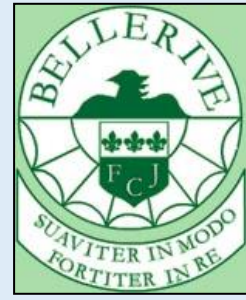


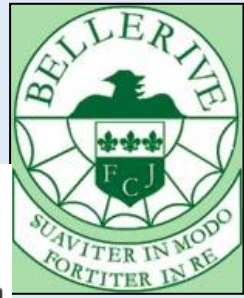
Lesson 1: Types of waves



Key points to learn:

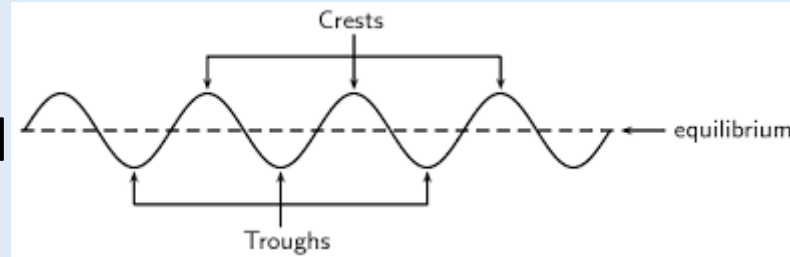
- Waves transfer **energy** and can be **transverse** or **longitudinal**
- In **transverse** waves the **vibrations** are at **right angles** to the direction of the wave e.g. **ocean waves** and **light**
- In **longitudinal** waves the **vibrations** are **parallel** to the direction of the wave e.g. a **slinky** and **sound**

Lesson 2: Superposition



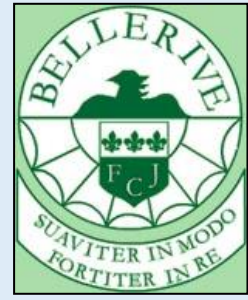
Key points to learn:

- The top of a wave is called a **crest** and bottom a **trough**



- **Superposition** happens when two waves **meet and combine** briefly
- If **two identical crests** meet, they add, and the **crest height doubles**
- If **two identical troughs** meet, they add and the **trough height doubles**
- If a **crest and trough of the same size** meet, they subtract, and **cancel**

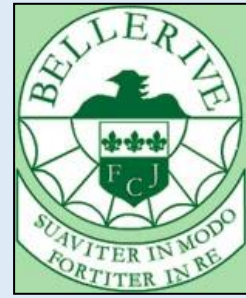
Lesson 3: Properties of light



Key points to learn:

- Light is produced by **luminous** objects from **sources**
- Light is a **transverse** wave that **transfers energy**
- Light travels in **straight lines**
- Light can travel in a **vacuum** and does so at **300 000 000m/s** ($3 \times 10^8 \text{m/s}$)

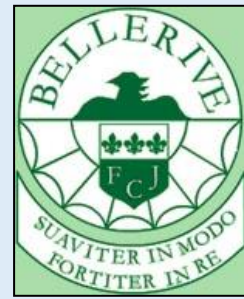
Lesson 4: Types of materials



Key points to learn:

- A **transparent** material **transmits** all the light
- An **opaque** material **absorbs** all light
- A **translucent** material **transmits some** light

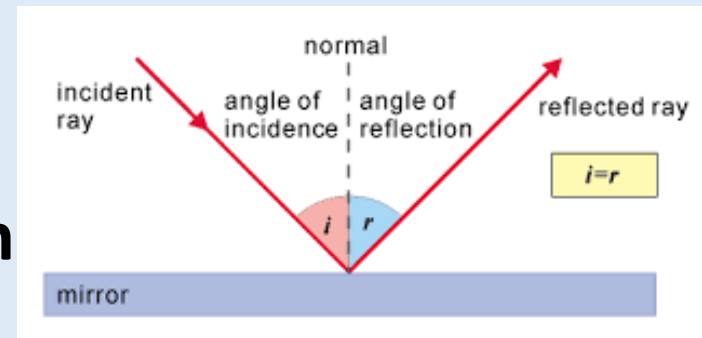
Lesson 5: Reflection



Key points to learn:

- **Specular** reflection is when **smooth, shiny surfaces reflect** light off at the **same angle** giving a clear image
- **Diffuse** reflection is when **rough surfaces scatter** light in **different directions** as it reflects, making it look dull

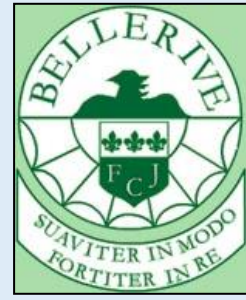
- The **law of reflection** is:
angle of incidence = angle of reflection



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Lesson 6: Refraction



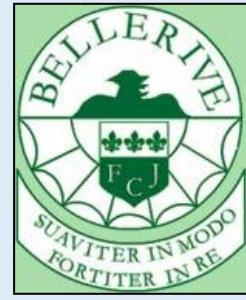
Key points to learn:

- **Refraction** is when **light bends** when it passes from one medium to another. It bends because the light travels at **different speeds** in different mediums of different density.
- Refraction does **not** occur if light enters along the **normal**
- When light travels from a **less dense medium to a more dense** one it slows down and **bends towards the normal**
- When light travels from a **more dense medium to a less dense** one it speeds up and **bends away from the normal**

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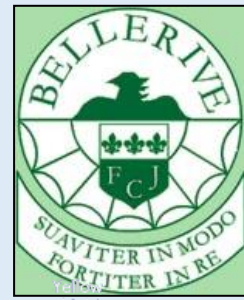
Lesson 7: The spectrum



Key points to learn:

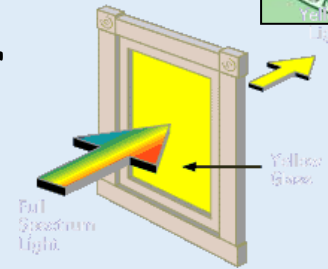
- When **white light** passes through a glass prism it **refracts** and splits up into the **colours of the spectrum**
- The colours of the spectrum in order are: **red, orange, yellow, green, blue, indigo and violet**
- Each **colour** of light has a **different frequency**. **Red** had the **lowest frequency** and it gets increasingly higher until **violet**, which has the **highest frequency**

Lesson 8: Coloured light



Key points to learn:

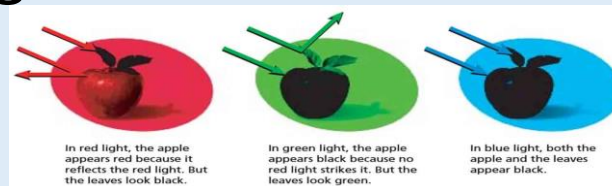
- Coloured **filters** only **transmit their colour** and all **others** are **absorbed**



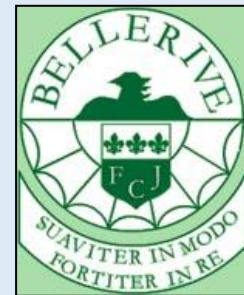
- Coloured **objects** reflect **their colour only**, the other colours are absorbed. **White** objects **reflect all** colours and **black** objects **absorb all** colours



- **Objects can seem to change colour in coloured light** as they will only reflect their colour and absorb all others, appearing black if there is no light to reflect.

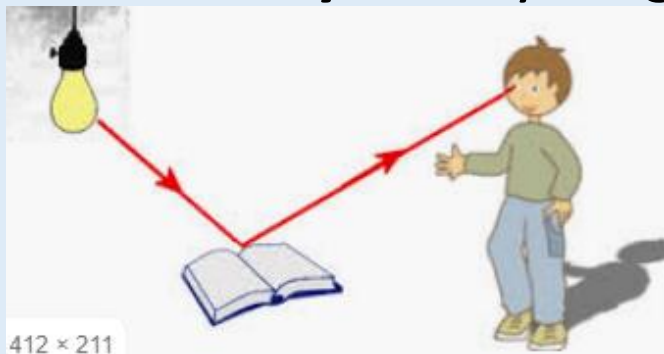


Lesson 9 & 10 : The Eye



Key points to learn:

- **Light reflects into our eyes.** Ray diagram:



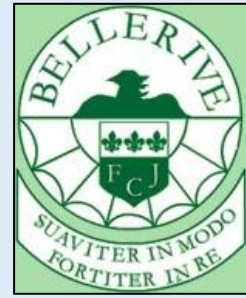
- The main **parts of the eye** and their functions:

part	function
lens	refracts and focuses light
cornea	focuses light and protects
iris	Coloured muscle to control amount of light entering the eye
retina	Light-sensitive cells where the image forms

- The eye can be compared to a **pinhole camera**

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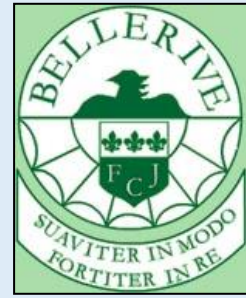
Lesson 11: Light effects Badger Task



Key points to learn:

- **All key points from previous lessons apply**

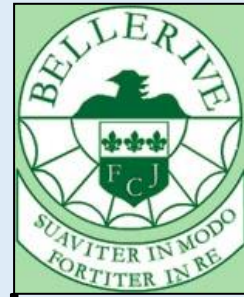
Lesson 12: Sound waves



Key points to learn:

- Sound waves are **longitudinal** waves
- Sounds are caused by **vibrations** which are passed through a medium as series of **compressions**
- Sound needs a **medium** to travel through and **cannot** travel in a **vacuum** e.g. space
- Sound waves can refract and reflect. A **reflected** sound wave is called an **echo**
- Sound travels fastest in solids and slowest in gases. It **travels much slower than light**

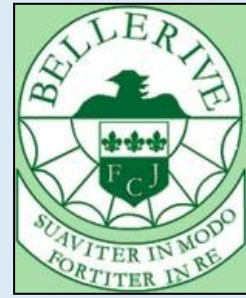
Lesson 13: Features of sound waves



Key points to learn:

- The **amplitude** of a wave is its **maximum displacement from rest position**
- **Frequency** is the **number of waves that pass a point per second**, measured in **hertz, Hz**
- The **larger** the **amplitude** of a sound, the **louder** it is
- The **higher** the **frequency** of a sound, the **higher pitched** it is
- **Microphones detect** sound waves and **loudspeakers recreate** them

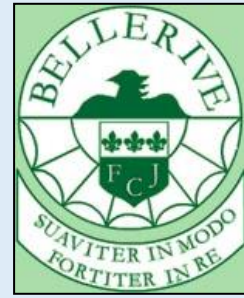
Lesson 14: The ear and hearing ranges



Key points to learn:

- Sound waves make your **ear drum vibrate**, making the **ear bones vibrate** and then the **hairs in the cochlea** which send messages to the brain
- Your **auditory range** is the range of frequencies you can hear. For **humans** it is typically **20 – 20 000Hz**
- Other animals can hear sounds below and above the typical human hearing range e.g. dogs, bats and dolphins

Lesson 15: Ultrasound



Key points to learn:

- **Ultrasound** are **sound waves above** the typical human hearing range of **20 000Hz**
- Ultrasound waves can be used for **imaging, cleaning** e.g. jewellery and for **physiotherapy**