

GCSE Grade Booster: A* Physics

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Contents on CD

All of the Boosters are available on the CD.

Editable content

Editable Boosters are included for teachers and students to make their own tasks based on their examination specification. They are:

- Knowledge Booster 5: Create a Knowledge Booster
- Concept Booster 5a: Create a Concept Booster
- Experiment Booster 1a: Explaining Experiments
- Experiment Booster 1b: Explaining Experiments Support Sheet
- Experiment Booster 5: Understanding Graphs and Charts
- Argument Booster 5: Controversial Issues

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Rationale

Confidence with the keywords in physics is essential to getting at least an A grade. Both the meaning of the word and the spelling of the word are important. Using activities to encourage the use of the keywords, their meaning and their spelling builds that confidence. These activities require the learner to decide on the keyword from the definition, or they can try defining the keywords themselves.

Activities

These activities all aim to engage learners with the keywords and their definitions, encouraging increased familiarity and confidence in these words. In addition, the activities encourage learners to ensure that they can spell these keywords.

Suggested approaches

- Begin with a starter activity to establish current understanding.
- Towards the end of the topic use the activities to consolidate, review or revise.
- Use the activities for independent study in class or as homework.

How to use the self-testers

These are designed so that the answers can be folded back. The learners then write their answers to the first 10 definitions. Stop, fold answers out and check them and their spellings. Give scores out of 10. Concentrate on learning the answers or spellings that were wrong.

At this point, it is best to move on to the next set of definitions. Go through the same process. Later, try the first set again and see if there is an improvement.

When supporting learners with this activity, concentrate on praising the improvement rather than the actual score out of 10.

How to use the diagrams and equations

Labelling and defining the parts of diagrams are skills that will boost knowledge. Learners can be given unlabelled master copies to label or, alternatively, laminate the unlabelled master copies with the answer sheet on the reverse. Learners can use a non-permanent marker to label the diagrams and check answers. Wipe off and try again.

Extension activities

Self-testers

- Reverse the activity: look at the answers and write the definitions.
- Teachers make their own sets of questions or definitions and answers using the exam specification or, even better, learners make their own and swap with others.

Diagrams and equations

Define each part of the diagram or equation.

Physics Knowledge Booster 1: Energy and Electricity



Students that achieve at least an A grade can:

- use a wide range of keywords.
- spell all keywords correctly.
- explain in detail what the keywords mean.

Note: some of these words go beyond some GCSE specifications.

How to use the self-test questions

- 1 Read through the questions and answers.
- 2 Fold back the answers.
- 3 Answer each question by saying the answer and writing it down.
- 4 Check your answers, then check your spellings.
- 5 Repeat until you get most of the answers and spellings correct.

Thermal energy	Answer
1 Thermal energy transfer through solids.	1 conduction
2 Thermal energy transfer through liquids and gases.	2 convection
3 Thermal energy transfer through a vacuum.	3 radiation
4 Thermal energy as a wave in the electromagnetic spectrum.	4 infra red
5 An object that takes in thermal energy.	5 absorber
6 An object that lets out thermal energy.	6 emitter
7 The absence of particles.	7 vacuum
8 The difference between two different temperatures.	8 temperature gradient
9 The movement of thermal energy.	9 transfer
10 The amount of energy required to raise the temperature of 1kg of a substance by 1°C.	10 specific heat capacity

Electrical equations	Answer
1 The unit of current.	1 amperes (A)
2 The unit of potential difference.	2 volts (V)
3 The unit of resistance.	3 ohms (Ω)
4 The unit for power.	4 watts (W)
5 The unit of energy.	5 joules (J)
6 The unit of charge.	6 coulomb (C)
7 voltage \div current =	7 resistance (Ω)
8 charge \times time =	8 current (A)
9 potential difference \times charge =	9 energy transferred (J)
10 $R_1 + R_2 + R_3 \dots =$	10 resistance in series (Ω)

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Physics Knowledge Booster 1: Energy and Electricity



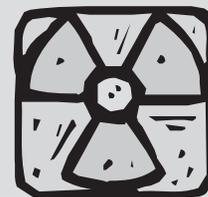
Energy resources	Answer
1 Non-renewable energy resource made from plants and animals.	1 fossil fuel
2 Energy resource from plutonium or uranium.	2 nuclear
3 Resource that relies on water falling through a turbine.	3 hydroelectric
4 Resource that relies on air movement across a turbine.	4 wind
5 Energy resource that does not need a turbine or generator.	5 solar
6 Resource that relies on wind and water to turn a turbine.	6 wave
7 Resource that relies on the moon's gravity.	7 tidal
8 Resource that relies on magma.	8 geothermal
9 A resource that can be replaced as fast as it is used.	9 renewable
10 Splitting up large nuclei to produce energy.	10 fission

Electrical generation	Answer
1 Vessel in which to evaporate water to create steam pressure.	1 boiler
2 A rotating mechanism composed of blades that turn an axle.	2 turbine
3 A magnet that rotates in a coil of wire.	3 generator
4 The ratio of energy taken in and useful energy given out.	4 efficiency
5 The movement of electrical energy from one place to another.	5 transmission
6 A soft iron core made up of primary and secondary coils.	6 transformer
7 Current that moves backwards and forwards in a wire at a given frequency.	7 alternating current
8 The voltage of the mains in the UK.	8 230V
9 The frequency of the AC current in the mains in the UK.	9 50Hz
10 The sub-atomic particles that flow through wires.	10 electrons

Electrical components	Answer
1 A conductor that electrical charge moves through in a circuit.	1 wire
2 Creates the potential difference to allow charge to move.	2 cell
3 More than one cell.	3 battery
4 Prevents charge from flowing completely.	4 switch
5 Restricts the flow of charge around a circuit.	5 resistor
6 Able to alter the flow of charge by changing resistance.	6 variable resistor
7 A component that lets charge flow in one direction only.	7 diode
8 Changes the flow of charge depending on the intensity of light.	8 light-dependent resistor
9 Has a deliberate finite resistance for safety.	9 fuse
10 Measures the flow of charge.	10 ammeter

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Physics Knowledge Booster 2: Radiation and Waves



Students that achieve at least an A grade can:

- use a wide range of keywords.
- spell all keywords correctly.
- explain simply what the keywords mean.

How to use the self-test questions

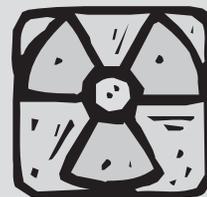
- 1 Read through the questions and answers.
- 2 Fold back the answers.
- 3 Answer each question by saying the answer and writing it down.
- 4 Check your answers, then check your spellings.
- 5 Repeat until you get most of the answers and spellings correct.

Electromagnetic spectrum	Answer
1 Electromagnetic waves that can treat and cause cancer.	1 gamma
2 Electromagnetic waves that are used to see bones.	2 X-rays
3 Electromagnetic waves that cause skin to tan.	3 ultraviolet waves
4 Electromagnetic waves detectable by the human eye.	4 visible waves
5 Electromagnetic waves used by TV remote controls.	5 infra red waves
6 Electromagnetic waves used to transmit audio signals.	6 radio waves
7 Electromagnetic waves that can vibrate water molecules.	7 microwaves
8 The unit of frequency of a wave.	8 hertz (Hz)
9 The harmful effect of UV radiation on skin.	9 skin cancer
10 The wavelength range of the visible spectrum.	10 390 to 700nm

Radioactivity	Answer
1 Radiation in the form of a helium nucleus.	1 alpha
2 Radiation in the form of an electron.	2 beta
3 Radiation in the form of an electromagnetic wave.	3 gamma
4 An atom with an increased or decreased number of neutrons.	4 isotope
5 The unit of radioactivity.	5 becquerel (Bq)
6 The time taken for radioactivity to decrease by 50%.	6 half-life
7 An atom with an unstable nucleus.	7 radioactive
8 The level of radiation naturally occurring in an environment.	8 background radiation
9 The extent to which radiation can move through a substance.	9 penetration
10 The effect of radiation on removing electrons from atoms.	10 ionisation

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Physics Knowledge Booster 2: Radiation and Waves



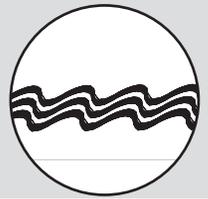
Light	Answer
1 The rebounding of light from a surface.	1 reflection
2 The bending of light at a change of media.	2 refraction
3 The spreading of light at a change of media.	3 dispersion
4 The part of the eye that contains light-sensitive cells.	4 retina
5 The speed of light.	5 300000000 m/s
6 A mirror or lens that converges light.	6 concave
7 The type of image produced in a mirror.	7 virtual
8 How fast light travels through a specific medium.	8 refractive index
9 The spreading of waves when they move through a gap.	9 diffraction
10 When reflected waves move to a focal point.	10 converge

Sound	Answer
1 Longitudinal waves caused by sound waves.	1 vibration
2 Loudness of a sound wave.	2 amplitude
3 Pitch of a sound wave.	3 frequency
4 The distance between the peaks of two waves.	4 wavelength
5 Very high sound frequencies.	5 ultrasound
6 The reflection of sound.	6 echo
7 The range of human hearing.	7 20 to 20000Hz
8 The bunching together of sound waves.	8 compression
9 The biological organ that detects and interprets sound waves.	9 ear
10 The spreading out of sound waves.	10 rarefaction

Nuclear energy	Answer
1 The neutral sub-atomic particle that determines isotopes.	1 neutron
2 The splitting of a large nucleus by neutrons.	2 nuclear fission
3 The fuel element for nuclear reactors, with the atomic number 92.	3 uranium
4 The process by which nuclear fusion continues.	4 chain reaction
5 Two atomic nuclei joining to form a large nucleus.	5 fusion
6 Devices that regulate the rate of reaction in a nuclear reactor.	6 control rods
7 A change in DNA sometime caused by radiation.	7 mutation
8 The slow breakdown of an unstable radioactive atom.	8 decay
9 The equation that determines the amount of energy produced from a nuclear reaction.	9 $E = mc^2$
10 Cosmic objects that shine due to nuclear fusion.	10 stars

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Physics Knowledge Booster 3a: Reading Waves



Students that achieve at least an A grade can:

- use a wide range of diagrams.
- explain the difference between similar words and definitions.

How to use the diagrams

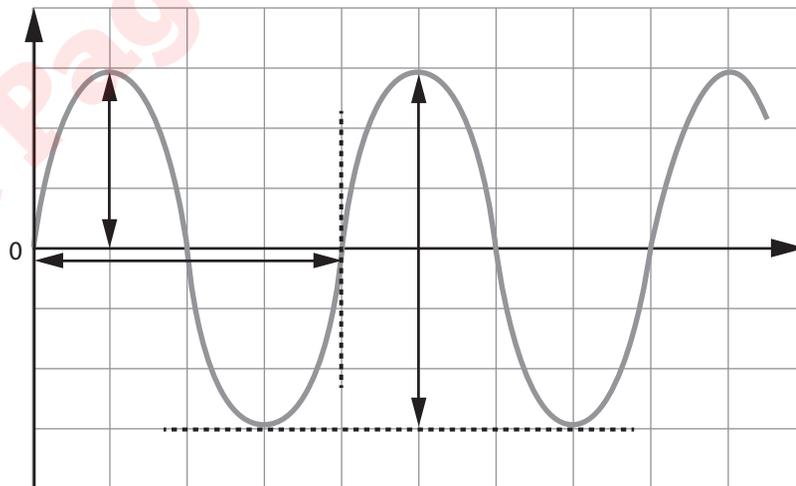
- 1 Label the diagrams.
- 2 Check your answers against the answer sheet.
- 3 Repeat until you feel confident.

Reading waves

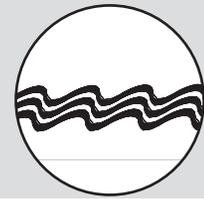
- 1 Write the wave equation here.

-
- 2 Add the following labels to the wave diagram:

- voltage
- amplitude
- time period
- peak–peak voltage
- time



Physics Knowledge Booster 3b: Reading Waves – Answers



- 1 Wave equation:
wave speed (m/s) = frequency (Hz) \times wavelength (m)
- 2 Labelled wave diagram:

