Your notes

KS3 Science: revision notes

P2.4 Light

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How light travels

- Light travels in straight lines (rays) at about 300 000 km per second. It can travel through a vacuum.
- **Luminous** objects give out light (the Sun, a bulb). We see non-**luminous** objects because light reflects off them into our eyes.
- **Transparent** materials let light through; **translucent** materials let some light through but scatter it; **opaque** materials block light, so they make shadows.
- Light travels much faster than sound, which is why you see lightning before you hear thunder.

Reflection

- The law of **reflection**: the **angle of incidence** equals the **angle of reflection**. Both are measured from the normal, a line at 90° to the surface.
- Smooth surfaces such as mirrors give a clear **reflection** (specular **reflection**). Rough surfaces scatter light in all directions (diffuse **reflection**).
- An image in a mirror is the same size, the right way up, reversed left to right, and as far behind the mirror as the object is in front.

Refraction and lenses

- **Refraction** is light changing direction when it passes from one material into another, because its speed changes.
- Going from air into glass or water, light slows down and bends towards the **normal**. Coming out, it speeds up and bends away from the **normal**.
- **Refraction** makes swimming pools look shallower than they are, and makes a straw look bent in a glass of water.

- A convex (converging) lens brings light rays together at a focal point; it is used in magnifying glasses, cameras and the eye. A concave (diverging) lens spreads rays out.

Colour

- White light is a mixture of colours: red, orange, yellow, green, blue, indigo and violet (the **spectrum**).
- A prism splits white light into a **spectrum** (**dispersion**), because each colour refracts by a different amount; violet bends the most.
- Objects look coloured because they reflect that colour and absorb the others. A white object reflects all colours; a black object absorbs them all.
- A **filter** only lets its own colour through. A red object looks black in blue light, because there is no red light for it to reflect.

Key terms

Luminous	Gives out its own light.
Opaque	Doesn't let light through.
Transparent	Lets light through clearly.
Translucent	Lets some light through, but scatters it.
Ray	A line with an arrow that shows the path of light.
Reflection	Light bouncing off a surface.
Normal	A line at 90° to a surface where a ray hits it.
Angle of incidence	The angle between the incoming ray and the normal.
Angle of reflection	The angle between the reflected ray and the normal.
Refraction	Light changing direction as it passes from one material into another.
Convex lens	A lens that brings light rays together at a focal point.
Spectrum	The band of colours that makes up white light.
Dispersion	White light splitting into its colours.
Filter	A material that only lets one colour of light through.

Quick questions

Cover the answers and test yourself: remembering is what makes it stick.

1. Which of these is luminous?
2. What is the law of reflection?
3. A ray hits a mirror with an angle of incidence of 35°. What is the angle of reflection?
4. What is the normal?

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5. What happens when a ray of light passes at an angle from air into glass?
6. Why does a swimming pool look shallower than it really is?
7. What does a convex lens do to parallel rays of light?
8. What is the order of the colours in the spectrum?

Answers

1. The Sun
2. The angle of incidence equals the angle of reflection
3. 35°
4. A line at 90° to a surface where a ray hits it
5. It slows down and bends towards the normal
6. Light refracts as it leaves the water
7. Brings them together at a focal point
8. Red, orange, yellow, green, blue, indigo, violet

What to do next

Practise 14 questions on this topic

Try 4 exam questions, with mark schemes

Read the lesson, one step at a time

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