AQA

Please write clearly in block capitals.

Centre number | | | | | | Candidate number | | | | |

Surname _____

Forename(s) _____

Candidate signature _____

GCSE
COMBINED SCIENCE: TRILOGY

F

Foundation Tier
Physics Paper 2F

Friday 15 June 2018 Morning Time allowed: 1 hour 15 minutes

Materials

For this paper you must have:
- a ruler
- a scientific calculator
- the Physics Equations Sheet (enclosed).

Instructions
- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions in the spaces provided.
- Do all rough work in this book. Cross through any work you do not want to be marked.
- In all calculations, show clearly how you work out your answer.

Information
- The maximum mark for this paper is 70.
- The marks for questions are shown in brackets.
- You are expected to use a calculator where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.

For Examiner's Use	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
8	
TOTAL	

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0 1 . 1 Which of these is a scalar quantity?

[1 mark]

Tick **one** box.

displacement ☐

distance ☐

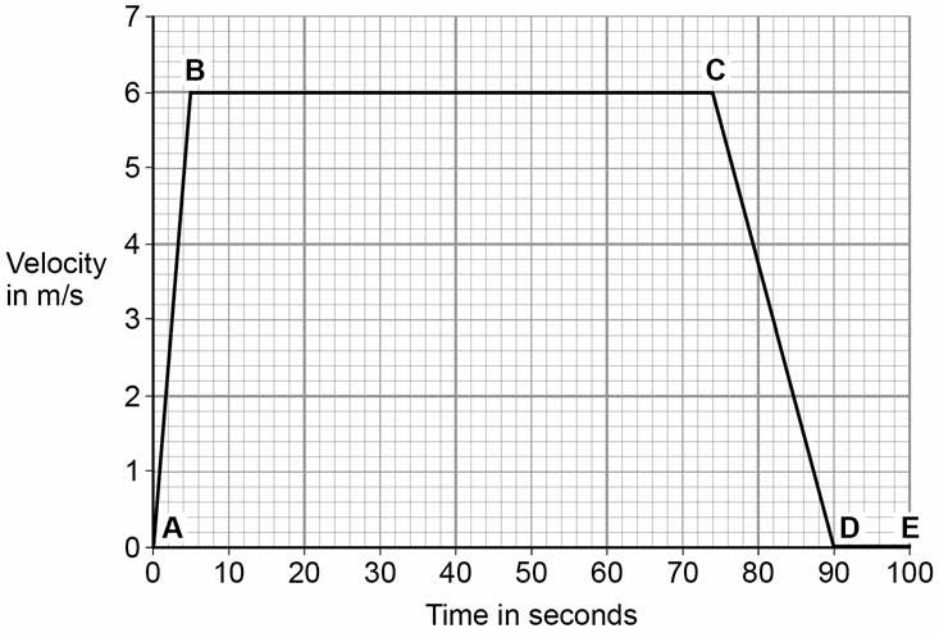
force ☐

velocity ☐

0 1 . 2 A woman cycled along a straight flat road.

Figure 1 shows how the woman's velocity changed with time.

Figure 1



Which part of the graph shows the woman moving at constant velocity?

[1 mark]

Tick **one** box.

BC ☐ **CD** ☐ **DE** ☐

Do not write outside the box

0 1 . 3 Which part of the graph shows the woman stationary?

[1 mark]

Tick **one** box.

BC ☐ **CD** ☐ **DE** ☐

Between points **A** and **B** the woman was accelerating.

0 1 . 4 Use **Figure 1** to determine the total time for which she was accelerating.

[1 mark]

Time = _____ s

0 1 . 5 Use **Figure 1** to determine her increase in velocity between points **A** and **B**.

[1 mark]

Increase in velocity = _____ m/s

0 1 . 6 Calculate her acceleration between points **A** and **B**.

Use the equation:

$$\text{acceleration} = \frac{\text{change in velocity}}{\text{time taken}}$$

[2 marks]

Acceleration = _____ m/s^2

Question 1 continues on the next page

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0 1 . 7 Estimate how a typical cycling speed of 6 m/s compares with a typical walking speed.

[1 mark]

Tick **one** box.

about twice as fast ☐

about four times faster ☐

about eight times faster ☐

8

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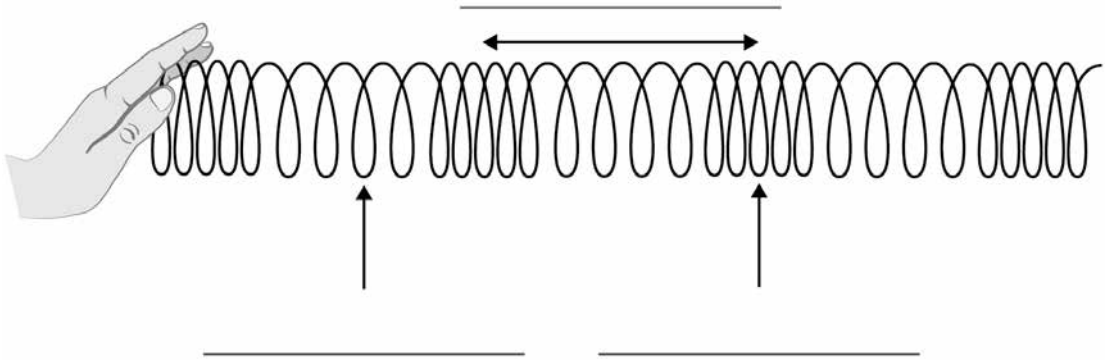
0 2 **Figure 2** shows a slinky spring used to model a sound wave.

Figure 2



0 2 . 1 Label the arrows on **Figure 2**

Choose the answers from the box.

[3 marks]

amplitude	**compression**	**frequency**
rarefaction		**wavelength**

0 2 . 2 What type of wave is a sound wave?

[1 mark]

Tick **one** box.

electromagnetic ☐

longitudinal ☐

transverse ☐

Question 2 continues on the next page

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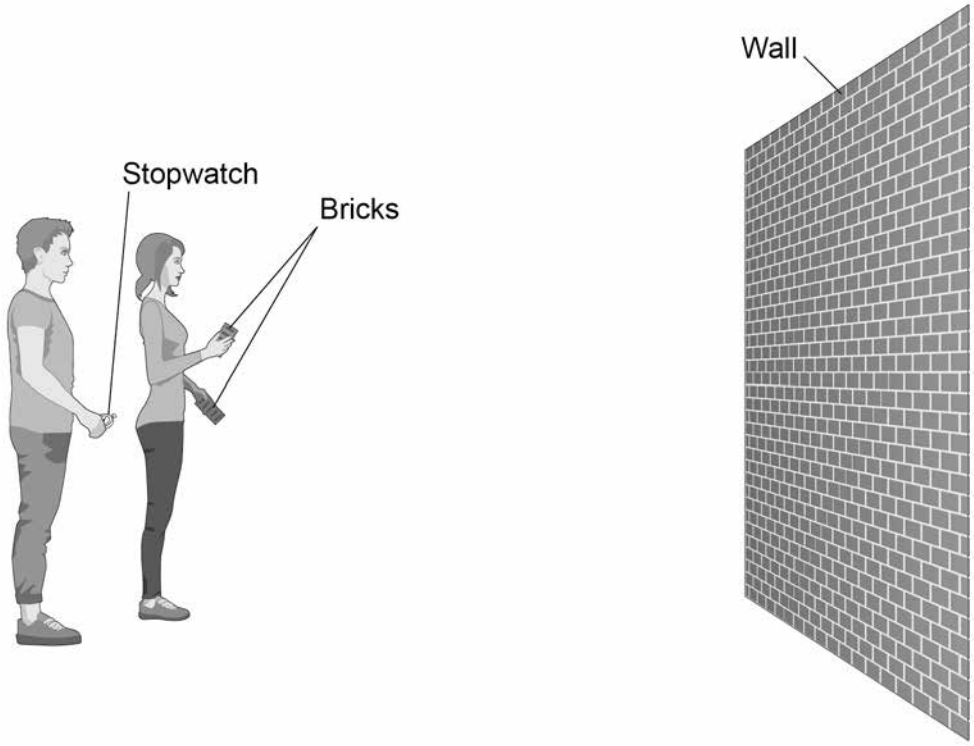
0 2 . 3 **Figure 3** shows two students measuring the speed of sound in air.

Figure 3



One student bangs two bricks together.

The sound wave produced is reflected from the wall and travels back to the students.

Describe how they can determine the speed of sound.

[4 marks]

8

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Turn over for the next question

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ANSWER IN THE SPACES PROVIDED

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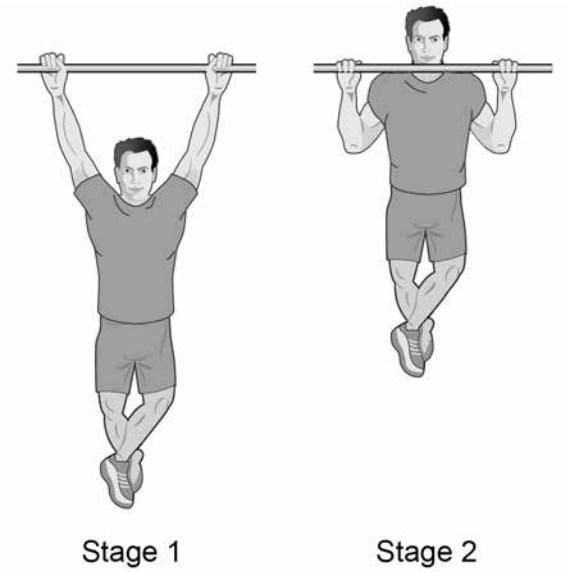
0 3 **Figure 4** shows a man doing two stages of a pull up. In both diagrams the man is stationary.

Figure 4



0 3 . 1 Complete the sentence.

Choose the answer from the box.

[1 mark]

equal to	**less than**	**more than**

In stage 1 the downwards force of the man on the bar is _____ the upwards force of the bar on the man.

0 3 . 2 The man has a mass of 85 kg

Gravitational field strength = 9.8 N/kg

Calculate the weight of the man.

Use the equation:

weight = mass × gravitational field strength

[2 marks]

_____

_____

Weight = _____ N

Do not write outside the box

0 3 . 3 The man raises his body a vertical distance of 0.63 m to go from stage 1 to stage 2

Calculate the work done by the man.

Use your answer to question **03.2**

Use the equation:

work done = force × distance

[2 marks]

Work done = _____ J

0 3 . 4 The man was **not** moving at stage 2

How much work is done by the man at stage 2?

[1 mark]

Work done = _____ J

0 3 . 5 A woman uses the bar to do a pull up.

The woman has a mass of 62 kg

She accelerates at 11 m/s^2

Calculate the resultant force on the woman.

Use the equation:

force = mass × acceleration

[2 marks]

Force = _____ N

8

Turn over for the next question

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0 4 **Figure 5** shows types of waves within the electromagnetic spectrum.

Some of the types of waves are represented by letters.

Figure 5

P	**microwaves**	**Q**	**visible light**	**R**		**S**	**gamma rays**

0 4 . 1 Which letter shows the position of ultraviolet (UV) radiation within the electromagnetic spectrum?

[1 mark]

Tick **one** box.

P ☐ **Q** ☐ **R** ☐ **S** ☐

0 4 . 2 A special lamp can produce UV radiation.

Which **two** statements describe the electromagnetic waves emitted by a UV lamp?

[2 marks]

Tick **two** boxes.

They have a higher frequency than X-rays. ☐

They have the same wave speed as visible light. ☐

They have a longer wavelength than microwaves. ☐

They have a lower frequency than gamma rays. ☐

They have a greater wave speed than radio waves. ☐

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0 4 . 3 UV radiation is used to treat a vitamin D deficiency.

People should **not** use a UV lamp for long periods of time.

State **two** risks of exposure to high levels of UV radiation.

[2 marks]

1 _____

_____

2 _____

_____

0 4 . 4 Ionising radiation is used for some medical imaging.

Name **two** types of electromagnetic waves that are used.

[2 marks]

1 _____

2 _____

7

Turn over for the next question

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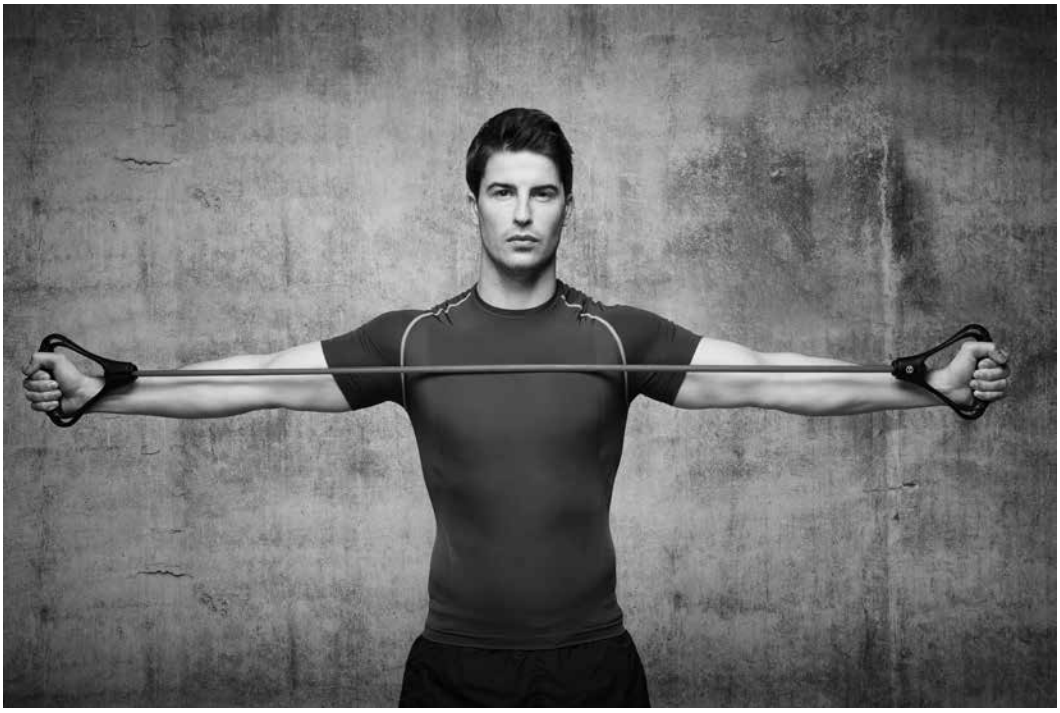
0 5 **Figure 6** shows a man using a resistance band when exercising.

The resistance band behaves elastically.

Figure 6



0 5 . 1 What happens to the store of elastic potential energy of the resistance band when the band is stretched?

[1 mark]

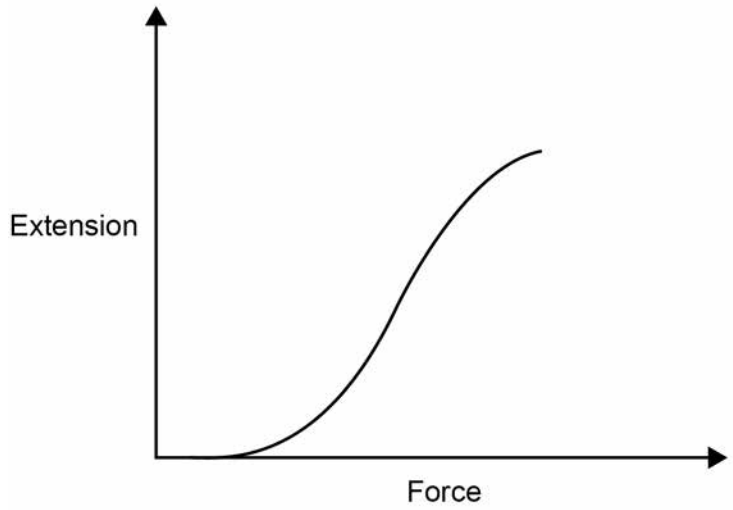
0 5 . 2 Explain what happens to the resistance band as it is released.

[2 marks]

Do not write outside the box

0 5 . 3 **Figure 7** shows how the extension of the resistance band changes as the force applied changes.

Figure 7



Describe the trend shown in the graph.

[2 marks]

Question 5 continues on the next page

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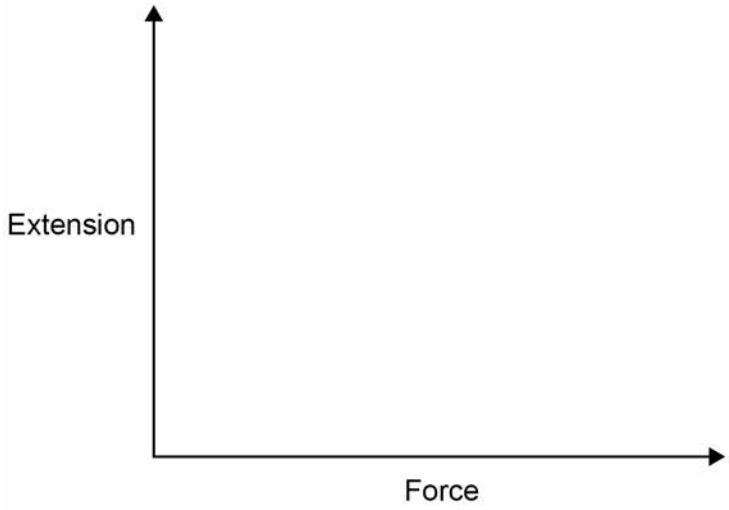
Figure 8 shows a chest expander.

Figure 8

0 5 . 4 Sketch a graph on **Figure 9** to show how the extension of a spring in the chest expander changes as the force applied changes.

[2 marks]

Figure 9



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When a force is applied to a spring, the spring extends by 7.5 cm

0 5 . 5 Write down the equation that links extension, force and spring constant.

[1 mark]

0 5 . 6 Calculate the force applied to the spring.

The spring has a spring constant of 1 600 N/m

Use your equation from question **05.5**

[3 marks]

Force = _____ N

11

Turn over for the next question

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0 6 **Figure 10** shows a lorry.

Figure 10

0 6 . 1 The brakes of the lorry are in a poor condition.

What effect will the condition of the brakes have on thinking distance and the braking distance of the lorry?

[2 marks]

Thinking distance _____

_____

Braking distance _____

_____

Do not write outside the box

0 6 . 2 Using a hand-held mobile phone while driving is illegal in the United Kingdom.

Table 1 shows the effect of using a mobile phone on thinking distance.

Table 1

	Thinking distance
Not using a mobile phone	19 m
Using a mobile phone with hands-free kit	23 m
Using a hand-held mobile phone	27 m

Explain why driving while using a hand-held mobile phone is more dangerous than using a mobile phone with a hands-free kit.

Use data from **Table 1**

[4 marks]

6

Turn over for the next question

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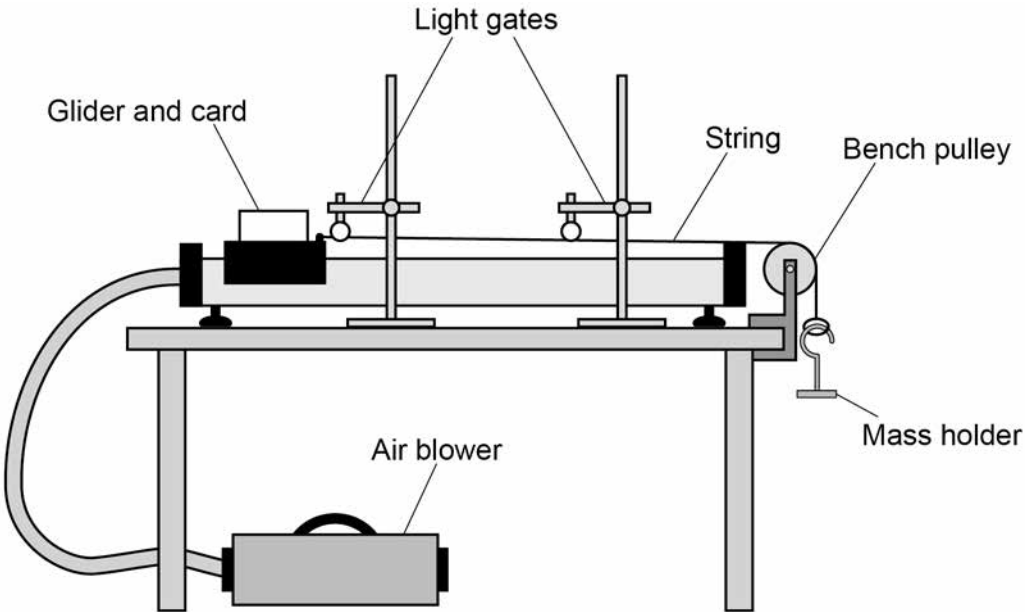
0 7 A student investigated acceleration using gliders, an air track and light gates.

The air track reduces friction between the glider and the track to zero.

Figure 11 shows the apparatus.

Figure 11



The glider was released from rest and moved along the track.

The mass holder hit the ground before the card passed through the second light gate.

0 7 . 1 Which **two** statements describe the effect this would have on the glider?

[2 marks]

Tick **two** boxes.

Its acceleration would decrease to zero. ☐

Its acceleration would increase. ☐

The resultant force on it would decrease to zero. ☐

The resultant force on it would increase. ☐

Its speed would increase. ☐

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0 7 . 2 The mass holder should **not** hit the ground before the card passes through the second light gate.

Suggest **one** way that the student could stop this happening.

[1 mark]

Question 7 continues on the next page

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The student increased the resultant force acting on the glider by adding more masses to the mass holder.

She calculated the acceleration of the glider for each resultant force.

Each test was done three times.

Table 2 shows the results.

Table 2

Resultant force in N	Acceleration in m/s^2			Mean acceleration in m/s^2
	Test 1	Test 2	Test 3	
0.20	1.3	1.2	1.3	1.26667
0.39	2.6	2.5	2.6	2.6
0.59	3.8	3.8	3.9	3.8
0.78	5.1	5.1	5.1	5.1
0.98	6.4	7.2	6.4	6.7

0 7 . 3 The student made **two** mistakes in the mean acceleration column.

Identify the mistakes the student made.

Suggest how each mistake can be corrected.

[4 marks]

Mistake _____

_____

Correction _____

_____

Mistake _____

_____

Correction _____

_____

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0 7 . 4 Write a conclusion for this investigation.

Use the data in **Table 2**

[1 mark]

Question 7 continues on the next page

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0 7 . 5 The student used a constant resultant force to accelerate the glider.

The student changed the mass of the glider and calculated the new acceleration.

She repeated this for different masses of the glider, keeping the resultant force constant.

The results are shown in **Table 3**

Table 3

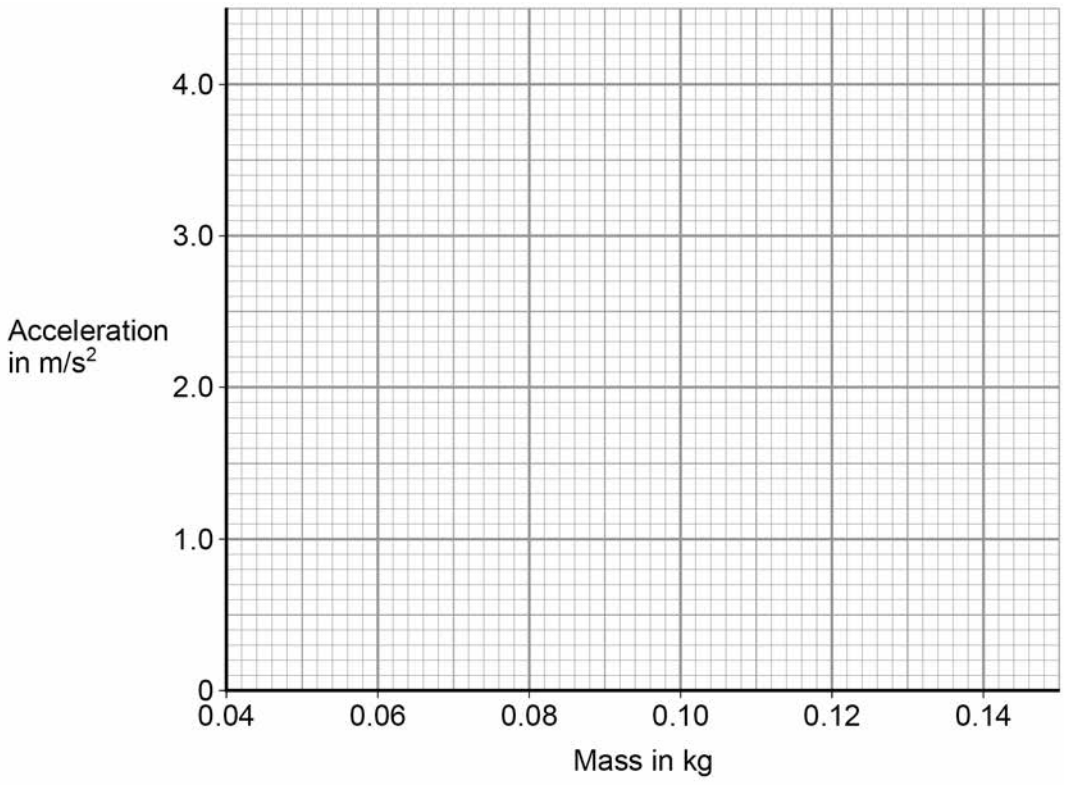
Mass of the glider in kg	Acceleration in m/s^2
0.060	3.5
0.080	2.6
0.10	2.0
0.12	1.7
0.14	1.4

Plot the results on **Figure 12**

Draw a line of best fit.

[3 marks]

Figure 12



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0 7 . 6 Describe the relationship between mass and acceleration.

[1 mark]

12

Turn over for the next question

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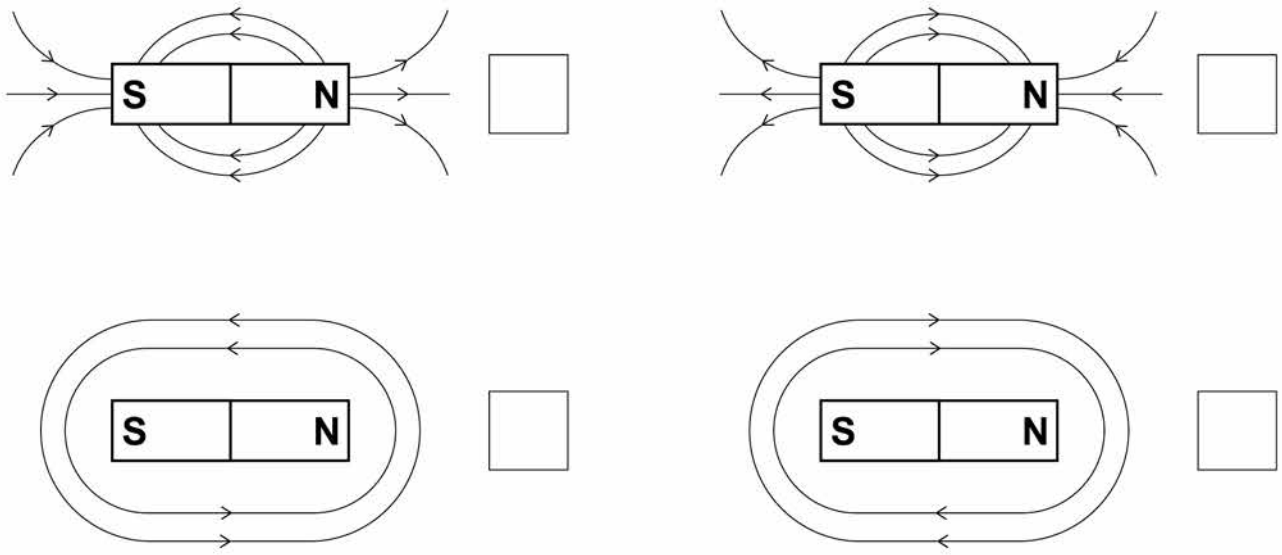
0 8 A magnet produces a magnetic field.

0 8 . 1 Which diagram shows the magnetic field pattern around a bar magnet?

[1 mark]

Tick **one** box.



0 8 . 2 **Figure 13** shows three metal blocks.

The blocks are not labelled.

One block is a permanent magnet, one is iron and one is aluminium.

Figure 13

Describe how another permanent magnet can be used to identify the blocks.

[3 marks]

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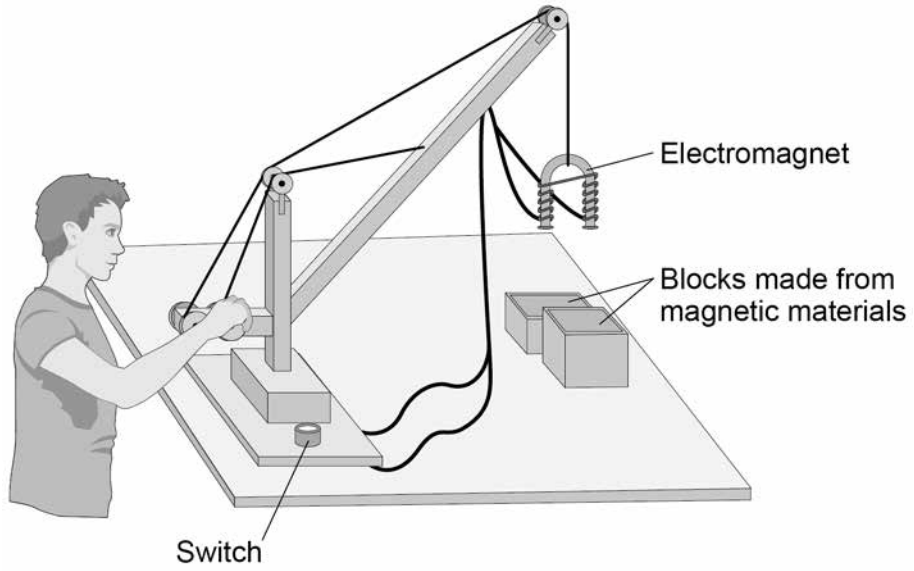
0 8 . 3 **Figure 14** shows a toy crane.

Figure 14



The toy crane uses an electromagnet to pick up and move the blocks.

Explain how this electromagnet is able to pick up and move the blocks.

[6 marks]

END OF QUESTIONS

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