Qualification Accredited

Oxford Cambridge and RSA

GCSE (9-1)

Exemplar Candidate Work

GATEWAY SCIENCE COMBINED SCIENCE A

J250
For first teaching in 2016

J250/11 Summer 2018 examination series

Version 1

Contents

Introduction

These exemplar answers have been chosen from the summer 2018 examination series.

OCR is open to a wide variety of approaches and all answers are considered on their merits. These exemplars, therefore, should not be seen as the only way to answer questions but do illustrate how the mark scheme has been applied.

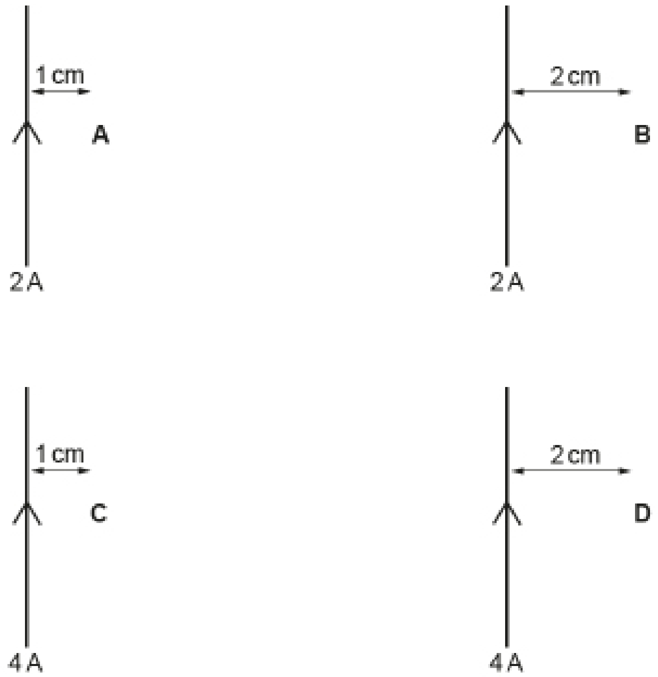
Please always refer to the specification https://www.ocr.org.uk/qualifications/gcse/gateway-science-suite-combined-science-a-j250-from-2016/ for full details of the assessment for this qualification. These exemplar answers should also be read in conjunction with the sample assessment materials and the June 2018 Examiners' report or Report to Centres available from Interchange https://interchange.ocr.org.uk/Home.mvc/Index

The question paper, mark scheme and any resource booklet(s) will be available on the OCR website from summer 2019. Until then, they are available on OCR Interchange (school exams officers will have a login for this and are able to set up teachers with specific logins – see the following link for further information http://www.ocr.org.uk/administration/support-and-tools/interchange/managing-user-accounts/).

It is important to note that approaches to question setting and marking will remain consistent. At the same time OCR reviews all its qualifications annually and may make small adjustments to improve the performance of its assessments. We will let you know of any substantive changes.

Question 1

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.



Please note there was an erratum notice for this question:

Turn to page 2 of the data sheet and look at the equation under the title 'Higher Tier only'.

Cross out the words 'field strength' and replace them with 'flux density'.

The equation should now read:

'force on a conductor (at right angles to a magnetic field) carrying a current =

magnetic flux density × current × length'

Exemplar 1 0 marks

Which compass experiences the **greatest** magnetic ~~field strength~~?
flux density

Your answer $\boxed{D}$ **[1]**

Examiner commentary

This candidate has amended the question using the information from the erratum notice. They have crossed out the words 'field strength' and replaced them with 'flux density'. The candidate has appreciated that the greater the current, 4 A rather than 2 A, is a factor in determining the greatest flux density, so has chosen option D. This was a commonly selected distractor that does not take into account that the flux density is greater closer to the wire. Candidates who also appreciated this correctly selected option C.

Question 2

Exemplar 1 — 1 mark

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: B [1]

Examiner commentary

This candidate has read through the options for the definition of specific heat capacity and selected the correct option by placing a tick next to option B and then writing the letter B in the answer box. Candidates should be encouraged to tick and/or cross the options within the question before using this information to select their answer. The most commonly selected distractor for this question was A where candidates thought that the unit of mass involved was 1 g rather than 1 kg.

Question 6

Exemplar 1 — 1 mark

6 Which of the following is the same speed as 7.2 km/h?

A 2.0 m/s

B 20.0 m/s

C 25.9 m/s

D 120.0 m/s

1 km = 1000 m
7.2 km = 7200 m/h

7200 h =
1 h = 3600 s
×7200

Your answer: A [1]

Examiner commentary

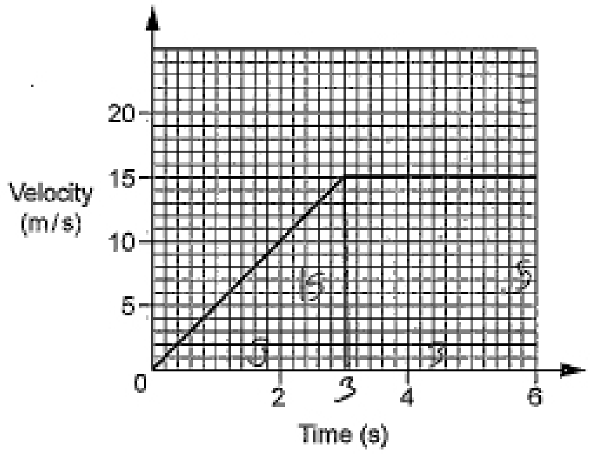
Only a third of candidates got this question right, as shown in Exemplar 1. The candidate has used the space beside the options to convert km to m and hours to seconds in two careful steps to calculate the correct answer, option A. The use of this space to perform calculations should be encouraged as the candidates that do this are more successful at questions of this type.

In general candidates found questions that involved conversions to be quite challenging, even where the mathematics involved was simple.

Question 8

Exemplar 1 — 1 mark

8 Look at the graph below.



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

A 22.5m

B 45.0m

C 67.5m

D 90.0m

$\frac{1}{2} \times 3 \times 15 = 22.5$
$+$
$3 \times 15 = \cancel{46}\ 45$

Your answer $\boxed{C}$ **[1]**

Examiner commentary

This candidate has used the graph to divide the area under the line into a triangle and a rectangle. They have then shown the measurements of each side to enable them to calculate the area of each shape. Finally they have added the two values together to give the answer of 67.5m, the correct option C. Candidates who carefully used the graph to determine the figures for their calculations performed well in this question.

Question 9

Exemplar 1 1 mark

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

$F = ma$

F

$m \; a$

Your answer $\boxed{B}$

weight = mass × grs

[1]

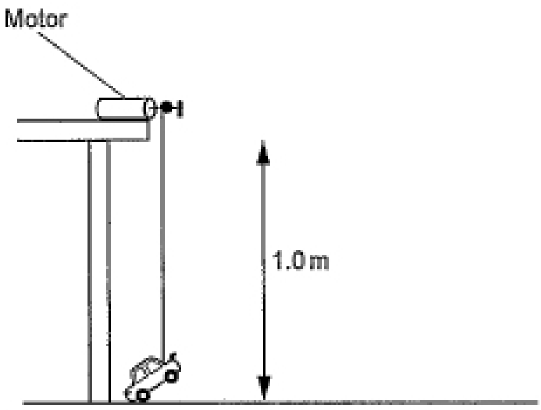
Examiner commentary

This candidate has used the relationship F = ma and then rearranged the relationship to give m = F/a. This has then helped the candidate to answer the question about how mass is calculated. Candidates that used this rearranged relationship performed well on this question.

Question 11 (a) (i)

Exemplar 1 3 marks

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.

(i) Calculate the work done when lifting the car through this distance.

work done = force × distance

0·05 × 1

Answer = 0·05 J [3]

Examiner commentary

This candidate has clearly written the equation, work done = force x distance, and then then substituted the numerical values into it from the question to obtain the correct answer of 0.05 (J). Candidates who demonstrated their knowledge of the equation and carefully substitution performed well on this question. A few candidates tried to convert the weight of the car into a mass in kilograms and then used this as their force. They were still able to achieve 1 mark if they had quoted the equation initially.

Question 11 (a) (ii)

Exemplar 1 4 marks

(ii) Calculate the power of the motor if the car takes 5.0 seconds to travel the 1.0 m distance.

State the unit.

$P = \frac{wd}{T}$ $\frac{0.05}{5}$

Answer = 0.01 Unit W [4]

Examiner commentary

This candidate has stated the equation, power = work done/time taken and then has substituted the correct figures into the equation from the question. The answer of 0.01 was given 3 marks, with error carried forward from their answer of the work done from part (a)(i) if necessary. The final mark for this question was for stating the unit of power. This candidate has corrected given the unit as W but watts, joules per second and J/s were all acceptable. A common error by candidates was to multiply the work done by the time taken and these candidates only tended to score the unit mark.

Question 11 (b) (i)

Exemplar 1 1 mark

(b) The motor uses 2 cells in series.

Each cell has a potential difference of 1.5 V.

(i) Write down the total potential difference of the cells.

1.5×2

Answer = 3 V [1]

Examiner commentary

This candidate has shown that potential difference of cells in series is the addition of the two cells, 1.5 V and 1.5 V to give 3 (V). Many candidates, with this simple calculation, just stated the correct answer. Some candidates thought that the potential difference would only be 1.5 V, the potential difference of one cell.

Question 11 (b) (ii)

Exemplar 1 — 3 marks

(ii) The motor has a resistance of 6.0 Ω.

Calculate the current in the circuit when the motor is in use.

Use the equation: Potential difference = Current × Resistance

Potential difference ÷ resistance = Current.

1.5V ÷ 6 = 0.25

ECF

Answer = 0.25 A **[3]**

Examiner commentary

This candidate got part (b)(i) incorrect with the value of 1.5 V, the potential difference of just one of the cells. They have not been penalised for this error as error carried forward has been used in this question. They have correctly rearranged the equation given to current = potential difference/resistance and then substituted their calculated value of potential difference and the given resistance into this equation. The correct answer with a potential difference of 3 V is 0.5 (A) but this candidate has an answer of 0.25 (A) because of the error carried forward from part (b)(i), a potential difference of 0.5 V.

Exemplar 2 — 3 marks

(ii) The motor has a resistance of 6.0 Ω.

Calculate the current in the circuit when the motor is in use.

Use the equation: Potential difference (voltage) = Current × Resistance

3 = current × 6

$\frac{3}{6} = 0.5$

Answer = 0.5 A **[3]**

Examiner commentary

This candidate has annotated the question to show that it is current that is required for the answer. They have then substituted the numerical values into the stated equation rather than rearranging the equation first. They have then rearranged the equation to give the correct answer of 3 (A). There is no need for an error carried forward for this response as the answer to (b)(i) was 3 (V).

Question 11 (c)

Exemplar 1 1 mark

(c) The student wishes to increase the time taken to lift this toy car vertically through the 1.0 m distance shown.

Suggest a change he could make to this experiment to achieve this.

Decrease the power by increasing the resistance for example adding more resistors into the circuit. [1]

Examiner commentary

The candidate has given a complex correct answer explaining why adding more resistors will increase the time taken to lift the toy car.

Exemplar 2 1 mark

(c) The student wishes to increase the time taken to lift this toy car vertically through the 1.0 m distance shown.

Suggest a change he could make to this experiment to achieve this.

The Student Can Increase the Weight of the Car. [1]

Examiner commentary

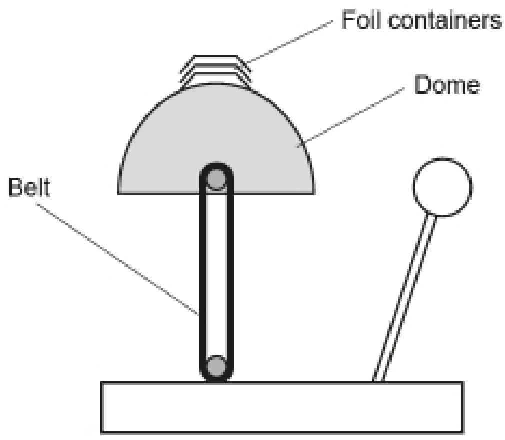
This candidate has given a simple correct answer by stating that the mass, in this case the weight, of the toy car can be increased to increase the time taken to lift the toy car.

Question 12 (a)

Exemplar 1 — 3 marks

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.

As the belt turns it rubs on the dome
and ~~p~~ electrons jump to the dome
makeing it negatively charged and
to containers have a ~~positive charges~~
negative charge so ~~n~~ they repel as
the same charge repel.

[4]

Examiner commentary

This candidate has clearly explained that charge is transferred to the dome when they refer to 'electrons jump to the dome making it negatively charged'. They then explain in a few words that the containers are also negatively charged and like charges repel. This candidate used clear simple language to explain why the foil containers fly off the dome one by one. Many candidates tried to write long explanations, often contradicting what was happening in their answer. Very few candidates stated that the dome and foil were conductors or that the charge was distributed across the dome or containers for fourth marking point.

Question 12 (b)

Exemplar 1 — 3 marks

(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

$$\text{Time} = \frac{\text{charge}}{\text{current}}$$

$5 \div 25 = 0.2$

Answer = 0.2 s **[4]**

Examiner commentary

This candidate has correctly rearranged the given equation to time = charge/current, for 1 mark. They have then substituted the values given in the question into this rearranged equation. However, they have not converted the current of 25 mA into 0.025 A. This is a common error with the answers seen for this question. As the candidate has shown all their working and they have only made one error in not converting the current from mA to A they are given 3 out of the 4 marks available.

Exemplar 2 — 4 marks

(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

÷10
2.5
÷100
0.025A

$$\frac{5}{0.025} = 200$$

Answer = 200 s **[4]**

Examiner commentary

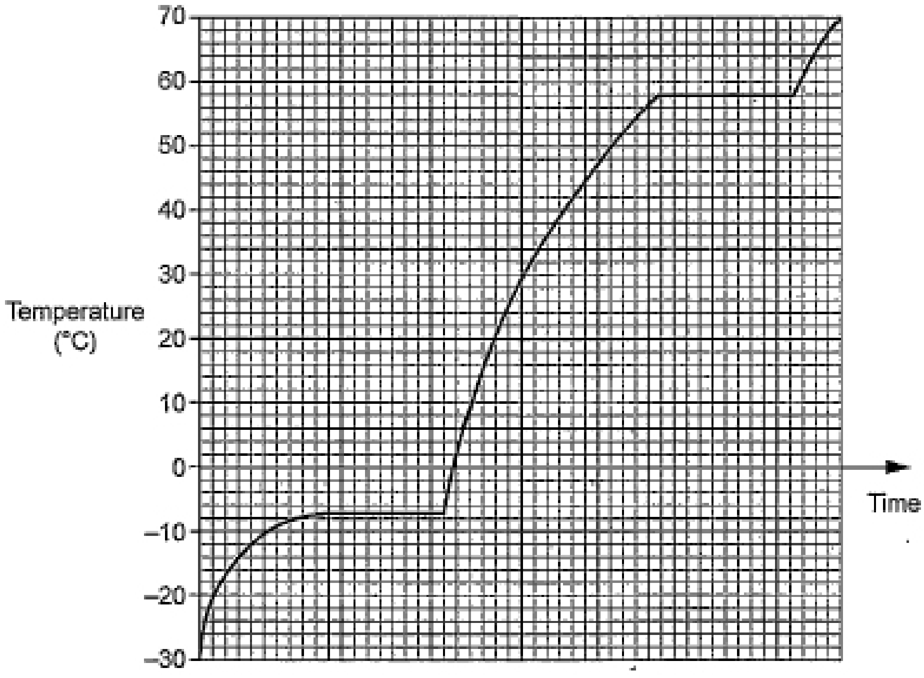
This candidate has correctly converted the 25 mA into 0.025 A by doing a conversion sum on the top right of their answer. They have then substituted this value for current into their rearranged equation to give the correct answer of 200 (s) and therefore have been given all 4 marks available.

Question 13

Exemplar 1 6 marks

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.



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

The points where the heating curve make a horizontal line means there is a state change happening. So the melting
L3 point of this material is about -7° and the boiling point is 58°. From this we know the material was not a pure sample of water ~~ice~~ or ice. The graph ~~it~~ shows us that it takes longer for the bonds to break when it is going from a liquid to a gas and that it has likely got a higher specific heat capacity when it is a liquid. If you use what you know about the melting and boiling points you can work out what element it is. At room temperature it is a liquid which you can also use to suggest the material. If it does not match other elements melting and boiling points, it might be an impure substance. **[6]**

Examiner commentary

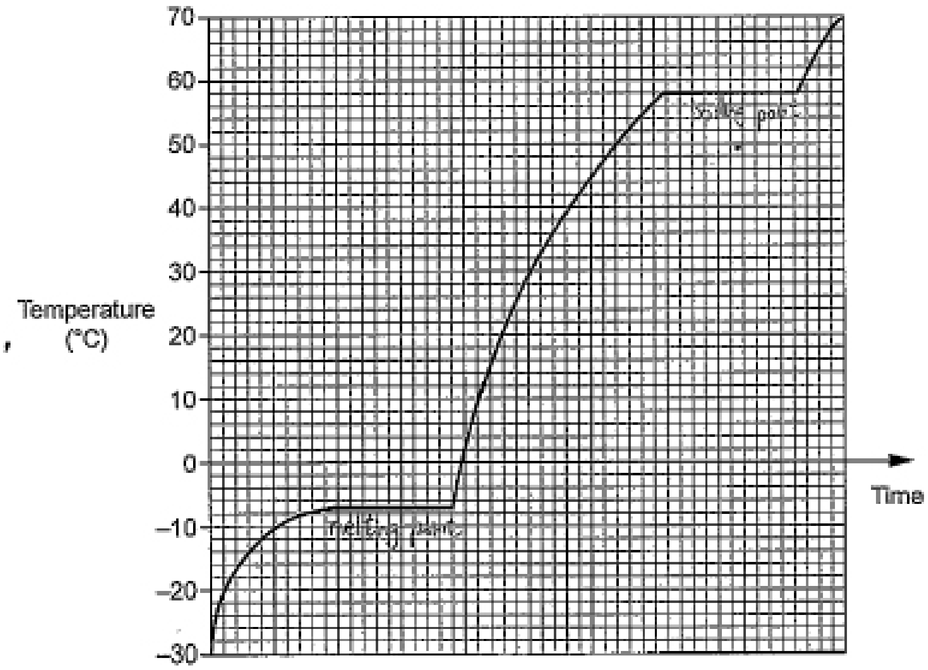
Exemplar 1 is an excellent response that was credited with the maximum 6 marks. The candidate has analysed information to interpret the graph by stating that the graph levels out and so there is no change in temperature at -7°C and 58°C. They have analysed information to make judgements about what the graph shows by explaining that the substance is not pure water and that at room temperature the substance is a liquid. The candidate has also analysed information from the graph to draw conclusions about the material by stating that the melting point is -7°C and the boiling point is 58°C.

Exemplar 2

4 marks

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.



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

Since the student heats the freezer, the temperature of the freezer increased quickly until −7°C approximately. Because in −7°C, there is a line, which means the freezer's 'melting point.' So it took similar time ~~as that~~ to melt as the freezer reached to the temperature to melt.

L2

After the melting point, the temperature ~~had~~ increased in the fastest speed to reach at 58°C. The temperature stopped at 58°C to be boiled in the boiling point. And then the temperature increases after the boiling point.

This graph shows the melting point is −7°C and the boiling point is 58°C in this freezer. Also it shows ~~the~~ temperature increases quickly to reach to a melting point and a boiling point. **[6]**

Examiner commentary

Exemplar 2 is a Level 2 response that met the criteria for the top of this level and was credited with 4 marks. The candidate has analysed information to interpret the graph by stating that the temperature increases at different rates. They have not explained that the graph levels out, only that there is a line. The candidate has also analysed information from the graph to draw conclusions about the material by stating that the melting point is -7°C and the boiling point is 58°C. However the candidature shows some confusion about the substance and the freezer at the beginning of their answer.

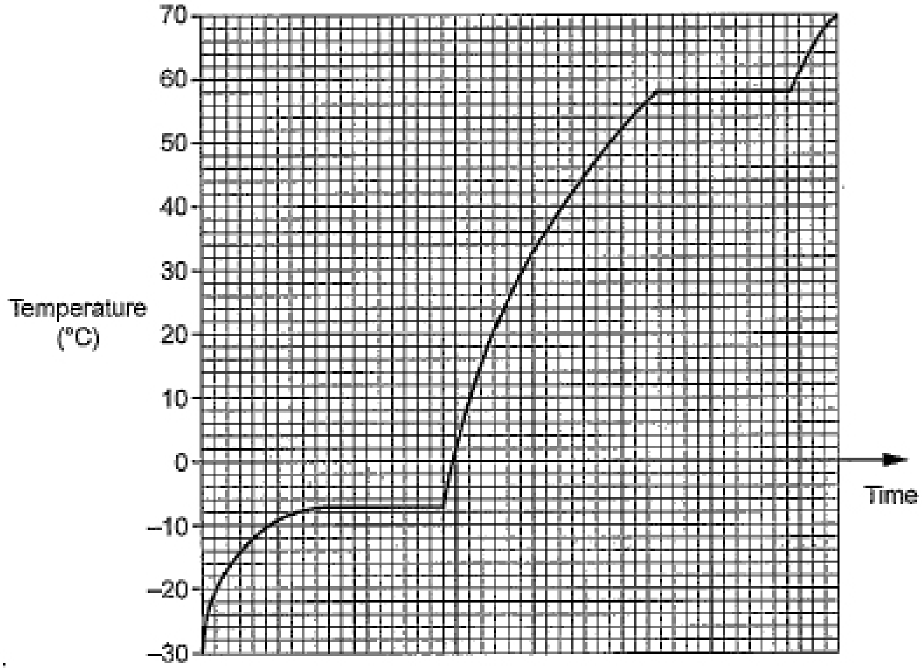
To move up to Level 3 the response would need to analyse information to make judgements about what the graph shows. For example the candidate could make an unambiguous reference to the substance not being water but being a liquid at room temperature or that the substance changes from a solid to a liquid and finally to a gas.

Exemplar 3

2 marks

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.



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

As you uncrease the temperature the plarticls

L1 get more energy in the kenetic stone and

vibrate more, as it gets to -8°c the energy

used to uncrease temperature will go to

break the bonds. When all the bonds are

brocken from melting the energy goes

back into uncreasing the temperature

as ~~6g~~ the temperature reaches 58°c the

energy goes into breaking the bond causing

it to evaporate. Once all the bonds break

the energy goes back into raising

the temperature. **[6]**

Examiner commentary

Exemplar 3 is a Level 1 response that was credited with 2 marks. The candidate's response concentrated on only one aspect of the question, and analyses information from the graph to draw conclusions about the material. The candidate incorrectly given the melting point at -8°C, but has correctly said that the material is a gas above 58°C.

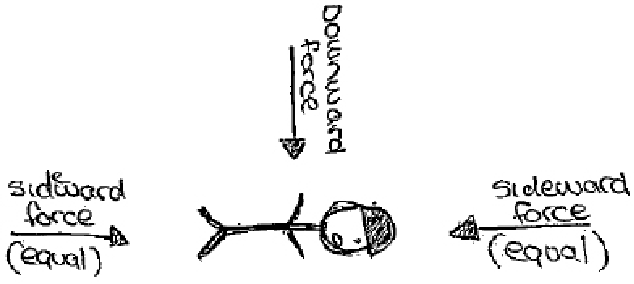
To progress up to Level 2 this candidate would need to analyse information to interpret the graph and make judgements about what the graph shows.

Question 14 (a)

Exemplar 1 0 marks

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]

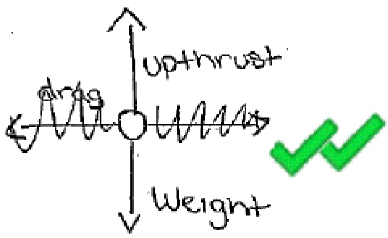
Examiner commentary

This candidate's answer is one of many examples where the candidate has attempted to draw a labelled diagram to show the forces acting on an object when it is falling at terminal velocity. They have not named the downward force and they have not appreciated that it is the upward and downward forces that need to have arrows of the same length.

Exemplar 2 2 marks

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]

Examiner commentary

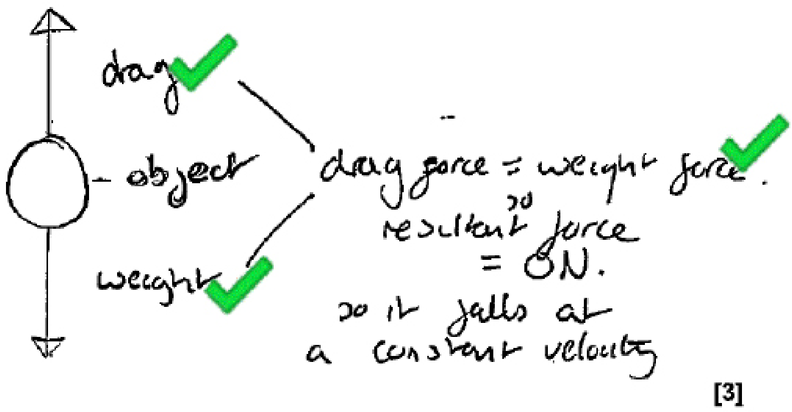
This candidate has drawn a good labelled diagram to show the upward and downward forces as equal length arrows. However, they have labelled the upwards arrow as 'Upthrust' when it should have been air resistance or drag, this is a common misconception. Upthrust is the upward buoyance force acting on a body that is floating in/on a fluid, for example a submarine or a kayak.

Exemplar 3

3 marks

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]

Examiner commentary

The candidate has drawn an excellent diagram to show the forces acting on an object when it is falling at terminal velocity.

Question 14 (b)

Exemplar 1

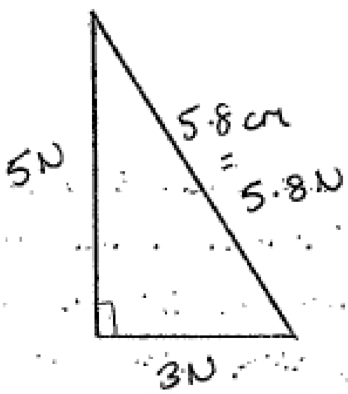
3 marks

(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.

Scale 1cm = 1N.



Answer = 5.8 N [3]

Examiner commentary

The candidate has drawn a correct scale drawing to determine the resultant force. They have labelled the 5 N and 3 N forces and these are drawn touching and at right angles to each other. The resultant force is clearly labelled as 5.8 N with the measurement of length given as 5.8 cm. This excellent answer is also accompanied by the scale showing that 1 cm represents 1 N. Many candidates did not draw a diagram with the arrows touching and at right angles to each other, some candidates did not use a ruler and a few did not use a suitable scale.

Question 14 (c)

Exemplar 1 1 mark

(c) An object travelling in a circle at a constant speed has a changing velocity.

State why.

The direction is always changing [1]

Examiner commentary

The candidate has given a clear answer explaining that the direction is changing rather than just the object is travelling in a circle or that velocity is a vector.

Question 15 (a) (i)

Exemplar 1 3 marks

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.

Fleming's left hand rule is used because the forces ~~prett~~ magnetic feild and thrust are all ~~90°c from eachother~~ at 90° angles. ~~This is~~ The thumb is thrust, the 1st finger is magnetic feild and the 2nd finger is for current. [3]

Examiner commentary

The candidate has given a complete answer by explaining that the forces are at 90° from each other. The candidate has then gone on to explain that the first finger represents the magnetic field, the second finger represents the current and the thumb represents the direction of movement.

Exemplar 2 2 marks

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.

The middle finger show the direction of the current. The index finger shows the direction ~~*~~ of the magnetic field. The thumb shows the direction of the force. [3]

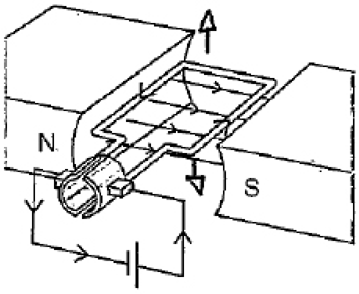
Examiner commentary

The candidate has not explained that the forces are at 90° or perpendicular to each other, a marking point that many candidates did not explain. The candidate has explained that the first finger represents the magnetic field, the second finger represents the current and the thumb represents the direction of movement so scores 2 marks for correctly identifying which part of the hand represents the field, current and movement.

Question 15 (a) (ii)

Exemplar 1 — 3 marks

(ii) A simple motor is shown in the diagram.



Use the diagram to explain how rotation is caused in the motor.

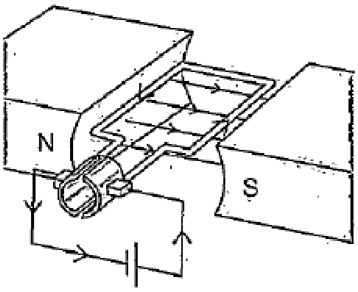
As the current is flowing in opposite directions on either side of the coil the force acting upon it will be in opposite directions. This means the wire on the left will go up and on the right will go down creating a spinning motion. The force is because the current in the wire produces a magnetic field as well as the constant magnetic field ~~on the~~ from the ~~magnetics~~ magnets these fields act on each other creating a force. A split-ring communicator is needed to constantly switch the direction of the current so it spins in the same direction. [3]

Examiner commentary

The candidate has given a correct but lengthy explanation as to how the rotation is caused in the motor. To complete their full explanation they have used the additional answer space at the end of the paper and have clearly labelled this answer with the question number 15(a)(ii). The candidate has explained that the opposite sides of the coil experience forces in opposite directions. They have also added arrows to the diagram to help show the direction of the forces. They have explained that the force is due to the current creating a magnetic field and that the magnetic fields interact.

Exemplar 2 — 1 mark

(ii) A simple motor is shown in the diagram.



Use the diagram to explain how rotation is caused in the motor.

As a current passses through ~~a~~ the wire it generates a magnetk seild opposit creating to opposit pole so the wire is pushed up or down and the current changes direction to keep the poles opposit. [3]

Examiner commentary

The candidate has started the explanation correctly by stating that the current creates a magnetic field. However, they have not used the diagram or Fleming's left-hand rule to explain how rotation is caused in the motor. This type of answer was a commonly seen response from many candidates.

Question 15 (b)

Exemplar 1 — 3 marks

(b) Calculate the magnetic flux density on a 0.5 m long conductor when a current of 0.8 A flows.

The force produced is 0.6 N.

0.6N = magnetic flux density × ~~current~~ 0.8A × ~~length~~ 0.5m

= magnetic flux density × 0.4 (m×A)

magnetic flux density = 0.6N ÷ 0.4 (m×A) = 1.5 T

Answer = 1.5 T [3]

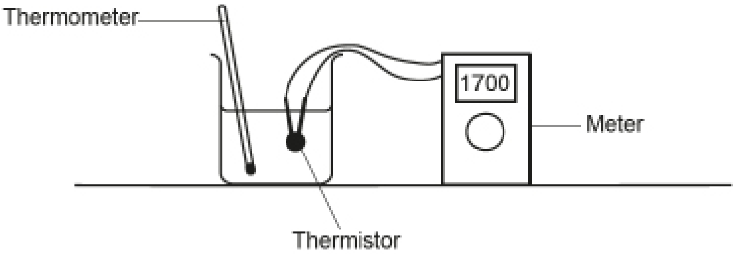
Examiner commentary

The candidate has inserted the numerical values into the correct equation and then rearranged the equation to calculate the magnetic flux density as 1.5 T. If the candidate had not given the correct answer the correct workings provided would still enable the candidate to achieve marks for this question.

Question 16 (a) (i)

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 (°C)	Resistance (Ω)			
	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

Exemplar 1 — 2 marks

(a) (i) Describe the pattern shown by these results.

As the temperature increases the resistance of the thermistor decreases. The decrease is quick at first but becomes lower the hotter it gets. **[2]**

Examiner commentary

The candidate has described the pattern in detail. They have recognised that as the temperature increases the resistance increases but that this change in resistance is larger at lower temperatures.

Exemplar 2 — 1 mark

(i) Describe the pattern shown by these results.

As the temperature increases the resistance decreases. **[2]**

Examiner commentary

This candidate has a very typical partial response to this question. They have only explained that as the temperature increases the resistance decreases. They have not looked carefully at the figures in the table to explain that this is not a linear relationship. That the question was worth more than 1 mark should have been an indication to the candidate that there was more than one thing to be said about the pattern shown by the results.

Question 16 (a) (ii)

Exemplar 1 — 2 marks

(ii) The students have made mistakes when recording their results.

Identify **two** mistakes **and** explain what they should have done.

The mean for 30° has been rounded down when it should have been rounded up to 537. The answers overall aren't consistent. If they are all rounded to 1dp. 25° and 30° should have decimal places and if they are rounded to a whole number 763·3 should be 763. **[2]**

Examiner commentary

In this question candidates were asked to identify two mistakes. This candidate has clearly identified two mistakes, the mean for 30°C and the 763.3 Ω. The question then asks the candidate to explain what they should have done. This candidate has also clearly explained that at 30°C the mean should be 763 Ω and the 763.3 Ω should be 763 Ω.

Exemplar 2 — 0 marks

(ii) The students have made mistakes when recording their results. decreased.

Identify **two** mistakes **and** explain what they should have done.

(continued on additional paper)

The mean for the 25°c temperature results was rounded to 647 when it should be left as the exact answer = 646.6 The mean for the 20°c temperature was not rounded but **[2]** left as a decimal so this should be the same for the 25°c ~~results~~ mean and the 30°c mean.

~~The result 720 on the 25°c result could be an~~

16.a.ii. The result 720 on the 25°c temperature could be an anomaly because trials 1 and 3 are the same = 610. They should be more careful ~~when~~ during the experiment and when recording data to avoid anomalies.

Examiner commentary

This candidate has given a very lengthy answer to this question and have used the additional answer space correctly by showing the question number as 16(a)(ii) on the additional answer space page. However, the candidate has not gained any marks for this answer. They have identified two mistakes, the mean for 20°C and the 720 Ω. However, the candidate has not explained what the student should have done when recording their results. The candidate has not been exact and has not stated that for 20°C the 763.3 Ω should be 763 Ω and has just given the vague idea about rounding. For the 720 Ω reading all the candidate has explained is that care need to be taken when writing down results. Many candidates thought that the mistakes were either due to not taking care to write down the correct results, or there was a problem with the apparatus or that there was a problem with the investigation method.

Question 16 (b)

Exemplar 1 1 mark

(b) Suggest **one** way the experiment could be improved.

They include a wider range of temperatures **[1]**

Examiner commentary

The candidate gives a clear, simply stated answer to increase the range of temperatures being investigated.

Exemplar 2 0 marks

(b) Suggest **one** way the experiment could be improved.

The beaker of water could be insulated so the temperature doesn't decrease during the experiment. **[1]**

Examiner commentary

The candidate has given a very common response to this question. They have stated that the beaker needs to be insulated so the water does not cool down during the investigation. This suggests that the candidate thinks this investigation is to measure the specific heat capacity of water rather than to investigate how resistance of a thermistor varies with temperature.

Question 16 (c)

Exemplar 1 3 marks

(c) At 10 °C the thermistor had a resistance of 1900 Ω. The thermistor has a power rating of 75×10^{-3} W.

Calculate the maximum current in this thermistor at 10 °C.

Use the equation: Power = Current^2 × Resistance

75×10^{-3} W = Current^2 x 1900

Answer = 6.28×10^{-3} A [3]

$\frac{75 \times 10^{-3}}{1900}$ = current^2 =

Examiner commentary

The candidate has used the equation given to substitute the correct values and then rearrange it so that the current squared is determined. Although they have not shown the final part of the calculation they have clearly performed the calculation correctly as they have the answer of 6.28 x 10^{-3} A. Clear workings in calculations will allow candidates to gains marks even if the final answer is not correct.

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