An Artist's Palette

The painter Vincent Van Gogh (1853 – 1890) is renowned for his use of vivid colours, a technique he developed during the latter part of his career. Figure 1 shows one of his most famous paintings, depicting a night-time landscape. Even though this is supposed to be a night scene, the sky is full of stars and swirling colours, from deep blues to bright yellows.

Figure 1: Vincent Van Gogh: The Starry Night, June 1889. Museum of Modern Art, New York (public domain).

When an artist is painting, they need to be able to use whatever colour they think best for the effect that they are trying to create. Certain colours can be bought (at least nowadays; in the past, painters had to make their own) but, even then, the exact shade might not be available.

The answer to this problem is for the artist to mix the paints to produce the shade that they want. Traditionally, this was done on a palette: a flat sheet of material specially shaped to be held in one hand while being used as a store for paint being applied by a brush in the other hand.

Figure 2: An artist's palette and brush. Note the thumb hole in the palette and the curved section to allow it to be comfortably held in the hand.

Mixing paints

Working out the exact shade that would be produced by mixing two paints is complicated, as it depends on the details of the type and consistency of the paint as well as the saturation (depth of colour) in the paint. However, we can understand the basic idea.

In a previous lesson, we investigated the light reflected by different-coloured pieces of card. A splash of paint will reflect light of some colours and absorb the rest. For example, some yellow paint (Figure 3) will reflect yellow light, but also some red and green, depending on the exact shade.

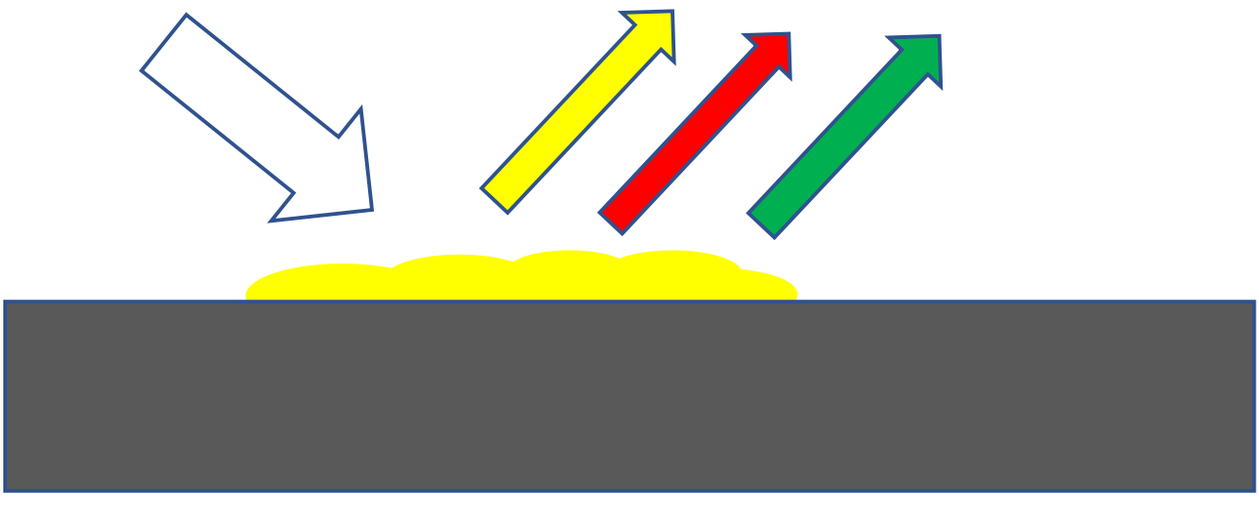

Figure 3: A splash of yellow paint will reflect some of the colours from white light, depending on the exact shade of yellow.

If the yellow paint reflects these colours, then it must *absorb* all the others. Write down a list of the colours that yellow paint absorbs.

List of colours absorbed by yellow paint:

Orange, Blue, Indigo, Violet.

Now think about a splash of purple paint. Figure 4 shows the colours of light that this paint should reflect.

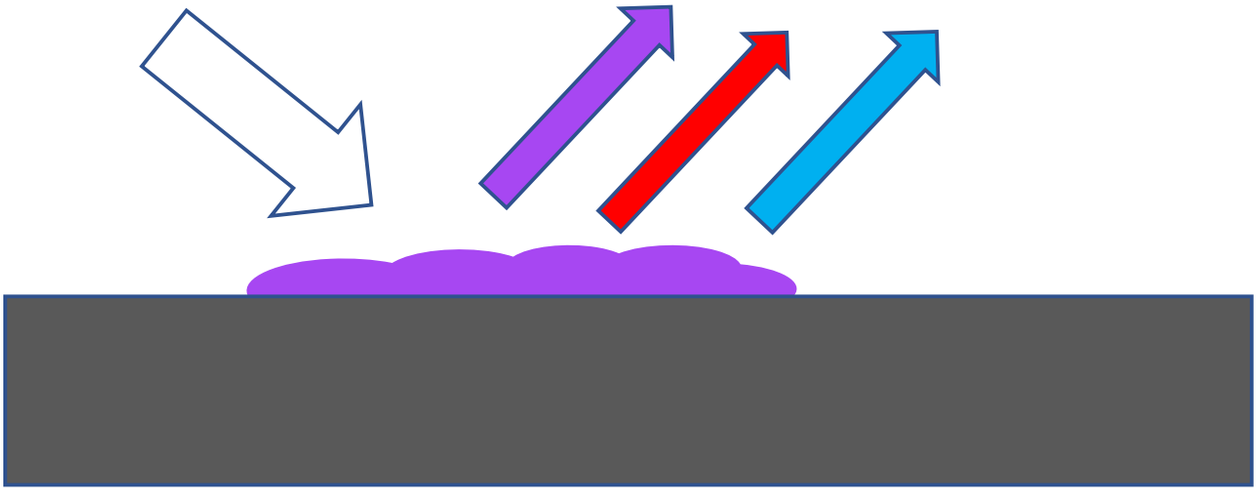

Figure 4: A splash of magenta (purple) paint reflects purple, red and blue.

Write down a list of all the colours that will be absorbed by this paint.

List of colours absorbed by purple paint:

Orange, Yellow, Green.

Compare this list to the one that you produced for yellow paint. Fill in the table below using the two lists.

Colour of light	Paint (colours) that absorb this
Red	Neither, both reflect red
Orange	Magenta & Yellow
Yellow	Magenta
Green	Magenta
Blue	Yellow
Indigo	Yellow
Violet	Yellow

There may be more than one paint that absorbs a certain colour of light.

Now look at the table carefully. Is there any colour of light that is not absorbed by either paint?

If you have filled in the table correctly, you should see that red light is not absorbed by yellow paint and it is not absorbed by purple paint either. In fact, that is the only colour of light that is not absorbed by either paint.

Now, what colour do you think that you would get if you mixed yellow and purple paints together?

Colour produced by mixing yellow and purple paint:

Red.

In the next box, write a short explanation of why you think that this colour is produced by mixing yellow and purple paint (you should check to be sure that you have the correct answer first).

Yellow and purple both reflect red light, and the combination absorbs all the other colours.

The colour wheel shown in Figure 5 summarises the pigments that can be mixed in order to achieve different shades.

Can you see from the wheel which pigments should be able to reflect which colours?

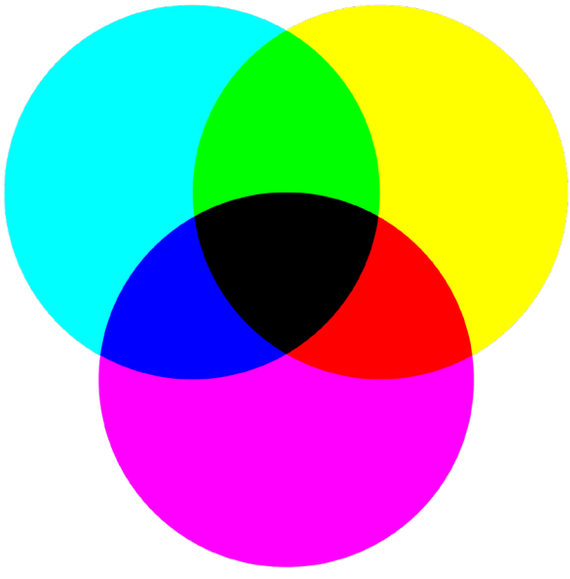

Figure 5: The colour wheel for mixing pigments.

Using the information from this lesson, and from previous lessons, answer the following questions:

1. A boy is wearing a yellow shirt; what colour does this shirt appear in blue light?
2. What colour does the boy's yellow shirt appear in green light?
3. What colour of pigment is produced by mixing yellow and blue (cyan) paint?
4. A girl is wearing a green pullover. What colour does it appear in red light? What colour does it appear in white light?

Other professions interested in colour

So far, we have discussed mixing paints so that an artist can get the colour they need. However, there are other people working in different jobs who are interested in the same ideas:

- A decorator wanting to produce a shade of colour to paint a wall;
- A make-up artist mixing colours to get the right shade of eyeliner;
- An inker responsible for colouring the pages of a comic book.

Can you think of any other professions where understanding how colour pigments mix might be helpful?

Lesson summary

- The colour of a paint is determined by the colours of light that it reflects.
- A paint can seem to be different colours under different lights.
- Mixing paints or other pigments can produce different colours.
- If you mix two paints, the colour produced will be whatever colour the two separate paints both reflect.