Your notes

GCSE Physics: revision notes

Lenses and visible light

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Lenses

- A lens forms an image by refracting light.
- In a convex (converging) lens, parallel rays of light are brought to a focus at the **principal focus**. The distance from the lens to the **principal focus** is the **focal length**.
- A concave (diverging) lens spreads parallel rays out, so they appear to come from the **principal focus**.
- Images can be real (light rays actually meet; it can be shown on a screen) or virtual (rays only appear to come from it).

Magnification

- **Magnification** = image height ÷ object height. It has no units because both heights are in the same units.
- A **convex lens** used as a magnifying glass (object closer than the **focal length**) makes a virtual, upright, magnified image.
- A **concave lens** always forms a virtual, upright, diminished (smaller) image.
- In ray diagrams, a **convex lens** is drawn as a line with outward arrows and a **concave lens** with inward arrows.

Visible light and colour

- Each colour in the visible spectrum has its own narrow band of wavelength and frequency, from red (longest wavelength) to violet (shortest).
- The colour of an opaque object depends on which wavelengths are most strongly reflected; the others are absorbed.
- If all wavelengths are reflected equally, the object looks white. If all are absorbed, it looks black.

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- Transparent and translucent objects transmit light. **Colour filters** absorb some wavelengths and transmit others: a red filter transmits only red light.

Black body radiation

- All bodies (objects), whatever their temperature, emit and absorb infrared radiation. The hotter the body, the more infrared radiation it emits in a given time.
- A perfect **black body** absorbs all the radiation that hits it, and is also the best possible emitter.
- A body at constant temperature absorbs radiation at the same rate as it emits it. The Earth's temperature depends on the balance of radiation absorbed and emitted.

Key terms

Convex lens	A converging lens that brings parallel rays to a focus.
Concave lens	A diverging lens that spreads parallel rays out.
Principal focus	The point where parallel rays meet (or appear to come from) after passing through a lens.
Focal length	The distance from the centre of a lens to the principal focus.
Real image	An image formed where light rays meet; it can be projected on a screen.
Virtual image	An image from which light rays only appear to come; it can't be projected.
Magnification	Image height ÷ object height.
Colour filter	A material that transmits some wavelengths of light and absorbs the rest.
Black body	An object that absorbs all the radiation falling on it; the best emitter.

Quick questions

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

1. What type of lens brings parallel rays to a focus?
2. What is focal length?
3. What is a real image?
4. An object 2 cm tall forms an image 6 cm tall. What is the magnification?
5. What type of image does a concave lens form?
6. Why does a red apple look red?
7. Why does a white object look white?

Your notes

8. What does a green filter do?

Answers

1. Convex
2. The distance from the lens to the principal focus
3. One where the light rays actually meet, so it can be shown on a screen
4. 3
5. Virtual, upright and smaller
6. It reflects red light and absorbs other colours
7. It reflects all wavelengths equally
8. Transmits green light and absorbs other colours

What to do next

Practise 10 questions on this topic

Try 7 exam questions, with mark schemes

Read the lesson, one step at a time

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