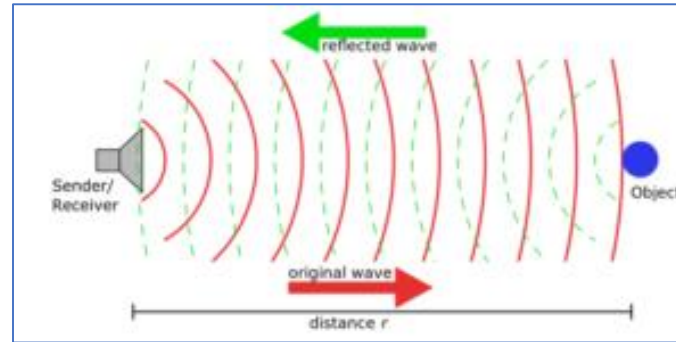
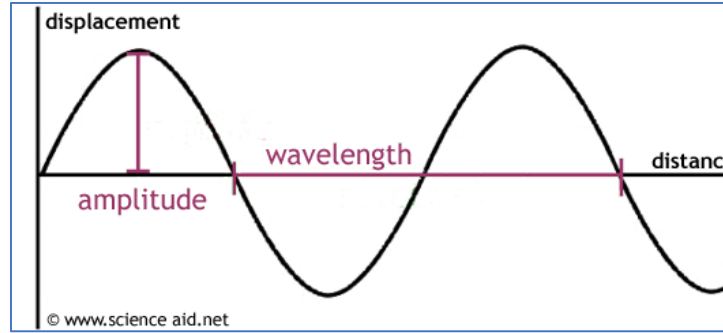


Year 8 PHYSICS UNIT 4

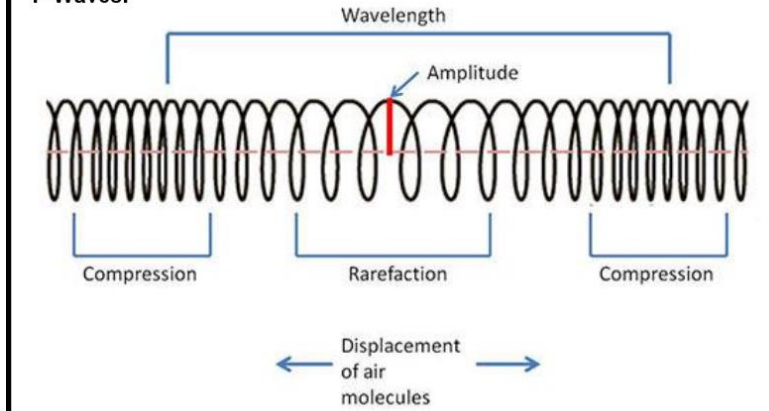
Wave effect, Wave properties, Work and Energy costs

Amplitude	The height of the wave measured from the middle (the undisturbed position of the water).
Wavelength	The distance from a point on one wave to the equivalent point on the next wave.
Frequency	The number of waves produced each second. It is also the number of waves passing a point each second.

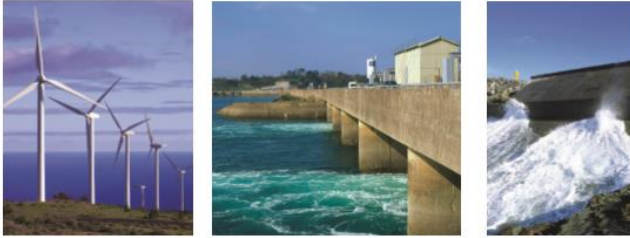


Longitudinal Waves

In longitudinal waves, the vibrations are parallel to the direction of wave travel. Examples are: Sound Waves, Ultrasound Waves, Seismic P-Waves.



Renewable energy resources



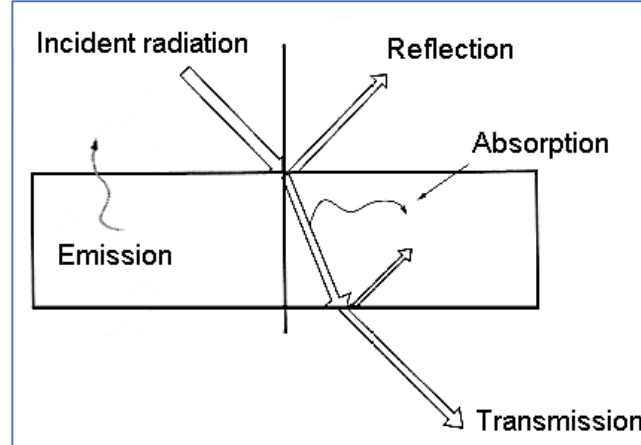
- ▲ A wind turbine spins a generator directly.
- ▲ Tidal: water flows through turbines as the tide goes in and out.
- ▲ Waves turn a turbine.



- ▲ Biomass: you can burn plants instead of coal in a power station. The plants use carbon dioxide when they grow.
- ▲ Solar (photovoltaic) cells generate a potential difference from light.



- ▲ Hydroelectric: water falls down through turbines in the dam.
- ▲ Geothermal: hot rocks in the Earth heat water to form steam, which turns turbines.



Energy Cost

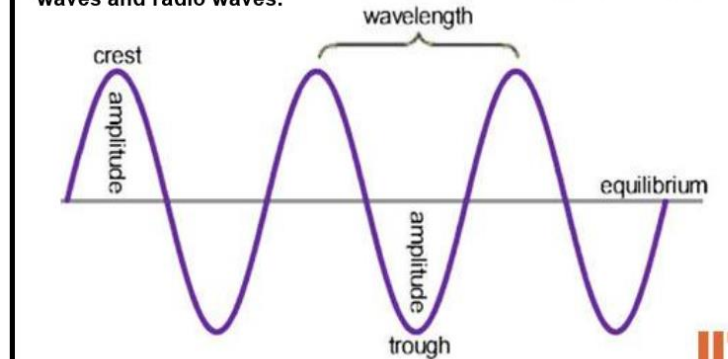
$$\text{Number of units (kWh)} = \text{Power (kW)} \times \text{time (h)}$$

$$\text{Total cost} = \text{Number of units (kWh)} \times \text{Cost Per Unit}$$

Transverse Waves

In transverse waves, the vibrations are at right angles to the direction of wave travel.

Examples include: Ripples on water, vibrations on a guitar string and a Mexican Wave. Electromagnetic waves such as light waves, micro waves and radio waves.



Skills Development:

Calculate the cost of home energy usage
Apply formula to complete calculations

Year 8 PHYSICS UNIT 4

Wave effect, Wave properties, Work and Energy costs

Working out work

In physics, the word '**work**' has a special meaning.

- When you lift a book you do work against gravity.
- When you slide the book you do work against friction.
- It takes work to **deform** objects, like stretching elastic or squashing your bed springs.
- When a force moves an object, or deforms it, energy is transferred between stores. The amount of work depends on the size of the force and the distance the object moves from its original position (or **displacement**).

$$\begin{array}{ccccc} \text{work done} & = & \text{force} & \times & \text{distance moved} \\ \text{(J)} & & \text{(N)} & & \text{(m)} \end{array}$$



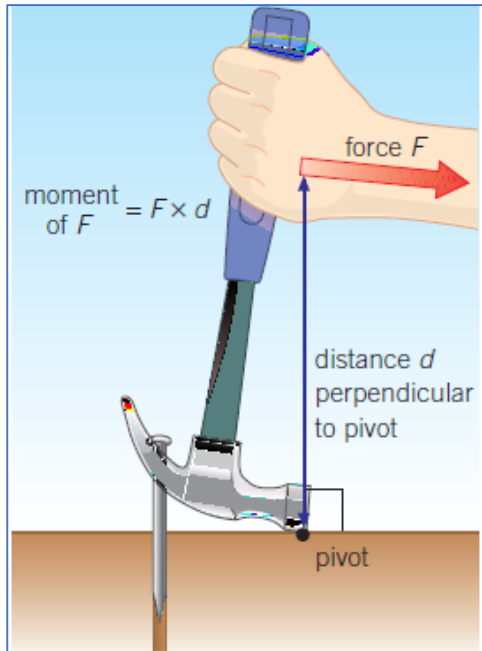
▲ Lifting a book.

$$\begin{aligned} \text{work done} &= \text{force} \times \text{distance} \\ &= 2 \text{ N} \times 1 \text{ m} \\ &= 2 \text{ J} \end{aligned}$$



▲ Sliding a book.

$$\begin{aligned} \text{work done} &= \text{force} \times \text{distance} \\ &= 1 \text{ N} \times 0.2 \text{ m} \\ &= 0.2 \text{ J} \end{aligned}$$



Using a claw hammer. The claw hammer is being used to remove a nail from a wooden beam

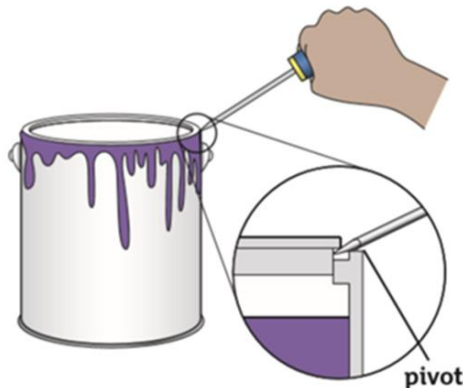
Key word	Definition
Energy resources	An energy resource is something that can produce heat, power life, move objects, or produce electricity
Non-renewable/ finite	Non-renewable energy comes from sources that will run out or will not be replenished in our lifetimes—or even in many, many lifetimes. Most non-renewable energy sources are fossil fuels.
Renewable	Renewable energy comes from sources that can be replenished. Renewable resources include biomass energy (such as ethanol), hydropower, geothermal power, wind energy , and solar energy
Fossil fuels	a natural fuel such as coal or gas, formed over millions of years from the remains of living organisms
Ultrasound	Sound whose frequency is above the upper limit of the range of human hearing (approximately 20 kilohertz).
Power	is the amount of energy transferred or converted per unit time.
Moment	A moment is the turning effect of a force. Moments act about a point in a clockwise or anticlockwise direction.

Levers

Most people use a **lever** to open a tin of paint. If you put a screwdriver between the lid and the rim of the tin, you can open the tin with a much smaller force.

The force applied to the lid by the lever (the **output force**) is bigger than the force that you apply with just your hand (the **input force**). A lever is a force multiplier.

Your hand moves down and the other end of the lever moves up. Your hand moves much further than the other end of the lever.



Calculating Power

Word Equation

$$\text{Power} = \frac{\text{Work Done}}{\text{Time Taken}}$$

Dimensions

$$P = W / t$$

Units

$$\text{Watt} = \text{Joule} / \text{second}$$

Extend to GCSE:

All of these topics will be re-visited in GCSE Physics.

Q) Calculate the work done when:

- a force of 20 N makes an object move 4.8 m in the direction of the force.
- an object of weight 80 N is raised through a height of 1.2 m.