OXFORD

INTERNATIONAL AQA EXAMINATIONS

Please write clearly in block capitals.

Centre number | | | | | | Candidate number | | | | |

Surname _____

Forename(s) _____

Candidate signature _____

INTERNATIONAL GCSE

Physics

Paper 1

Thursday 24 May 2018 07:00 GMT Time allowed: 1 hour 30 minutes

Materials

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

Instructions
- Use black ink or black ball-point pen.
- Fill in the box at the top of this page.
- Answer **all** questions in the spaces provided.
- Do all rough work in this book. Cross through any work you do not want to be marked.
- In all calculations, show clearly how you work out your answer.

Information
- The maximum mark for this paper is 90.
- The marks for questions are shown in brackets.
- You are expected to use a calculator where appropriate.

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

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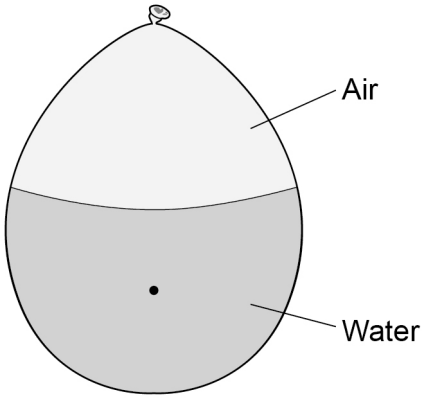
0 1 **Figure 1** shows a water-balloon.

Figure 1



A child drops the water-balloon. Forces act on the water-balloon as it falls.

0 1 . 1 Draw **two** arrows on **Figure 1** to represent the forces acting on the water-balloon.

Label one arrow **weight**.
Label the other arrow **air resistance**.

[2 marks]

0 1 . 2 When the water-balloon is dropped it accelerates.

What happens to the air resistance acting on the water-balloon as the water-balloon accelerates?

[1 mark]

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Some quantities are scalars and some are vectors.

0 1 . 3 Complete the sentence.

[2 marks]

Forces are vector quantities.

This means they have _____ and _____.

0 1 . 4 Add **one** tick to **each** row of the table to show whether each quantity is a scalar or a vector.

[2 marks]

Quantity	**Scalar**	**Vector**
Acceleration		
Distance		
Speed		

0 1 . 5 The water-balloon weighs 4.9 N.
gravitational field strength = 9.8 N/kg

Calculate the mass of the water-balloon.

Use the Physics Equations Sheet.

Give the unit.

[4 marks]

Mass = _____ Unit _____

Turn over ►

Do not write outside the box

0 1 . 6 Another water-balloon weighs 6.8 N.

Both water-balloons are the same size and shape.

The child drops both water-balloons from the same height at the same time.

Which statement is correct?

Tick **one** box.

[2 marks]

Both water-balloons will reach the ground at the same time. ☐

The 4.9 N water-balloon will reach the ground first. ☐

The 6.8 N water-balloon will reach the ground first. ☐

Give a reason for your answer.

Reason _____

_____

13

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Turn over for the next question

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ANSWER IN THE SPACES PROVIDED

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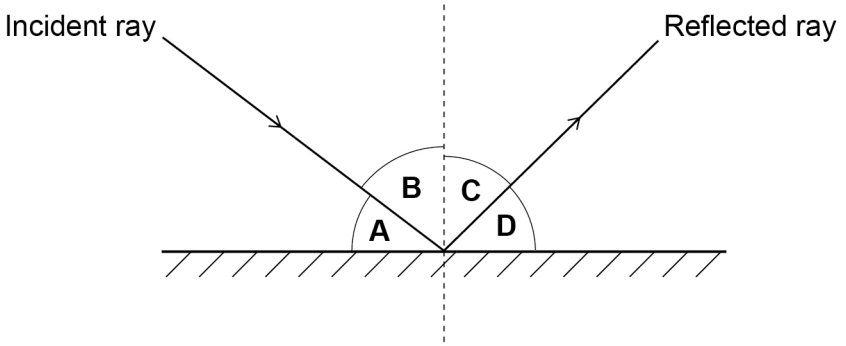
0 2 A student shone a ray of light onto a plane mirror as shown in **Figure 2.**

Figure 2



0 2 . 1 Choose an answer from the box to complete the sentence.

[1 mark]

equal to	**greater than**	**less than**

The law of reflection states that the angle of incidence is _____

the angle of reflection.

0 2 . 2 What is the dotted line on **Figure 2** called?

[1 mark]

_____

0 2 . 3 Which angle shown on **Figure 2** is the angle of incidence?

Tick **one** box.

[1 mark]

A ☐

B ☐

C ☐

D ☐

Do not write outside the box

0 2 . 4 What equipment should the student have used to measure the angle of incidence?

Tick **one** box.

[1 mark]

Compass ☐

Protractor ☐

Ruler ☐

Set-square ☐

0 2 . 5 **Table 1** shows the student's results.

Table 1

Angle of Incidence in degrees	Angle of Reflection in degrees
10	10
20	19
30	31
40	39
50	51

Explain **one** thing that the student could do to improve the results.

[2 marks]

0 2 . 6 Complete the sentence. Choose answers from the box.

[2 marks]

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

The image in a plane mirror is _____ and _____ .

8

Turn over ►

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ANSWER IN THE SPACES PROVIDED

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0 3 The Earth orbits a star called the Sun.

0 3 . 1 Stars form when enough dust and gas are pulled together in space.

What force causes the dust and gas to be pulled together?

[1 mark]

---

0 3 . 2 Name the process that releases energy in a main sequence star.

[1 mark]

---

0 3 . 3 Why is a main sequence star stable?

[1 mark]

---

0 3 . 4 In another part of their life cycle, stars form elements such as carbon, nitrogen and oxygen.

Which type of star forms these elements?

[1 mark]

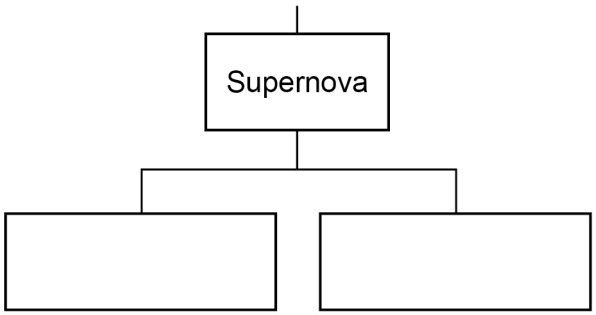
---

0 3 . 5 A supernova occurs when a large star explodes.

Complete **Figure 3** to show what remains after a supernova.

[2 marks]

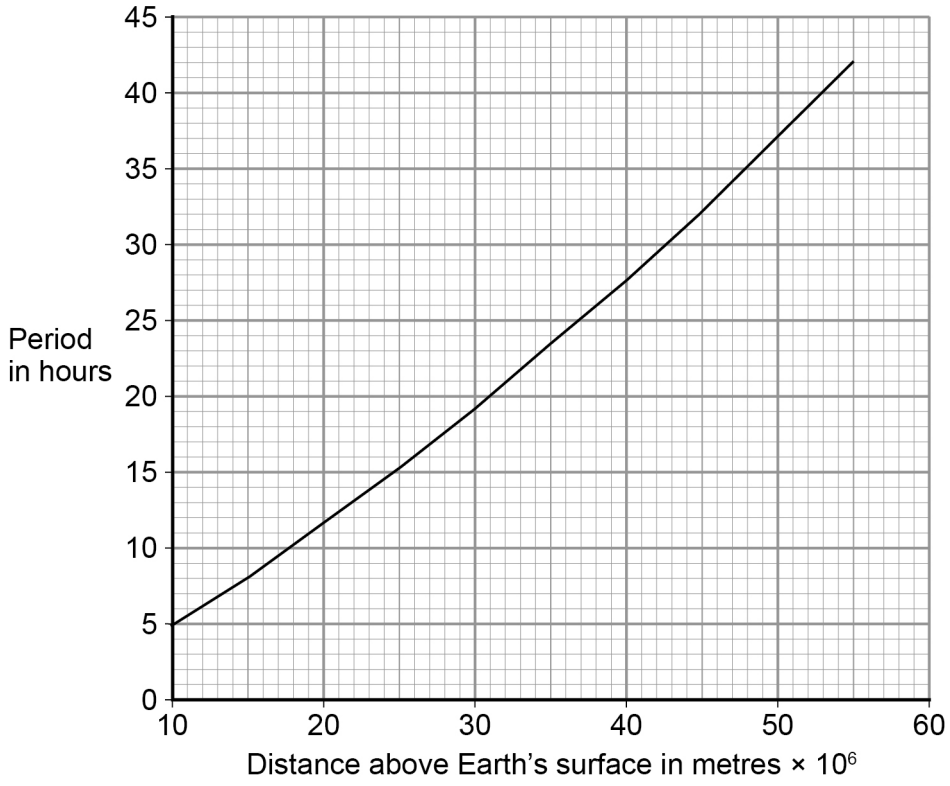
Figure 3



Stars can be observed using telescopes on satellites orbiting the Earth.

Figure 4 shows the period of satellites at different distances above the Earth's surface.

Figure 4



0 3 . 6 What distance above the Earth's surface is used for a satellite in a geostationary orbit?

Give a reason for your answer.

[2 marks]

Distance = _____ metres × 10^6

Reason _____

_____

_____

Do not write outside the box

0 3 . 7 A weather satellite is placed in a low polar orbit.

Explain why this orbit is used for a weather satellite.

[2 marks]

10

Turn over for the next question

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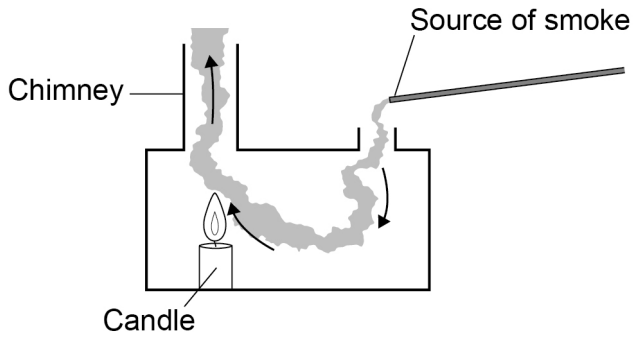
0 4 A student investigated energy transfers.

Figure 5 shows a candle underneath a chimney in a glass-fronted box.
A source of smoke was placed above a hole in the top of the box.

The smoke moves in the direction shown by the arrows.

Figure 5



0 4 . 1 Which method of energy transfer is shown by the movement of the smoke?

Tick **one** box.

[1 mark]

Conduction ☐

Convection ☐

Evaporation ☐

Radiation ☐

0 4 . 2 Complete the sentences to explain the method of energy transfer shown in **Figure 5**.

Each answer from the box can be used once, more than once or not at all.

[2 marks]

decreases	**increases**	**stays the same**

The temperature of the air above the candle _____.

The average distance between the particles _____.

The density of the air above the candle _____ .

Do not write outside the box

0 4 . 3 Describe how the student could carry out an experiment to plot a cooling curve for stearic acid as it changes from liquid to solid.

[6 marks]

9

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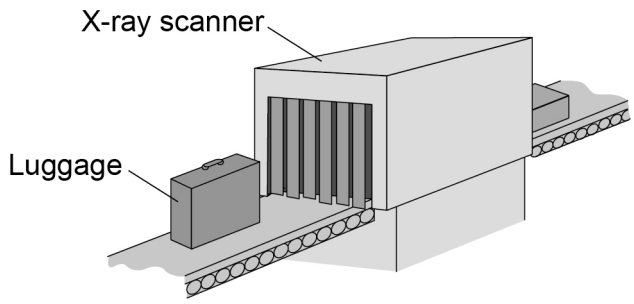
0 5 Passengers and luggage must pass through airport security before they can get on an aeroplane.

0 5 . 1 The luggage goes through an X-ray scanner as shown in **Figure 6**.

Figure 6



The luggage contains some metal objects.

What happens to X-rays when they reach metal objects?

[1 mark]

0 5 . 2 Workers using the X-ray scanner have to wear a radiation badge.

Explain why.

[2 marks]

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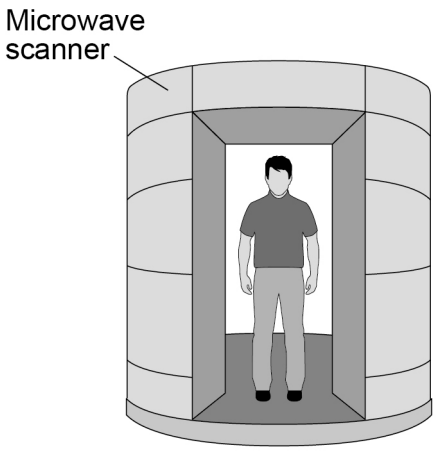
Figure 7 shows a passenger standing in a microwave scanner.

Figure 7



0 5 . 3 Explain why passengers are scanned with microwaves rather than X-rays.

[2 marks]

0 5 . 4 The microwaves used in the scanner have a wavelength of 16 mm.

speed of electromagnetic radiation = 3.0×10^8 m/s

Calculate the frequency of the microwaves used in the scanner.

Give your answer to **two** significant figures.

Use the Physics Equations Sheet.

[5 marks]

Frequency = _____ Hz

10

Turn over ►

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0 6 **Figure 8** shows a geothermal power station.

Figure 8

0 6 . 1 Explain **one** drawback of geothermal power.

[2 marks]

Do not write outside the box

0 6 . 2 Electricity generated by the geothermal power station is distributed to consumers.

The distribution system includes step-up transformers, transmission cables and step-down transformers.

Explain why the distribution system includes step-up transformers and step-down transformers.

[4 marks]

Question 6 continues on the next page

0 6 . 3 In the power station, steam at 100 °C is condensed to water at 100 °C and generates 6.9 MW of electrical power.

The specific latent heat of vaporisation of water is 2.3 MJ/kg.

The power station has an efficiency of 12%.

Calculate the mass of steam condensed each second.

Use the Physics Equations Sheet.

[5 marks]

Mass condensed each second = _____ kg

11

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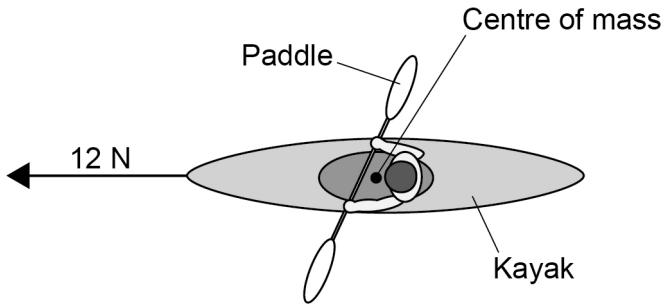
0 7 A kayak is a type of boat.

Figure 9 shows a person sitting in a kayak. The person uses a paddle to make the kayak move.

Figure 9



0 7 . 1 The centre of mass of the kayak is labelled on **Figure 9**.

What is meant by centre of mass?

[1 mark]

0 7 . 2 The kayak moves forwards with an initial momentum of 48 kg m/s.

The person uses the paddle for 18 s. The average resultant force on the kayak during this time is 12 N forwards.

Calculate the final momentum of the kayak.

Use the Physics Equations Sheet.

[4 marks]

Final momentum = _____ kg m/s

0 7 . 3 The kayak now moves at a steady speed of 2.2 m/s.

Calculate the time taken for the kayak to move 55 m at this speed.

[3 marks]

Time taken = _____ s

0 7 . 4 When the person uses the paddle, the forces on the paddle create moments.

What is meant by the moment of a force?

[1 mark]

Question 7 continues on the next page

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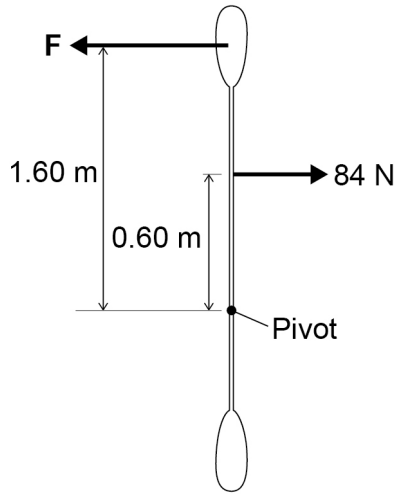
0 7 . 5 One end of the paddle is placed in the water. The water applies a force **F** to the paddle at the position shown in **Figure 10**.

The person applies a force of 84 N to the paddle.

The paddle does not turn.

Figure 10



Determine **F**.

Use the Physics Equations Sheet.

[3 marks]

F = _____ N

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ANSWER IN THE SPACES PROVIDED

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Table 2 shows some data about kayaks.

The greater the stability score, the less likely the kayak is to topple over.

The greater the ease of turning score, the easier the kayak is to turn.

Table 2

Kayak	Length in m	Width in m	Stability score in arbitrary units	Ease of turning in arbitrary units	Ratio of length to width
A	1.9	0.70	84	95	
B	2.3	0.60	60	82	3.8
C	2.4	0.75	88	79	3.2
D	2.5	0.65	76	76	3.8
E	3.1	0.80	90	65	3.9

0 7 . 6 Give **one** conclusion that can be made about the relationship between the length of a kayak and the ease of turning.

[1 mark]

0 7 . 7 Give **two** conclusions that can be made about the relationship between the shape of the kayak and its stability.

[2 marks]

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The design of a kayak affects how streamlined it is.

0 7 . 8 What is the effect on the drag force of having a longer, narrower kayak?

[1 mark]

0 7 . 9 The ratio of length to width can be used as a measure of how streamlined a kayak is.

Determine the ratio of length to width for kayak **A**.

[1 mark]

Ratio of length to width = _____

0 7 . 10 Suggest which kayak **A**, **B**, **C**, **D** or **E** can move fastest.

Tick **one** box.

[1 mark]

A ☐

B ☐

C ☐

D ☐

E ☐

18

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0 8 A teacher carried out a demonstration using a radiation detector and count rate meter. The teacher first measured the count rate from background radiation several times.

0 8 . 1 Which of the following is a man-made source of background radiation?

Tick **one** box.

[1 mark]

Cosmic rays ☐

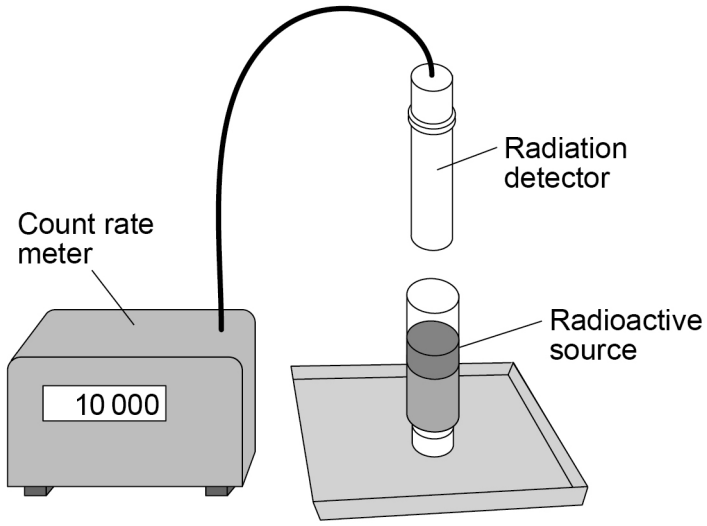
Nuclear weapons tests ☐

Radon gas ☐

Uranium from rocks ☐

The teacher then put the radiation detector close to a radioactive source as shown in **Figure 11**.

Figure 11



0 8 . 2 The teacher recorded the count rate.

Describe how the teacher should determine the count rate from the radioactive source.

[2 marks]

Question 8 continues on the next page

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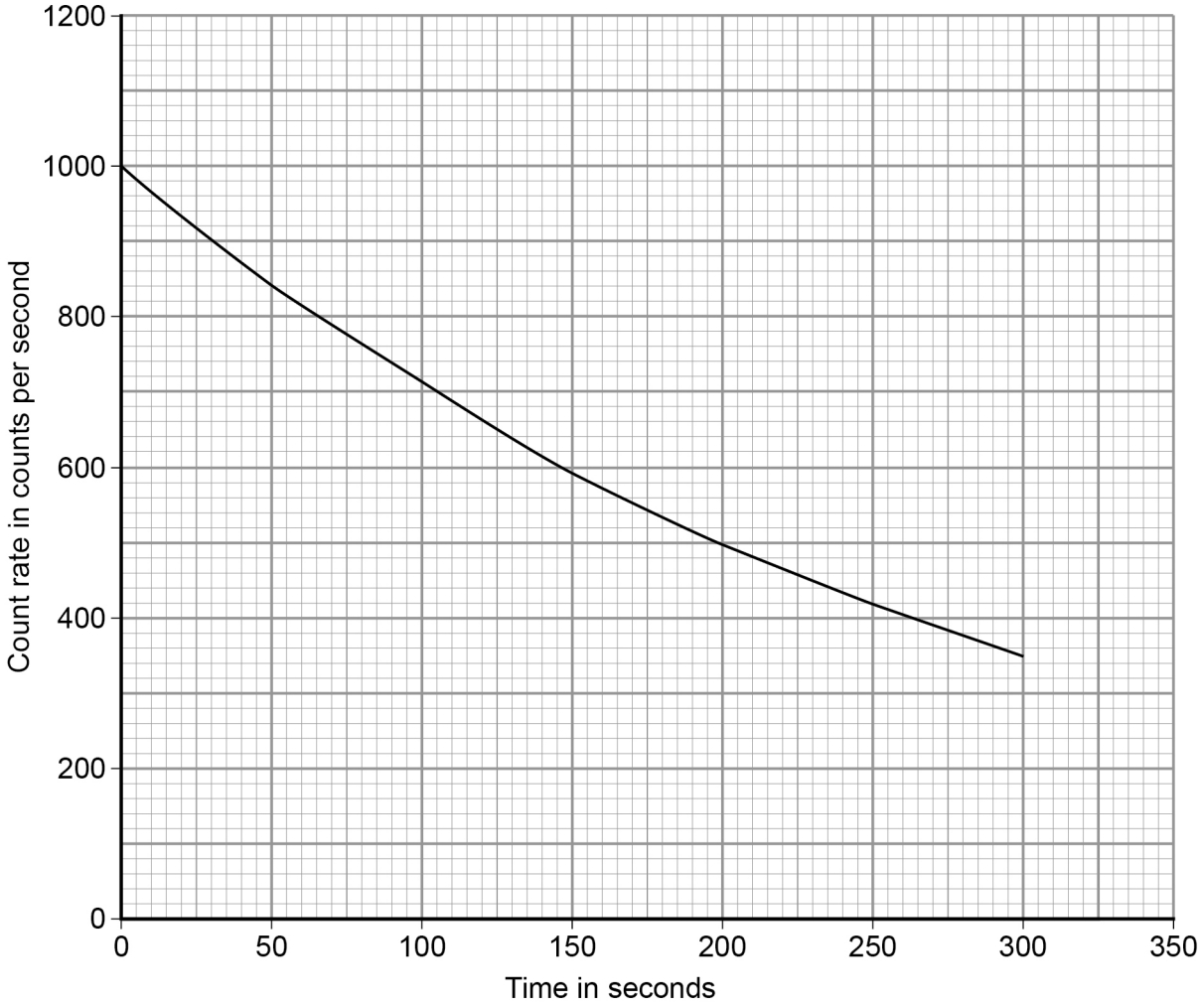
0 8 . 3 The teacher made measurements and plotted a graph to show how the count rate from the radioactive source changed over time.

The graph is shown in **Figure 12.**

Figure 12



Determine the expected count rate from the radioactive source after 10 minutes.

[4 marks]

Count rate after 10 minutes = _____ counts per second

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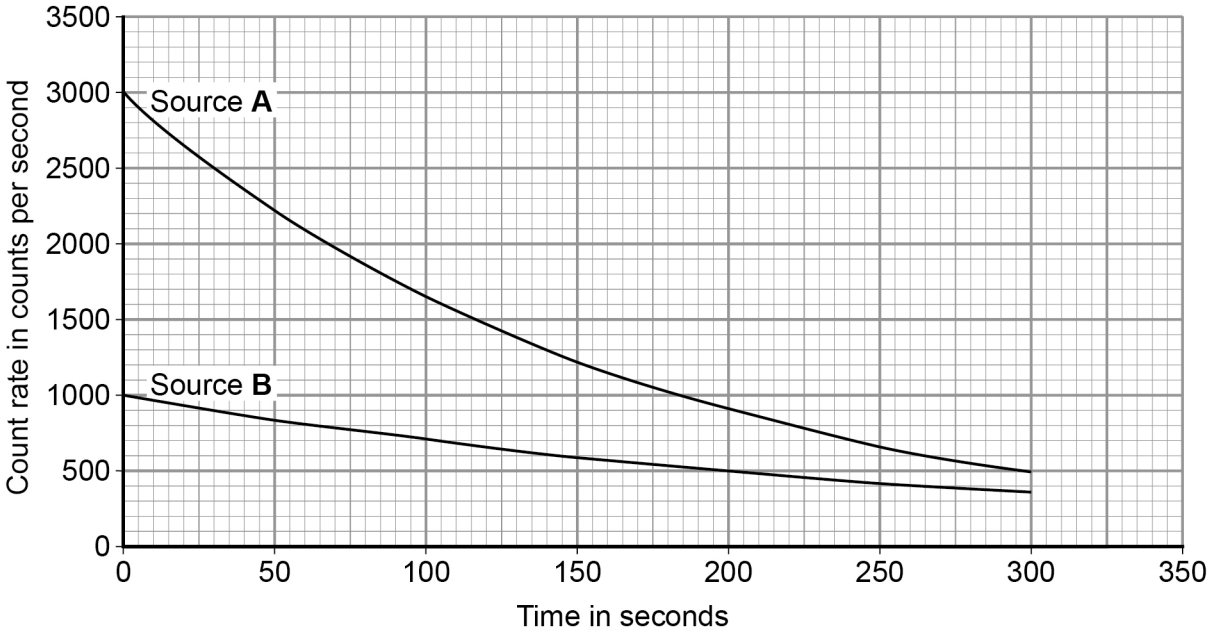
0 8 . 4 The teacher carried out the demonstration with two radioactive sources, **A** and **B**. **Figure 13** shows the results.

Figure 13



Explain how the stability of the nuclei in Source **A** compares with the stability of the nuclei in Source **B**.

[2 marks]

0 8 . 5 The teacher measured the count rate from background radiation again.

Explain how the teacher could use the measurements of count rate from background radiation to check that the radioactive sources had not contaminated the surroundings.

[2 marks]

11

END OF QUESTIONS

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