Scattering and soaking up light

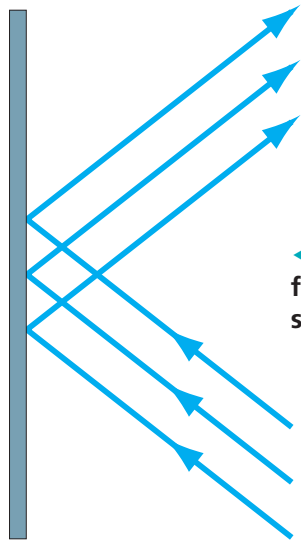
When light bounces from rough surfaces, some is soaked up and the rest is scattered. Unless it is black, everything around us bounces some light from its surface.

If you look in a mirror, you will see yourself clearly and in full colour. But other surfaces do not work like this. Here is the reason.

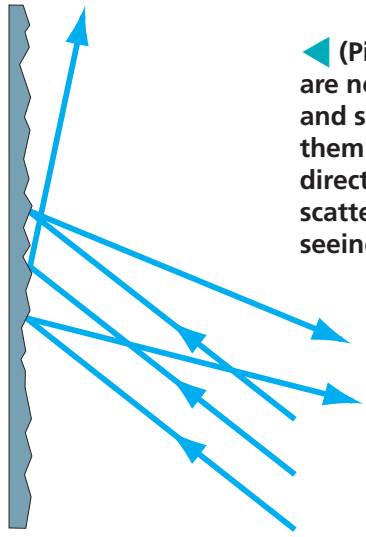
Scattering light

Only shiny surfaces, like spoons and glass, make mirrors. You cannot see a clear reflection in a surface that is not smooth.

When light reaches a rough surface, it is bounced off in all directions – it is scattered (Pictures 1, 2 and 3). Because light is scattered we never see all the light from one object, and so we can never see a clear reflection.



(Picture 1) Light bounces from a flat mirror at the same angle as it arrived.



(Picture 2) Most things are not entirely smooth and so light bounces off them in lots of different directions. This is called scattering. It prevents us seeing a clear reflection.

Coloured light

Most surfaces are not only rough, but they are also coloured.

A mirror is *not* coloured because it reflects nearly all of the light that hits its surface. However, most things soak up some of the light that reaches them. The more light they soak up, the darker they look. If they soak up all of the light, they are black (Picture 4).

White light is a mixture of all of the colours of the rainbow – we call this a **SPECTRUM** (Picture 5). Coloured surfaces soak up only some parts of the white light. For example, a green object soaks up all light except green light, a blue object soaks up all of the colours in white light except blue, and so on.

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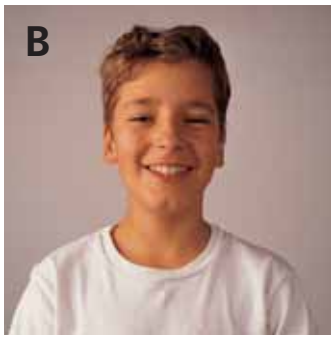
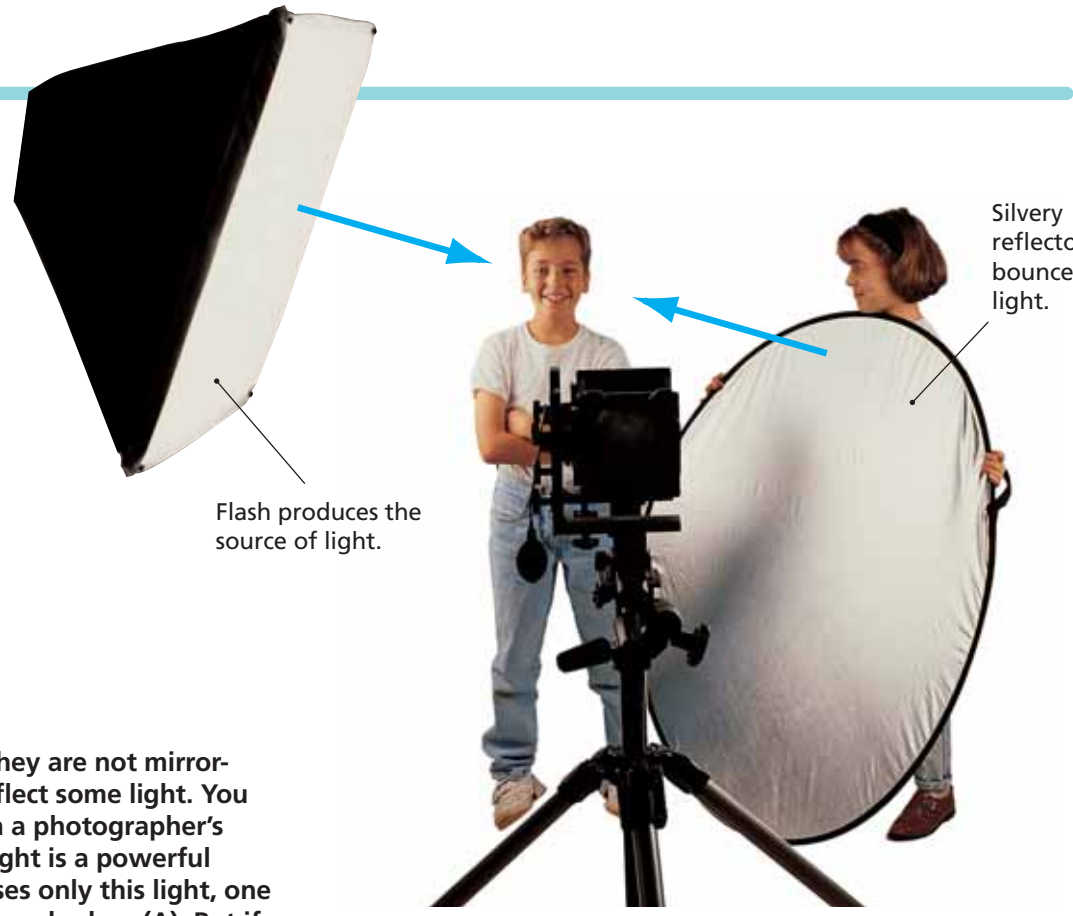
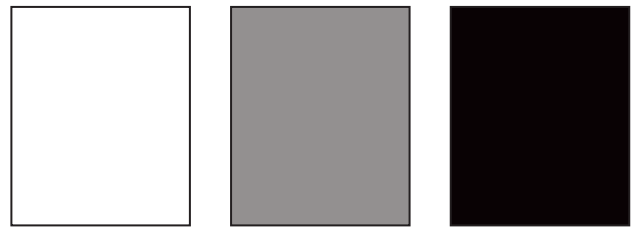




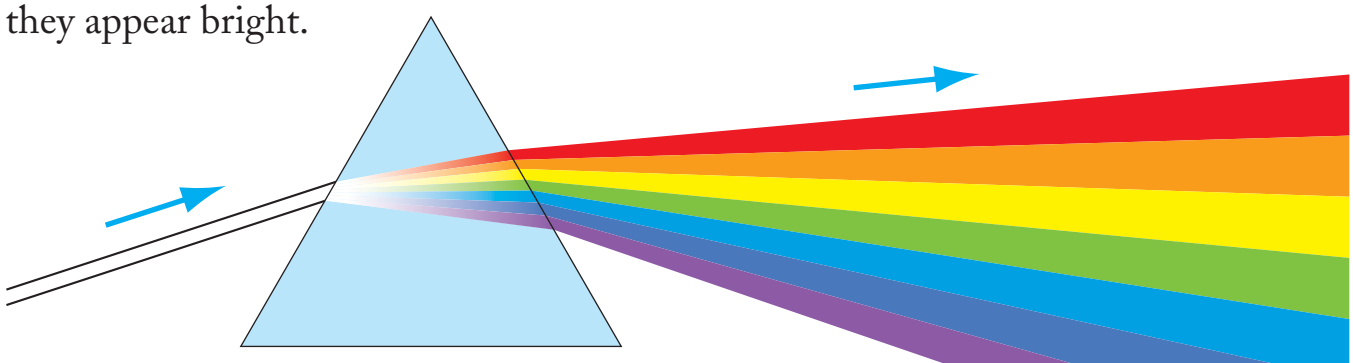
▲ **(Picture 3) Even though they are not mirror-shiny, nearly all materials reflect some light. You can see this property used in a photographer's studio. The main source of light is a powerful flash. If the photographer uses only this light, one side of the face will be in deep shadow (A). But if a silvery surface is also used, it reflects light back and reduces the darkness of the shadow (B).**

The fact that some of the light has been soaked up means that there is less light to reflect, which is why coloured surfaces are darker than white ones.

White surfaces do not soak up more of one colour than another. This is also why they appear bright.



▲ **(Picture 4) A white surface reflects a lot of the light that hits its surface, a black surface reflects very little light and a grey surface is somewhere in between.**



Summary

- **Most surfaces soak up some light.**
- **Lighter surfaces bounce back the most light.**
- **Scattered light makes shadows less dark.**

▲ **(Picture 5) White light is a mixture of all the colours of the rainbow. When you pass light through a triangle of glass, all the colours are separated out.**

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