Pearson Edexcel

INTERNATIONAL GCSE

Science (Single Award) (9-1)

EXEMPLARS WITH EXAMINER COMMENTARIES

PAPER 1P

Pearson Edexcel International GCSE in Science (Single Award) (4SS0)

Contents

Introduction

1.1 About this booklet

This booklet has been produced to support teachers delivering the Pearson Edexcel International GCSE in Science (Single Award) specification. The Paper 1P exemplar materials will enable teachers to guide their students in the application of knowledge and skills required to successfully complete this course. The booklet looks at questions 3(a)(ii), 3(b), 4(b), 4(c), 6(c), 7(b) from the June 2019 examination series, showing real candidate responses to questions and how examiners have applied the mark schemes to demonstrate how student responses should be marked.

1.2 How to use this booklet

Each example covered in this booklet contains:

- Question
- Mark scheme
- Exemplar responses for the selected question
- Example of the marker grading decision based on the mark scheme, accompanied by examiner commentary including the rationale for the decision and where relevant, guidance on how the answer can be improved to earn more marks.

The examples highlight the achievement of the assessment objectives at lower to higher levels of candidate responses.

Centres should use this content to support their internal assessment of students and incorporate examination skills into the delivery of the specification.

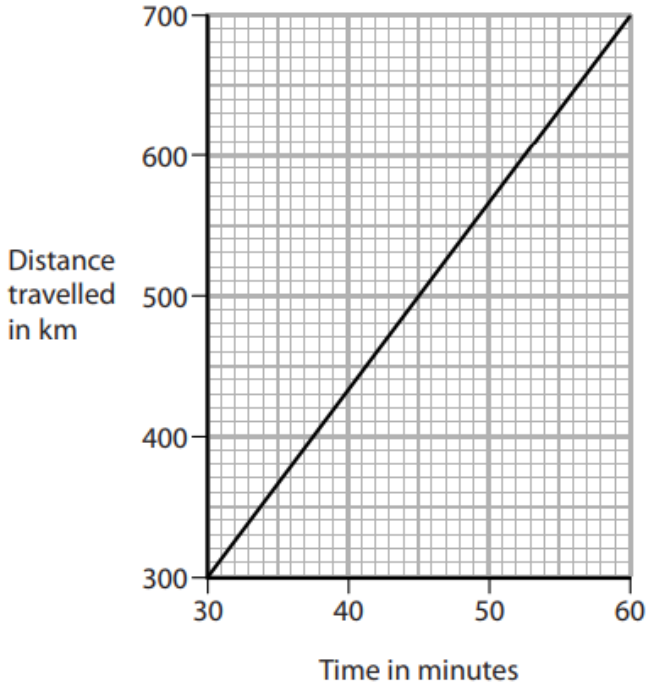
1.3 Further support

A range of materials is available from the Pearson qualifications website to support you in planning and delivering this specification.

Centres may find it beneficial to review this document in conjunction with the Examiner's Report and other assessment and support materials available on the Pearson Qualifications website.

Question 3(a)(ii)

3 The graph shows how the distance travelled by an aeroplane changes during part of its journey.



(ii) Calculate the average speed of the aeroplane during this part of its journey.

Give a suitable unit.

(4)

Mark scheme

(ii)	use of one correct pair of readings from the graph; substitution of a correct distance and time into formula; evaluation; matching unit; e.g. total distance = 700 (km), total time = 60 (mins) (speed =) 400 / 30 (speed =) 13 km/minute	seen anywhere in working must be consistent with units used in substitution 400 000 / 1800 222 m/s 0.222 km/s gains 4 marks 800 km/hour gains 4 marks 12 km/minute gains 2 marks only 194 m/s gains 2 marks only	4

Exemplar response A

(ii) Calculate the average speed of the aeroplane during this part of its journey.

Give a suitable unit.

(4)

$S = \frac{d}{t} = S = \frac{700\,Km}{60\,min} =$

average speed = 11.6 unit m/s .

Examiner's comments:

This response was given 1 mark.

This question required candidates to extract correct readings from a distance-time graph to determine the speed of an aeroplane. Candidates were also expected to give a suitable, matching unit with their answer.

Candidates working at Grade 4 typically scored at least 1 mark in this question and this particular response is indicative of a candidate working at this level. This candidate has correctly read a single pair of readings from the graph to gain the first mark. However, a mistake was made since the line on the graph does not start at the origin.

The response could be improved by taking a second pair of readings from the graph and using the distance between these readings and the respective time taken to substitute into the formula.

In addition, the unit mark has not been awarded as data was not used in metres and seconds. The answer could be improved by either giving the unit as kilometres per minute or converting their data into metres and seconds before calculating the final answer.

Candidates should take advantage of the opportunity to give a suitable unit by taking the simplest route through the problem. In this question, the simplest route is to leave the distance in kilometres and time in minutes and, therefore, give the unit as kilometres per minute.

Exemplar response B

(ii) Calculate the average speed of the aeroplane during this part of its journey.

Give a suitable unit.

(4)

gradient = average speed

∴ gradient = $\frac{\Delta y}{\Delta x}$ → $\frac{200}{15}$ → 13.3 km/m

average speed = 13.3 unit Km/m

Examiner's comments:

This response was given 3 marks.

This response is representative of a candidate working at Grade 7 or above. The working clearly communicates the understanding that the gradient of the graph can be used to determine the speed of the aeroplane. The candidate has chosen two points on the line and correctly determined the distance travelled and time taken between these points. The values have been substituted into the correct formula to gain the first two marks. The equation was evaluated correctly to determine the correct speed in kilometres per minute, which scores the third mark. However, the unit mark was not awarded in this response as there is confusion over the use of the symbol "m" for minutes. This response could be improved by either writing the unit in words or giving the symbol as km/min.
Candidates should be advised to only use the correct symbols if they are using them to write formulae or units. Examiners will not accept incorrect or contradictory symbols.

Question 3(b)

(b) During the flight, the height of the aeroplane decreases.

As the height of the aeroplane decreases, the temperature outside the aeroplane increases.

Explain how the air pressure outside the aeroplane changes as the height of the aeroplane decreases.

(3)

Mark scheme

(b)	pressure increases; air molecules move faster / gain KE; molecules collide more often with aeroplane;	 allow temperature proportional to KE allow idea that air becomes more dense at lower height / RA ignore molecules colliding with each other allow molecules colliding with aeroplane with more force / harder	3

Exemplar response A

As the height of the aeroplane decreases, the pressure of the air outside the plane would increase, this is because the area of the atmosphere would decrease as the plane decreases altitude and the forces acting on the plane would also increase like gravity therefore air pressure increases

Examiner's comments:

This response was given 1 mark.

Examiners use the command word ***explain*** when candidates are expected to give reasons to support the statement in their answer. This response was awarded the first mark due to correctly stating that the pressure would increase as the height decreases. However, the response does not give any valid reasons to support this statement and, therefore, does not gain further credit. The response could be improved by including such reasons. Candidates should be encouraged to try to use the word "because" in responses to questions requiring an explanation.

Exemplar response B

When the height of the aeroplane decreases the temperature outside the plane increases which means that the air pressure outside the plane will increase which means that the air particles will have more kinetic energy so it means that there will be more frequent and harder collisions of air particles with surface of the aeroplane resulting in a higher air pressure.

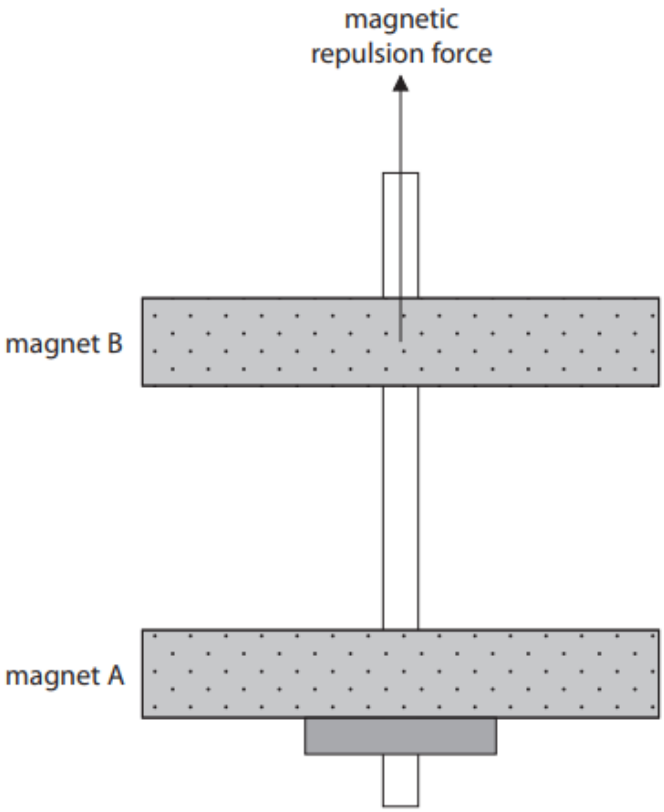
Examiner's comments:

This response was given 3 marks.

Candidates working at Grade 7 and above typically produced responses that gained all 3 marks. This candidate has correctly stated that the pressure would increase to gain the first mark and gone on to give a comprehensive explanation of this (in terms of particles) to gain the second and third marks. Despite the high quality of Physics communication in this response, the response could be improved further by using punctuation to break up the ideas into several sentences. This would allow the response to be structured more easily.

Question 4(b)

(b) This is a diagram of the toy shown in photograph 1.



One of the forces acting on magnet B is shown.

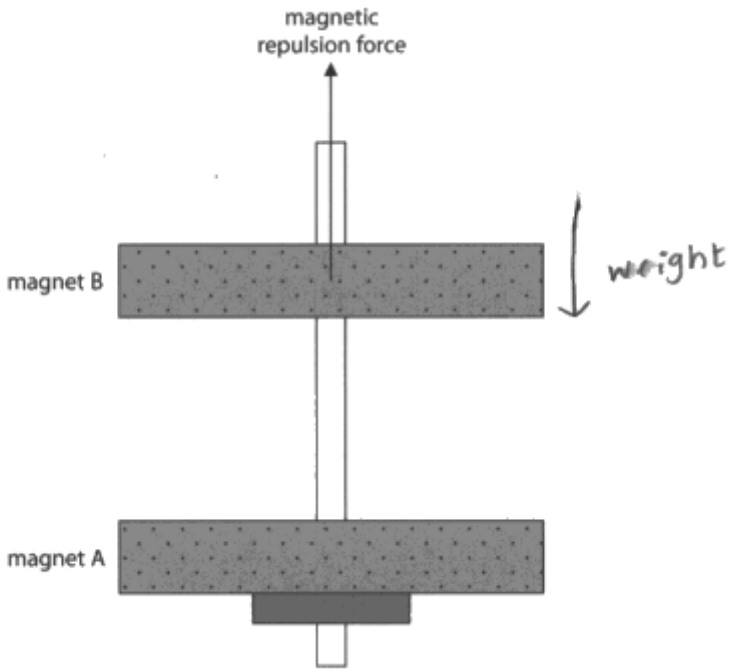
Draw another labelled arrow on the diagram to show the other force acting on magnet B.

(2)

Mark scheme

(b)	downward arrow labelled "weight"; arrow same length as upward force arrow;	ignore gravity allow gravitational force, gravitational pull ignore arrows associated with magnet A judge by eye	2

Exemplar response A



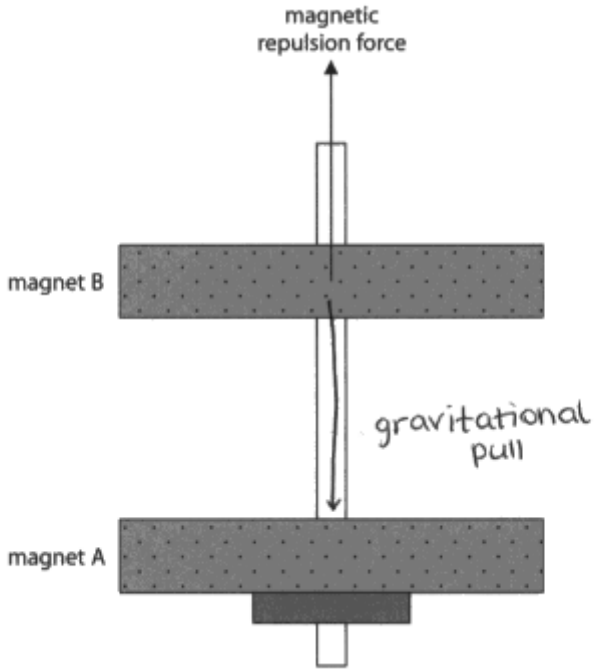
Examiner's comments:

This response was given 1 mark.

This response has been awarded the first mark for a correctly labelled downwards arrow. The magnets are being described as being at rest earlier in the question and, therefore, examiners expected to see the downwards arrow drawn the same length as the upwards arrow to award the second mark.

The response can be improved by paying closer attention to the length of the arrow and ensuring that its length is appropriate for this context. In addition, a ruler should be used to draw the force arrow to leave no ambiguity regarding its direction.

Exemplar response B



Examiner's comments:

This response was given 2 marks.

The most able candidates (grades 8 and 9) were usually capable of achieving 2 marks in this question. This response gains the first mark for a suitably labelled downwards force and the downwards arrow is drawn the same length as the upwards arrow, which gains the second mark. Despite scoring full marks, the response could be improved by using a ruler to draw the force arrow and by labelling the downwards force as "weight", rather than "gravitational pull".

Question 4(c)

(c) The student adds a 10 g mass on top of magnet B when it is stationary above magnet A and observes that the distance between the magnets decreases.

He carries out an investigation to see how the distance changes as more masses are added.

Describe a method for the student's investigation.

In your answer, you should refer to

- the measuring equipment required
- the independent and dependent variables
- a way to check the reliability of the data

You may draw a diagram to help your answer.

(5)

Mark scheme

(c)	any five from: MP1. caliper (to measure distance); MP2. balance (to check mass is 10g); MP3. use of set square to ensure vertical distance; MP4. independent variable identified as the mass added; MP5. dependent variable identified as the distance; MP6. repeat readings and find mean (average); MP7. plot graph of results; MP8. (identify and) remove / ignore anomalies;	allow any marking point if clear from diagram allow ruler, measuring tape allow scales	5

Exemplar response A

The student needs to have many 10g mass as it is the 'independent variable and he also has to make sure that the power of the magnets are the same and also in order to check the reliability the test could be done again and the same magnets will have to be used, in order to gain a accurate result. After adding a 10g mass a ruler can be used to check the distance between the two magnets in cm. As more mass is added the distance should be measured and recorded.

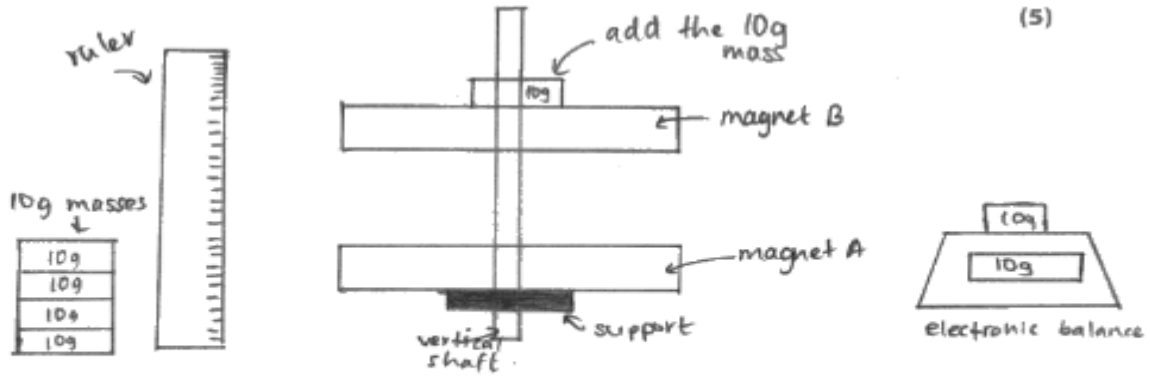
Examiner's comments:

This response was given 2 marks.

This response has been awarded Marking Point (MP)1 for referring to the use of a ruler and MP4 for the correct identification of the independent variable. The response can be improved by ensuring that each of the bullet points has been fully addressed in the scaffolding of the question; there is no attempt to identify the dependent variable in this response. In addition, the response has not taken advantage of the opportunity to draw a diagram. Candidates should be advised to draw a diagram when given the option to as marks can be always be awarded from both the diagram and a written part of the response. Diagrams are also helpful if examiners need further clarification of a vague statement given in the response.

Exemplar response B

(5)



Take the mass and the weigh it. Use the 10g masses and place it over magnet B. Place 10g by 10g , and record the distance between the two magnets. You can use a ruler with markings in centimetres to measure the distance. The independent variable will be the amount mass added and the dependent variable will be the distance between the two magnets (magnet A and B). This experiment can be repeated with each mass and the distance can be measured. In the end you can find the average distance for each mass added to make your data more reliable.

Examiner's comments:

This response was given 5 marks.

Candidates working at Grade 7 and above were typically awarded full marks for their response to this question. This response scores Marking Point (MP)1 and MP2 for the clear inclusion of a ruler and a balance in the diagram element of the response. The response has also correctly identified both the independent and dependent variables to gain MP4 and MP5 respectively. The idea of taking repeat measurements to obtain an average gains MP6. The response has been carefully structured and all elements of the bullet points in the question have been covered.

Question 6(c)

(c) The student extends her investigation by collecting data for cars P, Q, R and S.

She records the useful power output of their engines, their masses and their maximum speeds.

The table shows her data.

Car	Engine useful power output in kW	Mass in kg	Maximum speed in m/s
P	47	721	41
Q	92	1143	51
R	194	915	62
S	198	1226	68

Using information from the table, discuss the relationships between useful power output, mass and maximum speed.

(4)

Mark scheme

(c)	any four from: MP1. as power increases, maximum speed increases; MP2. use of data to justify MP1; MP3. (generally) as mass increases, maximum speed increases; MP4. use of data to justify MP3; MP5. (generally) as power increases, mass increases; MP6. use of data to justify MP5; MP7. data for Car R does not fit either of these trends; MP8. any other relevant use of data e.g. power to mass ratios;	allow reverse arguments condone use of energy for power DOP DOP condone use of energy for power DOP allow idea that car R is an anomaly	4

Exemplar response A

In the table, you can see that as you go down, maximum speed increases. Car R is an anomaly as the mass decreases from the previous one, but maximum speed isn't affected. So, from this, I can gather that as the useful power increases, then so does the maximum speed, regardless of the mass. If the mass was higher on car R however, the maximum speed would increase.

Examiner's comments:

This response was given 2 marks.

This question is worth 4 marks and the command word used is ***discuss***. This command word is used when candidates are expected to explore all aspects of a problem in their response and, therefore, candidates were expected to describe the relationships between the three variables in the table. In addition, candidates were also expected to support these relationships using information from the table.

This response was awarded Mark Point (MP)1 for recognising that as the power increases, the maximum speed increases. The candidate has also gained MP7 for suggesting that R is an anomaly. The candidate could have improved their response by looking at additional relationships involving the mass of the vehicles and also using the data in the table to support these relationships.

Exemplar response B

According to the table, car "S" has the most powerful engine (198 kW), the highest max speed (68 m/s) and also the highest mass (1226 kg). Car "P" has the lowest useful energy output (47 kW), & lowest max speed (41 m/s) and the lightest weight (721 kg). Therefore we can deduce that useful power output from engine is directly proportional to max speed. Higher the power, higher the maximum speed (47 kW - 41 m/s, 198 kW - 68 m/s). We can also deduce that as the useful power output and max speed increases, so does the mass. (47 kW - 41 m/s → 721 kg, 198 kW - 68 m/s → 1226 kg)

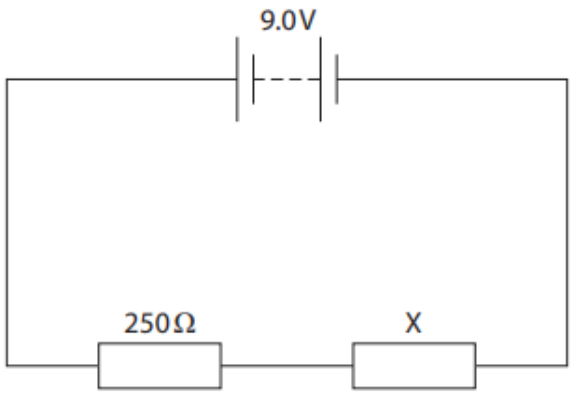
Examiner's comments:

This response was given 4 marks.

Candidates working at Grade 7 and above typically scored at least 3 marks in this question. This response successfully describes the relationships between all three variables to gain Marking Point (MP)1, MP3 and MP5. The candidate has also quoted relevant data from the table to support these relationships and, therefore, also gains MP2, MP4 and MP6. The relationship between power and maximum speed being described as directly proportional is incorrect, but this has been ignored given the quality of the rest of the response.

Question 7(b)

7 The circuit diagram shows a 9.0 V battery connected in series with a 250 Ω resistor and another resistor, X.



(b) The current in the circuit is 0.012 A.

Calculate the resistance of resistor X.

(4)

Mark scheme

(b)	use of V = I × R; calculation of total R; sum of resistances = total R; evaluation of resistance of X; e.g. 9.0 = 0.012 × R_T R_T = 750 (Ω) 750 = R_X + 250 (R_X =) 500 (Ω)	seen anywhere correct calculation of voltage of 250Ω resistor evaluation of voltage of X e.g. V_{250} = 0.012 × 250 V_{250} = 3.0 (V) V_X = (9.0 - 3.0) = 6.0 (V) (R_X =) 500 (Ω)	4

Exemplar response A

Voltage = current × resistance

$$\text{resistance} = \frac{9.0}{0.012}$$

resistance = 750 Ω

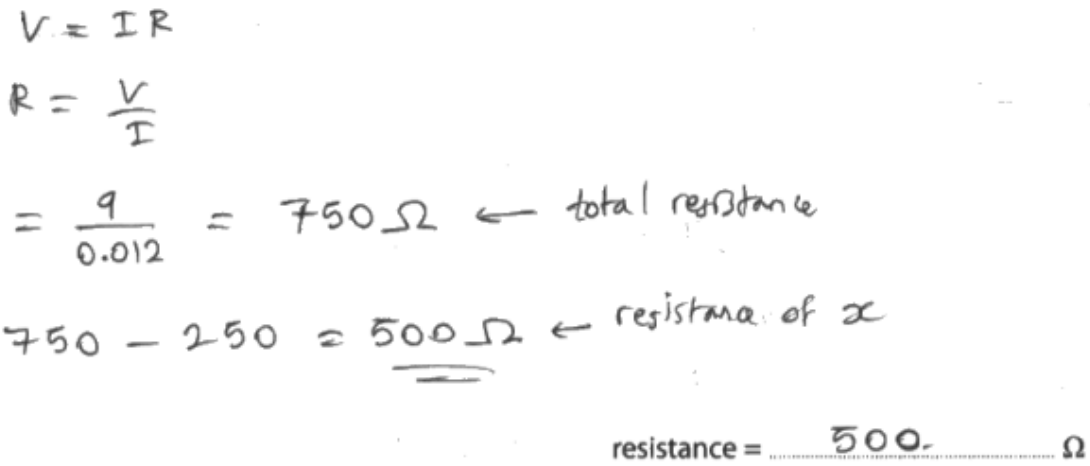
Examiner's comments:

This response was given 2 marks.

This response has correctly calculated the total resistance of the circuit using a suitable formula. However, it did not appreciate that this was only half the problem and have written this resistance value as their final answer. To improve the response, the candidate should have applied their knowledge of series circuits and subtracted 250Ω from this value to determine the resistance of resistor X.

Candidates working at Grade 4 could normally get at least this far through this challenging two-step calculation.

Exemplar response B



Examiner's comments:

This response was given 4 marks.

Candidates working at Grade 7 and above could usually complete this calculation to gain all 4 marks. This response has correctly determined the total resistance of the circuit and then subtracted 250Ω from this to arrive at the correct final answer. This response illustrates best practice in that the working is very clear and easy to follow. The candidate has written what they are doing at each stage and this ensures that the examiner can award method marks in the event that the candidate made a mistake.

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