Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
8	
TOTAL	

General Certificate of Secondary Education
Foundation Tier
June 2012

Additional Science PH2FP

Unit Physics P2

F

Physics

Unit Physics P2

Wednesday 30 May 2012 1.30 pm to 2.30 pm

For this paper you must have:
- a ruler
- the Physics Equations Sheet (enclosed).

You may use a calculator.

Time allowed
- 1 hour

Instructions
- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 60.
- You are expected to use a calculator where appropriate.
- Question 8 (b) should be answered in continuous prose. In this question you will be marked on your ability to:
  – use good English
  – organise information clearly
  – use specialist vocabulary where appropriate.

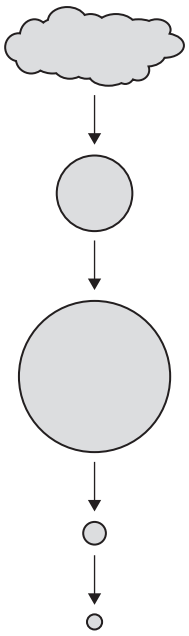
Advice
- In all calculations, show clearly how you work out your answer.

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

1 (a) The diagram shows the lifecycle of a star.

1 (a) (i) Use words or phrases from the box to complete the sentences contained in the diagram.

black dwarf	**black hole**	**protostar**	**red giant**



Gas and dust are pulled together to form a

..... .

The star gives out energy as a main sequence star.

The star expands forming a ..... .

The star shrinks to form a white dwarf.

The star fades away as a ..... .

(3 marks)

1 (a) (ii) The table compares the approximate size of three stars with the size of the Sun.

Star	Size
Alpha Centauri A	the same as the Sun
Betelgeuse	1120 times bigger than the Sun
Cephei	1520 times bigger than the Sun

Which **one** of these three stars has the lifecycle shown in part **(a) (i)**?

.....

Give a reason for your answer.

.....

.....

(2 marks)

1 (b) Which **one** of the following describes the process by which energy is given out in stars?

Tick (✓) **one** box.

Atomic nuclei inside the star join together. ☐

Atomic nuclei inside the star split apart. ☐

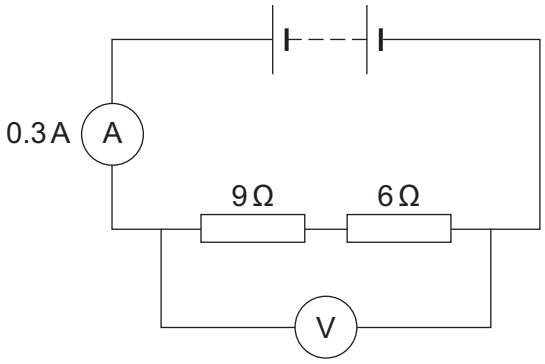
Gases inside the star burn. ☐

(1 mark)

6

Turn over for the next question

2 (a) The diagram shows a simple circuit.



2 (a) (i) Calculate the total resistance of the two resistors in the circuit.

.....

Total resistance = ... Ω

(1 mark)

2 (a) (ii) Calculate the reading on the voltmeter.

Use the correct equation from the Physics Equations Sheet.

Show clearly how you work out your answer.

.....

.....

Voltmeter reading = ... V

(2 marks)

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

Replacing one of the resistors with a resistor of higher value will

decrease
not change
increase

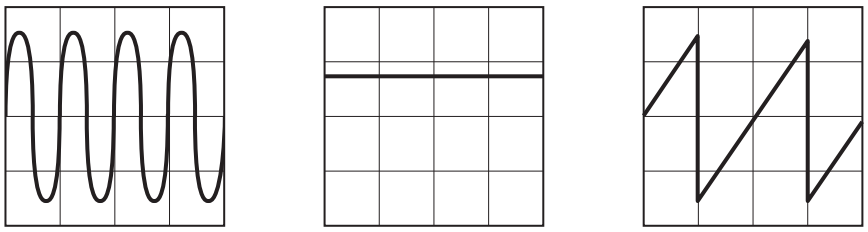
the reading on the ammeter.

(1 mark)

2 (b) The voltmeter in the circuit is replaced with an oscilloscope.

Which one of the diagrams, **X**, **Y** or **Z**, shows the trace that would be seen on the oscilloscope?

Write your answer, **X**, **Y** or **Z**, in the box.



X **Y** **Z**

Diagram ☐

Give a reason for your answer.

.....

.....

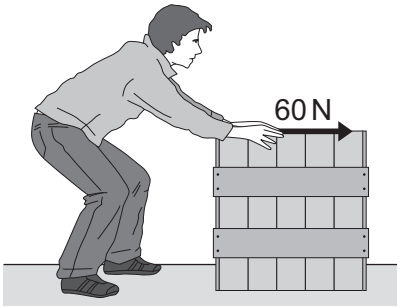
.....

(2 marks)

6

Turn over for the next question

3 The diagram shows a worker using a constant force of 60 N to push a crate across the floor.



3 (a) The crate moves at a constant speed in a straight line.

3 (a) (i) Draw an arrow on the diagram to show the direction of the friction force acting on the moving crate.

(1 mark)

3 (a) (ii) State the size of the friction force acting on the moving crate.

..... N

Give the reason for your answer.

.....

.....

(2 marks)

3 (b) Calculate the work done by the worker to push the crate 28 metres.

Use the correct equation from the Physics Equations Sheet.

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

Choose the unit from the list below.

joule **newton** **watt**

.....

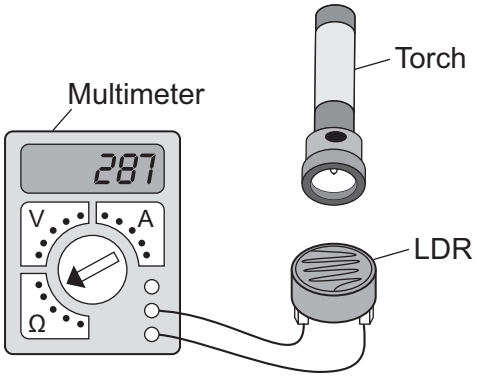
.....

Work done = ...

(3 marks)

6

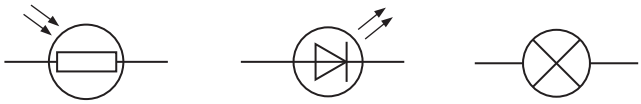
4 A student used the apparatus below to find out how the resistance of a light-dependent resistor (LDR) depends on light intensity.



The resistance of the LDR was measured directly using a multimeter.

4 (a) (i) Which **one** of the following is the correct circuit symbol for a LDR?

Draw a ring around your answer.



(1 mark)

4 (a) (ii) Name **one** factor that will affect the intensity of the light hitting the LDR.

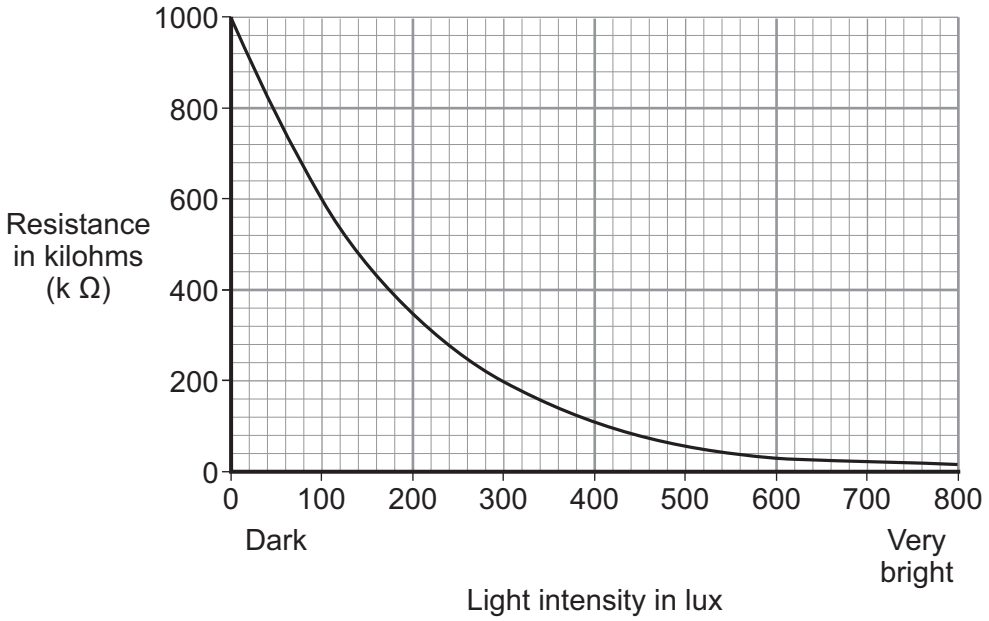
.....

.....

(1 mark)

Question 4 continues on the next page

4 (b) The manufacturer of the LDR provides data for the LDR in the form of a graph.



Describe how the resistance of the LDR changes when the light intensity increases from 100 lux to 300 lux.

.....

.....

.....

(2 marks)

4 (c) The student only obtained three results. These are given in the table.

Light intensity	Resistance in kilohms
Dark	750
Bright	100
Very bright	1

4 (c) (i) The student could **not** use the results to draw a line graph.
Why not?

.....

.....

(1 mark)

4 (c) (ii) Do the student's results agree with the data the manufacturer provided?

Draw a ring around your answer. YES NO

Give a reason for your answer.

.....

.....

.....

(1 mark)

4 (d) Which **one** of the following circuits probably includes a LDR?

Tick (✓) **one** box.

A circuit that automatically switches outside lights on when it gets dark. ☐

A circuit that automatically switches central heating on and off. ☐

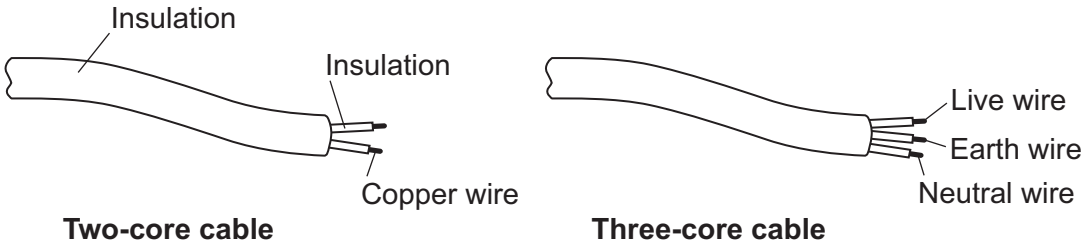
A circuit that automatically turns lights off when no one is in the room. ☐

(1 mark)

7

Turn over for the next question

5 (a) The diagram shows a piece of two-core cable and a piece of three-core cable.



Two-core cable **Three-core cable**

5 (a) (i) Which **one** of the wires inside a three-core cable is missing from a two-core cable?

Draw a ring around your answer.

earth wire **live wire** **neutral wire**

(1 mark)

5 (a) (ii) Use a word from the box to complete the following sentence.

double	**extra**	**totally**

A pottery table lamp fitted with a two-core cable is safe to use because it is

..... insulated.

(1 mark)

5 (b) The cables connecting the power sockets in a building contain wires 1.8 mm thick. The maximum current that can safely pass through these wires is 20 amps. A fuse is included in the circuit to protect the wiring.

Explain how a fuse protects the wiring of a circuit.

.....

.....

.....

.....

.....

.....

.....

(3 marks)

5

6 The table shows the average background radiation dose from various sources that a person living in the UK receives in one year.

Source of background radiation	Average radiation dose received each year in dose units
Cosmic rays (from space)	300
Food and drink	250
Medical treatments (including X-rays)	350
Radon gas	1250
Rocks	350
TOTAL	2500

6 (a) (i) A student looked at the data in the table and then wrote down four statements.

Only **two** of the statements are true.

Put a tick (✓) in the boxes next to the **two** true statements.

More than half of the average radiation dose comes from radon gas. ☐

On average, cosmic rays produce less background radiation than rocks. ☐

Everyone living in the UK receives the same background radiation dose. ☐

Having no X-rays reduces a person's radiation dose. ☐

(2 marks)

6 (a) (ii) Each time a chest X-ray is taken, the patient receives about 100 units of radiation.

How many chest X-rays would just exceed the yearly average dose for medical treatments?

.....

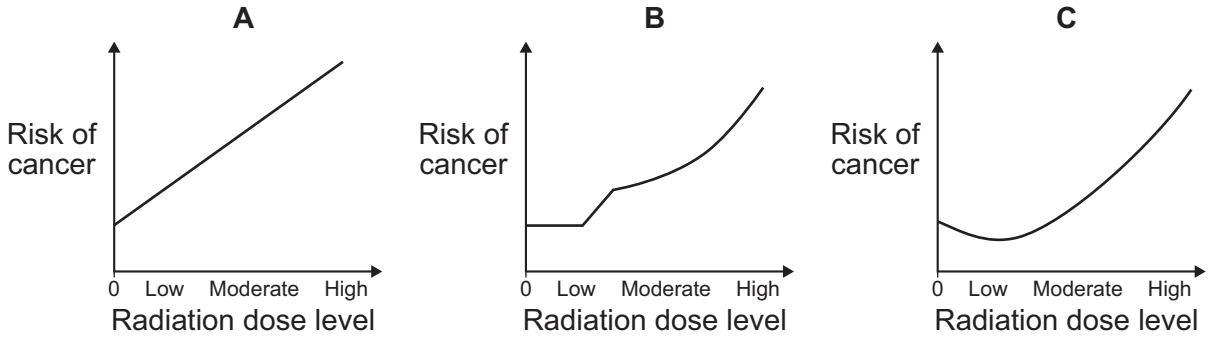
Number of chest X-rays = ...

(2 marks)

Question 6 continues on the next page

6 (b) Exposure to radiation can cause cancer.

The graphs, **A**, **B** and **C**, show three different ways that the exposure to radiation and the risk of getting cancer could be linked.



6 (b) (i) What do all three of these graphs suggest happens to the risk of getting cancer when the radiation dose goes from moderate to high?

.....

.....

(1 mark)

6 (b) (ii) Some scientists believe that exposure to **low** radiation doses reduces the chance that a person will get cancer. This effect is called 'radiation hormesis'.

Which **one** of the graphs, **A**, **B** or **C**, shows 'radiation hormesis'?

Write your answer in the box. ☐

Give a reason for your answer.

.....

.....

.....

(2 marks)

6 (c) Scientists did an experiment in which mice were exposed to different doses of radiation.

The results from the experiment are given in the table.

Description of exposure	Percentage of mice getting cancer
Mice exposed to a low dose of radiation and then a high dose of radiation.	16%
Mice exposed to a high dose of radiation only.	46%

6 (c) (i) Do the results from this experiment provide evidence to support 'radiation hormesis'?

Draw a ring around your answer. NO YES

Explain the reason for your answer.

.....

.....

.....

.....

.....

(2 marks)

6 (c) (ii) Complete the following sentence by drawing a ring around the correct word in the box.

Using animals in scientific experiments raises

environmental
ethical
social

issues.

(1 mark)

10

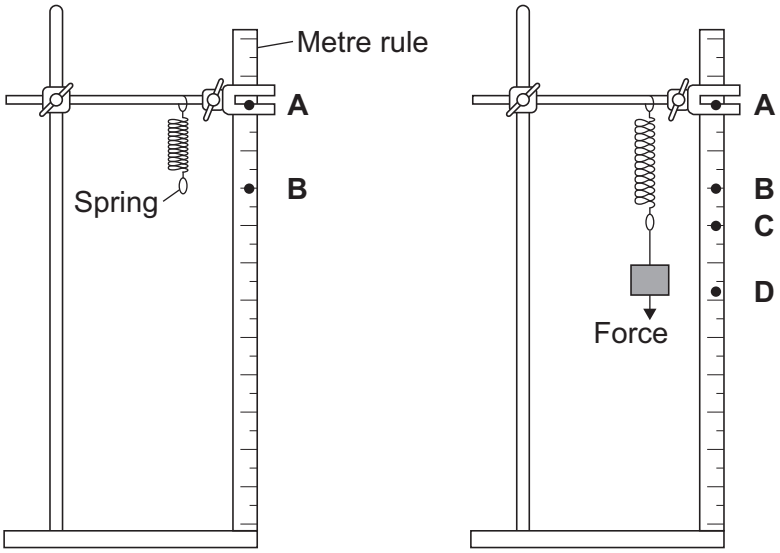
Turn over for the next question

There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

7 A student investigated how the extension of a spring depends on the force applied to the spring.

The diagram shows the spring before and after a force had been applied.



7 (a) (i) Complete the following sentence using letters, **A**, **B**, **C** or **D**, from the diagram.

The extension of the spring is the distance between the positions labelled .....

and ..... on the metre rule.

(1 mark)

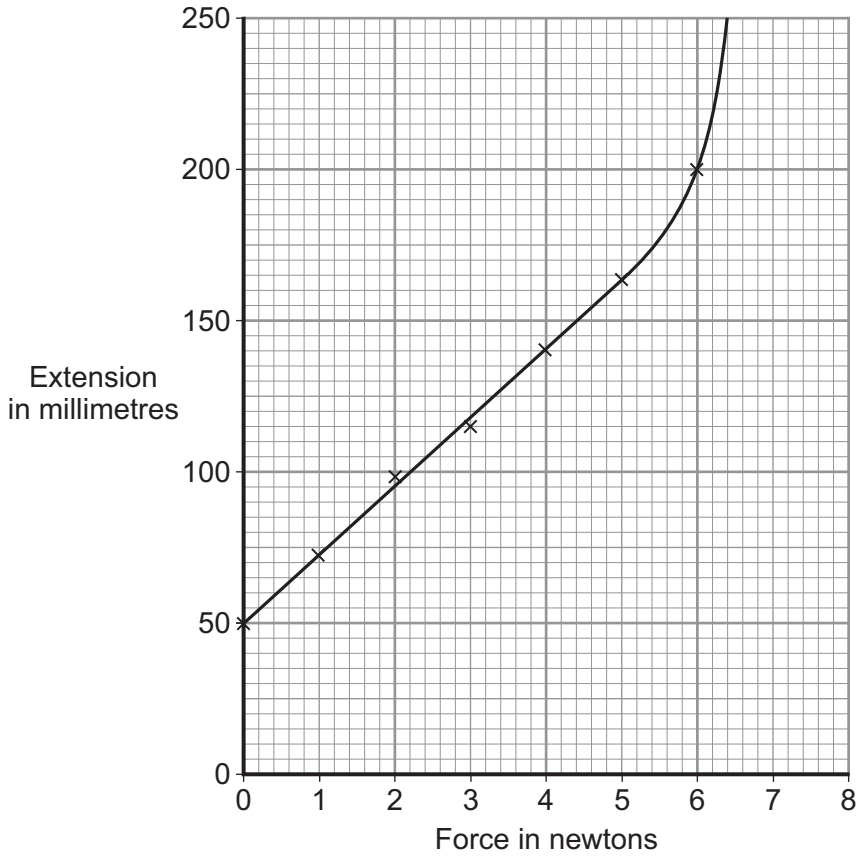
7 (a) (ii) What form of energy is stored in the stretched spring?

.....

(1 mark)

Question 7 continues on the next page

7 (b) The results from the investigation are plotted on the following graph.



7 (b) (i) The graph shows that the student has made an error throughout the investigation.

What error has the student made?

.....

.....

Give the reason for your answer.

.....

.....

(2 marks)

7 (b) (ii) The student has loaded the spring beyond its *limit of proportionality*.

Mark on the graph line the *limit of proportionality* of the spring. Label the point **P**.

Give the reason for choosing your point **P**.

.....

.....

.....

(2 marks)

7 (c) The student uses a different spring as a spring balance. When the student hangs a stone from this spring, its extension is 72 mm.

The spring does not go past the limit of proportionality.

Calculate the force exerted by the stone on the spring.

spring constant = 25 N/m

Use the correct equation from the Physics Equations Sheet.

Show clearly how you work out your answer.

.....

.....

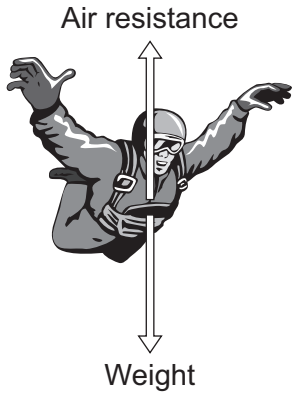
Force = ... N

(2 marks)

8

Turn over for the next question

8 (a) The diagram shows the forces acting on a parachutist in free fall.



The parachutist has a mass of 75 kg.

Calculate the weight of the parachutist.

gravitational field strength = 10 N/kg

Use the correct equation from the Physics Equations Sheet.

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

.....

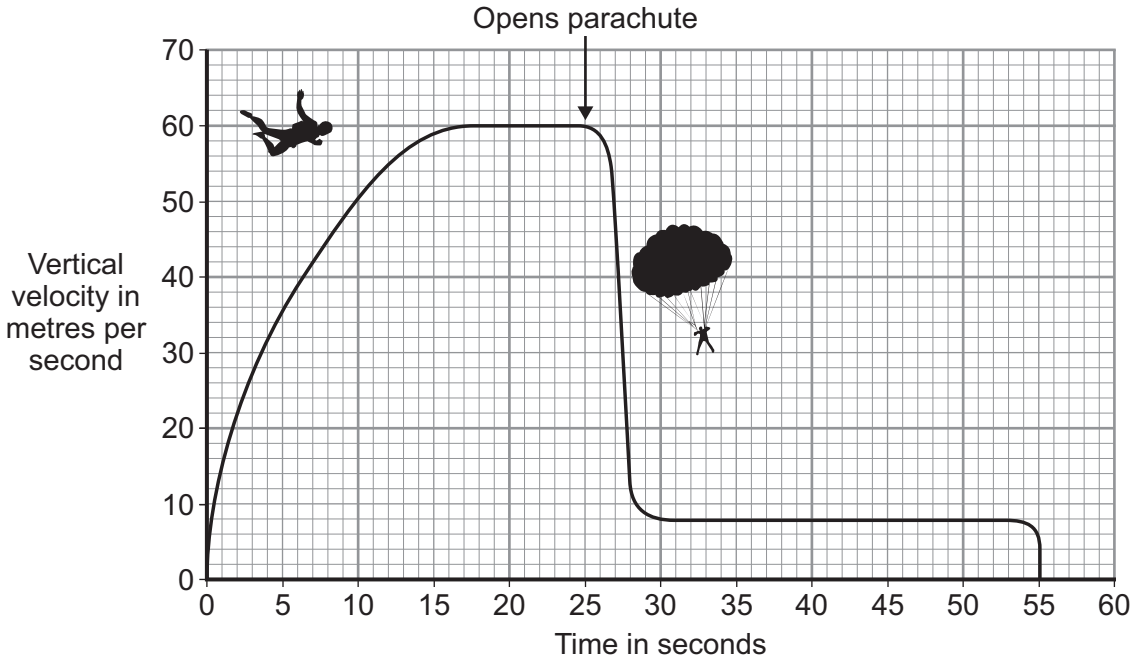
.....

Weight = ...

(3 marks)

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

The graph shows how the vertical velocity of a parachutist changes from the moment the parachutist jumps from the aircraft until landing on the ground.



Using the idea of forces, explain why the parachutist reaches a terminal velocity and why opening the parachute reduces the terminal velocity.

.....

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(6 marks)

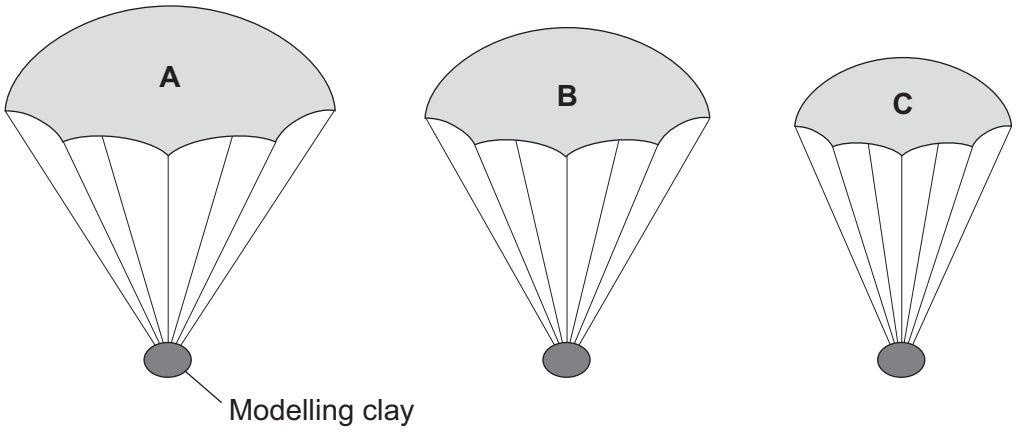
Question 8 continues on the next page

Turn over ▶

8 (c) A student wrote the following hypothesis.

'The larger the area of a parachute, the slower a parachutist falls.'

To test this hypothesis the student made three model parachutes, **A**, **B** and **C**, from one large plastic bag. The student dropped each parachute from the same height and timed how long each parachute took to fall to the ground.



8 (c) (i) The height that the student dropped the parachute from was a control variable.

Name **one** other control variable in this experiment.

.....

(1 mark)

8 (c) (ii) Use the student's hypothesis to predict which parachute, **A**, **B** or **C**, will hit the ground first.

Write your answer in the box. ☐

Give a reason for your answer.

.....

.....

.....

(2 marks)

12

END OF QUESTIONS