



# GCSE (9–1) Combined Science A (Physics) (Gateway Science)

**J250/11** Paper 11, P1–P3 and CS7 (PAGs P1–P6) (Higher Tier)

## Wednesday 23 May 2018 – Afternoon

Time allowed: 1 hour 10 minutes

#### You must have:

- a ruler (cm/mm)
- the Data Sheet (for GCSE Physics A (inserted))

#### You may use:

- · a scientific or graphical calculator
- an HB pencil



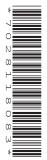
First name	
Last name	
Centre number	Candidate number

### **INSTRUCTIONS**

- The Data Sheet will be found inside this document.
- 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. If additional space is required, use the lined page(s) at the end of this booklet. The question number(s) must be clearly shown.
- · Do not write in the barcodes.

## **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 16 pages.



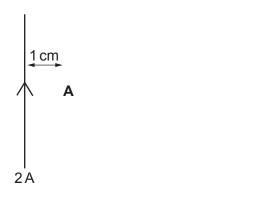
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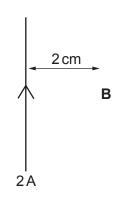
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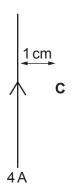
## Answer all the questions.

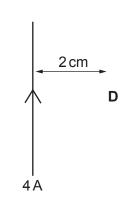
You should spend a maximum of 20 minutes on this section.

1 Four compasses are each placed near to a wire at points **A**, **B**, **C** and **D**. Each wire has a current flowing through it. The distance of each compass from its wire is shown.









Which compass experiences the **greatest** magnetic field strength?

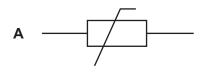
Your answer [1]

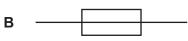
- 2 Which of the following is a definition for specific heat capacity in physics?
  - A Energy needed to increase the temperature of 1 g of material by 1 °C.
  - **B** Energy needed to increase the temperature of 1 kg of material by 1 °C.
  - **C** Energy needed to increase the temperature of 1 g of material by 10 °C.
  - **D** Energy needed to increase the temperature of 1 kg of material by 10 °C.

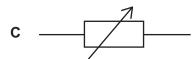
Your answer [1]

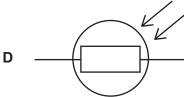
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**3** A student wishes to draw a diagram of a circuit she has created.









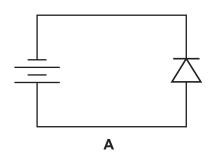
Which diagram A, B, C or D shows the circuit symbol for a variable resistor?

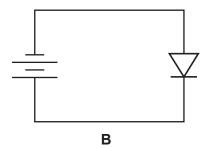
Your answer [1]

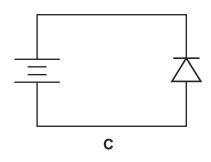
- 4 Which of the following forces is a non-contact force?
  - A Drag
  - **B** Electrostatic
  - **C** Tension
  - **D** Upthrust

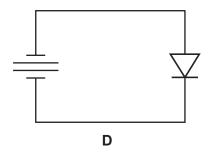
Your answer [1]

5 In which circuit would a current flow?









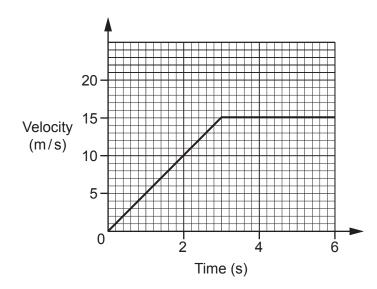
Your answer [1]

Whi	ch of the following is the same sp	eed as 7.2km/h?
Α	2.0 m/s	
В	20.0 m/s	
С	25.9 m/s	
D	120.0 m/s	
Your	answer	[1
	udent is heating substances in fo contents of the beakers is shown	ur identical beakers <b>A</b> , <b>B</b> , <b>C</b> and <b>D</b> . Some information abou below.
	A  2 kg  cific heat capacity = 4200 J/kg °C	B  1 kg  Specific heat capacity = 4200 J/kg °C
	cific heat capacity = 2000 J/kg °C	D  4 kg  Specific heat capacity = 2000 J/kg °C
Whie		amount of energy to raise the temperature of its contents
Your	ranswer	[1

6

7

8 Look at the graph below.



Which of the following is the distance travelled between 0 and 6 seconds?

- **A** 22.5 m
- **B** 45.0 m
- **C** 67.5 m
- **D** 90.0 m

Your answer			[1]
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- 9 How can mass be calculated?
  - A Acceleration divided by force
  - **B** Force divided by acceleration
  - **C** Gravity divided by weight
  - **D** Weight divided by force

Your answer [1]

**10** A student lifts four different objects onto a set of shelves.

Object	Mass (kg)	Height lifted (m)
Α	0.1	2.2
В	0.3	1.5
С	0.4	1.7
D	0.5	2.0

Which object gains the **most** gravitational potential energy?

Your answer	[1	]

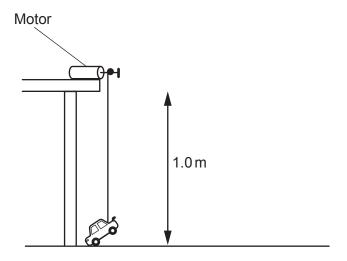
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## **SECTION B**

Answer all the questions.

11 (a) A student uses a small motor to lift a toy car through a vertical distance of 1.0 m.



The car has a weight of 0.05 N.

1	i۱	Calculate	the work	done	whon	lifting the	car	through	thie	distance	
(	1)	Calculate	the work	uone	wnen	mung me	Cal	unrougn	เกเร	distance	έ.

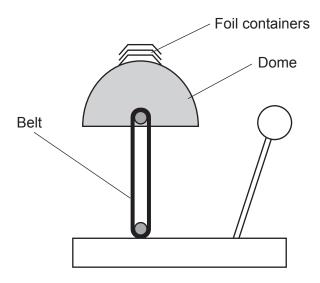
Answer =		J <b>[3]</b>
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(ii)	Calculate the power of the motor if the car takes 5.0 seconds to travel the 1.0 m distance.
	State the unit

(b)	The	motor uses 2 cells in series.
	Eac	ch cell has a potential difference of 1.5 V.
	(i)	Write down the total potential difference of the cells.
		Answer = V [1]
	(ii)	The motor has a resistance of $6.0\Omega$ .
		Calculate the current in the circuit when the motor is in use.
		Use the equation: Potential difference = Current × Resistance
		Answer = A [3]
(c)		student wishes to increase the time taken to lift this toy car vertically through the 1.0 m ance shown.
	Sug	gest a change he could make to this experiment to achieve this.
		[1]

**12** A teacher demonstrates static electricity using a Van de Graaff generator.

She places 3 metal foil containers on top of the dome of the Van de Graaff generator. When the Van de Graaff generator is turned on, the foil containers fly off the dome one by one.



(a) Explain why this happens.

Use ideas about charge in your answer.
[4]

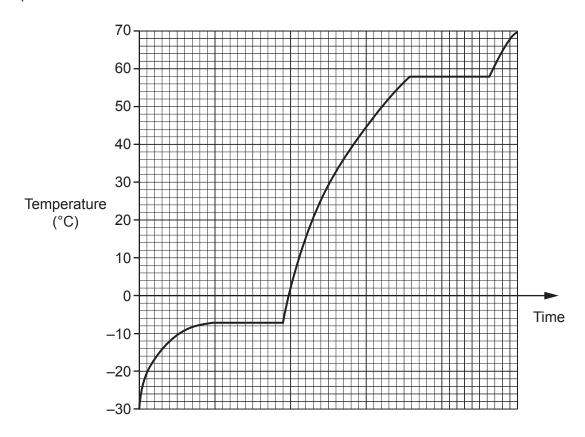
(b) Calculate how long it would take for a charge of 5.0 C to flow with a current of 25 mA.

Use the equation: Charge flow = Current × Time

Answer = ..... s [4]

13\* A student removes a material from a freezer and heats it up.

He uses a heater with a constant power output. He then plots a heating curve of the material as its temperature rises.



[6	
Describe and explain what the graph tells us about the material being heated.	

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**Turn over** 

14	(a)	Objects in freefall eventually reach terminal velocity.
		Draw a labelled diagram to show the forces acting on an object when it is falling at terminal velocity.
		[3]
	(b)	A student measures two forces.
		The forces are 5.0 N and 3.0 N. The forces act at 90° to each other.
		Draw a scale drawing to determine the resultant force.
		Answer = N [3]
	(c)	An object travelling in a circle at a constant speed has a changing velocity.
		State why.
		[1]

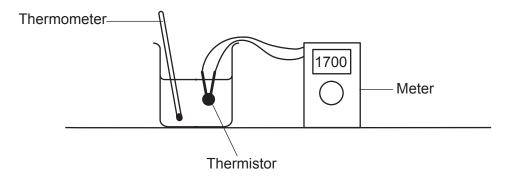
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			13
15	(a)	(i)	Fleming's left-hand rule is used to show the direction of the force produced when a current flows in a magnetic field.
			Explain how.
		/::\	A simple restor is above in the discussion
		(ii)	A simple motor is shown in the diagram.
			N S
			Use the diagram to explain how rotation is caused in the motor.
			[3
	(b)		culate the magnetic flux density on a 0.5 m long conductor when a current of 0.8A flows.
		The	e force produced is 0.6 N.
			Answer = T [3]

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**16** Two students investigate how the resistance of a thermistor varies with temperature.

The students place the thermistor in a beaker of water and measure the resistance of the thermistor for 5 different temperatures. They repeat the experiment three times at each temperature in order to calculate a mean.



Temperature	Resistance ( $\Omega$ )				
(°C)	1	2	3	Mean	
10	1900	1870	1930	1900	
15	980	1000	990	990	
20	770	760	760	763.3	
25	610	720	610	647	
30	540	540	530	536	

(a)	(i)	Describe the pattern shown by these results.	
			. [2]
	(ii)	The students have made mistakes when recording their results.	
		Identify two mistakes and explain what they should have done.	
			[2]

(D)	Suggest <b>one</b> way the experiment could be improved.				
	[1]				
(c)	At 10 °C the thermistor had a resistance of 1900 $\Omega$ . The thermistor has a power rating of 75 × 10 <sup>-3</sup> W.				
	Calculate the maximum current in this thermistor at 10 °C.				
	Use the equation: Power = Current <sup>2</sup> × Resistance				
	Answer = A [3]				

## **END OF QUESTION PAPER**

#### 16

## **ADDITIONAL ANSWER SPACE**

If additiona must be cle	I space is required, you should use the following lined page(s). early shown in the margin(s).	The question number(s
	I	
$\overline{\cap}$	D	



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