 15.6. “Invisible” fish

1. Open the *Fish.jpg* image from the *Lesson 15* folder.
2. Let's try first, so that the fish swims further. Select the **Content-Aware Move** tool, in Move mode with a medium level of adaptation **Medium**.

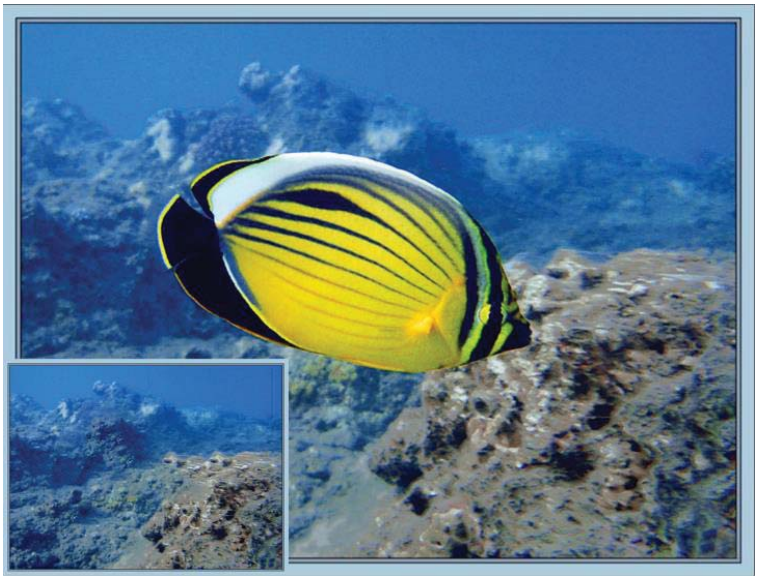


Fig.15.7. The disappearance of the fish

3. Select the fish with a small amount of background around (Fig. 15.7) and move it diagonally down. After a while, the old image of the fish will fill in the background, and the fish will be in a new place.
4. In **Extend** mode, the program will copy the object to a new location. By repeating the operation several times, you can create a whole school of fish.
5. Next, let's try to carefully remove the fish from the image. To do this, select the fish with a stock background, and run the command **Edit/Fill**. In the Use window, select the **Content-Aware** fill mode.
6. After a while, the program will analyze and fill the selected fragment with the fish with the background content, and the fish will disappear, as in Fig. 15.7, bottom left.

Self-work "Cat's eyes"

Using the tool **Red Eye** correct the red color of the cat's pupils in the image *Cat's eyes.jpg* from the *Lesson 15* folder.

16. FILTERS OF EFFECTS AND DEFORMATIONS

The Adobe Photoshop editor has many filters that create various artistic and special effects that help transform, stylize images. Dialog boxes for working with all filters are arranged in approximately the same way.

To create your own original effects, you will need to use not just one filter, but a combination of several. In addition, you can filter not the entire image, but its individual layers, color channels, fragments.After applying filters, you can cancel or change its effect with the **Edit/Fade** command immediately after applying the filter, using blending modes [1, 3, 6].

Regarding the use of various effects, I would like to note that, from the point of view of artistic value, excessive use of filters is not welcome. The value of the work lies in the originality of the idea and the ways of its implementation.

As a rule, filters require a lot of RAM for their work. Therefore, if you have problems applying the filter, you should clear the memory with the **Edit/Purge** command. RAM is divided by commands into the following parts: **Undo, Clipboard, Histories** and **All**.

16.1. Filter menu commands

Filters are combined into groups according to the effect on the image:

- **Last Filter**, apply the last filter;
- **Convert for Smart Filters**, converting an image to a smart filter;
- **Filter Gallery**, selection of multiple filters;
- **Adaptive Wide Angle**, camera correction;
- **Lens Correction**, lens effects;
- **Liquify**, the effects of "melting" the image;
- **Oil Paint**, oil painting effects;
- **Vanishing Point**, creating a selection with perspective;
- **Artistic**, artistic tools and techniques;
- **Blur**, image blur by a given method;
- **Brush strokes**, applying brush strokes to the image;
- **Distort**, introducing geometric distortions into the image;
- **Noise**, retouching, removing scratches, adding noise;
- **Pixelate**, combining pixels into cells, rasters;
- **Render**, creating lighting effects;
- **Sharpen**, adding sharpness to the image;
- **Sketch**, converting images into different graphics techniques;
- **Stylize**, styling the image in different ways;
- **Texture**, adding various textures to the image;
- **Video**, converting an image to a video image;
- **Digimarc**, image registration for protection;
- **Other**, for image correction when working with masks.

16.2. Purpose of filters

Let's take a closer look at the composition of each set of filters. To test the effect of these filters, select any image from the Lesson 16 folder.

The **Filter Gallery** command displays a dialog box for performing various filter operations. With it, you can apply several filters to an image or undo some.

The **Adaptive Wide Angle** filter corrects distortion in images taken with wide-angle cameras using horizontal and vertical guides.

The **Lens Correction** filter creates the effect of viewing an image under a lens.

The **Liquify** filter is designed to perform manual distortion using special tools. In this case, the image resembles a plastic substance that can be moved, twisted, created a mirror fragment, etc.

The **Oil Paint** filter gives images the effect of oil painting.

The **Vanishing Point** filter allows you to define perspective planes in the image, and then preserve the perspective when editing image plans with buildings.

The **Artistic** filter set contains the following filters with real tool drawing techniques and techniques: Colored Pencil, Cutout, Dry Brush, Film Grain, Fresco, Neon Glow, Paint Daubs, Palette Knife, Plastic Wrap, Poster Edges, Rough Pastel, Smudge Stick, Sponge, Underpainting, Watercolor.

The **Blur** filter set contains the following filters to reduce image sharpness: Field Blur, Iris Blur, Tilt-Shift, Average, Blur, Blur More, Box Blur, Gaussian Blur, Lens Blur, Motion Blur, Radial Blur, Shape Blur, Smart Blur, Surface.

The **Brush strokes** filter set contains the following filters for applying hatching and brush strokes to the image: Accented Edges, Angled strokes, Crosshatch, Dark Strokes, Ink Outlines, Spatter, Sprayed Strokes, Sumi-e.

The **Distort** filter set contains the following filters for introducing geometric distortions into the image: Diffuse Glow, Displace, Glass, Lens Correction, Ocean Ripple, Pinch, Polar Coordinates, Ripple Size, Shear, Spherize, Twirl, Wave, Zig-zag.

The **Noise** filter set contains the following filters for retouching, removing scratches, adding noise: Add Noise, Despeckle, Dust & Scratches, Median, Reduce Noise.

The **Pixelate** filter set contains the following filters to merge pixels of similar colors: Color Halftone, Crystallize, Facet, Fragment, Mezzotint, Mosaic, Pointilize.

The **Render** Filter Set contains the following filters for creating lighting related effects: Clouds, Difference Clouds, Fibers, Lens Flare, Lighting Effects.

The **Sharpen** Filter Set contains the following filters to sharpen an image: Sharpen, Sharpen Edges, Sharpen More, Smart Sharpen, Unsharp Mask.

The **Sketch** Filter Pack contains the following filters for converting a color image to a duotone: Bas Relief, Chalk and Charcoal, Charcoal, Chrome, Conte Crayon, Graphic Pen, Halftone Pattern, Note Paper, Photocopy, Plaster, Reticulation, Stamp, Torn Edges, Water Paper.

The **Stylize** filter set contains the following filters for styling an image: Diffuse, Emboss, Extrude, Find Edges, Glowing Edges, Solarize, Tiles, Trace Contour, Wind.

The **Texture** filter set contains the following filters for adding texture to an image: Craquelure, Grain, Mosaic Tiles, Patchwork, Stained Glass, Texturizer.

The **Video** filter set contains the following filters for converting an image to a video image: De-Interlace, NTSC Colors.

The **Digimarc** Filter Set contains the following filters for registration on the Digimarc Corporation website and copyright protection: Embed Watermark, Read Watermark.

The **Other** filter set contains the following filters for image correction when working with masks: Custom, High Pass, Maximum, Minimum, Offset.

17. PRINTING OF THE IMAGE

The printing process of creating printed products can be simplified as follows. At the first stage, the original layout of the product is created with graphic images and text blocks. Images can be either raster or vector. Usually, raster images for further layout are saved in TIFF format in the CMYK color model, and vector images are recommended to be saved in the universal EPS format.

Further, the original layout of printed products is created directly in the layout program. Graphic images are located between text blocks, text formatting and other text processing methods are performed. The original layout is saved in the internal format of the layout program.

At the second stage, color separation of products is performed, process or spot colors are selected, and color separation films are created. Further, printing forms are created from these films, and the circulation is printed.

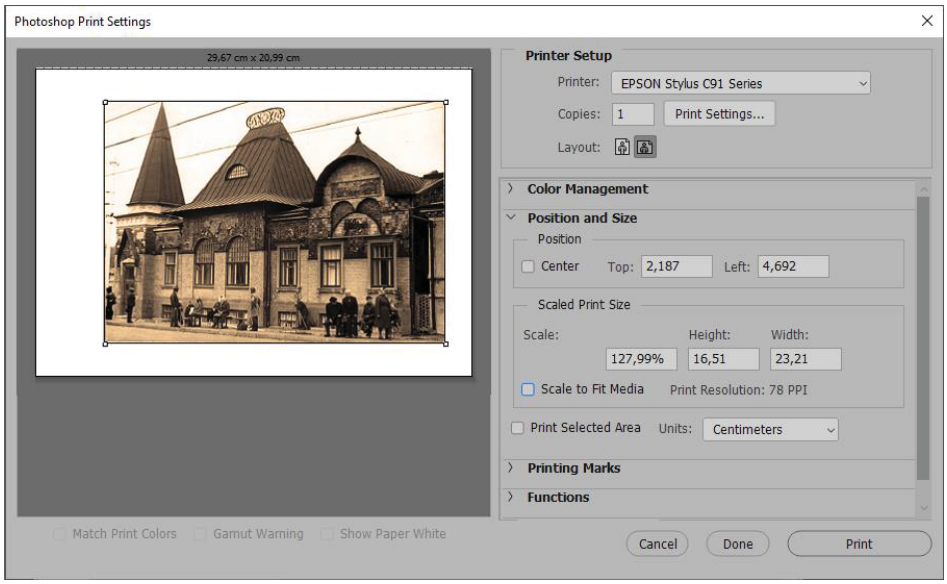


Fig.17.1. **Print** Dialog Box

Consider the process of printing an image on an office printer using the Adobe Photoshop editor. After setting the required dimensions, resolution and color model of the image, the **File/Print** command is used for direct printing, the dialog box of this command is shown in Fig.17.1. The dialog box allows you to select a printer, set its properties, sheet size, type of paper for printing.

It also sets the position of the image on the format, the scale of the image on the format, the number of copies of the image. After the final setting of the necessary parameters, you can start the printing process by pressing the Print button. If there is ink on the printer, I hope your expectations will come true.

CONCLUSION

This tutorial covered the issues of creating and editing bitmap images in the Adobe Photoshop 2021 graphics editor.

The first chapter described the graphical editor window, panels and palettes, the status bar, and issues of opening documents.

The second chapter provided information about the basics of raster graphics, the issues of creating a new image, setting units of measurement. File formats for storing images were also considered.

In the third chapter, concepts were considered: canvas and editing canvas parameters, as well as changing the size and resolution of an image, and their impact on image quality.

The fourth chapter described the commands for creating and editing layers, their linking, grouping, aligning and merging at the final stage.

The fifth chapter presented the basics of color formation in computer graphics, the main color models, their implementation in graphics programs, color channels, bit depth of various types of images.

In the sixth and seventh chapters, the editor's capabilities for creating and transforming selections were considered: regular geometric shape, arbitrary shape, selections by color.

The eighth chapter presented the issues of choosing and creating colors, tools and commands for filling and stroking specified areas.

In the ninth chapter, drawing tools and their adjustment using the brush palette were presented, and tools for removing image fragments were also used.

In the tenth and eleventh chapters, the wide possibilities of the graphic editor for the correction of grayscale and color images were described: histogram, tone curve, color balance, brightness and color saturation.

In the twelfth chapter, commands and modes for creating and saving selections in the form of masks, alpha channels and issues of their editing were considered.

In the thirteenth and fourteenth chapters, the possibilities of working with vector graphics objects were presented: tools for creating and editing vector contours, inserting text blocks and setting text parameters.

In the fifteenth and sixteenth chapters, the issues of retouching images with the help of corrective tools were considered and the sets of filters for creating various effects and deformations were described.

In the seventeenth chapter, commands for printing an image were introduced. The manual also contains questions for control, a list of educational and methodological literature.

It should be noted that *not all the features* of the Adobe Photoshop graphics editor are described in this manual. Issues are described in a compact form, from creating an image to printing it. To check the mastered material after performing numerous exercises, work is given for independent implementation.

The book can be useful for everyone who wants to expand their creative possibilities with the help of computer graphics.

CONTROL QUESTIONS

1. What is a raster, a pixel? What is a bit, byte?
2. What is meant by the bit depth of a pixel? What does the number 256 mean?
3. What are the advantages and disadvantages of raster graphics?
4. What are the advantages and disadvantages of vector graphics?
5. What is the color? What do the abbreviations RGB, CMYK, HSL mean?
6. What color systems are used in computer graphics?
7. Editors of raster and vector graphics. What do you know? Photoshop editor. Main functions.
8. What does the Photoshop graphics editor window contain?
9. How to create a new document? What are coordinate rulers, guides, grid used for?
10. What graphic formats do you know? What are their features?
11. What does the Measure tool do? How to measure distances and angles? What does the Info palette contain?
12. What image viewing modes do you know? What are the Hand, Zoom, and Navigator palettes for?
13. What is canvas and image? How to edit the size and position of the canvas?
14. How do I change the dimensions and resolutions of an image? What methods of image restoration do you know?
15. How is an image cropped? What do the Crop tool and Trim command allow?
16. What does the History palette contain? How to take a snapshot of a line and keep a non-linear protocol?
17. What does the Move tool do? What is a layer? What does the Layers palette contain?
18. How to create, copy and delete layers? How to link and merge layers?
19. What color modes are there in Photoshop? How to convert an image to a different color mode?
20. What is an indexed palette, color table used for?
21. What does the Channels palette contain? How is a halftone image toned?
22. How to convert a color image to monochrome? What types of raster dot do you know?
23. How is selection made with the Rectangular and Elliptical Marquee tools?
24. How to select an area of arbitrary shape? What does the Lasso tool allow?
25. What are the magic wand, quick selection tools for? What modes complement the magic wand?

26. What logical operations can be performed with areas? How to modify the borders of selection areas?
27. How to move and copy selections within an image and between images?
28. What are the commands for transforming areas? How is complex mesh-based curvature implemented?
29. How is color created and selected? What are the possibilities for this?
30. How are areas filled? What is Color Blend Mode?
31. What is the purpose of the Gradient tool? How to create a new gradient?
32. What is the Paint Bucket tool used for? How is an area drawn?
33. What is the brush palette? How to create a new brush? How to adjust brush dynamics?
34. What tools for removing image fragments do you know? How does the magic eraser, background eraser work?
35. What does it mean to "erase to the protocol of history"? How is the border removed? What do Healing Brushes allow?
36. What is a brightness histogram? Tone, tonal range? Black, gray, white dots of the image? tone curve?
37. How to create a color wheel? What is a fill layer and an adjustment layer?
38. What do the dialog boxes Levels, Curves contain?
39. What are the commands for color correction?
40. What are the Color Balance, Hue/Saturation dialog boxes for?
41. What do the Selective Color, Channel Mixer, Variations dialog boxes allow?
42. What are alpha channels, masks, quick masking mode used for? How to create and edit an alpha channel?
43. How to create a layer mask? What do the Channels palettes and Replace Color, Color Range windows contain?
44. How to create a vector outline? What is bezier curve, smooth and angular anchor points? What do the Pen, Freeform Pen tools allow?
45. What are the Path palette, Rectangle, Rounded Rectangle, Ellipse, Polygon, Path Component Selection, Direct Selection tools for?
46. How to create a text layer, text mask, point text, text block?
47. How does the Type tool work? What do the Character and Paragraph palettes contain?
48. What correction and retouching tools are there?
49. How do the Sharpen, Blur, Dodge, Burn, Sponge, Smudge, Clone Stamp, Pattern Stamp tools work?
50. What are the Spot Healing Brush, Healing Brush, Patch, Content-Aware Move, Red Eye tools for?
51. What effect and warp filters do you know? What are they for?
52. How is an image printed?

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Basics of Graphic Design in Photoshop 2021

Tutorial