

OCR

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**GCSE (9–1) Combined Science A
(Physics) (Gateway Science)
J250/05 Paper 5 (Foundation Tier)
Sample Question Paper**

F

Date – Morning/Afternoon

Time allowed: 1 hour 10 minutes

You must have:

- the Data Sheet

You may use:

- a scientific or graphical calculator
- a ruler



* o o o o o o *

First name					
Last name					
Centre number					
Candidate number					

INSTRUCTIONS

- Use black ink. You may use an HB pencil for graphs and diagrams.
- Complete the boxes above with your name, centre number and candidate number.
- Answer **all** the questions.
- Write your answer to each question in the space provided.
- Additional paper may be used if required but you must clearly show your candidate number, centre number and question number(s).
- Do **not** write in the bar codes.

INFORMATION

- The total mark for this paper is **60**.
- The marks for each question are shown in brackets [].
- Quality of extended responses will be assessed in questions marked with an asterisk (*).
- This document consists of **24** pages.

SECTION A

You should spend a maximum of 20 minutes on this section.

Answer **all** the questions.

1 What is the typical diameter of an atom?

- A 1×10^{-7} m
- B 1×10^{-8} m
- C 1×10^{-9} m
- D 1×10^{-10} m

Your answer

[1]

2 A bus takes 1.8 hours to travel 24 km.

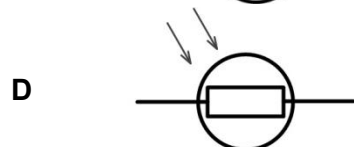
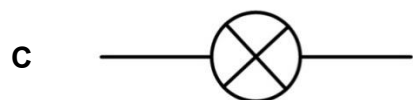
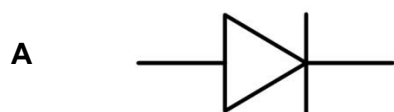
What is the average speed of the bus?

- A 43.2 km/hr
- B 25.8 km/hr
- C 22.2 km/hr
- D 13.3 km/hr

Your answer

[1]

3 Which of these symbols is used to show an LDR?



Your answer

[1]

- 4 A student lifts a box with a force of 12 N a distance of 7 m.

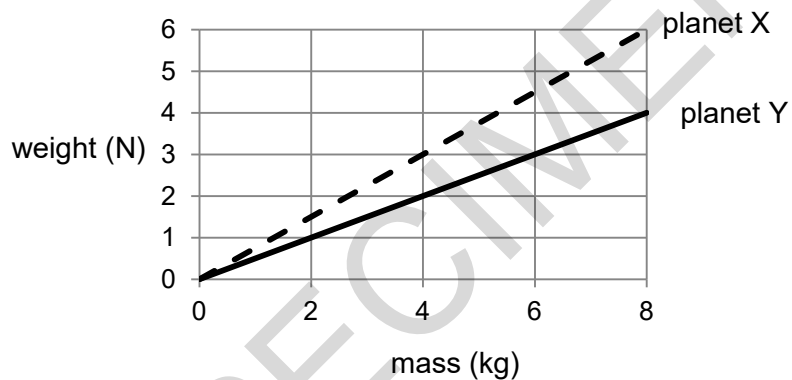
How much work do they do?

- A 1.7 J
- B 5.0 J
- C 19 J
- D 84 J

Your answer

[1]

- 5 The graph shows the relationship between mass and weight on two different planets.



The weight of an object on planet X is 3.0 N.

What is the weight of the same object on planet Y?

- A 1.5 N
- B 2.0 N
- C 4.0 N
- D 6.0 N

Your answer

[1]

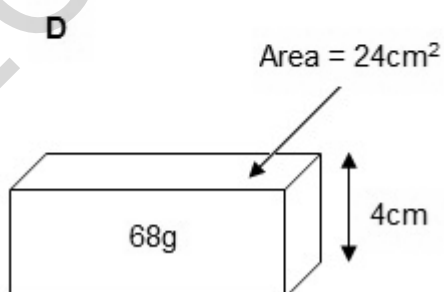
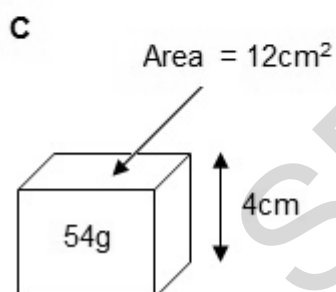
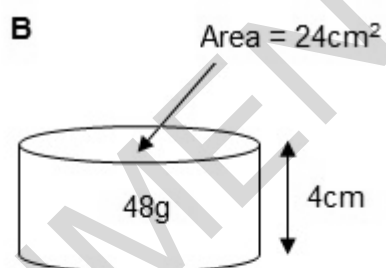
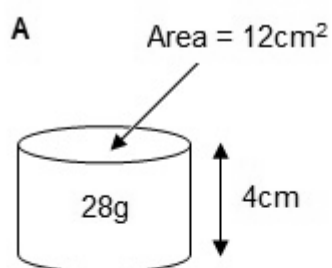
6 What is the **minimum** number of forces that are acting on a compressed spring?

- A 3
- B 2
- C 1
- D 0

Your answer

[1]

7 Which of these solid blocks of material has the **smallest** density?



Your answer

[1]

- 8 Which sentence about static electricity is **not** correct?
- A A charged object exerts a force of attraction or repulsion on another charged object.
 - B If charges are the same on two objects they attract each other.
 - C Static electricity due to friction involves the movement of electrons.
 - D When a neutral object gains electrons it always becomes negatively charged.

Your answer

[1]

- 9 A sealed bottle contains gas. The bottle is heated and the pressure of the gas increases.
How do the gas particles cause this increase in pressure?

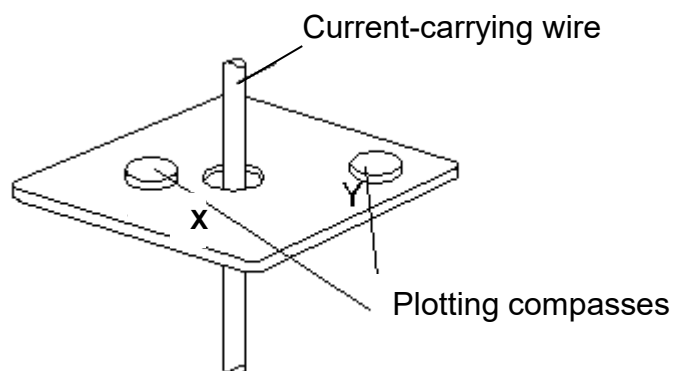
- A Their average distance apart increases.
- B They expand.
- C They hit each other more frequently.
- D They hit the can more frequently.

Your answer

[1]

SPECIMEN

- 10 Plotting compasses are positioned at **X** and **Y** near to a current-carrying wire.



Compared to **Y**, the strength and direction shown on the compass, of the magnetic field at **X** is:

- A** the same strength and direction
- B** the same strength and the opposite direction
- C** stronger and the opposite direction
- D** stronger and the same direction

Your answer

[1]

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TURN OVER FOR THE NEXT QUESTION

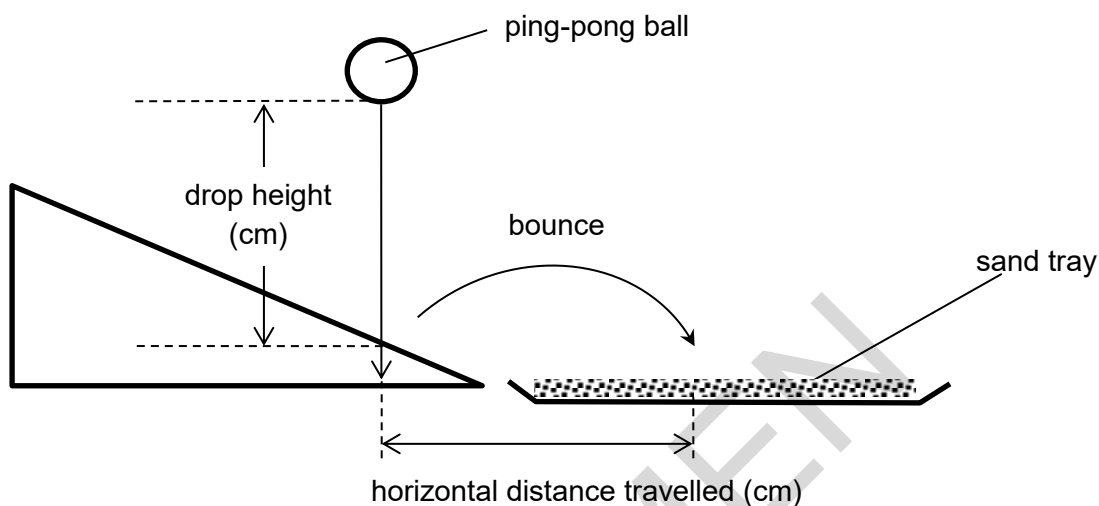
SPECIMEN

SECTION B

Answer **all** the questions.

- 11 A ping-pong ball is dropped onto a sloping surface.

It bounces and the horizontal distance it travels is measured.



The results of the experiment are shown in the table below.

Drop height (cm)	10	20	30	40	50	60	70	80
Horizontal distance travelled (cm)	7	14	20	25	29	32	34

- (a) Complete the table above by predicting the horizontal distance travelled by a ping-pong ball dropped from 80 cm.

[1]

- (b) The ball dropping from 70 cm took 0.6 seconds to travel a horizontal distance of 34 cm.
Calculate the horizontal velocity of the ping pong ball using the formula:

$$\text{distance travelled} = \text{speed} \times \text{time}$$

Show your working and give the unit.

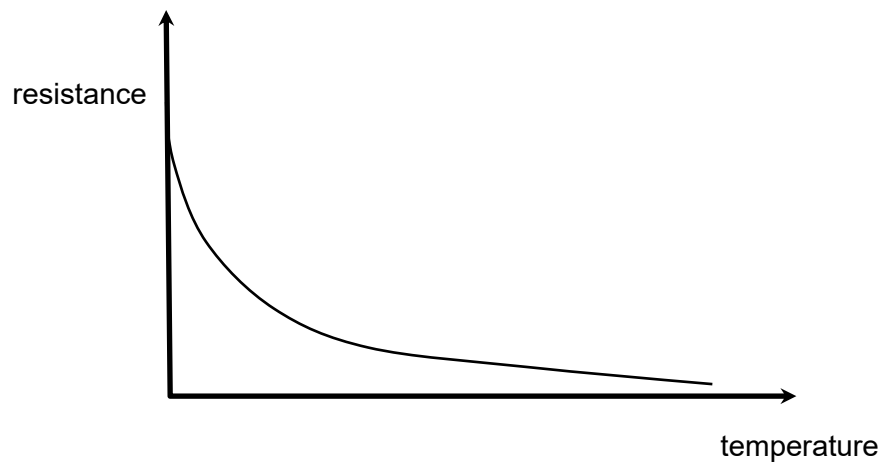
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answer: unit:

[4]

SPECIMEN

- 12 A graph of the resistance of a thermistor against temperature is shown below.

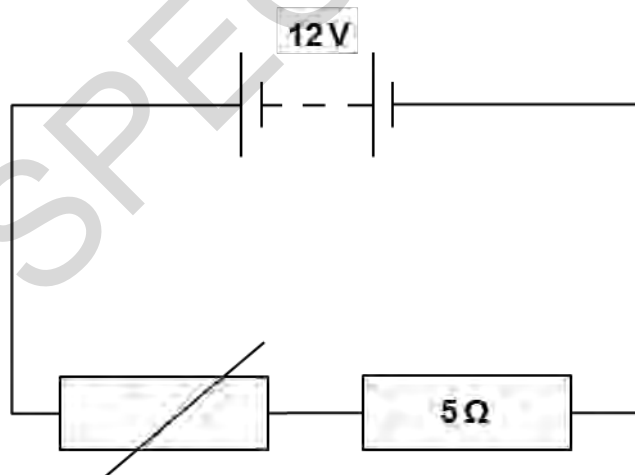


- (a) What happens to the resistance of the thermistor as the temperature increases?

.....
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[1]

The fixed resistor in the circuit below is a $5\ \Omega$ resistor.



- (b) The fixed resistor has 2 A of current flowing through it.

Using the equation:

$$\text{power} = (\text{current}^2) \times \text{resistance}$$

calculate the power dissipated in the resistor.

Show your working.

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[2]

answer:W

SPECIMEN

13 A spring is stretched using different weights.

The results of the experiment to find the extension of the spring are shown below.

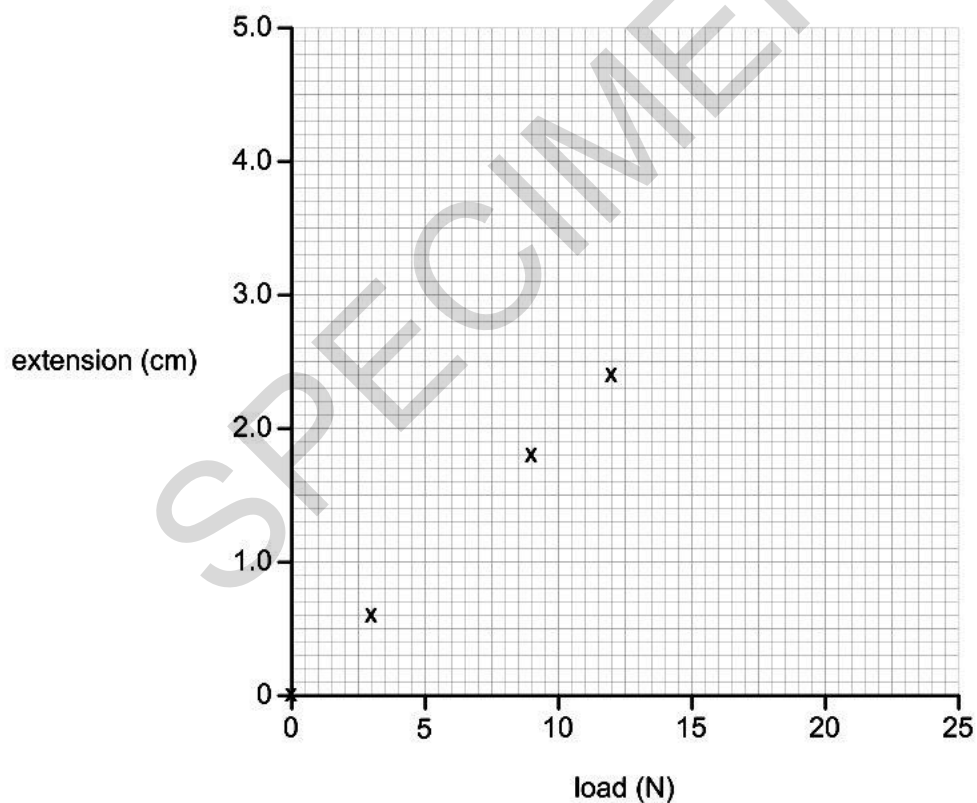
Load (N)	Length (cm)	Extension (cm)
0.0	10.0	0.0
3.0	10.6	0.6
6.0	11.2	
9.0		1.8
12.0	12.4	2.4
15.0	13.0	3.0

(a) Complete the table of results.

[2]

(b) Some points from the table have been plotted on the graph below.

Plot the points for loads of 6 N and 15 N against extension and draw a line of best fit.



[2]

(c) What evidence is there that the extension of the spring is **linear**?

..... [1]

(d) Calculate the spring constant using the formula:

$$\text{force} = \text{spring constant} \times \text{extension}$$

Show your working.

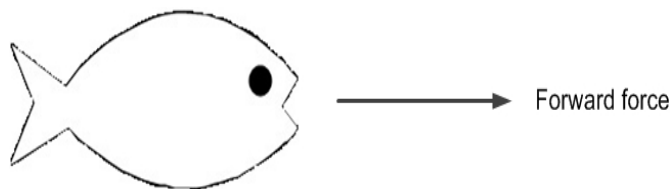
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answer: N/cm

[3]

SPECIMEN

- 14 A fish is swimming forwards and the forward force is labelled on the diagram below.



- (a) Draw and label the three other forces that are acting on the fish. Ignore the water pressure. [3]
- (b) If the fish uses 0.18 kJ of energy in 4 seconds, calculate the power of the fish using the formula:

$$\text{work done} = \text{power} \times \text{time}$$

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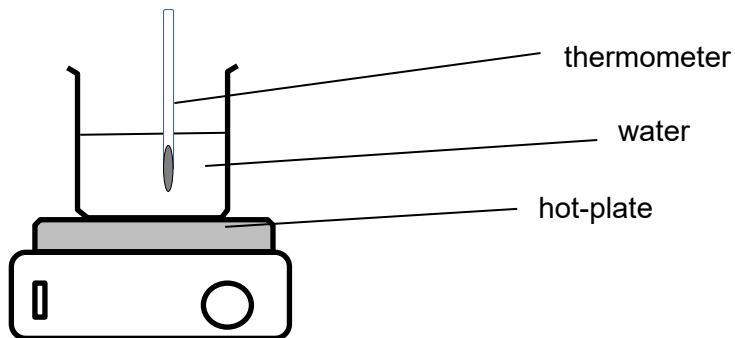
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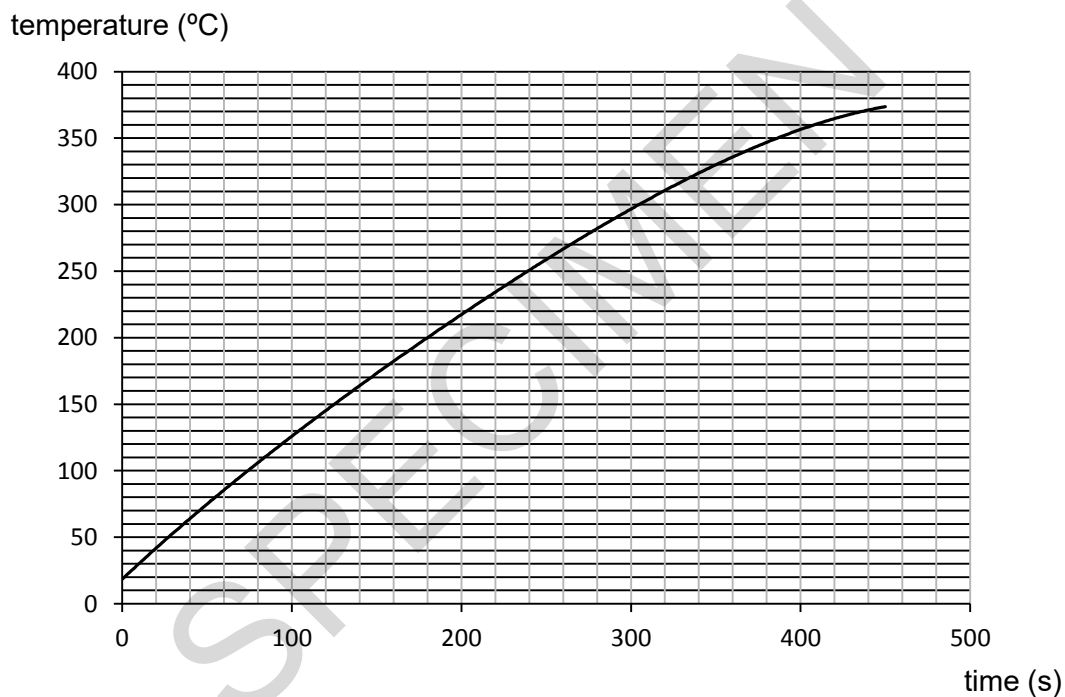
answer: W

[4]

- 15 0.4 kg of water is heated on a hot-plate.



The increase in temperature with time of the surface of the hot-plate is shown on the graph below.



- (a) (i) Use the temperature-time graph to find the time taken for the hot-plate to reach a temperature of 200 °C.

Show clearly on the graph **how** you measured this time.

answer s

[2]

- (ii) Predict the temperature of the hot plate at 500 s.

answer °C

[1]

(b) The water is heated until it boils to form steam.

The specific latent heat of vapourisation of water is 2 260 000 J/kg.

Use the formula:

thermal energy for a change of state = mass x specific latent heat

to calculate how much energy is needed to evaporate 0.4 kg of water.

Show your working and state the unit.

.....

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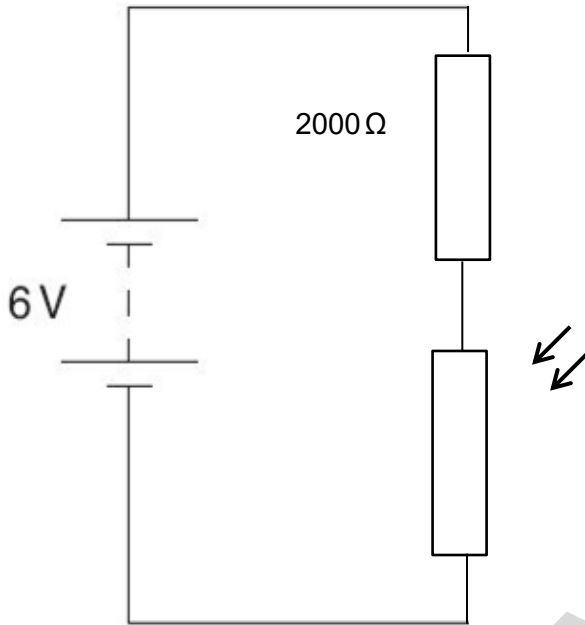
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answer **unit**

[3]

SPECIMEN

- 17 A security light is designed to switch on automatically when it becomes dark.
 Part of the circuit for the security light contains a battery, a light dependent resistor (LDR) and a $2000\ \Omega$ resistor.



- (a) In bright light, voltage across the $2000\ \Omega$ resistor is $4.0\ \text{V}$.
 Calculate the potential difference across the LDR.

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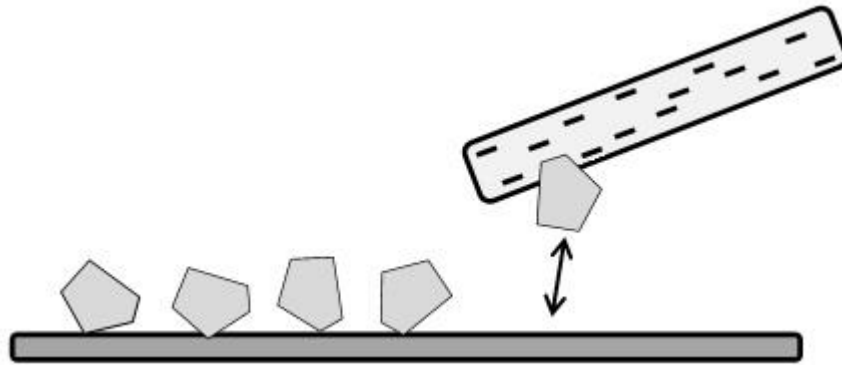
answer V [1]

- (b) Calculate the current in the $2000\ \Omega$ resistor.
 Show your working and state the unit.

.....

answer unit [4]

18 Some small pieces of paper are on a surface and a negatively charged rod is held near them.



(a)

(i) State what is meant by the term negatively charged?

..... [1]

(ii) A negatively charged rod made of another type of plastic is brought near to the pieces of paper.

Why is the plastic rod able to keep a negative charge?

..... [1]

(iii) Explain why the pieces of paper move towards the charged rod.

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..... [3]

