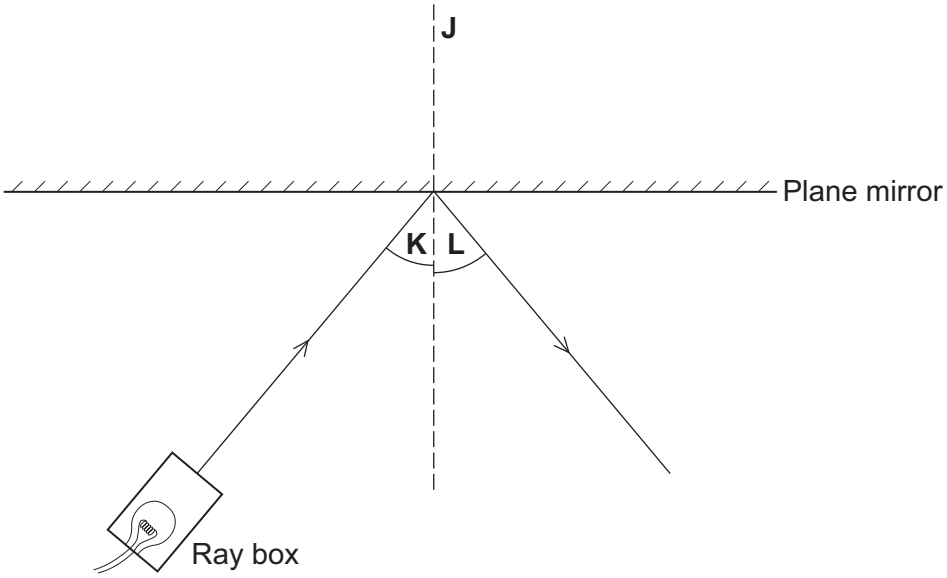
NOTICE TO CUSTOMER:

The sale of this product is intended for use of the original purchaser only and for use only on a single computer system. Duplicating, selling, or otherwise distributing this product is a violation of the law ; your license of the product will be terminated at any moment if you are selling or distributing the products.

Answer **all** questions in the spaces provided.

1 The diagram shows a ray of light from a ray box that is reflected by a plane mirror.



1 (a) What name is given to the dashed line labelled **J**?

Draw a ring around the correct answer.

incident **normal** **reflection**

(1 mark)

1 (b) Draw a ring around the correct answer in the box to complete the sentence.

If the angle marked **K** is halved, then the angle marked **L** will

- be doubled.
- not change.
- be halved.

(1 mark)

1 (c) A student looking into the mirror can see an image of the ray box.

Which **two** words can be used to describe the image that the student sees?

Draw a ring around the **two** correct answers.

inverted **magnified** **real** **upright** **virtual**

(2 marks)

4

Turn over for the next question

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

2 (a) The diagram below shows six of the seven types of wave that make up the electromagnetic spectrum.

Gamma rays		Ultraviolet	Visible light	Infrared	Microwaves	Radio waves

2 (a) (i) What type of electromagnetic wave is missing from the diagram?

.....

(1 mark)

2 (a) (ii) Which of the following electromagnetic waves has the most energy?

Draw a ring around the correct answer.

gamma rays **radio waves** **visible light**

(1 mark)

2 (a) (iii) Which of the following electromagnetic waves is given out by a TV remote control?

Draw a ring around the correct answer.

infrared **microwaves** **ultraviolet**

(1 mark)

2 (b) Draw a ring around the correct answer in the box to complete the sentence.

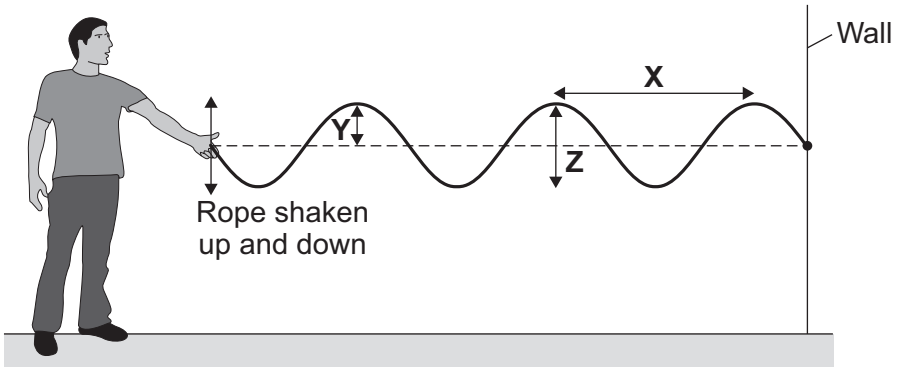
Microwaves travel through a vacuum at

a slower speed than
the same speed as
a faster speed than

radio waves.

(1 mark)

2 (c) The diagram shows waves being produced on a rope.
The waves are **not** reflected by the wall.



2 (c) (i) Draw an arrow on the diagram to show the direction in which the waves transfer energy.
(1 mark)

2 (c) (ii) Which **one** of the arrows, labelled, **X**, **Y** or **Z**, shows the amplitude of a wave?

Write the correct answer in the box. ☐

(1 mark)

2 (c) (iii) The waves produced on the rope are transverse.

Name **one** other type of transverse wave.

.....

(1 mark)

2 (d) The rope is shaken up and down, producing 3 waves every second.
The waves have a wavelength of 1.2 metres.

2 (d) (i) State the frequency of the waves.

..... Hz
(1 mark)

2 (d) (ii) Calculate the speed of the waves.

Use the correct equation from the Physics Equations Sheet.

Show clearly how you work out your answer.

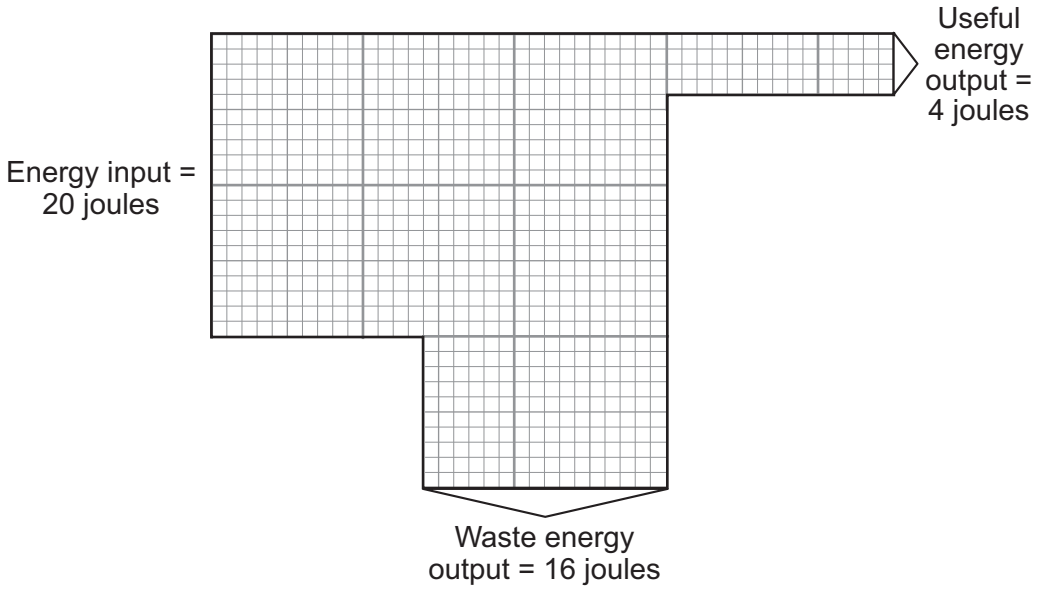
.....

.....

Wave speed = ... m/s
(2 marks)

10

3 (a) The Sankey diagram for a low energy light bulb, known as a CFL, is shown below.



3 (a) (i) What is the useful energy output that the CFL is designed to produce?

.....

(1 mark)

3 (a) (ii) What effect does the waste energy output have on the surrounding air?

.....

.....

(1 mark)

3 (a) (iii) Use the information in the diagram to calculate the efficiency of the CFL.

Use the correct equation from the Physics Equations Sheet.

Show clearly how you work out your answer.

.....

.....

.....

.....

Efficiency = ...

(2 marks)

3 (a) (iv) CFLs contain mercury. Mercury is a poisonous substance.

It is important that old CFLs are sent for recycling and not thrown into a rubbish bin.

Suggest **one** reason why.

.....

.....

(1 mark)

3 (b) A new type of low energy bulb uses light emitting diodes (LEDs).

Draw a ring around the correct answer in the box to complete the sentence.

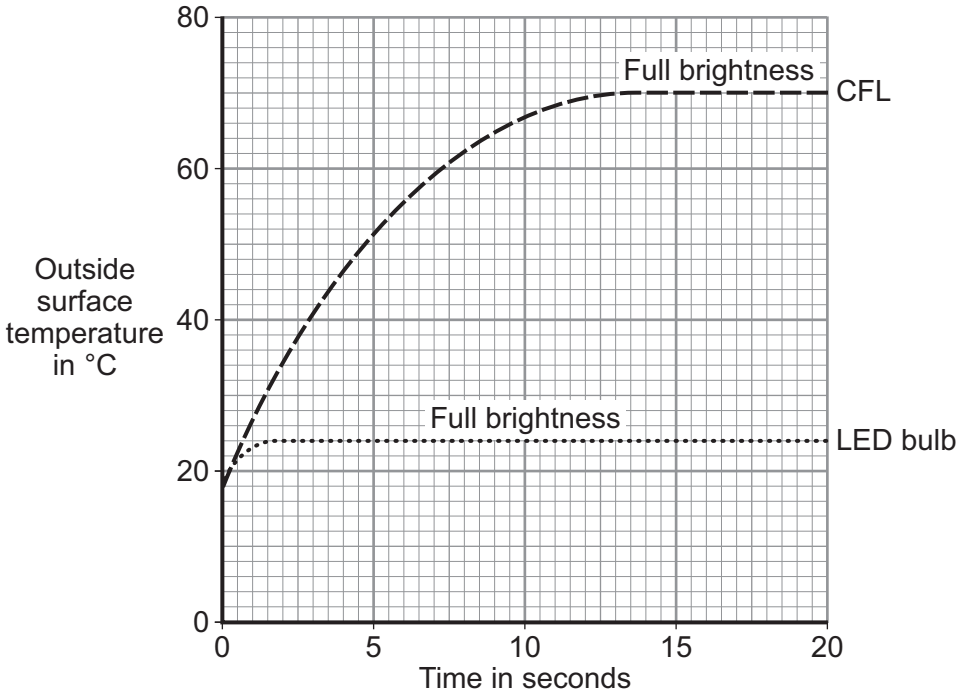
LED bulbs are more efficient than CFLs. This means that LED bulbs

waste [a smaller / the same / a bigger] proportion of the input energy compared to CFLs.

(1 mark)

Question 3 continues on the next page

3 (c) The graph shows how the outside surface temperatures of a CFL and an LED bulb change after they are switched on.



Apart from a higher efficiency, suggest **one** advantage of using an LED bulb rather than a CFL.

.....

.....

(1 mark)

3 (d) At the moment, LED bulbs are much more expensive to buy than CFLs.

Which **two** of the following would a homeowner need to know to decide whether it would be cost-effective to replace a CFL with an equally bright LED bulb?

Tick (✓) **two** boxes.

The number of hours each bulb lasts before needing to be replaced ☐

The power of each bulb in watts ☐

The voltage of the mains electricity supply ☐

(1 mark)

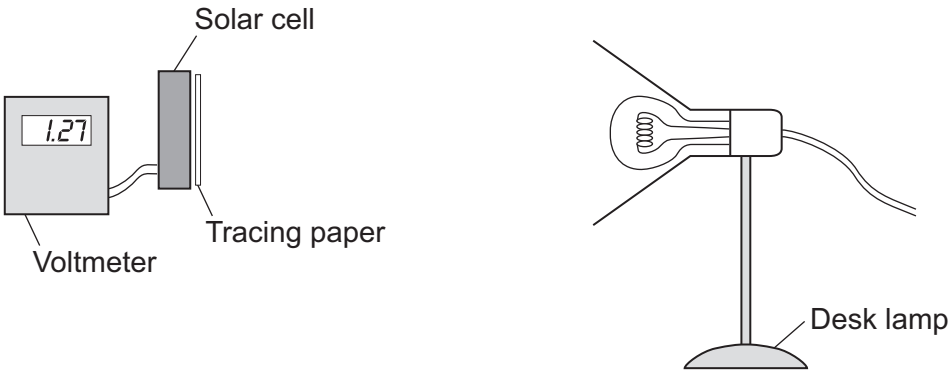
8

Turn over for the next question

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

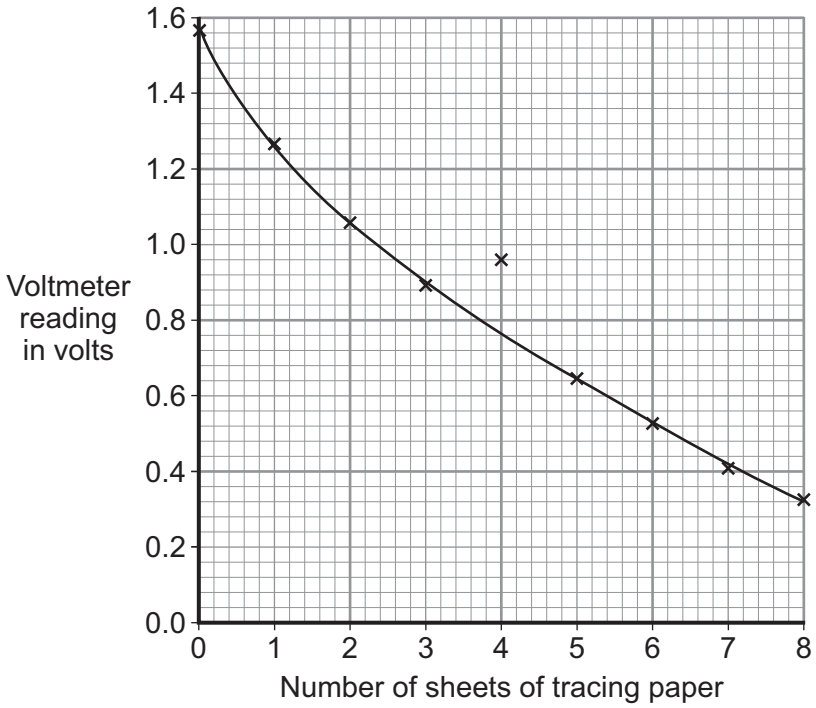
4 A student has read that a solar cell with a dirty surface will not work as well as a solar cell with a clean surface.

To test the effect of a dirty surface on a solar cell, the student set up the following equipment.



The student put the desk lamp a fixed distance from the solar cell. To represent the effect of a dirty surface, the student covered the surface of the solar cell with pieces of tracing paper. Each time the student added a piece of paper, she measured the output voltage of the solar cell.

4 (a) The results taken by the student have been used to draw the graph below.



4 (a) (i) One of the results seems to be anomalous.

Draw a ring around the anomalous data point on the graph.

(1 mark)

4 (a) (ii) The larger the number of sheets of tracing paper used, the lower the intensity of the light reaching the solar cell.

Draw a ring around the correct answer in the box to complete the sentence.

A decrease in the intensity of the light reaching the solar cell causes

a decrease in
no change to
an increase in

the output voltage from the solar cell.

(1 mark)

4 (b) People can buy panels of solar cells to generate electricity for their homes.
Any surplus electricity can be sold to the electricity supply company.

4 (b) (i) Give **one** environmental advantage of generating electricity using solar cells rather than generating electricity in a coal-burning power station.

.....

.....

(1 mark)

4 (b) (ii) A homeowner pays £7600 to have solar panels fitted on the roof of their house.
The homeowner expects to save £950 each year from reduced energy bills and from selling the electricity.

Assuming these figures to be correct, calculate the pay-back time for the solar panels.

Show clearly how you work out your answer.

.....

.....

.....

Pay-back time = ... years

(2 marks)

Question 4 continues on the next page

4 (b) (iii) Draw a ring around the correct answer in the box to complete the sentence.

Allowing the surface of the solar panels to become very dirty will

decrease
not change
increase

the pay-back time.

(1 mark)

4 (b) (iv) Explain your answer to part **(b)(iii)**.

.....

.....

.....

.....

(2 marks)

8

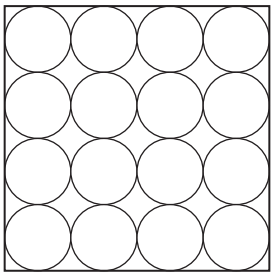
Turn over for the next question

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

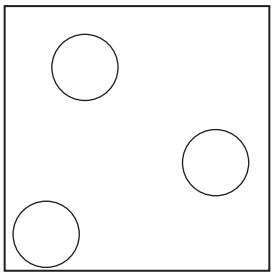
5 (a) The diagrams show the arrangement of the particles in a solid and in a gas.

Each circle represents one particle.

Solid

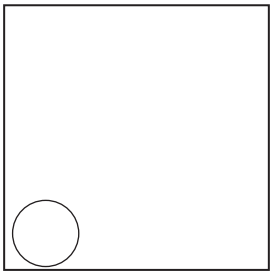


Gas



5 (a) (i) Complete the diagram below to show the arrangement of the particles in a liquid.

Liquid



(2 marks)

5 (a) (ii) Explain, in terms of the particles, why gases are easy to compress.

.....

.....

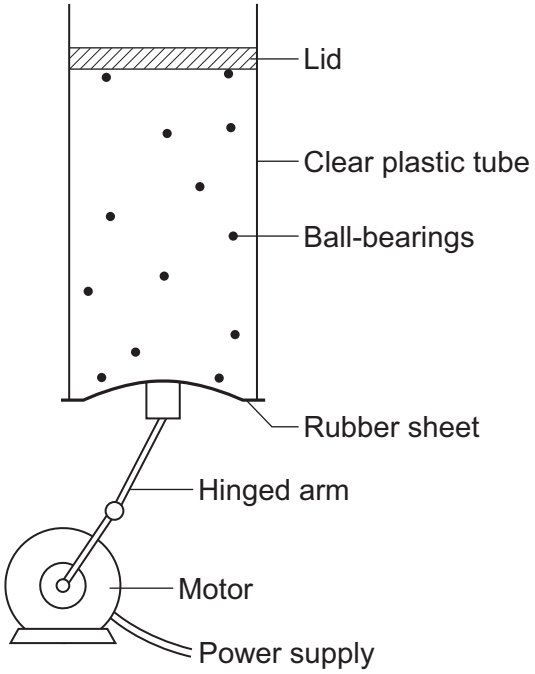
.....

.....

(2 marks)

5 (b) The diagram below shows the model that a science teacher used to show her students that there is a link between the temperature of a gas and the speed of the gas particles.

The ball-bearings represent the gas particles. Switching the motor on makes the ball-bearings move around in all directions.



5 (b) (i) How is the motion of the ball-bearings similar to the motion of the gas particles?

.....

.....

(1 mark)

5 (b) (ii) The faster the motor runs, the faster the ball-bearings move. Increasing the speed of the motor is like increasing the temperature of a gas.

Use the model to predict what happens to the speed of the gas particles when the temperature of a gas is increased.

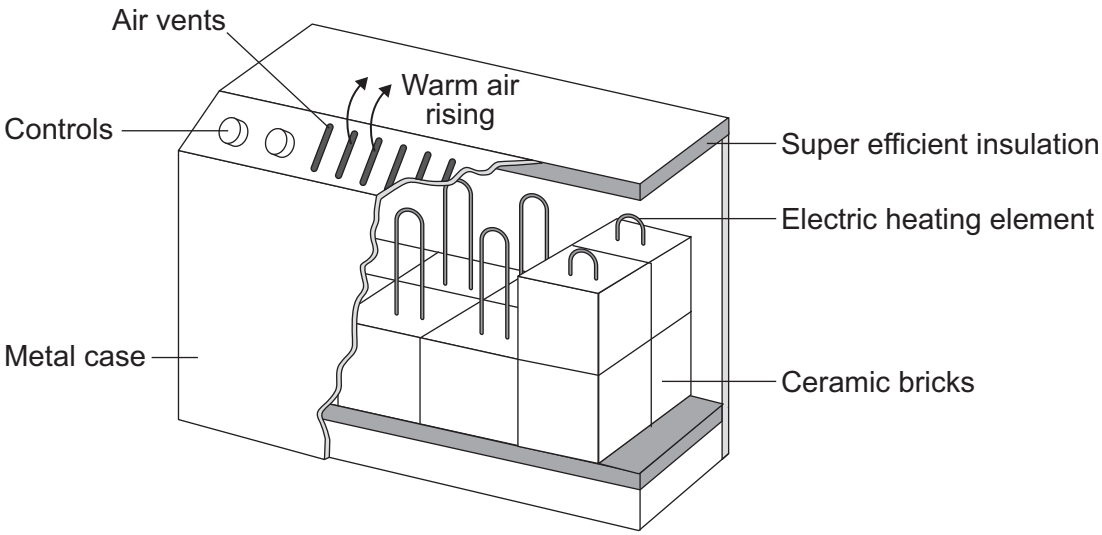
.....

.....

(1 mark)

6

6 The diagram shows how one type of electric storage heater is constructed. The heater has ceramic bricks inside. The electric elements heat the ceramic bricks during the night. Later, during the daytime, the ceramic bricks transfer the stored energy to the room.



6 (a) (i) Complete the following sentences using words from the box.

conduction	**convection**	**evaporation**

Energy is transferred through the metal casing by ..... .

The warm air rising from the heater transfers energy to the

room by ..... .

(2 marks)

6 (a) (ii) The inside of the metal case is insulated.

Which **one** of the following gives the reason why?

Tick (✓) **one** box.

To transfer energy from the ceramic bricks to the room faster ☐

To stop energy from the room transferring into the heater ☐

To keep the ceramic bricks hot for a longer time ☐

(1 mark)

6 (b) In winter, the electricity supply to a 2.6 kW storage heater is switched on for seven hours each day.

6 (b) (i) Calculate the energy transferred, in kilowatt-hours, from the electricity supply to the heater in seven hours.

Use the correct equation from the Physics Equations Sheet.

Show clearly how you work out your answer.

.....

.....

Energy transferred = ... kWh

(2 marks)

6 (b) (ii) The electricity supply to the heater is always switched on between midnight and 7 am. Between these hours, electricity costs 5 p per kilowatt-hour.

Calculate how much it costs to have the heater switched on between midnight and 7 am.

.....

.....

Cost = ... p

(1 mark)

6 (c) Between 7 am and 8 am, after the electricity supply is switched off, the temperature of the ceramic bricks falls by 25 °C.

Calculate the energy transferred from the ceramic bricks between 7 am and 8 am.

Total mass of ceramic bricks = 120 kg.
Specific heat capacity of the ceramic bricks = 750 J/kg °C.

Use the correct equation from the Physics Equations Sheet.

Show clearly how you work out your answer.

.....

.....

.....

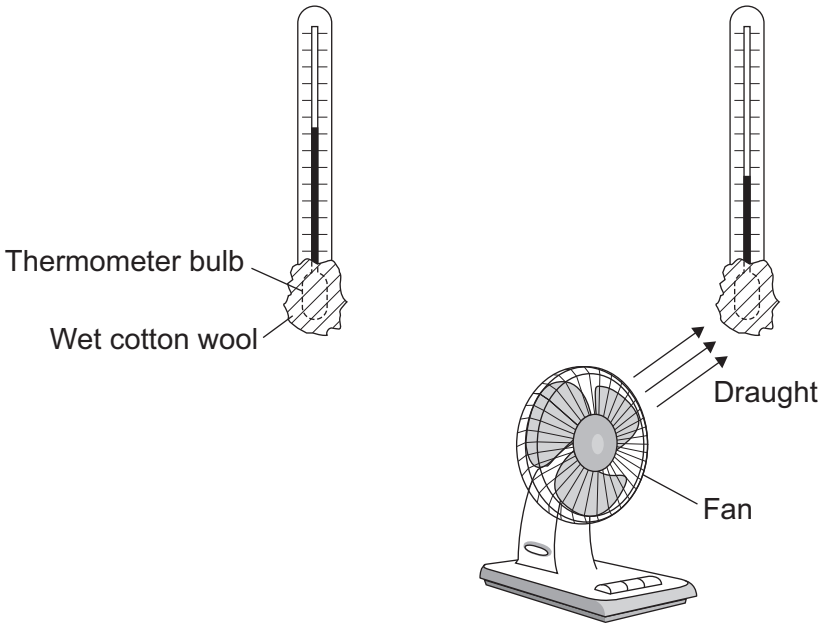
.....

Energy transferred = ... J

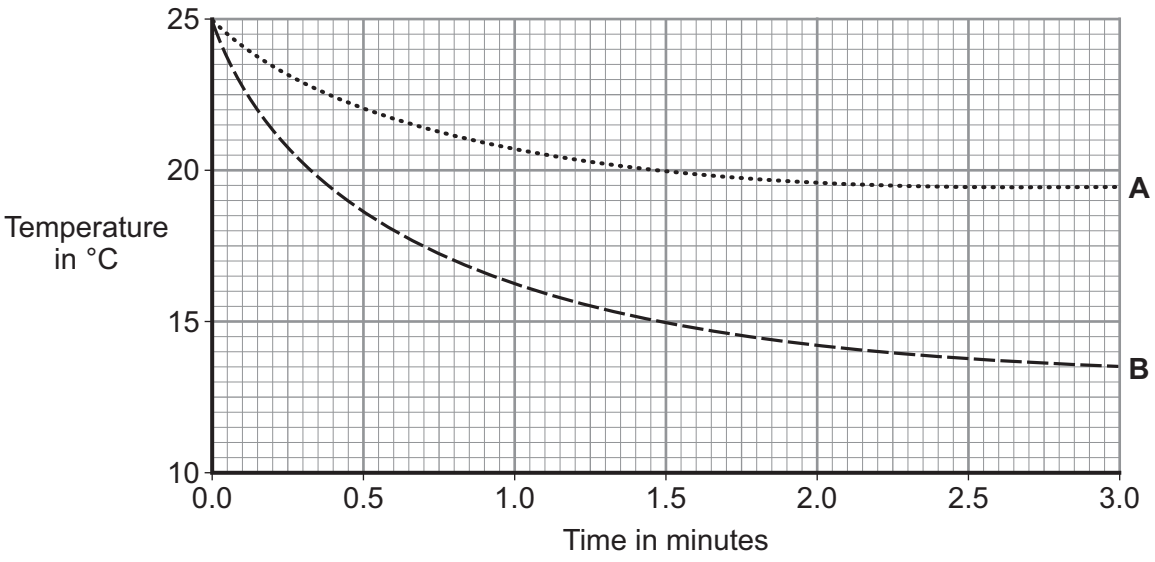
(2 marks)

8

7 The diagram shows two thermometers. The bulb of each thermometer is covered with a piece of wet cotton wool. One of the thermometers is placed in the draught from a fan.



The graph shows how the temperature of each thermometer changes with time.



7 (a) Which of the graph lines, **A** or **B**, shows the temperature of the thermometer placed in the draught?

Write the correct answer in the box. ☐

Explain, in terms of evaporation, the reason for your answer.

.....

.....

.....

.....

.....

.....

(3 marks)

7 (b) A wet towel spread out and hung outside on a day without wind dries faster than an identical wet towel left rolled up in a plastic bag.

Explain why.

.....

.....

.....

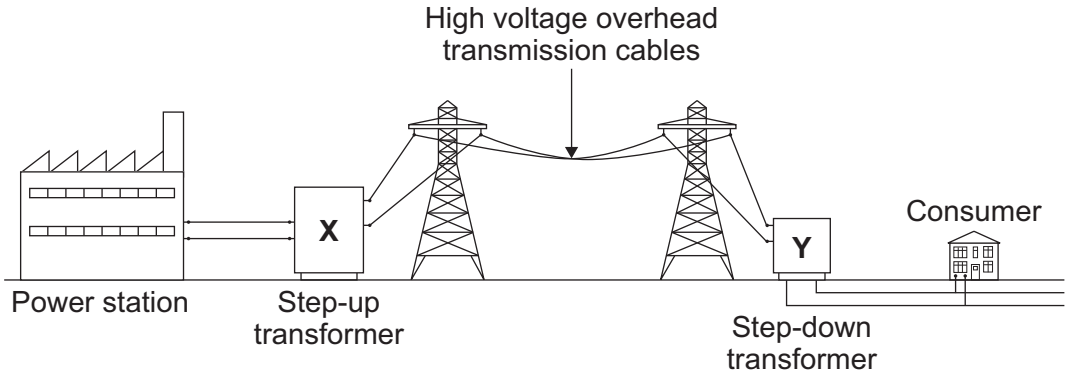
.....

(2 marks)

5

Turn over for the next question

8 The diagram shows the National Grid system.



8 (a) The National Grid includes step-up transformers.

Explain why.

.....

.....

.....

.....

(2 marks)

8 (b) *In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.*

Over the next 10 years, more than 300 kilometres of new high voltage transmission cables are to be added to the National Grid. Most of the new cables will be suspended from pylons and run overhead while the rest will be buried underground.

Outline the advantages and disadvantages of both overhead transmission cables and underground transmission cables.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

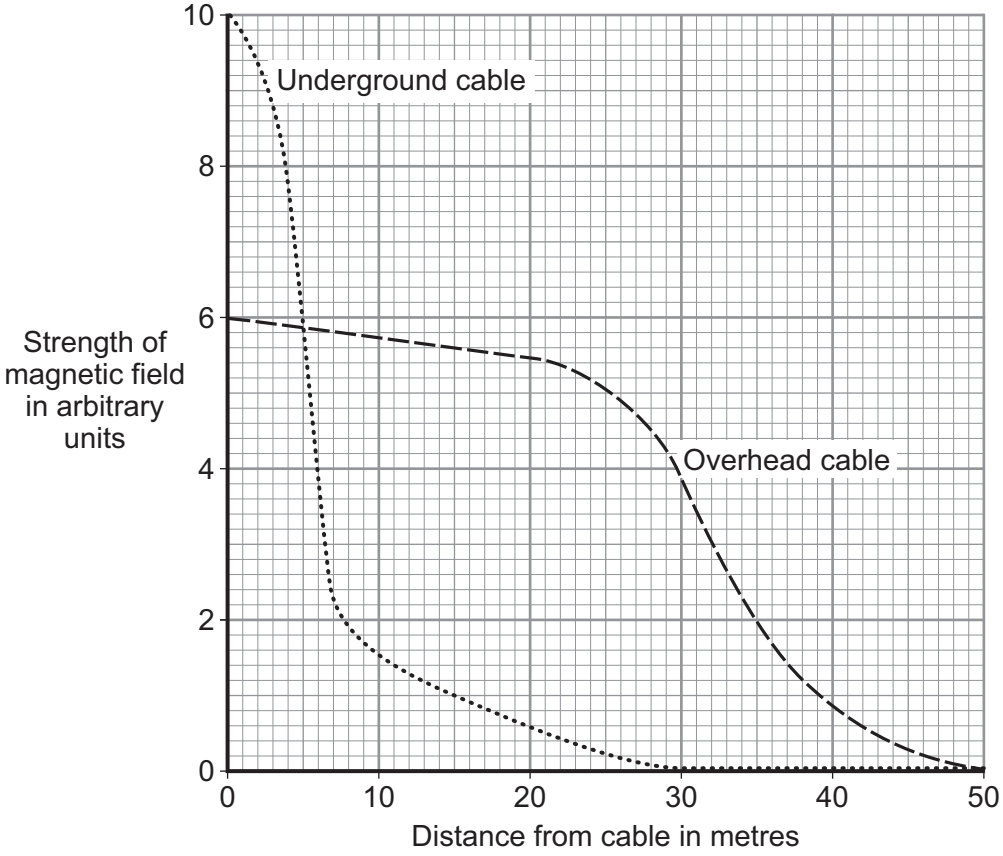
.....

(6 marks)

Question 8 continues on the next page

8 (c) When an electric current flows through a transmission cable, a magnetic field is produced.

The graph shows how the strength of the magnetic field varies with distance from both overhead and underground transmission cables that carry the same current.



What conclusions may be drawn from this graph?

.....

.....

.....

.....

(2 marks)

8 (d) Some people think that, because of the magnetic fields, living close to transmission cables is dangerous to health. Laboratory studies on mice and rats exposed to magnetic fields for two or more years found that the magnetic fields had no effect on the animals' health.

Draw a ring around the correct answer in the box to complete the sentence.

Using animals in scientific research raises | economic / environmental / ethical | issues.

(1 mark)

11

END OF QUESTIONS

Answer ALL questions.

Some questions must be answered with a cross in a box ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

Scaring cats with ultrasound

1 Anna uses a device to keep cats away from her garden.
This device emits some ultrasound waves that cats do not like.

(a) Which of these could be the frequency of the ultrasound waves?

Put a cross (☒) in the box next to your answer.

(1)

- ☐ **A** 23 000 Hz
- ☐ **B** 2300 Hz
- ☐ **C** 230 Hz
- ☐ **D** 23 Hz

(b) State another use for ultrasound waves.

(1)

.....

(c) Anna has good hearing but she cannot hear the ultrasound waves from the device. However, a cat can hear them.

Explain this difference.

(2)

.....

.....

.....

.....

(d) Anna finds a leaflet about how the device works.

- A cat approaches the device.
- Heat from the cat is emitted as infrared rays.
- The device detects these infrared rays.
- Then the device emits ultrasound waves.
- These waves scare the cat away.

(i) The speed of the ultrasound waves is 340 m/s.
The ultrasound takes 0.047 s to reach the cat.

Calculate the distance between the device and the cat.

distance (m) = wave speed (m/s) × time (s)

(2)

distance = ... m

(ii) The infrared rays from the cat take much less than 0.047 s to reach the device. The infrared rays and the ultrasound waves travel the same distance.

Suggest why the infrared rays take much less time than the ultrasound waves.

(2)

.....

.....

.....

.....

(Total for Question 1 = 8 marks)

Ionising radiations

2 A radioactive source emits three types of ionising radiation

alpha
beta
gamma

(a) Complete the sentence by putting a cross (☒) in the box next to your answer.

Radioactive sources emit radiation

(1)

☒ **A** all the time

☒ **B** at regular intervals

☒ **C** every few minutes

☒ **D** only when they are heated

(b) Use words from the box to complete the table.

(3)

atom	energy	molecule
particle	source	wave

radiation	type	transfer
alpha	particle	energy
beta	.....	energy
gamma	.....	.....

(c) State **two** uses of gamma radiation.

(2)

.....

.....

.....

.....

(d) Stars can emit gamma waves and light waves.
Gamma waves and light waves are both parts of the electromagnetic spectrum.

Explain why it takes the same time for both of these waves to travel from the star to a space telescope.

(2)

.....

.....

.....

.....

(Total for Question 2 = 8 marks)

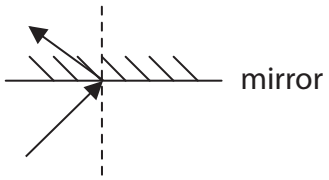
Visible light

3 Mirrors and lenses can be used in telescopes.

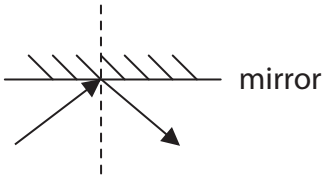
(a) Which diagram best shows what happens to a ray of light when it hits a plane mirror?

Put a cross (☒) in the box next to your answer.

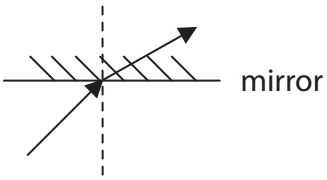
(1)



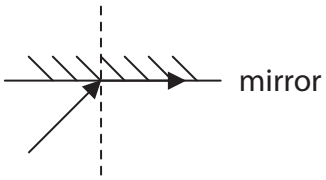
☒ **A**



☒ **B**

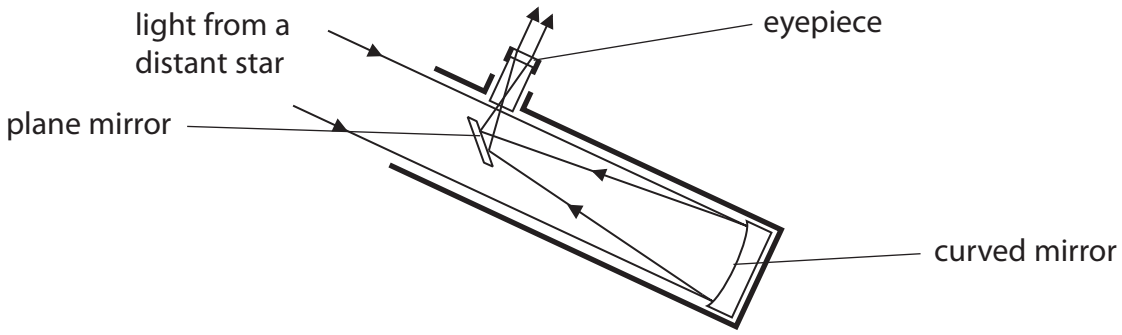


☒ **C**



☒ **D**

(b) The diagram shows light rays in a reflecting telescope.



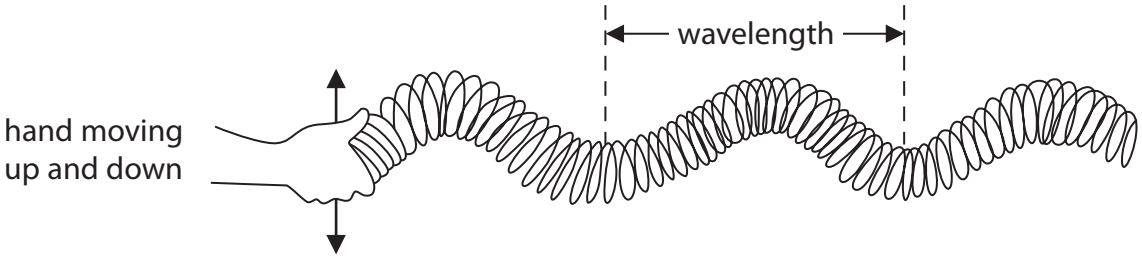
(i) Describe what the mirrors and the eyepiece do to the light rays to form an image of a distant star.

(3)

(ii) Explain an advantage of using a telescope instead of the naked eye to look at stars.

(2)

(c) Light travels through space as a wave.
A model of this type of wave can be made using a Slinky spring.
A Slinky spring is a long coil of wire like the one shown in the diagram.



(i) State the name of this type of wave.

(1)

.....

(ii) How could the movement of the hand be changed to make the amplitude of this wave bigger?

Put a cross (☒) in the box next to your answer.

(1)

☒ **A** move up and down a smaller distance

☒ **B** move up and down at a faster rate

☒ **C** move up and down a bigger distance

☒ **D** move up and down at a slower rate

(iii) The wave shown in the model has a wavelength of 0.5 m and the frequency is 4 Hz.

Calculate the speed of the wave.

(2)

speed of wave = ... m/s

(Total for Question 3 = 10 marks)

The power of television

4 Modern televisions use small amounts of power.

(a) Which of these describes power?

Put a cross (☒) in the box next to your answer.

(1)

- ☒ **A** distance travelled per second
- ☒ **B** energy transferred
- ☒ **C** energy transferred per second
- ☒ **D** work done

(b) A television is connected to the 230 V mains.
When it is switched on, the current in the television is 0.25 A.

(i) Calculate the power consumption of the television when it is switched on.

(2)

power consumption = ... W

(ii) Describe what is meant by **current**.

(2)

.....

.....

.....

.....

(c) When the television is switched to standby, the power consumption falls to 0.5 W.

(i) State how this changes the current in the television.

(1)

.....

(ii) The cost of electricity is 26p per kW h.

Show that the cost of leaving the television on standby for 48 hours is less than 1p.

(3)

(iii) It is cheaper to switch the television off instead of leaving it on standby.

Suggest another reason why it is better not to leave the television on standby.

(1)

.....

.....

(Total for Question 4 = 10 marks)

Running like clockwork

5 The diagram shows Simon's clock.
Once a week, Simon turns a key to tighten the spring.
The spring uncoils slowly to keep the clock working.

(a) Which type of energy is stored in the tightened spring?

Put a cross (☒) in the box next to your answer.

(1)

☒ **A** chemical energy

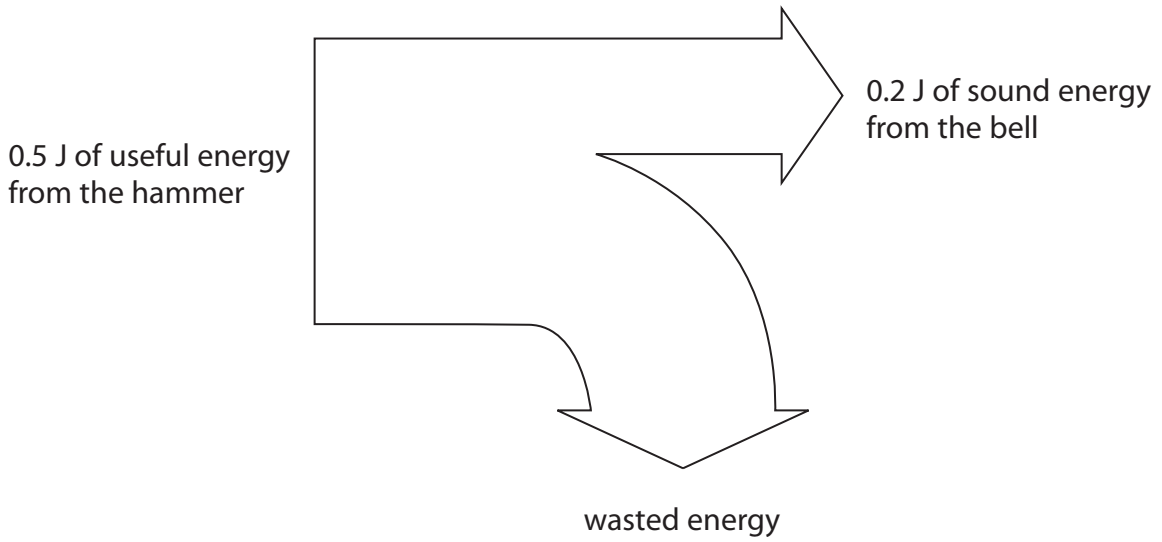
☒ **B** elastic potential energy

☒ **C** gravitational potential energy

☒ **D** thermal energy

(b) Every hour, the clock chimes to remind Simon of the time.
The clock lifts a small hammer.
The hammer falls and rings a little bell.

The diagram shows what happens to the energy from the falling hammer.



(i) Calculate the energy wasted.

(1)

wasted energy = ... J

(ii) Calculate the efficiency of this process.

(2)

efficiency = ...

(iii) Suggest what happens to the wasted energy.

(2)

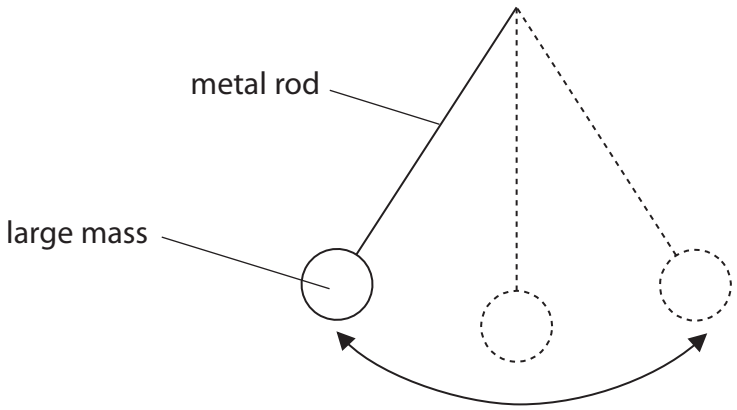
.....

.....

.....

.....

*(c) The clock uses a pendulum.
The pendulum is a metal rod with a large mass at the end.
The mass swings from side to side.



The spring keeps the pendulum swinging without stopping.

Describe the energy changes that happen as the pendulum continues to swing from side to side.

(6)

(Total for Question 5 = 12 marks)

Stars and galaxies

6 (a) The image shows the Andromeda galaxy.

(i) Complete the sentence by putting a cross (☒) in the box next to your answer.

Andromeda is just one of many millions of galaxies that form the

(1)

☒ **A** constellations

☒ **B** planets

☒ **C** stars

☒ **D** Universe

(ii) State the name of the galaxy that contains our Solar System.

(1)

(b) When astronomers study distant galaxies, they notice changes to the waves they observe.

(i) Describe the changes to the waves they observe.

(2)

.....

.....

.....

.....

(ii) State the evidence that astronomers have observed to support the Big Bang theory for the origin of the Universe.

(2)

.....

.....

.....

.....

*(c) By observing stars in distant galaxies, astronomers have been able to identify the different stages in the life of a star.

Describe the life cycle, from birth to death, of a star that is similar in mass to our Sun.
You may draw labelled diagrams to help with your answer.

(6)

(Total for Question 6 = 12 marks)

TOTAL FOR PAPER = 60 MARKS

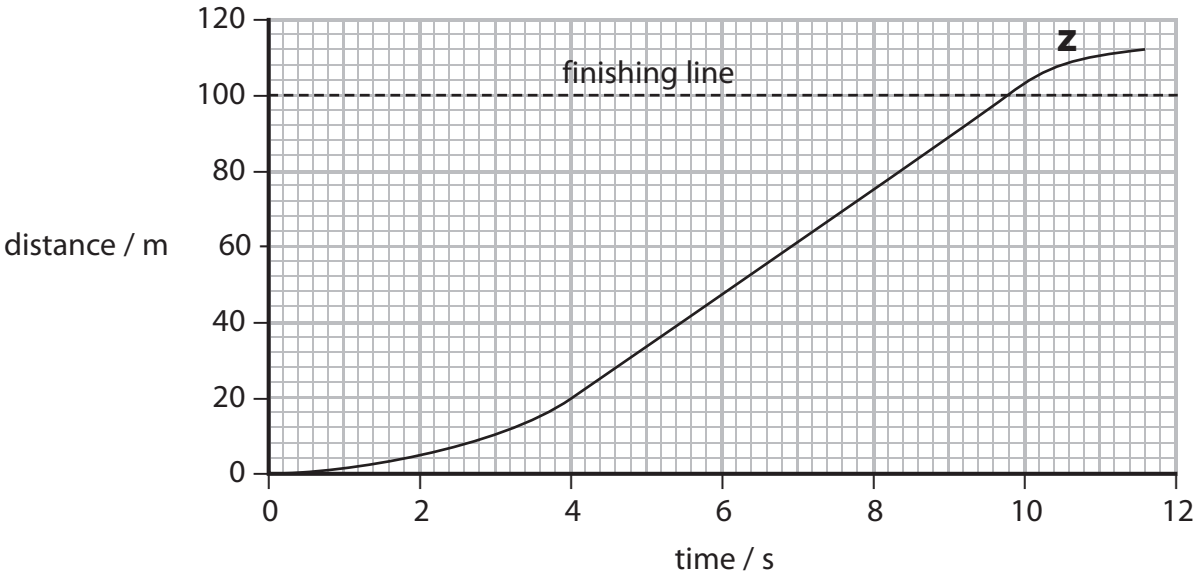
Answer ALL questions

Some questions must be answered with a cross in a box ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

100 m race

1 The photograph shows the beginning of a 100 m race.

David wins the race.
The graph shows David's distance-time graph.



(a) Use the graph to find the distance David ran in the first 4 s.

(1)

distance in the first 4 s = ... m

(b) David runs 100 m in a time of 9.80 s.

Calculate his average speed.
State the unit.

(3)

average speed = ... unit .....

(c) Explain why David's average speed is less than his top speed.

(2)

.....

.....

.....

.....

(d) Complete the sentences by putting a cross (☒) in the box next to your answer.

(i) In the section of the graph marked **Z**, David is

(1)

☒ **A** running at constant speed

☒ **B** slowing down

☒ **C** speeding up

☒ **D** stopped

(ii) Velocity is

(1)

☒ **A** speed in a circle

☒ **B** the same as speed

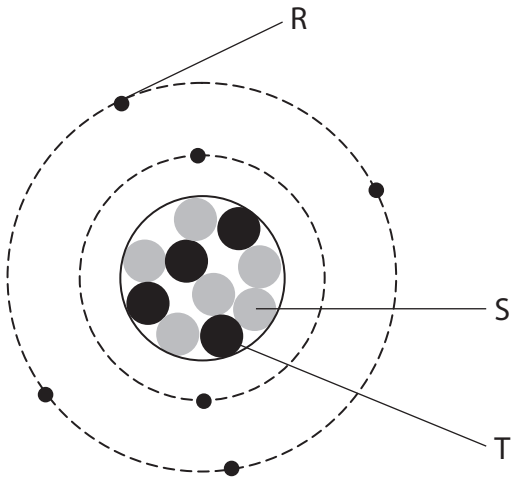
☒ **C** constant speed

☒ **D** speed in a stated direction

(Total for Question 1 = 8 marks)

Static electricity

2 (a) The diagram represents an atom.
The atom is neutral.



Draw **one** straight line from each letter in the boxes to the particle.

(2)

letter	particle
R	proton
S	neutron
T	electron

(b) A boy combs his hair using a plastic comb.
His hair becomes positively charged.

(i) Explain what happens to the boy's hair when it becomes positively charged.

(2)

.....

.....

.....

.....

(ii) Complete the sentence by putting a cross (☒) in the box next to your answer.

His plastic comb also becomes charged.
If a copper comb was used, it would not become charged.

This is because the copper is

(1)

☒ **A** an insulator

☒ **B** a conductor

☒ **C** magnetic

☒ **D** non-magnetic

(iii) The boy puts his charged comb near some small pieces of paper.

Explain what happens.

(3)

.....

.....

.....

.....

.....

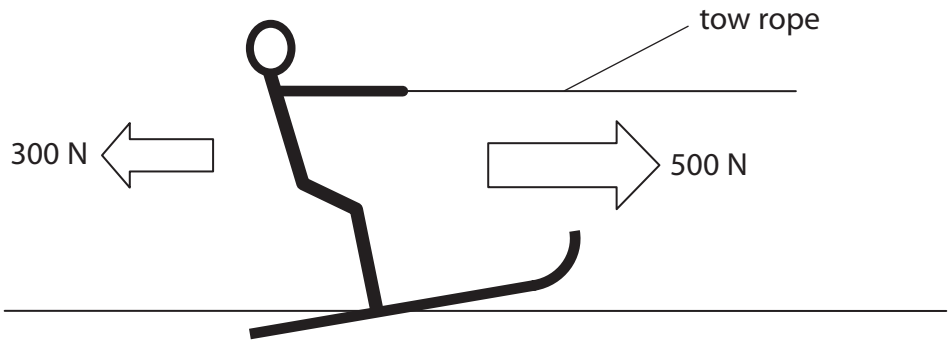
.....

(Total for Question 2 = 8 marks)

Water skiing

3 The photograph shows a water skier being pulled along by a boat.

(a) The diagram shows the horizontal forces acting on the water skier.



(i) The 500 N force is the force that the boat tow rope is exerting on the water skier.

Suggest what causes the 300 N force.

(1)

.....

(ii) Calculate the resultant of these two forces.

(2)

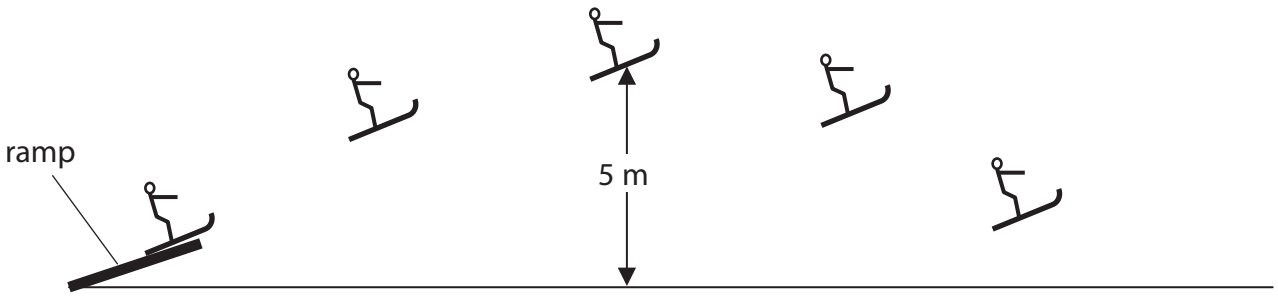
resultant force = ... N

(iii) State the direction of the resultant of these two forces.

(1)

.....

(b) The diagram shows the water skier using a ramp to perform a jump.
During the jump, she gains gravitational potential energy.



(i) Complete the sentence by putting a cross (☒) in the box next to your answer.

The unit of gravitational potential energy is

(1)

☒ **A** A

☒ **B** J

☒ **C** N

☒ **D** W

(ii) The mass of the water skier is 54 kg.
At the top of the jump, she is 5 m above the water level.

Calculate the amount of gravitational potential energy she gains in rising 5 m.
Gravitational field strength = 10 N/kg

(2)

gain in gravitational potential energy = ...

(iii) When the water skier reaches the top of the ramp, she lets go of the rope.

Describe the energy changes that happen between the skier leaving the ramp and reaching the top of the jump.

(2)

.....

.....

.....

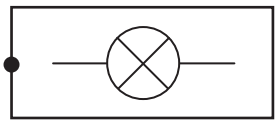
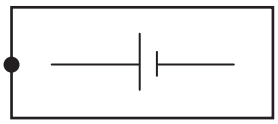
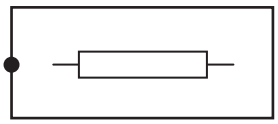
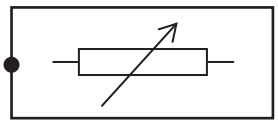
.....

(Total for Question 3 = 9 marks)

Circuits

4 (a) (i) Draw **one** straight line from each name to its circuit symbol.

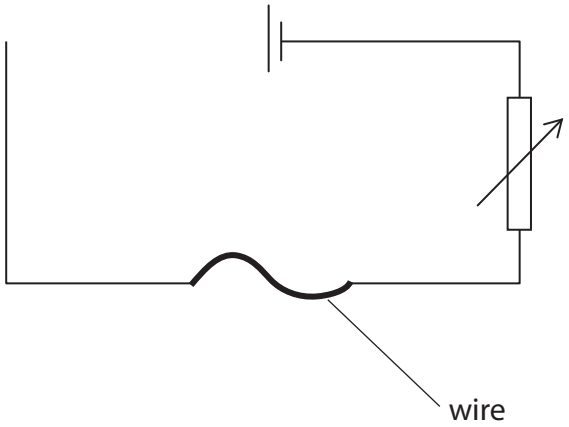
(2)

name	circuit symbol
lamp	
fixed resistor	
	
	

(ii) The diagram shows an incomplete circuit for measuring the resistance of a length of wire.

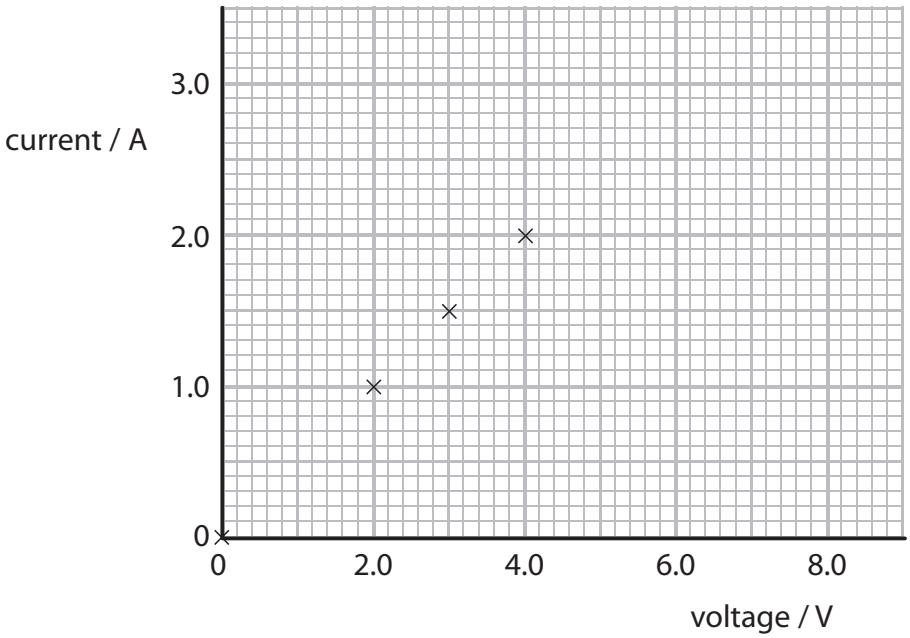
Complete the diagram to show how an ammeter, —(A)—, and a voltmeter, —(V)—, should be connected in the circuit.

(2)



(b) A student sets up a circuit to find the resistance of a piece of wire.
She measured current and voltage at different voltage settings.

She plotted a graph of her results.



(i) Draw the line of best fit for these four points.

(1)

(ii) She then took an extra reading and found that a voltage of 7.0 V gave a current of 3.0 A.

Plot this point on the graph.

(1)

(iii) She decides to take an additional reading.
This is to help her reach a conclusion about the way current changes with voltage.

Explain which additional reading she could take.

(2)

.....

.....

.....

.....

(iv) $R = \frac{V}{I}$

Calculate the resistance of the piece of wire when the current is 1.5 A.

(3)

resistance = ... Ω

(Total for Question 4 = 11 marks)

Nuclear reactions

5 (a) The nucleus of an atom of cobalt-60 can be represented by the symbol

$$^{60}_{27}Co$$

(i) Use numbers from the box to complete the following sentences.

(2)

27	33	60	87

The number of protons in an atom of cobalt-60 is .....

The number of neutrons in an atom of cobalt-60 is .....

(ii) Complete the sentence by putting a cross (☒) in the box next to your answer.

Atoms are neutral. An atom can become an ion by losing

(1)

☒ **A** an electron

☒ **B** a neutron

☒ **C** a gamma ray

☒ **D** an X-ray

(iii) Cobalt-60 is radioactive.
It emits beta radiation and gamma radiation.

Describe the differences between beta radiation and gamma radiation.

(3)

.....

.....

.....

.....

.....

.....

*(b) Fission and fusion are two different types of nuclear reaction.

Describe the similarities and differences between nuclear fission reactions and nuclear fusion reactions.

(6)

(Total for Question 5 = 12 marks)

Radioactivity – natural and useful

6 (a) (i) One source of background radiation is radon gas.

State another source of background radiation.

(1)

.....

(ii) Which of these two statements about background radiation are correct?

1 Radon gas from nuclear power stations is the main cause of background radiation.

2 Background radiation can be detected during radioactive experiments.

(1)

☒ **A** statement 1 only

☒ **B** statement 2 only

☒ **C** both statement 1 and statement 2

☒ **D** neither statement 1 nor statement 2

(iii) Background radiation from radon gas is different from place to place in the UK.

Explain these differences in background radiation.

(2)

.....

.....

.....

.....

(b) Scientists have changed their ideas about the hazards from radioactive sources.

Describe how their ideas have changed since radioactivity was first discovered.

(2)

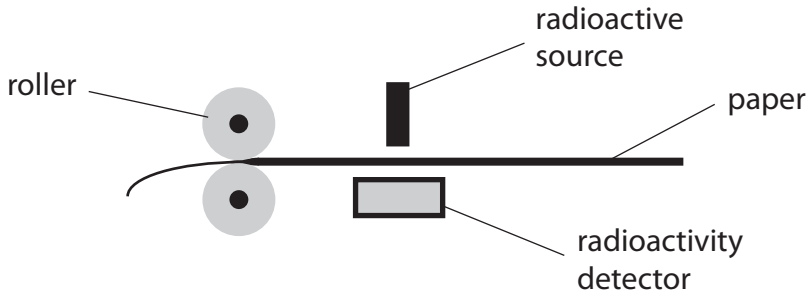
.....

.....

.....

.....

*(c) The diagram shows how rollers can change the thickness of paper in a factory.
A thickness gauge controls the rollers.
The thickness gauge contains a radioactive source and a detector.
If the paper is too thick, the reading on the detector goes down.
This causes the rollers to be pushed closer together.



The radioactive source used must be chosen carefully to be effective and used in a way that is not a hazard to workers.

Discuss the factors to consider when choosing and using this radioactive source.

(6)

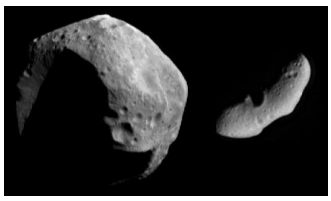
(Total for Question 6 = 12 marks)

TOTAL FOR PAPER = 60 MARKS

Answer **all** the questions.

1 The Solar System consists of many different objects.

The Earth, Moon, Sun and asteroids are some of these objects.



(a) Put the following objects in order of size. Start with the smallest first.

The first one has been done for you.

Earth **Moon** **asteroid** **Sun**

smallest

asteroid

largest

[2]

(b) Here are some statements about the Earth.

Put ticks (✓) in the boxes next to the **two** correct statements.

The Earth is much older than the Sun. ☐

The Earth is younger than the Universe. ☐

The Earth orbits the Moon every 28 days. ☐

The Earth orbits the Sun once a year. ☐

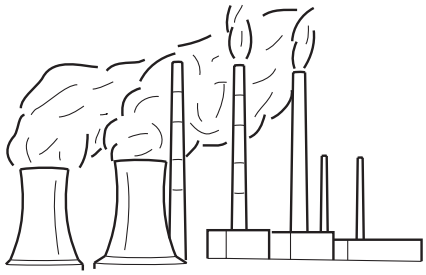
The Earth is the largest planet in the Solar System. ☐

[2]

[Total: 4]

2 This question is about generating electricity.

You need a primary energy source to generate electricity.



(a) Draw a straight line from each **primary energy source** to its **main waste product**.

primary energy source	main waste product
nuclear fuel	produces little or no waste
fossil fuel	produces radioactive waste
solar	produces carbon dioxide

[2]

(b) Finish the sentences. Choose words from this list.

Each word may be used once, more than once or not at all.

dangerous **long** **low** **oil**

wind **primary** **secondary** **top**

Fossil fuels are the most common primary energy source in this country for generating electricity.

This means that electricity is a …… energy source.

Electricity is convenient because it can be transmitted over ……

distances and used in many ways.

Energy from sources such as solar and …… are classed as renewable.

Radioactive waste can be classed as either high level, intermediate level or

…… level. [4]

[Total: 6]

[Turn over

BLANK PAGE

PLEASE DO NOT WRITE ON THIS PAGE

3 Here is the electromagnetic spectrum.

radio waves	microwaves	infrared	visible light	ultraviolet	X-rays	gamma rays

low energy photons → high energy photons

(a) What is a photon?

Put a (ring) around the best answer.

a parcel of colour **a stream of energy** **a packet of energy** [1]

(b) Some types of radiation are classed as 'ionising'.

On the diagram below, put a tick (✓) in **each** box that contains an ionising type of radiation.

radio waves	microwaves	infrared	visible light	ultraviolet	X-rays	gamma rays

[2]

(c) Ionising radiation can damage living cells.

What effect does **non-ionising** radiation have on living cells?

Put a tick (✓) in the box next to the correct answer.

It can warm them up. ☐

It can cool them down. ☐

It can make them radioactive. ☐

[1]

[Total: 4]

4

No phones for kids?

A mobile phone designed for young children has been withdrawn from sale by the company that makes it.

A study found that people who regularly use a mobile phone for over 10 years are four times more likely to develop cancer of the ear. The study involved 750 people.

A spokesman for the mobile phone company said: 'The decision to withdraw the product is taken because of this new evidence. It suggests that long term exposure to microwave radiation from mobile phones can damage health, especially in very young children.'

'Any risk to our children is unacceptable.'

(a) What type of radiation do mobile phones use to make a call?

Put a (ring) around the best answer.

radio waves **sound waves** **microwaves** [1]

(b) The article describes a correlation between using mobile phones and ear cancer.

Which of the following describes this **correlation**?

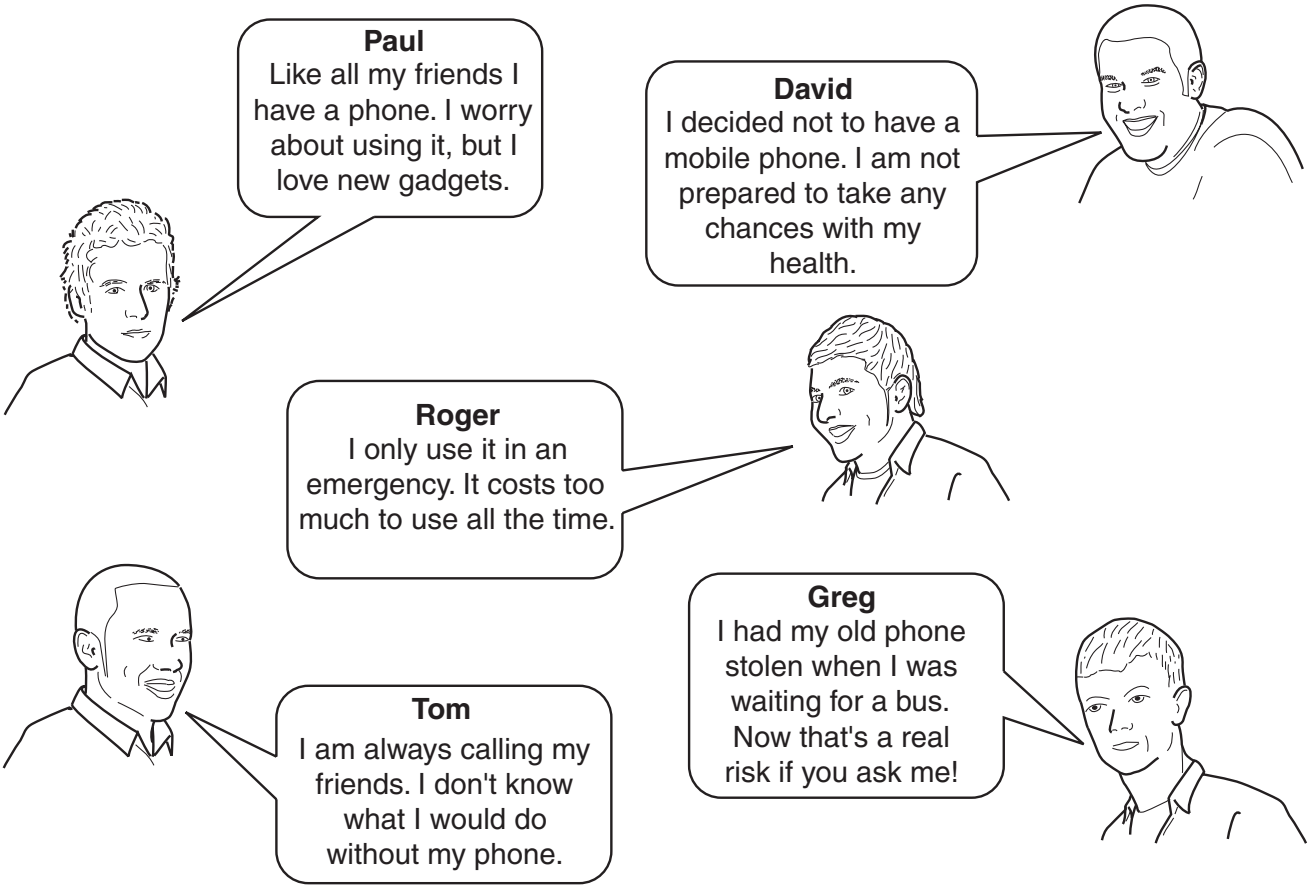
Put a tick (✓) in the box next to the **best** answer.

Using a mobile phone causes ear cancer. ☐

Greater use of a mobile phone increases the risk of ear cancer. ☐

Using a mobile phone does not increase the risk of ear cancer. ☐ [1]

(c) A group of students are discussing their views on mobile phones.



(i) The article suggests there is a risk to using a mobile phone.

Which **two** students seem unaware of any risks?

answer …… and …… [2]

(ii) Which **two** students have done things that lead to a lower risk?

answer …… and …… [2]

(iii) How could you **explain** the decision that Paul has made?

Put a tick (✓) in the box next to the **best** answer.

He is aware of a risk, but it doesn't bother him.	☐
He believes the benefit outweighs the risk.	☐
He is aware of a risk and decides not to go ahead.	☐
He believes that there is more risk than benefit.	☐

[1]

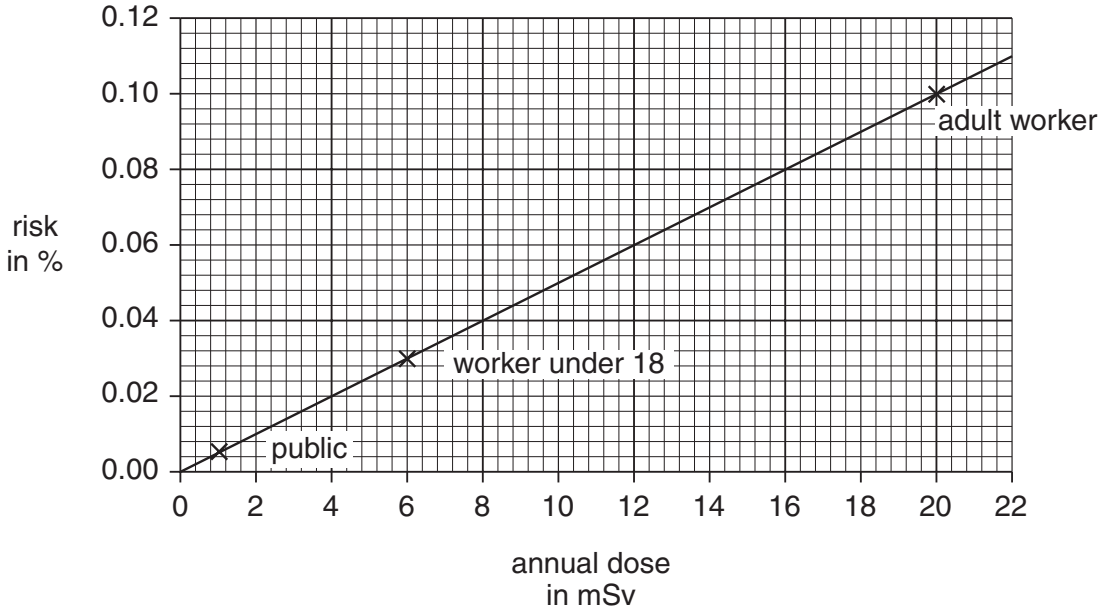
[Total: 7]

[Turn over

5 Workers in a nuclear power station have their radiation dose carefully monitored.

This chart shows how risk is related to radiation dose.

The **annual dose limits** for different categories of people are marked with a cross.



(a) Use the chart to answer the following questions.

(i) What is the annual dose limit for an adult worker?

Put a (ring) around the correct answer.

1 mSv **0.10%** **6 mSv** **0.06%** **20 mSv** **zero** [1]

(ii) What dose produces a risk of 0.07%?

Put a (ring) around the correct answer.

10 mSv **12 mSv** **14 mSv** **16 mSv** [1]

(b) The annual dose limit for a worker in a nuclear power station is much higher than for a member of the public.

(i) Why might it be acceptable for workers in the power station to receive a higher dose than the public?

Put a tick (✓) in the box next to the **best** answer.

Members of the public are not exposed to as much radiation.	☐
Nuclear power provides us with energy. This is worth the small risk to the workers.	☐
Workers in a nuclear power station are used to the effects of an increased dose.	☐

[1]

(ii) Why might the workers put themselves at additional risk?

Put a tick (✓) in the box next to the **best** answer.

They get well paid to work in the power station.	☐
They are provided with protective clothing.	☐
They are trained to deal with emergencies.	☐

[1]

(c) What precautions could be taken to sensibly reduce the **risk to workers** in a nuclear power station?

Put a tick (✓) in the box next to **each** correct answer.

not allowing them to bring any visitors to work	☐
wearing a badge to monitor radiation dose	☐
using shielding to reduce the level of radiation	☐

[1]

[Total: 5]

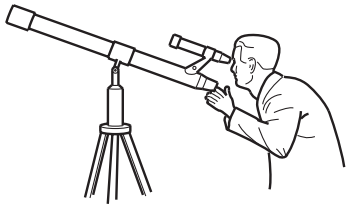
6

Heather takes part in an astronomy club at her school in London.

Heather has a friend called Stella.

Stella takes part in an astronomy club at her school in the Welsh countryside.

Both girls use the same type of telescope to observe the night sky.



(a) Heather does not see as much detail through the telescope as Stella.

Choose the best explanation for this from the list below.

Put a tick (✓) in the box next to the **best** answer.

Stella knows more about astronomy than Heather. ☐

Light pollution is interfering with Heather's observations. ☐

It rains more in the Welsh countryside. ☐

Stella's telescope is on top of a hill. ☐

[1]

(b) Heather's teacher tells her that looking at distant stars is like looking back in time.

What did Heather's teacher mean by this statement?

Put a tick (✓) in the box next to the **best** answer.

Stars have been around for a long time. ☐

Stars do not ever change their appearance. ☐

It takes time for light to reach us from the stars. ☐

New stars are being formed all the time. ☐

[1]

(c) Heather's teacher then tells her that the star she is looking at is about 4 light-years away.

(i) What is a light-year?

Put a tick (✓) in the box next to the correct answer.

the distance that light travels in one year	☐
the time it takes for the Earth to orbit the Sun	☐
the time it takes for light from a star to reach the Earth	☐

[1]

(ii) Heather then moves the telescope to look at a star that is further away.

Complete the sentence below. Choose from this list.

less

more

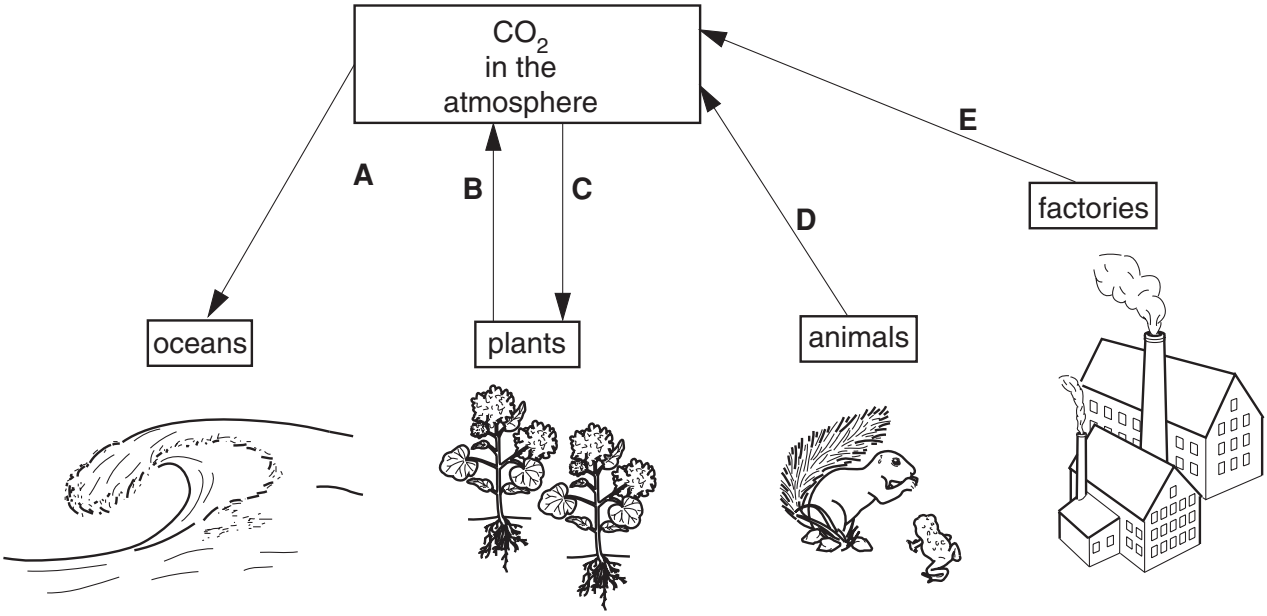
the same

Light from the more distant star takes ..... time to reach Heather.

[1]

[Total: 4]

7 This diagram shows part of the Carbon Cycle.



(a) Which process is shown by arrow **C**?

Put a (ring) around the correct answer.

decomposition **photosynthesis** **radiation** [1]

(b) Which **two** arrows, **A**, **B**, **C**, **D** or **E**, show respiration?

answer …… and …… [1]

(c) Which arrow, **A**, **B**, **C**, **D** or **E**, shows combustion?

answer ..... [1]

(d) There is concern over changes to the amount of carbon dioxide in the atmosphere.

(i) Before 1800 the amount of carbon dioxide was steady for thousands of years.

Which of the following statements explains why it was steady?

Put a tick (✓) in the box next to the correct answer.

The carbon dioxide going into the atmosphere was taken out again by plants and the oceans.	☐
There was no carbon dioxide produced before people built factories.	☐
The atmosphere was already full of carbon dioxide, so no more could fit in.	☐
Carbon dioxide was absorbed by forest fires.	☐

[1]

(ii) In the last 200 years the amount of carbon dioxide in the atmosphere has risen.

Which of the following statements best explain the **rise** of carbon dioxide?

Put a tick (✓) in the box next to **each** correct answer.

There are more factories now than in the past, as more countries have become developed.	☐
Scientists have developed a way of storing carbon dioxide underground.	☐
Environmental groups have been working to get more trees planted around the world.	☐
Forests have been burnt down to clear land for farming and new buildings.	☐
Scientists do not agree that the amount of carbon dioxide has risen over the last 200 years.	☐

[2]

[Total: 6]

8

Around 100 years ago many scientists believed that mountains on the Earth were caused by the surface of the Earth shrinking as it cooled down.

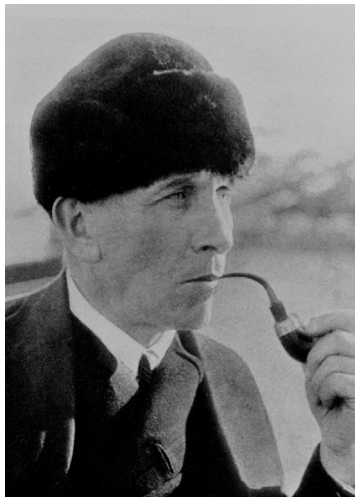
Alfred Wegener came up with a different idea to explain how mountains formed.

In 1912 Wegener presented his big idea to a meeting of geologists in Germany.

Wegener's big idea became known as continental drift.

He published a book that described his ideas in 1922.

After 'peer review' of his work his ideas were rejected by most geologists at the time.



(a) What is 'peer review'?

Make the best description you can by drawing **one** straight line from a box on the left to a box on the right.

The public look at your work …	… and they give their opinion.
Scientists look at your work …	… to see if it is interesting.
Your friends look at your work …	… and repeat the experiments.

[1]

(b) Read the following statements about continental drift.
Some statements are data, others are explanations.

Choose which statements are **data** about continental drift and mark them with a **D**.

The continents could have once been joined together. ☐

The outlines of the continents appear to fit like a jigsaw. ☐

Fossils found in Africa match those found in South America. ☐

A land bridge may once have joined Africa to South America. ☐

[2]

(c) What reasons did the geologists of Wegener's time have to reject his ideas?

Put ticks (✓) in the boxes next to the **two** best answers.

He was an outsider to their group.	☐
The evidence he provided was clearly wrong.	☐
They did not know how the continents could be moved.	☐
They agreed that similar fossils were found in Africa and South America.	☐

[2]

(d) How does the theory of continental drift account for mountain building?

Put a tick (✓) in the box next to the **best** answer.

Land is pushed upwards when continents collide.	☐
Weathering wears away softer rock to leave a hard lump behind.	☐
The surface of the Earth becomes wrinkled as it cools down.	☐

[1]

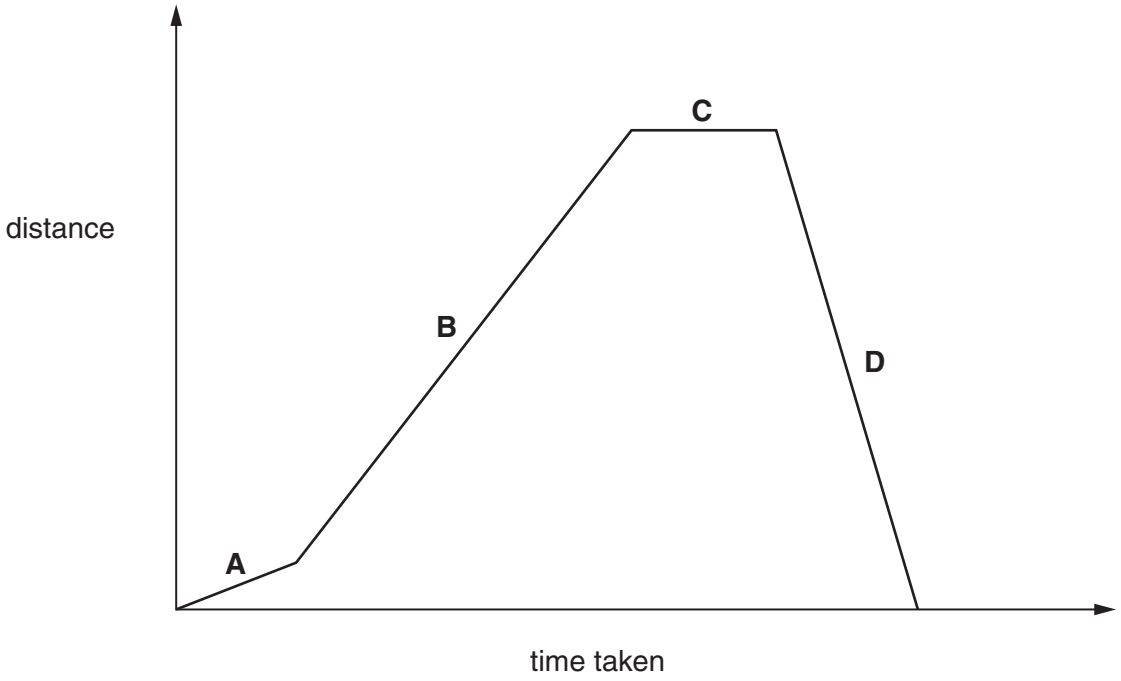
[Total: 6]

END OF QUESTION PAPER

Answer **all** the questions.

1 Dan goes to buy a newspaper for his granddad in the morning. He walks in a straight line to the shop and back.

(a) The graph shows the distance Dan is from home and the time it takes.



Complete the table below.

Each letter may be used once, more than once or not at all.

what Dan is doing	**part of the graph** (**A**, **B**, **C** or **D**)
standing still	
walking at his fastest speed	
at the shop buying the newspaper	
walking with a negative velocity	

[4]

(b) Dan is walking, so he has momentum.

The equation linking momentum, mass and velocity is:

momentum = mass × velocity

Dan has a mass of 60 kg.

At one time his velocity is 2 m/s.

Which of the following is his momentum?

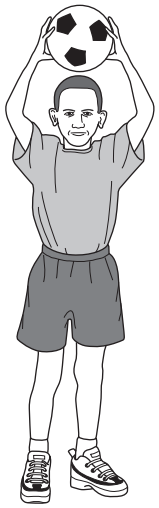
Put a (ring) around the correct answer.

30 **58** **62** **120**

[1]

[Total: 5]

2 Bobby is playing with a ball.



Complete the following sentences.

Choose words from this list.

distance

kinetic

mass

potential

weight

Bobby lifts the ball up from the ground above his head.

To calculate the work done you must multiply the force by the …… .

When Bobby holds the ball above his head it has more gravitational …… energy.

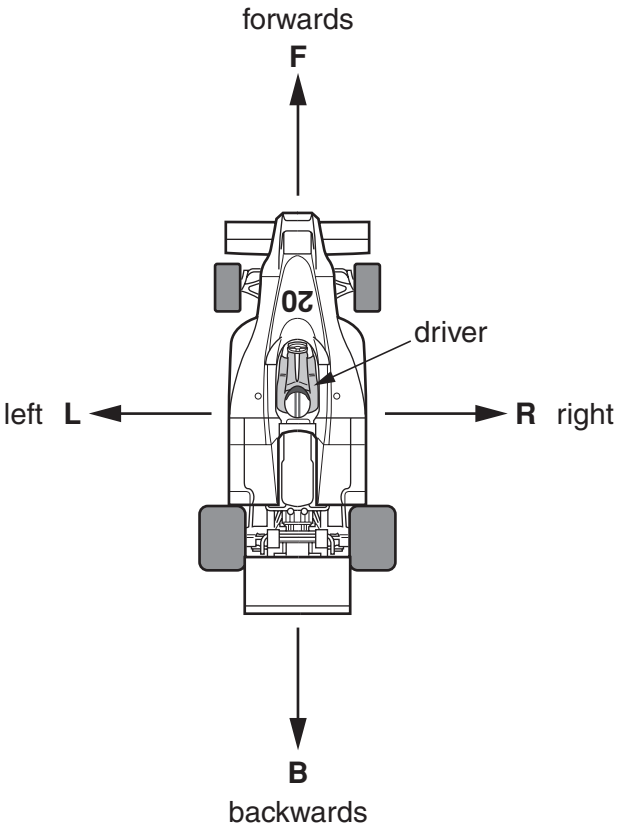
Bobby lets the ball fall to the ground.

The ball speeds up and gains …… energy.

The ball is pulled down by its …… . [4]

[Total: 4]

3 A driver in a car experiences forces in different directions as he drives forwards.



(a) (i) The car speeds up in a straight line.

Which force, **F**, **R**, **L** or **B**, does the car exert **on the driver**?

answer ..... [1]

(ii) The car slows down **and** turns left.

Which two forces, **F**, **R**, **L** or **B**, does the car exert **on the driver**?

..... and ..... [2]

(b) The car speeds up in a straight line.

Which force, **F**, **R**, **L** or **B**, does the driver exert **on the car**?

answer ..... [1]

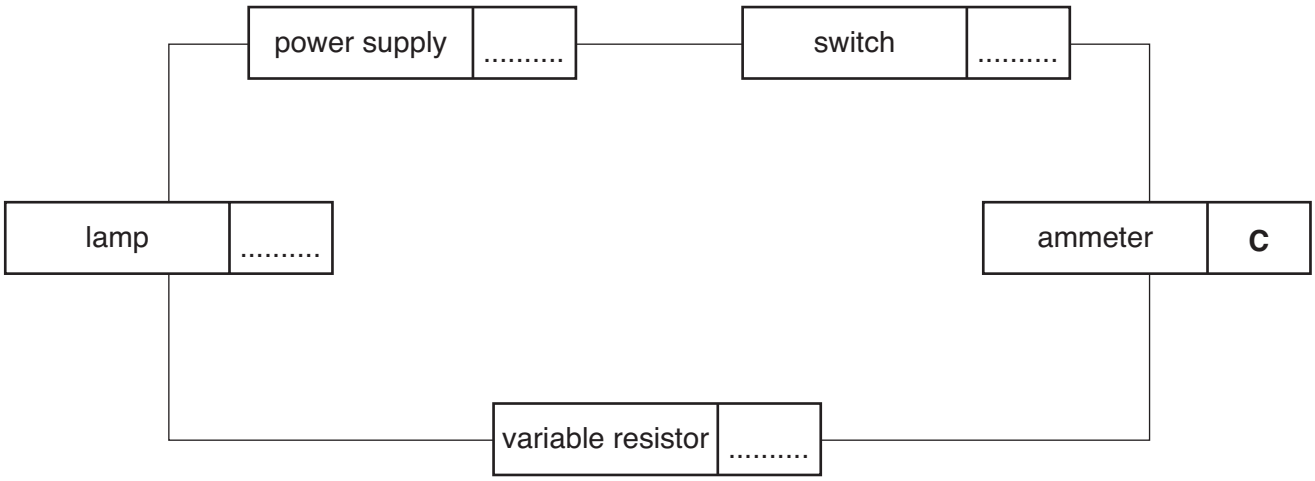
[Total: 4]

4 Here are some circuit symbols for electrical components.

This circuit uses some of the components.

Write the **letter** for each component symbol in the correct box in the circuit.

One has been done for you.



[4]

[Total: 4]

5 The most commonly used model of electric circuits uses ideas about current and electrons.

Complete the sentences. Choose statements from this list.

a flow of charge

a repulsive force

a continuous loop

an attractive force

a negative charge

(a) An electron has …… .

(b) In a circuit the electrons move in …… .

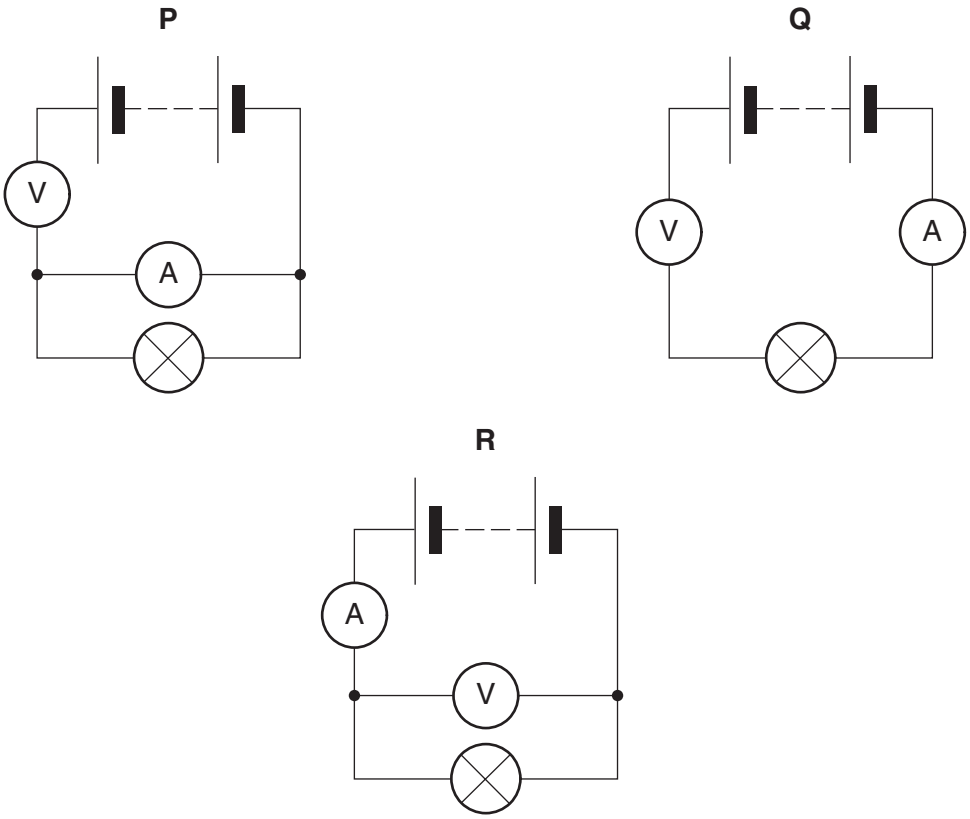
(c) Electric current is …… .

(d) Two negative charges are pushed apart by …… .

[4]

[Total: 4]

6 This question is about making measurements in an electric circuit.



(a) Which circuit, **P**, **Q** or **R**, is correct for measuring the current through the lamp and the voltage across the lamp?

answer ..... [1]

(b) Put a (ring) around the word which means the same as potential difference.

charge **current** **power** **voltage**

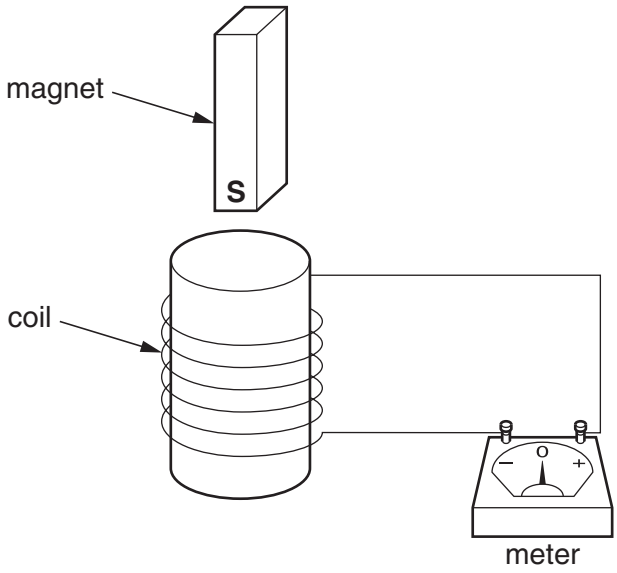
[1]

[Total: 2]

[Turn over

7 Electricity can be generated by moving a magnet in a coil of wire.

The diagram shows a magnet held above a coil of wire.



Experiments with this apparatus can show how the electricity is generated.

(a) Draw a straight line from each **experiment** to **what happens on the meter**.

The first line has been done for you.

experiment	**what happens on the meter**
push the South end of the magnet into the coil	needle flicks to right
pull the South end of the magnet out of the coil	needle does not move
push the North end of the magnet into the coil	needle flicks to left
hold the magnet still in the coil	

[3]

(b) What is the name for this method of producing a voltage?

Put a (ring) around the correct answer.

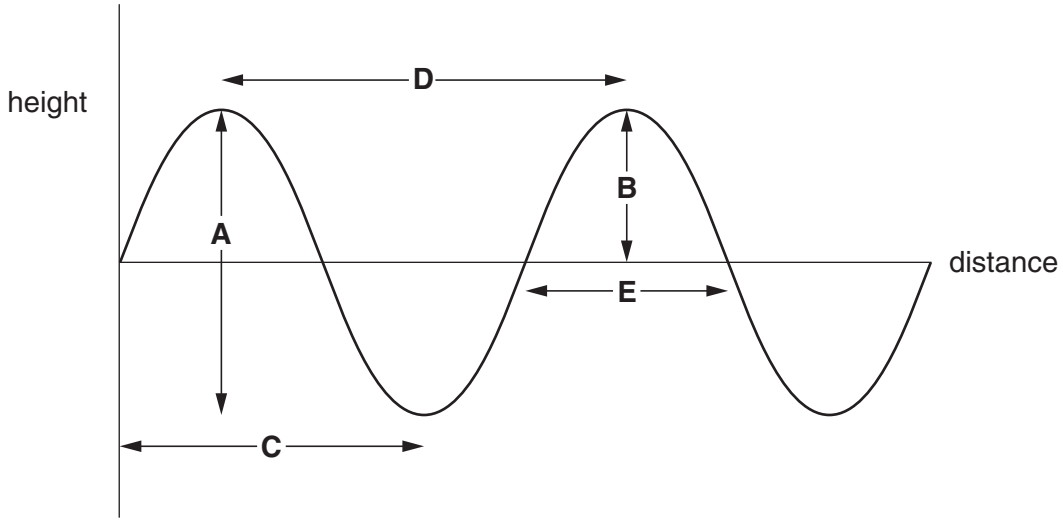
deduction **induction** **reduction** **transformation**

[1]

[Total: 4]

8 Water waves and sound waves are different.

(a) This is a diagram of a water wave.



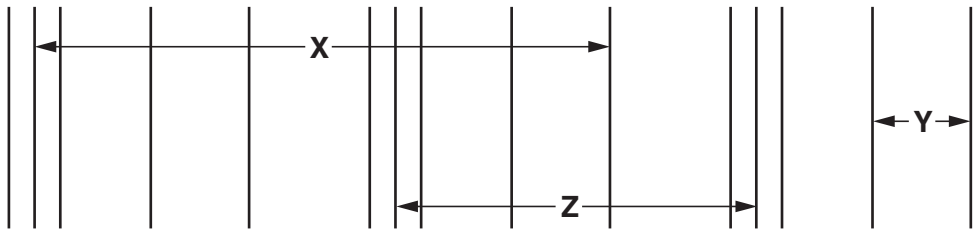
(i) Which letter, **A**, **B**, **C**, **D** or **E**, shows the amplitude of the wave?

answer .....

(ii) Which letter, **A**, **B**, **C**, **D** or **E**, shows the wavelength of the wave?

answer .....
[2]

(b) Sound waves are shown differently.



Which letter, **X**, **Y** or **Z**, shows a wavelength?

answer ..... [1]

(c) Draw a straight line from each **name** to its **wave type** and

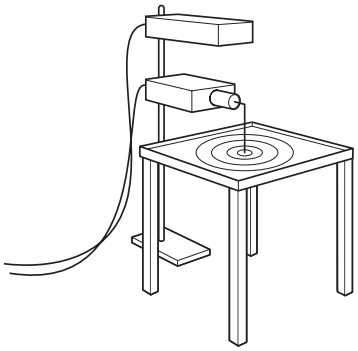
draw another straight line from each **name** to its **description**.

wave type	name	description
		particles move at right angles to wave direction
transverse	sound wave	
		particles move in same direction as wave
longitudinal	water wave	
		particles do not move at all

[2]

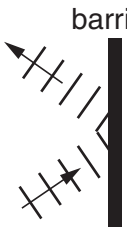
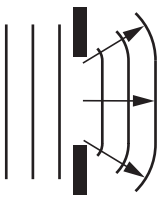
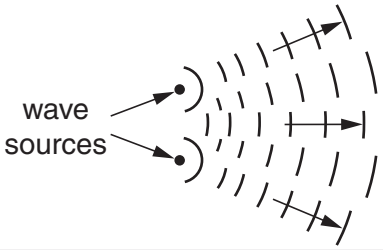
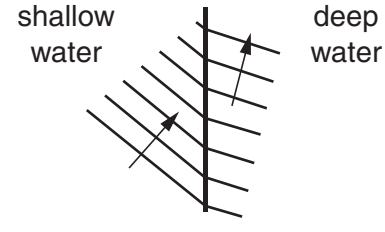
[Total: 5]

9 Susan is experimenting with water waves in a ripple tank.



She draws some diagrams to show different wave properties.

Draw a straight line from each **diagram** to the **wave property** it shows.

diagram	**wave property**
	refraction
	interference
	reflection
	diffraction

[3]

[Total: 3]

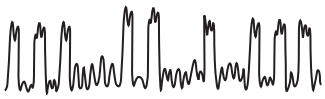
10 Information can be sent using analogue or digital signals. Here are four different signals.

A

B

C

D



(a) Which diagram, **A**, **B**, **C** or **D**, shows an analogue signal?

answer ..... [1]

(b) Which diagram, **A**, **B**, **C** or **D**, shows a digital signal with no noise?

answer ..... [1]

(c) Signal **D** is the **output** from an amplifier. Which diagram, **A**, **B** or **C**, shows the input signal to the amplifier?

answer ..... [1]

[Total: 3]

11 Here are different parts of the electromagnetic spectrum.

gamma radiation

infrared

microwaves

radio waves

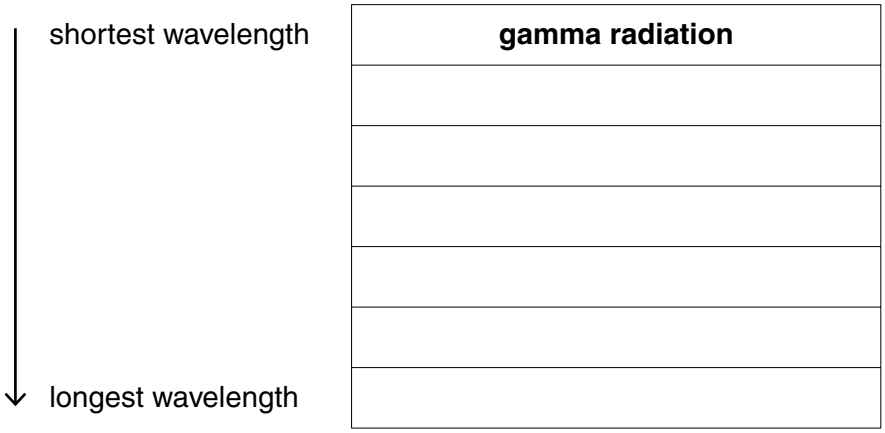
ultraviolet

visible light

X-rays

(a) Put the parts of the electromagnetic spectrum in order of **increasing wavelength**.

The first one has been done for you.



[3]

(b) Photons with the highest frequency have the most energy.

Write down the name of the part of the spectrum that has photons with the most energy.

answer ..... [1]

[Total: 4]

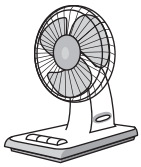
END OF QUESTION PAPER

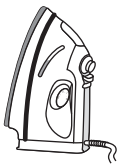
Do not write outside the box

Answer **all** questions in the spaces provided.

1 The appliances shown below transfer electrical energy to other types of energy.

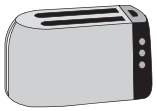

Vacuum cleaner


Fan


Iron


Drill


Washing machine


Toaster


Television

1 (a) The vacuum cleaner is designed to transfer electrical energy to kinetic energy.

Three more of the appliances are also designed to transfer electrical energy to kinetic energy. Which **three**?

Draw a ring around each correct appliance.

(3 marks)

1 (b) Which **two** of the following statements are true?

Tick (✓) **two** boxes.

Appliances only transfer part of the energy usefully. ☐

The energy transferred by appliances will be destroyed. ☐

The energy transferred by appliances makes the surroundings warmer. ☐

The energy output from an appliance is bigger than the energy input. ☐

(2 marks)

5

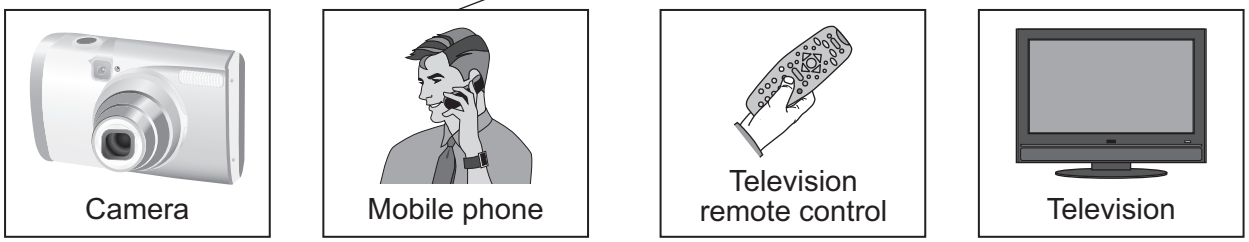
Turn over for the next question

2 (a) The diagram shows the electromagnetic spectrum.

The pictures show four devices. Each device uses a different type of electromagnetic wave.

Draw **one** line from each device to the type of electromagnetic wave the device uses. One line has been drawn for you.

Gamma rays	X-rays	Ultraviolet waves	Visible light waves	Infrared waves	Microwaves	Radio waves



(3 marks)

2 (b) Visible light waves travel through space at a speed of 300 000 km/s.

How fast do infrared waves travel through space?

.....

(1 mark)

2 (c) Draw a ring around the correct answer in the box to complete the sentence.

Infrared waves have [a longer wavelength than / the same wavelength as / a shorter wavelength than] visible light waves.

(1 mark)

2 (d) The two diagrams, **A** and **B**, show a light ray travelling into a glass block.

Diagram A

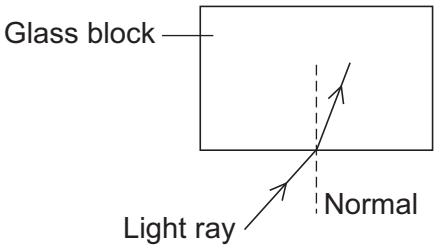
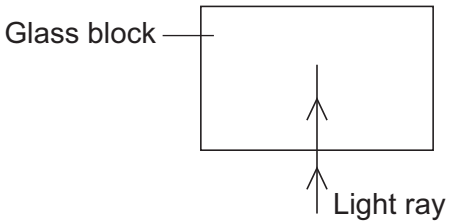


Diagram B



2 (d) (i) Look at **Diagram A**.

What name is given to the process that happens as the light enters the glass block?

.....

(1 mark)

2 (d) (ii) Look at **Diagram B**.

The light enters the glass block without changing direction.

Why?

.....

.....

(1 mark)

7

Turn over for the next question

3 A school is near a busy road. A car travels past the school at high speed.

The students notice that the sound of the car engine seems to change as the car travels past the school. A teacher says that this is an example of the Doppler effect. The students decide to study the sound they hear from passing cars.

3 (a) (i) Give **one** risk the students should consider when doing their study.

.....

(1 mark)

3 (a) (ii) As a car travels towards the students, the frequency of the sound the students hear is different to the frequency of the sound they would hear if the car was stationary.

Draw a ring around the correct answer in the box to complete the sentence.

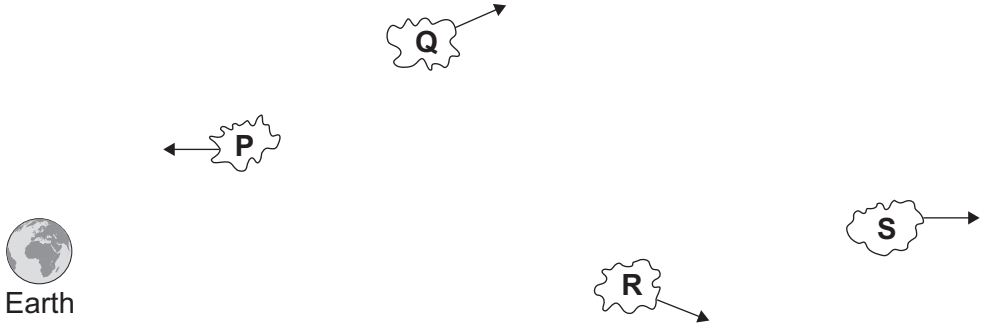
Compared to the sound from the stationary car, the frequency has

decreased.
increased.
become quieter.

(1 mark)

3 (b) In the same way as the sound from the car engine changes, the light from most galaxies also seems to have a change in observed frequency. This is called red-shift.

3 (b) (i) The diagram shows four galaxies, **P**, **Q**, **R** and **S**. The arrows show the direction the galaxies are moving relative to the Earth.



Which **one** of the galaxies is moving the fastest?

Write the correct answer in the box. ☐

Which **one** of the galaxies will produce the biggest red-shift?

Write the correct answer in the box. ☐

(2 marks)

Question 3 continues on the next page

3 (b) (ii) Most scientists support a theory that the Universe began from a very small initial point. Red-shift can be used as evidence for this theory.

What name is given to the theory that the Universe began from a very small initial point?

.....

(1 mark)

3 (b) (iii) Cosmic microwave background radiation (CMBR) provides more evidence for this theory. CMBR is detected coming from space.

Where does CMBR come from?

Tick (✓) **one** box.

CMBR only comes from near the Sun. ☐

CMBR comes from all parts of the Universe. ☐

CMBR only comes from the Moon. ☐

(1 mark)

3 (b) (iv) Which statement gives the reason why most scientists support the theory that the Universe began from a very small initial point?

Tick (✓) **one** box.

The evidence proves it happened. ☐

There is no other way of explaining how the Universe began. ☐

At the moment it is the best way of explaining our scientific knowledge. ☐

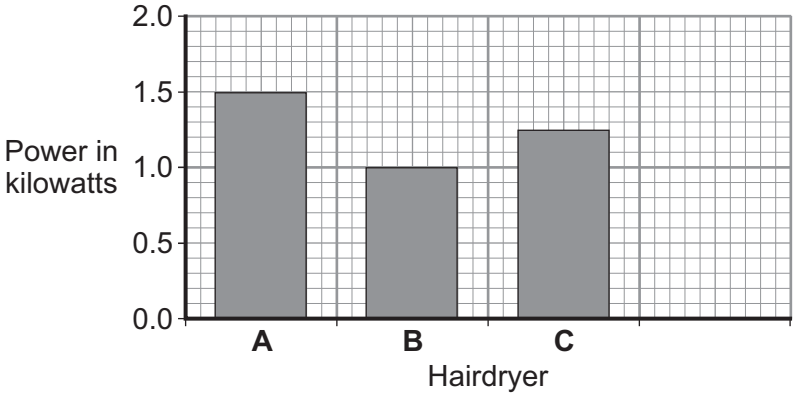
(1 mark)

7

Turn over for the next question

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

4 (a) The bar chart shows the power of three different electric hairdryers.



4 (a) (i) Which **one** of the hairdryers, **A**, **B** or **C**, would transfer the most energy in 5 minutes?

Write the correct answer in the box. ☐

(1 mark)

4 (a) (ii) A small 'travel' hairdryer has a power of 500 watts.

Draw a fourth bar on the bar chart to show the power of the 'travel' hairdryer.

(1 mark)

4 (b) A family shares the same hairdryer.
The hairdryer has a power of 1.2 kW. The hairdryer is used for a total of 2 hours each week.

4 (b) (i) Calculate how many kilowatt-hours (kWh) of energy the hairdryer transfers in 2 hours.

Use the correct equation from the Physics Equations Sheet.

Show clearly how you work out your answer.

.....

.....

Energy transferred = ... kWh

(2 marks)

4 (b) (ii) Electricity costs 15 pence per kWh.

Calculate the cost of using the hairdryer for 2 hours.

Show clearly how you work out your answer.

.....

.....

Cost = ... pence

(2 marks)

6

Turn over for the next question

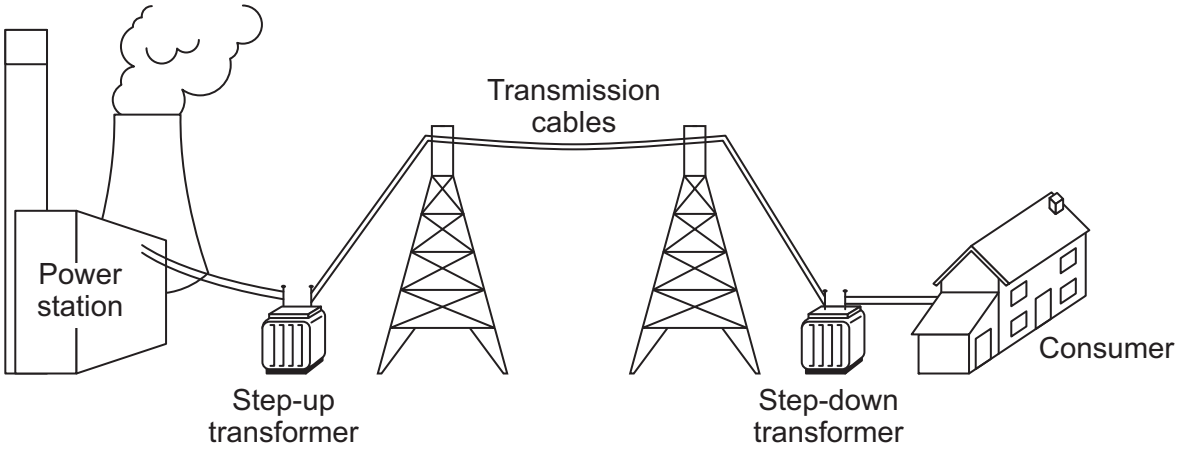
5 In the UK, most electricity is generated in power stations that burn fossil fuels.

5 (a) Which type of fossil fuel power station has the shortest start-up time?

.....

(1 mark)

5 (b) The diagram shows how electricity is distributed around the UK.



5 (b) (i) Which of the parts labelled in the diagram form the National Grid?

.....

(1 mark)

5 (b) (ii) A step-up transformer is used near the power station.

Draw a ring around the correct answer in each box to complete each sentence.

A step-up transformer increases the

current.
power.
voltage.

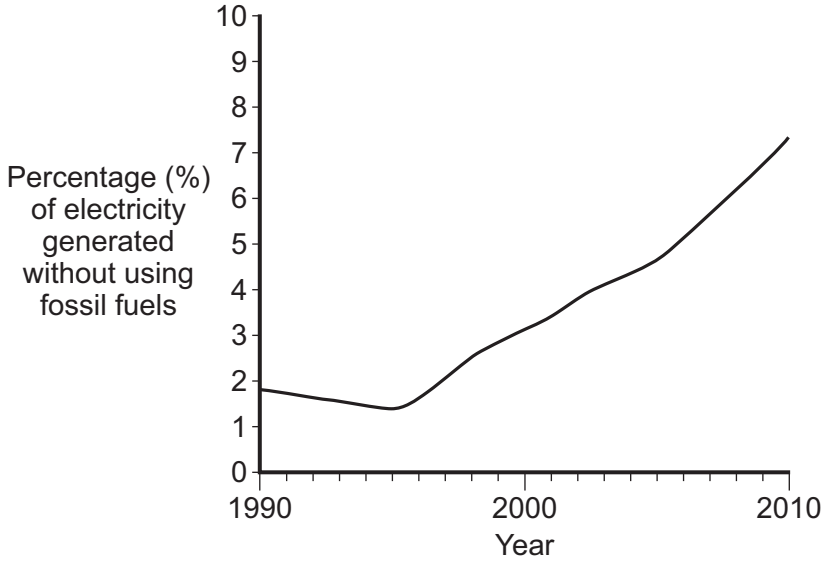
Using a step-up transformer makes the distribution of electricity

less dangerous.
more efficient.
work faster.

(2 marks)

5 (c) Electricity in the UK is also generated without using fossil fuels.

The graph shows how the percentage of electricity generated in the UK without using fossil fuels changed between 1990 and 2010.



What does the data in the graph suggest will probably happen to the percentage of electricity generated in the UK without using fossil fuels over the next 10 years?

.....

.....

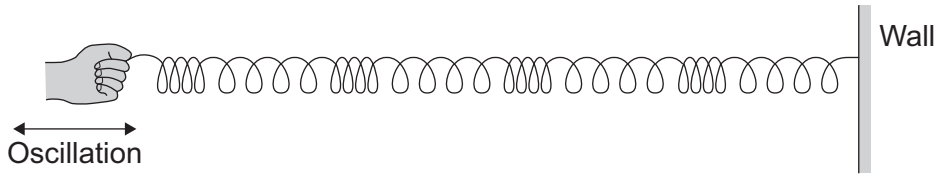
(1 mark)

5

Turn over for the next question

6 **Diagram 1** shows a longitudinal wave being produced in a stretched spring.

Diagram 1



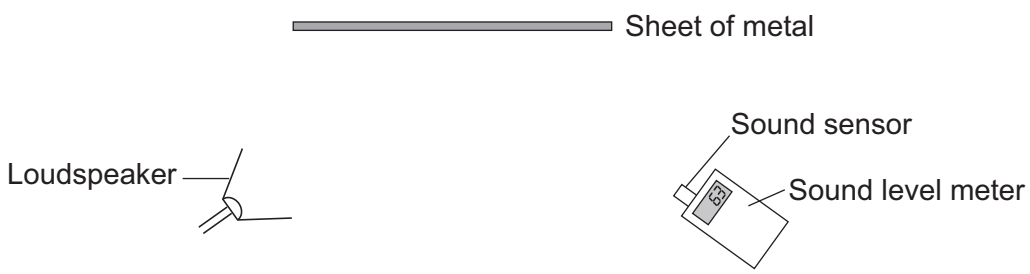
6 (a) A longitudinal wave has areas of compression and areas of rarefaction.

Mark with the letter **C**, **one** area of compression shown in **Diagram 1**.

(1 mark)

6 (b) **Diagram 2** shows the apparatus a teacher uses to demonstrate that sound can be reflected.

Diagram 2



6 (b) (i) Using a ruler, draw on **Diagram 2** to show how sound from the loudspeaker is reflected by the sheet of metal to the sound sensor.

(2 marks)

6 (b) (ii) The teacher replaced the sheet of metal with a sheet of glass.

When he did this, the reading on the sound level meter went down.

Suggest why.

.....

.....

(1 mark)

6 (b) (iii) The teacher changed the output from the loudspeaker to increase the amplitude of the sound wave produced.

What effect, if any, does this increase of amplitude have on the loudness of the sound?

Draw a ring around the correct answer.

makes the sound quieter	**does not change the loudness of the sound**	**makes the sound louder**

(1 mark)

6 (b) (iv) The loudspeaker produces a sound wave at a frequency of 850 Hz. The wavelength of the sound wave is 0.4 m.

Calculate the speed of the sound wave.

Use the correct equation from the Physics Equations Sheet.

Show clearly how you work out your answer.

.....

.....

.....

Speed = ... m/s

(2 marks)

6 (c) Music concerts are sometimes performed in sports halls. The concerts can be spoilt because of the sound reflected from the floor and walls.

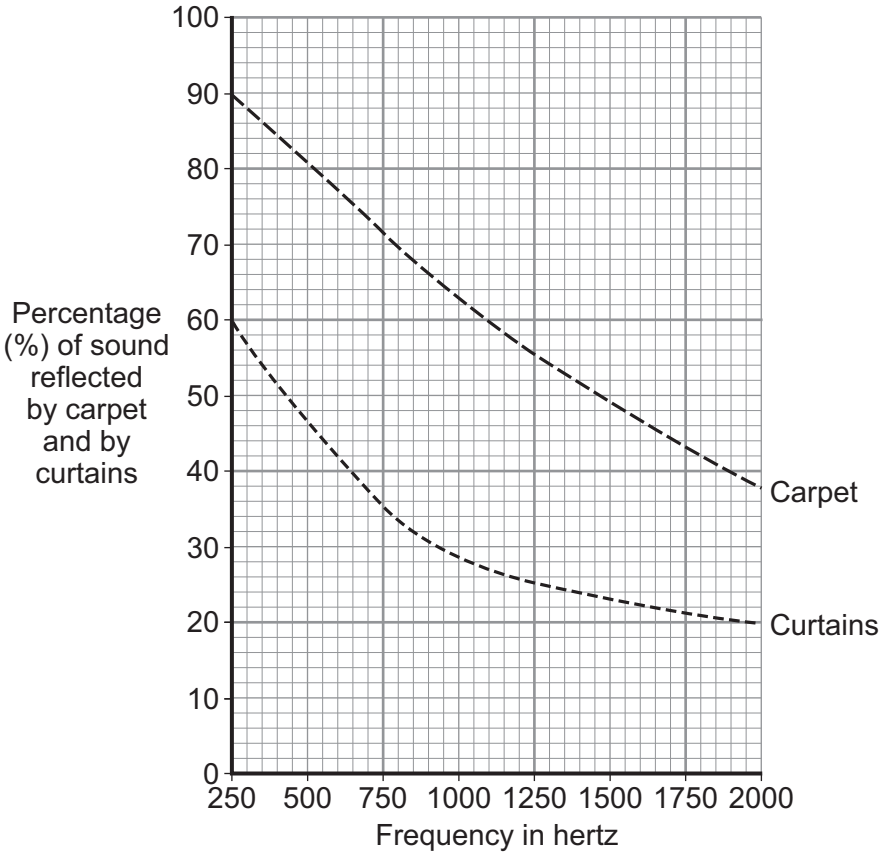
What word is used to describe a reflected sound?

.....

(1 mark)

Question 6 continues on the next page

6 (d) The graph shows how the percentage of sound reflected from the floor and from the walls of a large room can be reduced by carpets and by curtains.



6 (d) (i) Over which range of frequencies do curtains reduce the percentage of sound reflected the most?

Tick (✓) **one** box.

from 250 Hz to 750 Hz ☐

from 750 Hz to 1250 Hz ☐

from 1250 Hz to 1750 Hz ☐

(1 mark)

6 (d) (ii) The manager of a sports hall plans to use the hall for regular music concerts. He has enough money to buy either carpet or curtains, but not both.

To improve the sound an audience hears, it would be better to hang curtains on the walls rather than laying a carpet over the floor.

Use the data in the graph to explain why.

.....

.....

.....

.....

(2 marks)

11

Turn over for the next question

7 A wood burning stove is used to heat a room.

The fire in the stove uses wood as a fuel. The fire heats the matt black metal case of the stove.

7 (a) The air next to the stove is warmed by infrared radiation.

How does the design of the stove help to improve the rate of energy transfer by infrared radiation?

.....

.....

.....

.....

(2 marks)

7 (b) Burning 1 kg of wood transfers 15 MJ of energy to the stove. The stove then transfers 13.5 MJ of energy to the room.

Calculate the efficiency of the stove.

Use the correct equation from the Physics Equations Sheet.

Show clearly how you work out your answer.

.....

.....

.....

Efficiency = ...

(2 marks)

7 (c) Some of the energy from the burning wood is wasted as the hot gases leave the chimney and warm the air outside the house.

Name **one** other way energy is wasted by the stove.

.....

(1 mark)

7 (d) Some people heat their homes using electric heaters. Other people heat their homes using a wood burning stove.

Give **two** environmental advantages of using a wood burning stove to heat a home rather than heaters that use electricity generated from fossil fuels.

1 .....

.....

2 .....

.....

(2 marks)

Question 7 continues on the next page

7 (e) The metal case of the stove gets hot when the fire is lit.

Here is some information about the stove.

Mass of metal case	100 kg
Starting temperature of metal case	20 °C
Final temperature of metal case	70 °C
Specific heat capacity of metal case	510 J/kg °C

Calculate the energy required to raise the temperature of the metal case to 70 °C.

Use the correct equation from the Physics Equations Sheet.

Show clearly how you work out your answer and give the unit.

.....

.....

.....

.....

Energy required = ...

(3 marks)

10

Turn over for the next question

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

8 (a) Geothermal energy and the energy of falling water are two resources used to generate electricity.

8 (a) (i) What is geothermal energy?

.....

.....

(1 mark)

8 (a) (ii) Hydroelectric systems generate electricity using the energy of falling water.

A pumped storage hydroelectric system can also be used as a way of storing energy for future use.

Explain how.

.....

.....

.....

.....

.....

.....

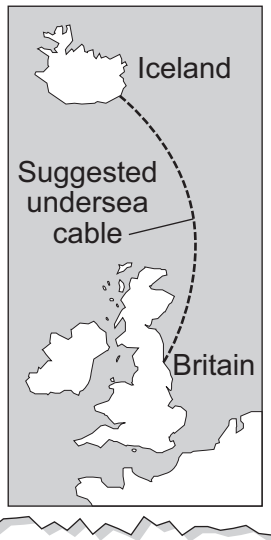
(2 marks)

8 (b) *In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate*.

Read the following extract from a newspaper.

Britain may be switched on by Iceland

Iceland is the only country in the world generating all of its electricity from a combination of geothermal and hydroelectric power stations. However, Iceland is using only a small fraction of its energy resources. It is estimated that using only these resources, the amount of electricity generated could be increased by up to four times.



To help supply the future demand for electricity in Britain, there are plans to build thousands of new offshore wind turbines. It has also been suggested that the National Grid in Britain could be linked to the electricity generating systems in Iceland. This would involve laying a 700 mile undersea electricity cable between Iceland and Britain.

Discuss the advantages and disadvantages of the plan to build thousands of offshore wind turbines around Britain **and** the suggested electricity power link between Britain and Iceland.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(6 marks)

9

END OF QUESTIONS