Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2017–2018

Science: Single Award

Unit 3 (Physics)
Higher Tier

GSS32

[GSS32]

FRIDAY 9 NOVEMBER 2018, MORNING

TIME

1 hour 15 minutes.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer **all nine** questions.

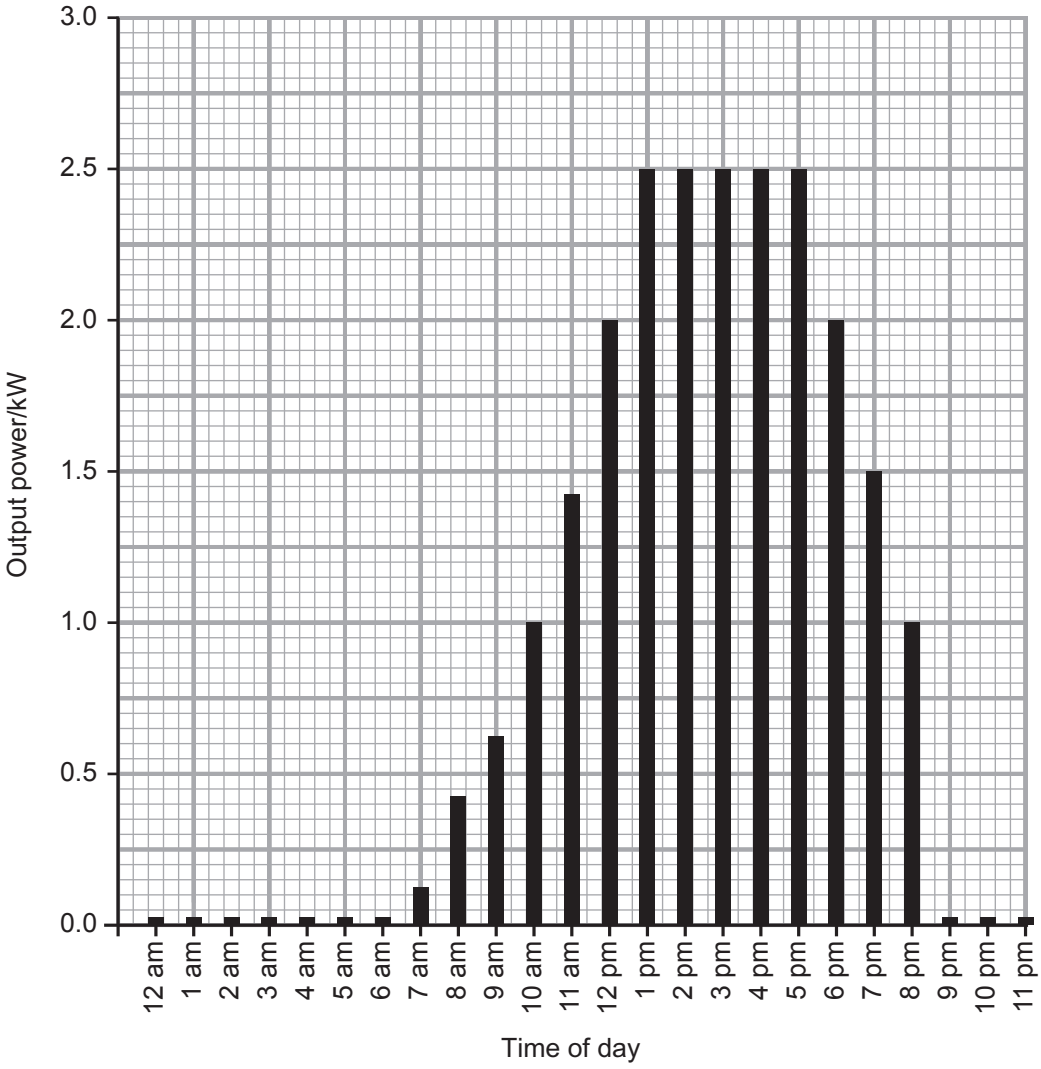
INFORMATION FOR CANDIDATES

The total mark for this paper is 75.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
Quality of written communication will be assessed in Questions **3(a)** and **9(a)**.

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	
Total Marks	

Examiner Only	
Marks	Remark

1 The graph below shows the output power from solar panels on the roof of a house on a clear summer day.



Source: Principal Examiner

(a) Describe fully the trend shown by this information between 6 am and 5 pm.

_____

_____

_____

_____ [2]

(b) Describe **two** ways in which this graph would look different, between 6 am and 5 pm, in winter

1. _____

2. _____ [2]

(c) Between 12 am and 5 am the solar panels still produce power. Suggest **one** source of light that allows the solar panels to produce this power.

_____ [1]

(d) Solar energy is a renewable energy source.

(i) What is meant by the term renewable?

_____

_____ [1]

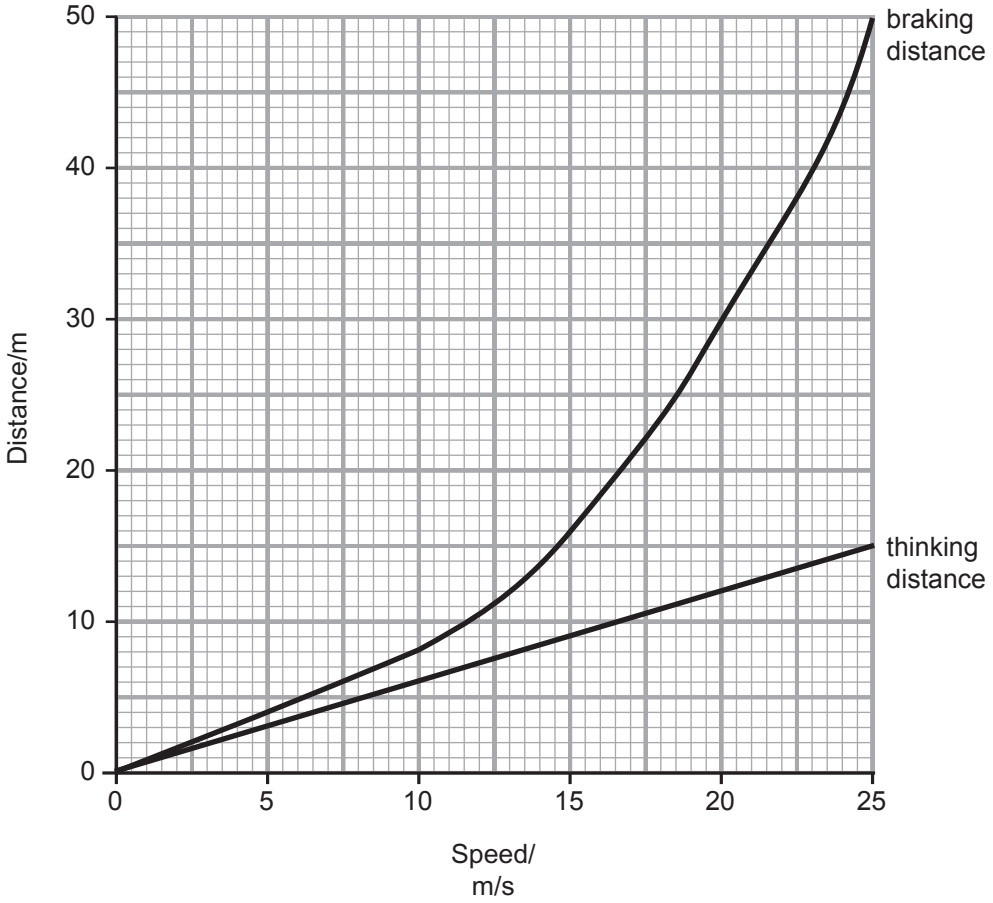
(ii) Name **one** other renewable energy source.

_____ [1]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

2 The graph below shows how the speed of a vehicle affects thinking and braking distances.



Source: Principal Examiner

(a) Describe fully the conclusion that can be made from this information.

_____

_____

_____

_____ [2]

(b) (i) Use the graph to calculate the **stopping** distance at a speed of 25 m/s.

Answer _____ m [1]

(ii) Describe how **stopping** distance is affected by speed.

_____

_____ [1]

(c) Friction also affects braking distance.

(i) Describe fully what is meant by the term friction.

_____

_____

_____ [2]

(ii) State and explain the effect rain will have on braking distance.

_____

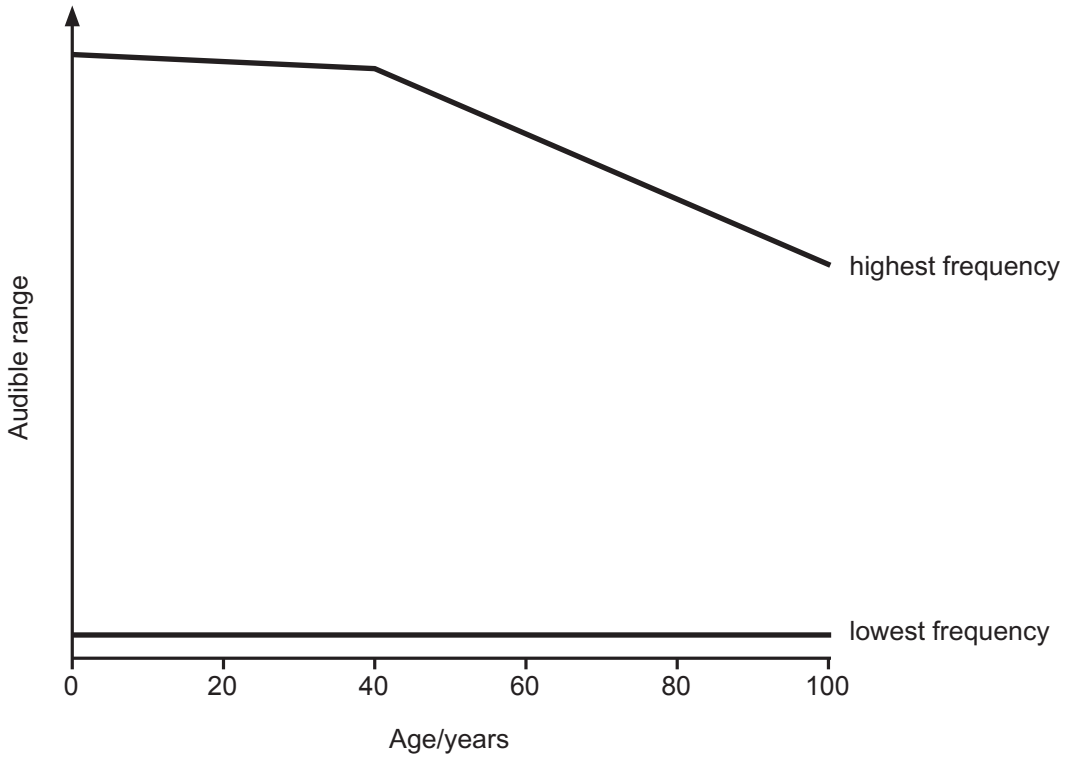
_____

_____ [2]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

3 **(a)** There are many different frequencies of sound but humans can only hear those within the audible range. Age and other factors can affect this range. The graph below shows the effect of age.



Source: Principal Examiner

Using the graph and your knowledge, describe fully how the audible range is affected by age.

Your answer should include:

- what is meant by the term frequency
- the normal audible range
- **one** other factor that affects this range.

In this question you will be assessed on your written communication skills including the use of specialist scientific terms.

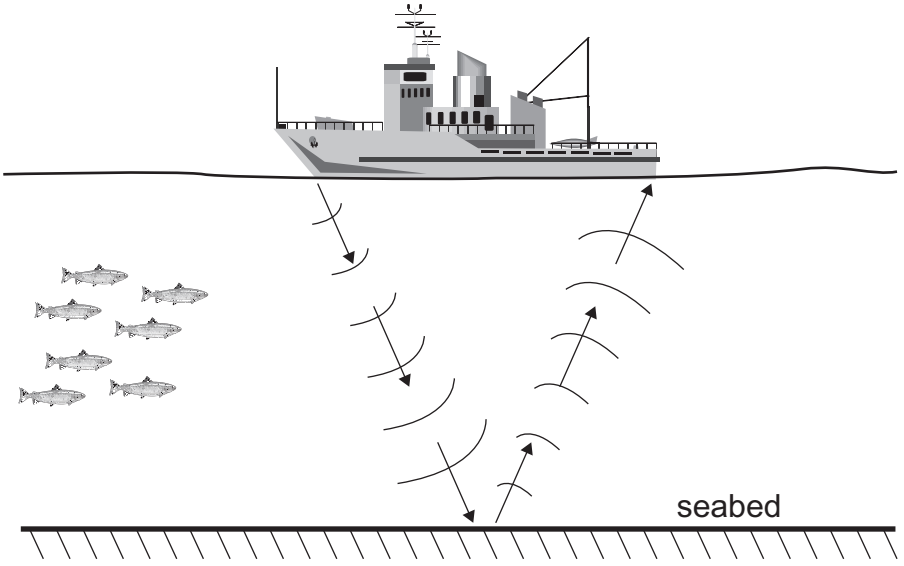
Examiner Only	
Marks	Remark

[6]

(Questions continue overleaf)

Examiner Only	
Marks	Remark

(b) The diagram below shows a ship using ultrasound to measure the depth of the sea.



© CCEA

Ultrasound travels at a speed of 1500 m/s in water.

(i) What is meant by the term ultrasound?

_____ [1]

(ii) The ship sends out an ultrasound pulse which returns 4 s later.

Use the equation:

distance = speed × time

to calculate the depth of the sea.

(Show your working out.)

Answer _____ m [3]

(iii) Explain how the captain will know when a shoal of fish swims under the ship.

_____

_____ [1]

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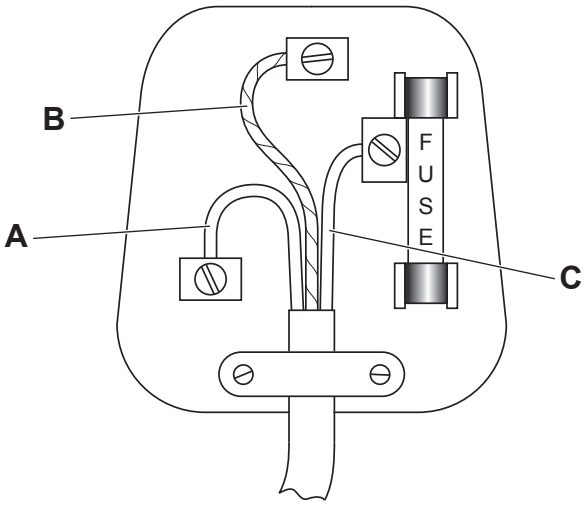
(Questions continue overleaf)

Examiner Only	
Marks	Remark

4 **(a)** The diagram below shows a 3-pin plug used to connect an 800 W fridge-freezer to the 230 V mains electricity.



(i) Name the wire labelled **A**.

_____ [1]

(ii) State the colour(s) of the wire labelled **B**.

_____ [1]

(b) **(i)** Use the equation:

power = voltage × current

to calculate the current used by this fridge-freezer.

(Show your working out.)

Answer _____ A [2]

(ii) What size of fuse should be used in the plug of this fridge-freezer?

Choose from:

1 A **3 A** **5 A** **13 A**

Answer _____ [1]

(c) Most hairdryers are double insulated.

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(i) Name the wire that is **not** needed in a double insulated hairdryer.

_____ [1]

(ii) Explain fully how double insulation protects the user.

_____

_____

_____

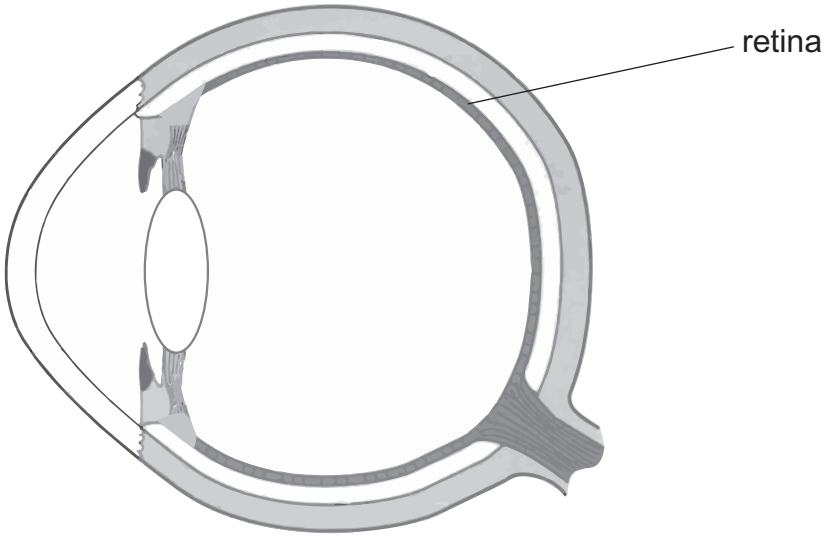
_____ [2]

Examiner Only

Marks	Remark

Examiner Only	
Marks	Remark

5 The diagram below represents the human eye.



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(a) Refraction of light helps the eye to form clear images.

(i) What is meant by the term refraction?

_____

_____ [1]

(ii) Explain fully how refraction helps the eye produce clear images on the retina.

_____

_____

_____ [2]

(b) A person who is short-sighted can only see near objects clearly.

(i) Give **one** cause of short sight.

_____ [1]

(ii) How is short sight corrected?

_____ [1]

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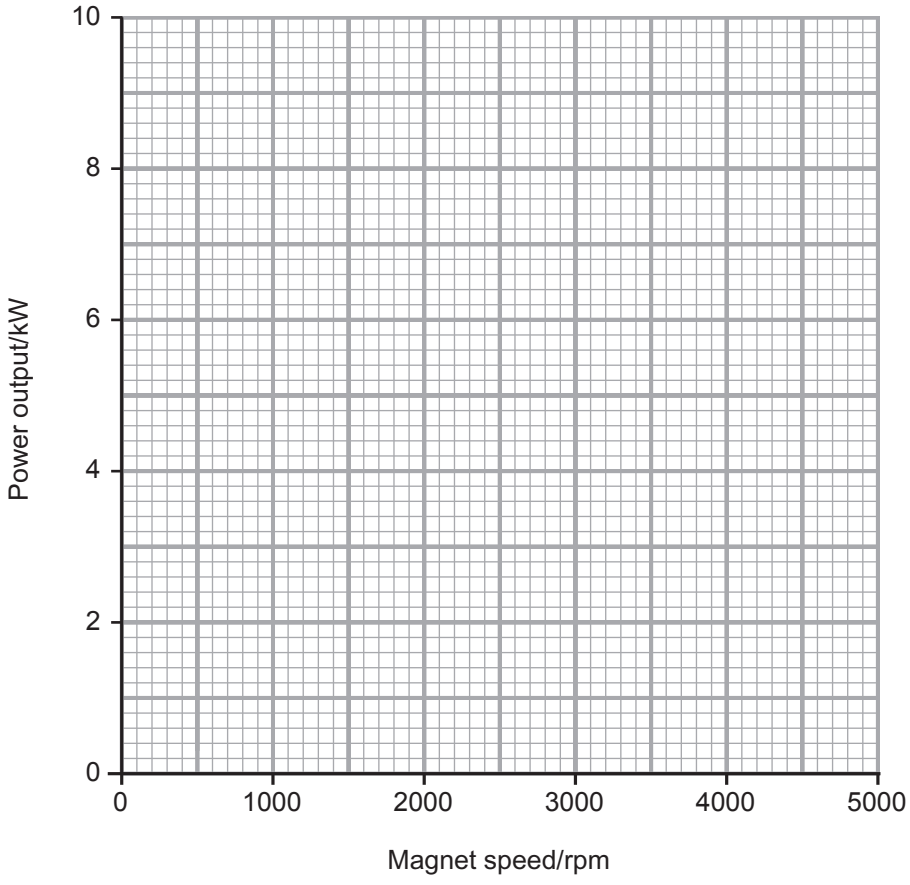
(Questions continue overleaf)

6 The generator in a power station produces electricity by having a magnet and a coil of wire which move relative to each other. The table below gives the power output for different magnet speeds.

Magnet speed/rpm	Power output/kW
0	0.0
800	1.6
2000	4.0
3200	6.4
4000	7.8
4500	8.0
5000	8.0

(a) On the grid below plot and draw a line graph for this information.



[3]

Examiner Only

Marks	Remark

(b) Give **one** reason why a magnet speed above 4500 rpm is not of any advantage to this generator.

_____

_____ [1]

(c) Apart from increasing magnet speed, state **one** other way the output power of this generator could be increased.

_____

_____ [1]

(d) Power stations can use fossil fuels to generate electricity. Describe fully how fossil fuels are formed.

_____

_____

_____

_____ [3]

(e) Fuel substitutes and extenders can be used in car engines.

(i) Give **one** example of each.

Substitute _____

Extender _____ [2]

(ii) Explain the main reason why these are being used.

_____

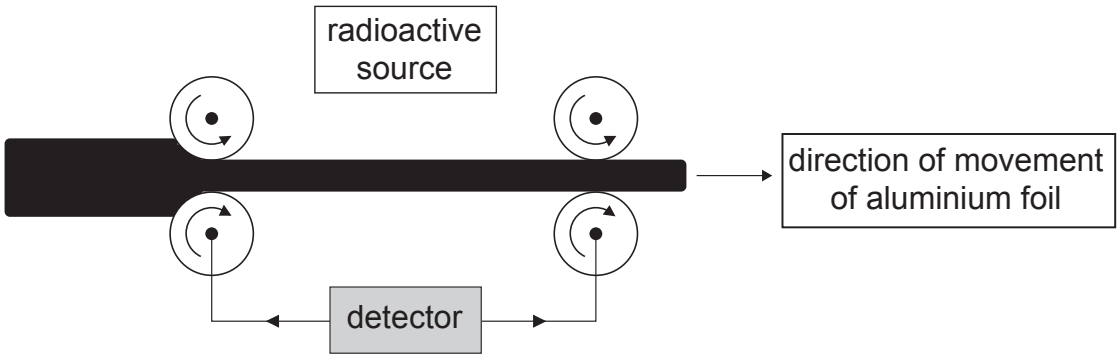
_____ [1]

Examiner Only

Marks	Remark

Examiner Only	
Marks	Remark

7 The diagram below shows how radiation can be used to monitor the thickness of aluminium foil. If the thickness increases the amount of radiation detected decreases.



Source: Principal Examiner

The table below gives information about four possible radioactive sources.

Radioactive source	Radiation emitted	Half-life
S	Alpha	4 hours
T	Gamma	5 years
U	Beta	15 years
V	Beta	4 mins

(a) Which radioactive source (**S**, **T**, **U** or **V**) should be used to monitor the thickness of aluminium? Explain your answer fully.

_____

_____

_____

_____ [3]

(b) Explain fully why some atoms are radioactive.

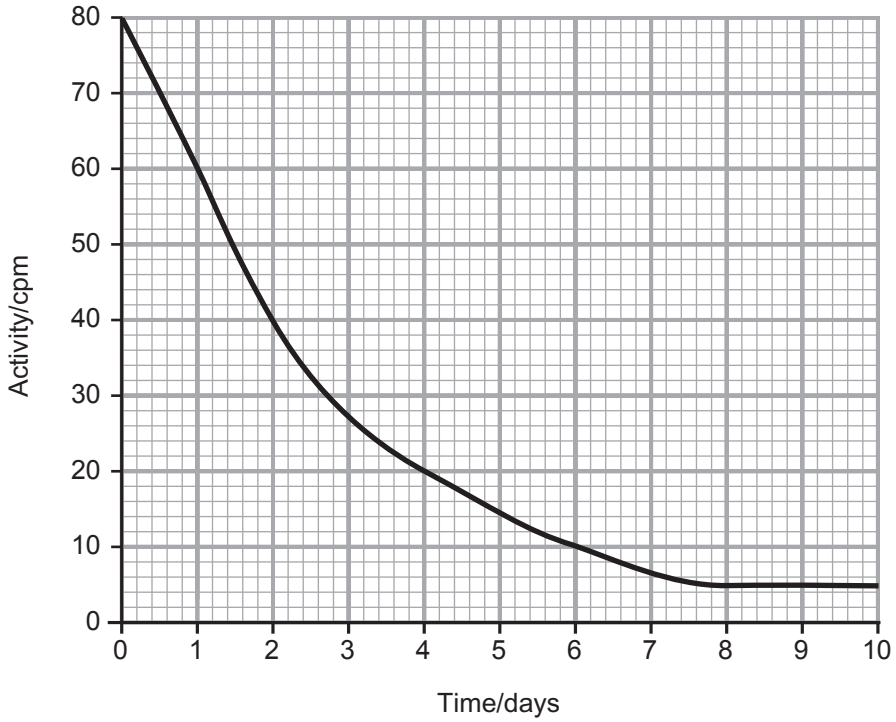
_____

_____

_____ [2]

Examiner Only	
Marks	Remark

(c) Radioactive materials have various uses in hospitals. A source to be used as a tracer arrived at a hospital with an activity of 80 cpm. The graph below shows its activity over the next 10 days.



(i) What is the activity on day 5?

Answer _____ cpm [1]

(ii) Use the graph to find the half-life of this source.

Answer _____ days [1]

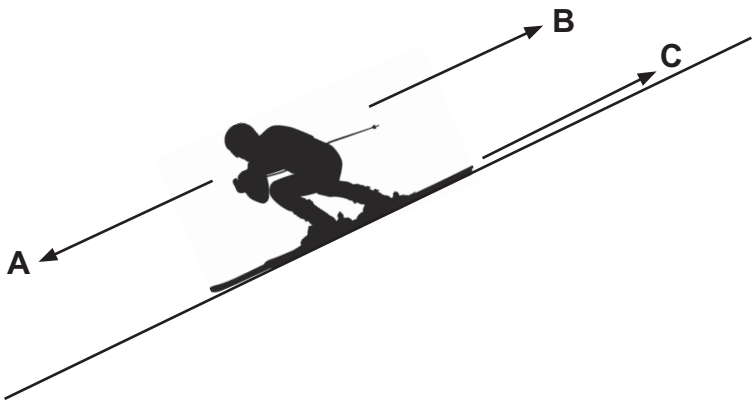
(iii) Calculate what the activity of this source was 4 days **before** it arrived at the hospital.

(Show your working out.)

Answer _____ cpm [2]

Examiner Only	
Marks	Remark

8 The diagram below shows a 75 kg skier accelerating downhill and some of the forces (**A**, **B** and **C**) acting on him.



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(a) Explain fully, in terms of forces, why this skier is accelerating.

_____

_____

_____

_____ [3]

(b) Name the force that opposes motion.

_____ [1]

(c) (i) Use the equation:

momentum = mass × velocity

to calculate the momentum of the skier when travelling at 3 m/s.

(Show your working out.)

Answer _____ [2]

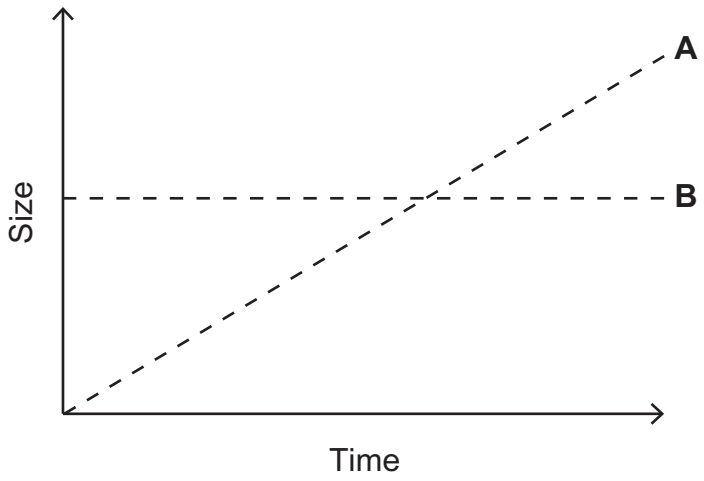
(ii) What is the unit of momentum?

_____ [1]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

9 The diagram below represents two of the major theories (**A** and **B**) for the existence of the Universe.



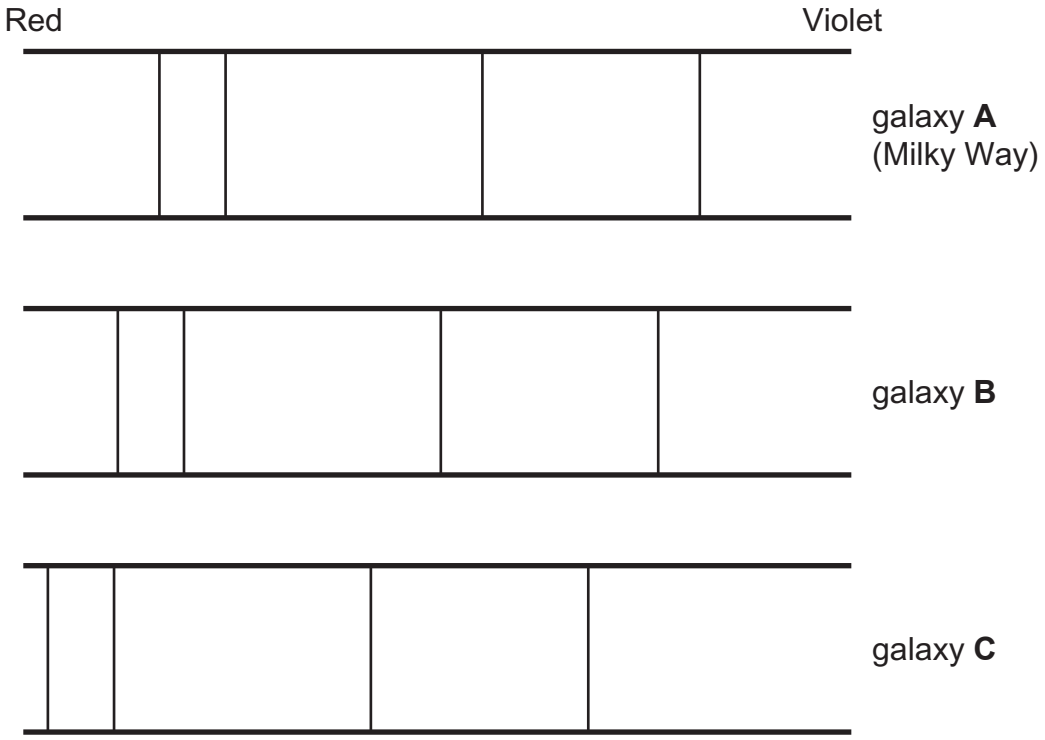
(a) Use the diagram and your knowledge to name, describe and compare the two theories.

In this question you will be assessed on your written communication skills including the use of specialist scientific terms.

[6]

Examiner Only	
Marks	Remark

(b) When astronomers look at light from galaxies they see the following black lines in their spectrum.



Source: Principal Examiner

(i) Name the phenomenon shown in the spectra for galaxies **B** and **C**.

_____ [1]

(ii) Use the diagrams to compare the position and movement of galaxies **B** and **C** relative to the Milky Way.

_____

_____

_____ [2]

THIS IS THE END OF THE QUESTION PAPER

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