

## Get the colour right

What is your favourite colour? How do you make it?

When given the choice, we like to pick a pencil, bag or T-shirt in the colours that we like. Today, we take it often for granted that products are available in different colours. Chemists have worked hard to find molecules (a group of atoms that are bound together) that absorb exactly those parts of white light that will produce a desired colour. And they have found many ways to make these molecules stick to objects so we see them with colour: paints, inks, dyes...

However, it's not that easy as it might seem to colour things, especially when you want to match a specific colour that you have in mind. To get the colour right, you usually have to mix other colours in exactly the right proportion. In this worksheet, we will explore some of the many ways to do this.

- 1) To illustrate how difficult it can be to exactly match a specific colour, try to copy the **eye colour** of a classmate. The iris, the coloured ring around the centre of our eye, serves as a kind of gate to control how much light enters our eye. Everybody's iris has a different colour. Some might look very similar, but research has shown that not even the eyes of twins are identical – every iris is unique!

Choose someone in your class whose eye colour you would like to copy. Use any painting technique you like (water colours, felt or ink pens, crayons, ...) and try to match the colour as close as possible. You can check if you got the colour right, if other classmates can recognize your eye model based on your artwork.



- 2) How many different colours did you mix to match the colour of your classmate's eye? \_\_\_\_\_

Now have a look at the photo **prints** in your schoolbooks. After your experiment above, don't you think it is impressive how the maker of this book manages to print colours that accurately? How do people in the print shop do this? Take a closer look and find it out yourself!

- 3) Please look at a print with a strong **magnifying glass**, preferably in a bright region of the picture. What do you notice? What does the picture actually consist of?

- 4) How do you make **white** in a print? And how can you control the **brightness** of colours in a print?

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- 5) What do you think: How many different colours are used to mix all the colours that you see? Can you guess which colours these are?

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Phenomena Explorer | WS 02.2 Colour Mixing

## Notes for teachers

on module 2:

### Colours

Colours catch our attention. Just as marketing specialists use colourful advertisement to draw your attention to some kind of product, you can use the attractiveness of colours to draw your student's attention to your science lessons.

You might find that this module introduces colours in a different way than do most schoolbook authors. The worksheets do not aim at "explaining" the phenomena of colours, but rather use the topic to make students familiar with the scientific method. Students have to choose a hypothesis, design and conduct their own experiments, distinguish between observation and interpretation of their experimental results, and give evidence for their conclusion. Please allow your students enough time to make their own research discoveries, and, if necessary, for some detours. The most valuable lesson may be learned by students proving their own hypothesis wrong.

**Summary:** Students will learn how colours are created and how they are mixed.

The module is structured in two chapters:

- Rainbow colours: Students find out how colour filters work and use them to study the cause of the colours of the rainbow.
- Colour mixing: Subtractive colour mixing is illustrated with colour printing, while additive colour mixing is demonstrated with computer screens.

**Designed for:** lower secondary level (age ca. 12 to 14)

**Duration:** Each chapter is designed for ca. 80 min.  
in total 4 lessons or 160 min

**What students should already know:**

- Humans see an object because light from the object enters the eyes.

**What students will learn:**

**Facts**

- Sunlight includes all colours of the rainbow
- The colours in white light can be split apart, e.g. by refraction
- Colour filters and coloured objects appear coloured because they absorb parts of the visible spectrum
- Additive colour mixing, illustrated with computer screens
- Subtractive colour mixing, illustrated with colour prints
- Colour is a perception

**Skills**

- Working with the scientific method
- Designing experiments to provide evidence for a hypothesis
- Distinguishing between observation and interpretation of experimental results

**This module includes:**

- 2 worksheets
- 2 fact sheets