

AQA Combined Science GCSE Trilogy

Physics Paper 1 AO1 Questions

Energy

1. Describe the energy changes of a ball that is thrown upwards.
2. Describe the energy changes when 2 dodgem cars collide.
3. Describe the energy changes when a skydiver jumps out of a plane.
4. Describe the energy changes when a car applies to the brakes to slow down.
5. Describe the energy changes when an electric kettle boils water.
6. What unit is energy measured in?
7. Calculate the kinetic energy of a 60kg person running at 3 m/s.
8. Calculate the elastic potential energy stored in a spring with a spring constant of 5N/m when it is stretched 30cm.
9. Calculate the gravitational potential energy gained by a person of 50kg who climbs a set of stairs of height 3m.
10. What is specific heat capacity.
11. Calculate the energy needed to raise the temperature of 0.5kg of water (specific heat capacity 4200J/kg/°C) by 20°C.
12. Define power and state its unit.
13. Calculate the power output of a heater that gives out 5000J of heat energy in 5 seconds.
14. What is wasted energy?
15. What is the principle of conservation of energy?
16. What will affect how quickly a building cools down?
17. What is efficiency?
18. Calculate the efficiency of an electric motor that is supplied with 230W of power and supplies 160W as its output.
19. What are the main energy resources available for use on Earth?
20. What are the fossil fuels?
21. What is a renewable energy resource?
22. What are the environmental impacts of burning coal for energy?
23. What are the environmental impacts of nuclear fission as an energy source?
24. What is the greenhouse effect?
25. Describe some of the consequences of climate change.

Electricity

1. Draw the circuit symbols for a switch, a lamp, a fuse, a cell, a voltmeter, an ammeter, a diode, a resistor, a thermistor, a variable resistor, an LDR, an LED.
2. What is electrical current?
3. What unit is current measured in?
4. What current is flowing if 1C of charge flows past a point in 10s?
5. What do the terms V, I and R represent in the equation $V = IR$?
6. What are the units of each of the quantities in the equation $V = IR$?
7. Sketch the current-potential difference characteristic graphs for:
 - a. A resistor
 - b. A filament lamp
 - c. A diode
8. True or false:

- a. In a series circuit, the current is the same for every component in the circuit.
 - b. In a series circuit, the potential difference is the same for every component in the circuit.
 - c. In a parallel circuit, the current is the same for every component in the circuit.
 - d. In a parallel circuit, the potential difference is the same for every component in the circuit.
9. A $150\text{k}\Omega$ and $300\text{k}\Omega$ resistor are connected in series. What is the total effective resistance of the two together?
 10. Does the UK mains supply use D.C. or A.C.?
 11. What is the frequency of the UK mains supply?
 12. What is the potential difference of the UK mains supply?
 13. There are 3 wires in the 3-pin plug. What colours are they and which wire is which?
 14. Calculate the power output of a heater when 0.5A of current flows through it with a potential difference of 6V across it.
 15. What is the unit of power?
 16. Describe the energy transfers taking place in a TV.
 17. How much charge flows through a light bulb that gives out 50J of energy with a potential difference of 12V across it?
 18. Describe the components of the National grid.

Particle Model of Matter

1. What is the equation for calculating density?
2. What are the units of density?
3. Draw diagrams to show the arrangement of particles in a solid, liquid and gas.
4. What do the following terms mean?
 - a. Melting
 - b. Freezing
 - c. Evaporation
 - d. Condensation
 - e. Sublimation
5. What is the internal energy of a system?
6. What is latent heat?
7. What is the difference between the specific latent heat of fusion and the specific latent heat of vaporisation?
8. Describe the motion of particles in a gas.

Atomic Structure

1. What is an isotope?
2. Describe the structure of the atom – a diagram may help.
3. How much smaller is the radius of the nucleus compared to the radius of the atom?
4. True or false: an atom has the same number of protons as it has electrons.
5. What is the mass number of carbon?
6. If an atom loses an electron, does it become a positive or a negative ion?
7. What were the observations made in the alpha particle scattering experiment?
8. What are the differences between the nuclear and plum pudding models of the atom?
9. What are the 3 types of ionising nuclear radiation?
10. Which material just stops alpha radiation?
11. Which material just stops beta radiation?
12. Which material just stops gamma radiation?

13. How far can alpha radiation travel in air?
14. How far can beta radiation travel in air?
15. How far can gamma radiation travel in air?
16. What is meant by the half-life of a radioactive substance?
17. What are the consequences of a person becoming exposed to high levels of radiation?

Practical Knowledge Needed:

- How could you determine the specific heat capacity of a block of aluminium?
- Draw a circuit diagram to show the circuit you could use to investigate how changing potential difference affects the resistance of a bulb.
- Draw a circuit diagram to show the circuit you could use to investigate how the resistance of 3 resistors in series is different to 3 resistors in parallel.
- Draw a circuit diagram to show the circuit you could use to investigate how changing temperature affects the resistance of a thermistor.
- How could you find the density of a lump of plasticene?
- What safety procedures would you need to investigate the half-life of a radioactive substance?

Maths Skills Needed:

- Can you convert 30mA into Amps?
- Can you convert 20km into m?
- Do you know how to square a number using a calculator?
- Can you express 0.65 as a percentage?
- Can you express 18% as a decimal?
- Can you calculate the gradient of a straight line graph?
- Can you express 3340000 in standard form?