COLOUR MIXING

- *Follow instructions in this worksheet, if you have difficulty understanding them, ask us.*
- *Write down both your partial and final results into the text and prepared graphs.*
- *If you want, you can record videos and take photos of conducted experiments, etc.*

The goal and idea of the experiment

You will explore different ways of mixing colours.

Task 1: Colour mixing

If you have done the *Preparative task: RGB colour mixing* at COLOURS OF OBJECTS, you can skip to step 5.

Photoreceptor cells

We have two types of photoreceptor (on light reacting) cells on retina – the cones and the rods.

We recognize 3 kinds of cones– L-cones most sensitive on yellowish green light ( ), M-cones most sensitive on green light ( ) and S-cones most sensitive on purple-blue light ( ).

When a photoreceptor cell absorbs light it sends a nerve signal to the brain that then calculates the colour and location of the light source.

We can obtain the whole colour spectrum by adding up differently intensive nerve signals from different cones from the same spot on the retina.

Procedure

1. Estimate and write down into the table bellow what the resulting mixed colour of given colours is going to be. After your estimations, use lamps to mix these lights and write down observed mixed colours.

Colour combinations	Estimated mixed colour	Observed mixed colour
Red + Green		
Red + Blue		
Green+ Blue		
Red+ Green + Blue		

2. Active the *smooth* mode on lamps. Write down the sequence of colours the lamp shines with.

Spectroscope is an optics device that diffracts transmitted light by its colour. Here, it looks like a foil in a little window. Place it closely to eyes for the best effect.

3. Look at the lamp (still in the *smooth* mode) through a spectroscope and describe what you see.

4. Why does our eye see different colours even though the spectroscope tells us that there are only three colours coming from the lamp?

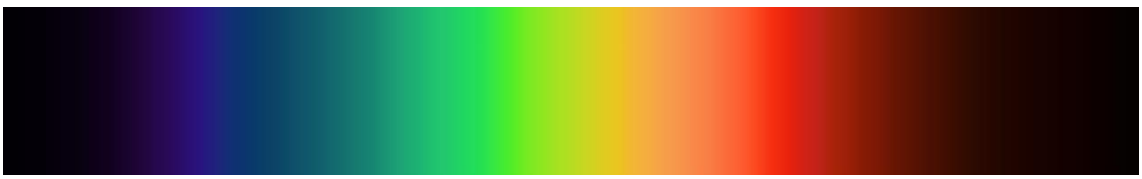
5. Try to figure out where this colour mixing method is used.

Now you will work with the Camera program and a USB microscope connected to the notebook. The scroller on the microscope focuses the image. It is always possible to find two levels of focus – one more zoomed in, one less zoomed in. The scroller on the microscope's cable regulates the intensity of LED lights on the microscope. They are useful for surfaces that are not backlit.

6. Start the *Camera program*, change the window's size to cover half the screen and open a picture of the rainbow and put it into the other half of the screen.

7. Look at different parts of the rainbow on screen through the USB microscope. Describe, what you see. Don't forget to zoom in enough.

8. Look at the printed rainbow bellow through the USB microscope. Describe what you see there.



9. Look at coloured pencils, clothes, etc. through the USB microscope. Describe how the colours are made here.

10. What is the difference between colour mixing on display and colour mixing of printed colours?

Task 2: Exploring the night mode

1. Minimalize the *Camera* window and open *Options* instead. Find the night mode options and activate the mode.

2. Describe how the rainbow changes when you change the intensity of the night mode.

3. Look at different colours of the rainbow through the USB microscope. Describe how the colours change when you change the intensity of the night mode.

Conclusion

While light can be obtained by mixing , we can also split it into these colours.

The eye can/cannot distinguish between yellow light and mixed red and green light, because

The subtractive colour mixing method is commonly used in printing. This is how this method works:

When eyes see blue light, the brain stops producing melatonin, which is a hormone "responsible for sleepiness and sleep". For this reason, the night mode