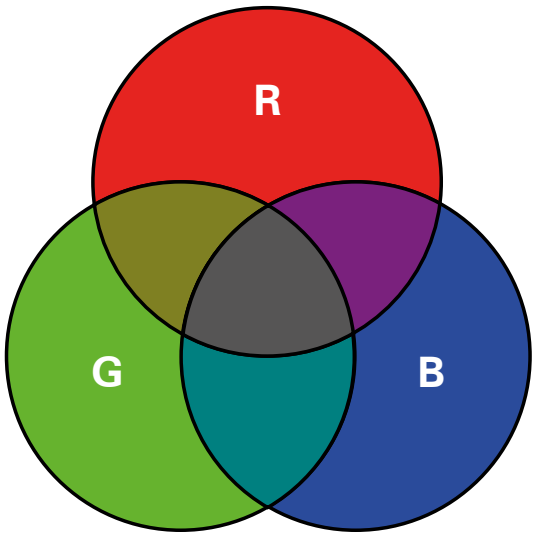
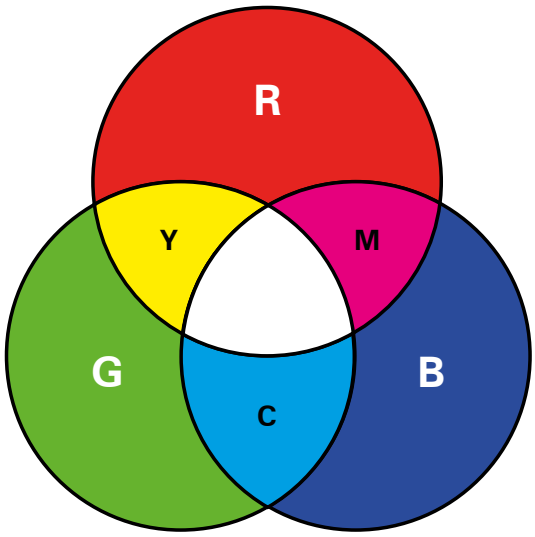
2.2 Colour theory in a nutshell

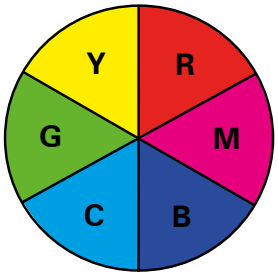


Subtractive colour mixing



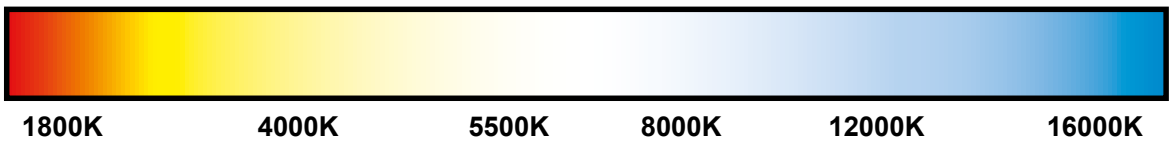
Additive colour mixing

To appreciate how light and colour interact, we first need to understand the basic scientific principles on which this depends.
The first important point is colour mixing. The primary colours are red, green and blue – just as we learned in school. The more of each colour we mix together, the darker that the resulting mixed colours will be.
If all three primary colours are mixed in equal proportions, we get black. This kind of colour mixing is known as subtractive, and can be applied to all methods in which colour pigments are mixed together.
When we work with light, we refer instead to additive colour mixing. If we mix together red, green and blue light in equal proportions, we get white light. Red and green light in equal proportions without any blue light will produce yellow, while red plus blue makes magenta, and blue plus green makes cyan. We need this knowledge in order to understand how coloured bodies interact with coloured light. We will look at this topic in chapter 2.3.



Colour wheel

White light is therefore composed of a mixture of the three wavelengths red, green and blue. Accordingly, it logically follows that white light cannot be given a wavelength itself. Instead, the classification of white light relies on the colour temperature. This is specified in Kelvin and corresponds to the temperature of a black body, or black-body radiator*. The black body perfectly absorbs all electromagnetic radiation. If it is heated, however, it begins to glow and therefore produce light in the visible spectrum. The temperature at which this occurs is the colour temperature.



Colour temperature in kelvins (K)

* For a precise definition of terms, see the Glossary on the last page of this Knowledge Base.

Influence of the lighting angle
Wavelengths
Optical filters
Flash vs. continuous
Fluorescence applications
Lighting systems for the reading and verification of codes
Lighting technology for shape-from-shading