



GCSE COMBINED SCIENCE: TRILOGY

F

Foundation Tier Paper 6: Physics 2F

Specimen 2018

Time allowed: 1 hour 15 minutes

Materials

For this paper you must have:

- a ruler
- a calculator
- the Physics Equation Sheet (enclosed).

Instructions

- 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.

Information

- There are 70 marks available on this paper.
- 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.
- When answering questions 02.3 and 06.6 you need make to sure that your answer:
 - is clear, logical, sensibly structured
 - fully meets the requirements of the question
 - shows that each separate point or step supports the overall answer.

Advice

- In all calculations, show clearly how you work out your answer.

Please write clearly, in block capitals, to allow character computer recognition.

Centre number Candidate number

Surname

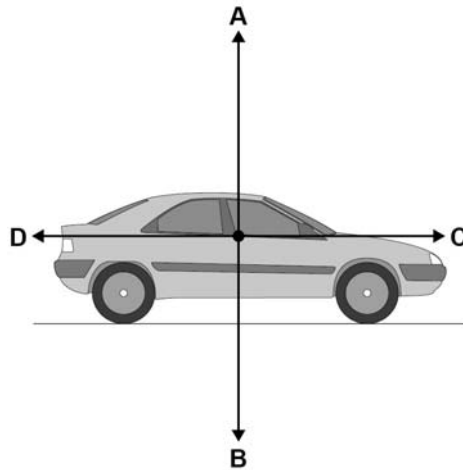
Forename(s)

Candidate signature _____

0 1

Figure 1 shows the forces acting on a car moving at a constant speed.

Figure 1



0 1 . 1

Which force would have to increase to make the car accelerate?

[1 mark]

Tick **one** box.

- A
- B
- C
- D

0 1 . 2

The car travels a distance of 2040 metres in 2 minutes.

Use the following equation to calculate the mean speed of the car.

$$\text{mean speed} = \frac{\text{distance}}{\text{time}}$$

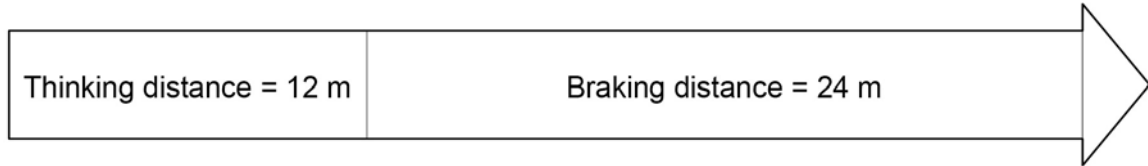
[2 marks]

Mean speed = _____ m/s

0 1 . **3** The car makes an emergency stop.

Figure 2 shows the thinking distance and braking distance of the car.

Figure 2



What is the stopping distance?

[1 mark]

0 1 . **4** The person driving the car is tired.

What effect will this have on the thinking distance and braking distance?

Tick **one** box for thinking distance.

Tick **one** box for braking distance.

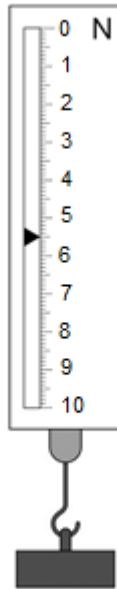
[2 marks]

	decreases	increases	stays the same
thinking distance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
braking distance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Turn over for the next question

0 2

A newtonmeter measures the weight of objects.

Look at **Figure 3**.**Figure 3****0 2** . **1**What is the weight of the object in **Figure 3**?**[1 mark]**

Weight = _____ N

0 2 . **2**

The spring inside the newtonmeter behaves elastically.

What happens to the length of the spring when the object is removed from the newtonmeter?

[1 mark]Tick **one** box.The spring gets longer The spring gets shorter The spring stays the same length

0 2 . 3 A student carried out a practical to investigate the extension of a spring.

Write a method the student could have used.

[4 marks]

0 2 . 4 What could be done to improve the accuracy in this investigation?

[2 marks]

Tick **two** boxes.

Use a pointer from the spring to measure the length.

Use a stronger spring in the practical.

Use a new spring between each reading.

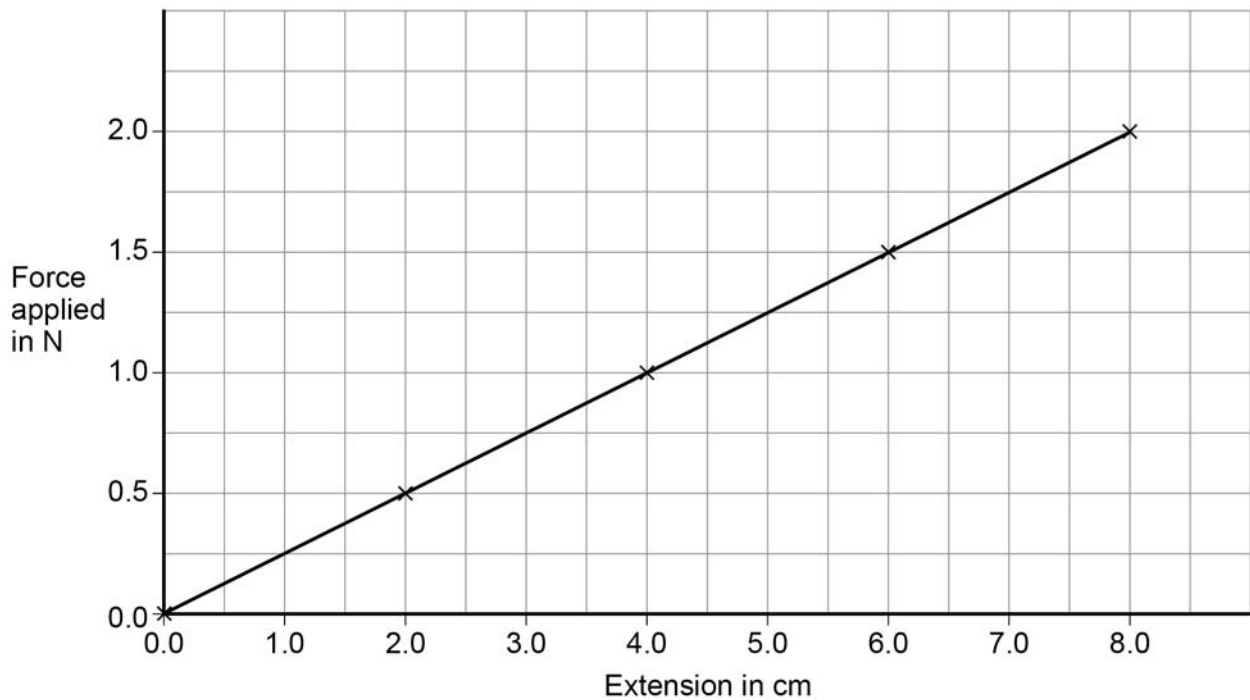
Make sure the spring is stationary before measuring length.

Use a longer rule when measuring length.

The student added weights to a spring and measured the extension of the spring.

Figure 4 shows his results.

Figure 4



0 2 . **5** What is the relationship between force applied and extension?

[1 mark]

Tick **one** box.

Extension is inversely proportional to force

Extension increases by smaller values as force increases

Extension is directly proportional to force

0 2 . **6** Use **Figure 4** to determine the additional force needed to increase the extension in the spring from 5.0 cm to 7.0 cm.

[1 mark]

Force needed = _____ N

0 2 . 7 Table 1 shows some results with a different spring.

Table 1

Force applied in N	Extension in m
0.0	0.000
0.5	0.025
1.0	0.050
1.5	0.075

What would the extension be with a force of 2.0 N?

[1 mark]

Tick **one** box.

0.080 m

0.090 m

0.095 m

0.100 m

0 2 . 8 The spring constant for the spring in **Table 1** is 20 N/m.

Calculate the work done in stretching the spring until the extension of the spring is 0.050m

Use the correct equation from the Physics Equation Sheet.

[2 marks]

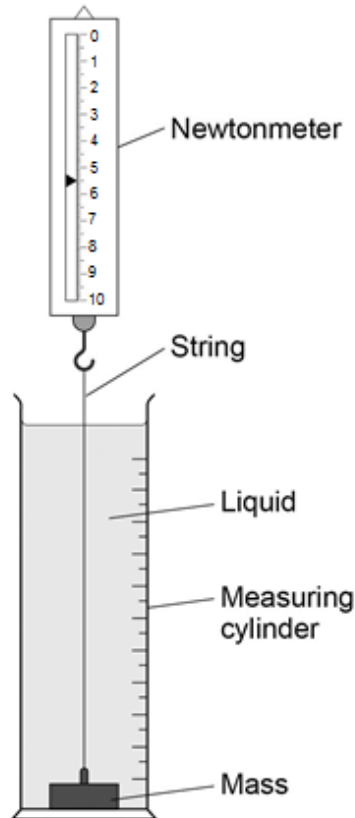
Work done = _____ J

0 3

A student investigated the force needed to raise a mass through different liquids at a constant speed.

She set up the apparatus shown in **Figure 5**.

Figure 5



0 3 . 1

In the investigation there are several variables.

Draw **one** line from each variable to the correct description for this investigation.

[3 marks]

Variable	Description
Control	Distance the mass was lifted
Dependent	Value of force on the newtonmeter
Independent	Mass
	Type of liquid

Table 2 shows the student's results.

Table 2

Liquid	Force in N
Water	10.0
Washing up liquid	11.1
Glycerol	11.5
Syrup	13.8

0 3 . **2** What was the resolution of the newtonmeter?

Tick **one** box.

[1 mark]

0.1 N

0.5 N

1 N

10 N

Question 3 continues on the next page

0 3 . **3** The student wanted to display her results.

How should she display her results?

[1 mark]

Tick **one** box.

A bar chart

A line graph

A pie chart

0 3 . **4** Give a reason for your answer to part **03.3**.

[1 mark]

0 3 . **5** A force of 13.8 N was used to lift the mass 30 cm vertically through the liquid.

Use the following equation to calculate the work done in lifting the mass.

Work done = force \times distance

Choose the correct unit from the box.

[3 marks]

J	m/s	N
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Work done = _____

Unit = _____

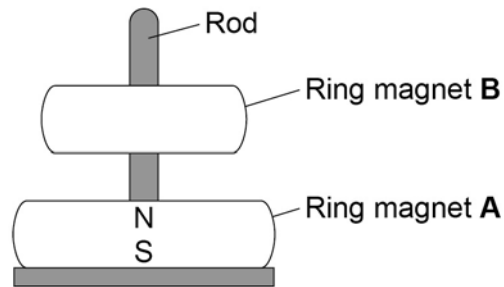
0 4

A magnetic toy uses ring-shaped magnets.

Look at **Figure 6**.

The magnets can move up and down the rod. Ring magnet **B** appears to float.

Figure 6

**0 4****1**

The magnetic poles are labelled on ring magnet **A**.

Label the magnetic poles on ring magnet **B**.

[1 mark]

0 4**2**

What would happen if ring magnet **B** was turned upside down?

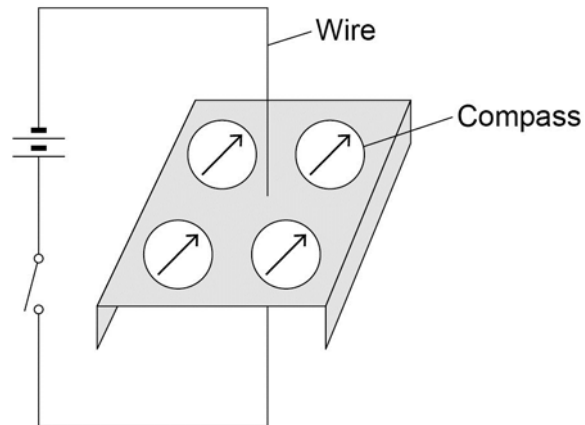
[1 mark]

Question 4 continues on the next page

Figure 7 shows four plotting compasses arranged around a wire.

The needle of a compass is a magnet.

Figure 7



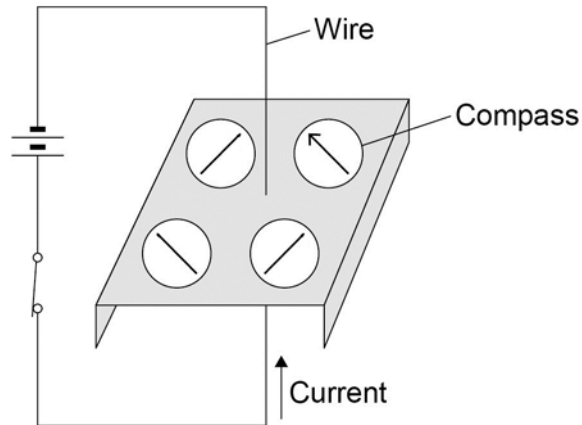
0 4 . 3 In **Figure 7** the switch is open and there is no current in the wire.

Explain why the compass needles all point in the same direction.

[2 marks]

Figure 8 shows the switch closed.

Figure 8



0 4 . 4 There is now a current in the wire.

The compass needles change direction.

On **Figure 8** draw arrowheads on the three incomplete compass needles to show their direction.

[1 mark]

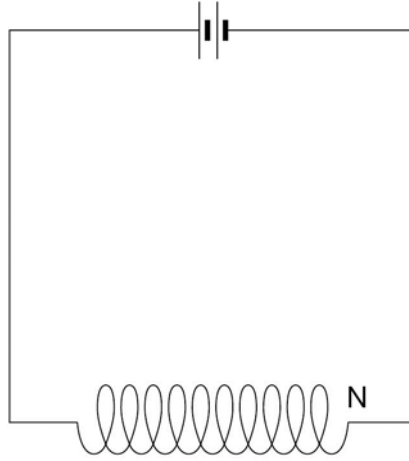
0 4 . 5 What would happen to the direction of the compass needles if the current was reversed?

[1 mark]

Question 4 continues on the next page

Figure 9 shows a coil of wire in a circuit.

Figure 9



0	4
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 .

6

 On Figure 9 draw the magnetic field due to the current in the coil.

[3 marks]

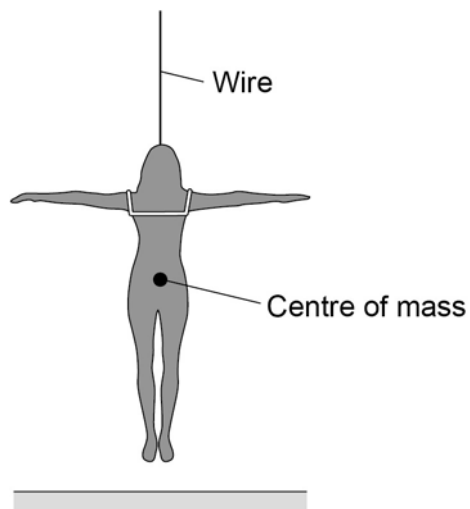
Turn over for the next question

0 5

An actor is attached to a wire so that she can hang above the stage.

Look at **Figure 10**.

Figure 10

**0 5** . **1**

On **Figure 10** draw **two** arrows to show the forces acting on the actor.

[2 marks]

0 5 . **2**

Which **two** forces are acting on the actor?

[2 marks]

Tick **two** boxes.

Air resistance force

Electrostatic force

Gravitational force

Magnetic force

Tension force

0 5 . **3** The actor hangs above the stage in a stationary position.

What is the resultant force on the actor?

[1 mark]

Resultant force = _____ N

0 5 . **4** The actor has a mass of 70 kg.

Gravitational field strength = 9.8 N/kg

Use the following equation to calculate the weight of the actor.

Weight = mass \times gravitational field strength

Give your answer to 2 significant figures.

[2 marks]

Weight of actor = _____ N

0 5 . **5** A motor pulls vertically upwards on the wire with a force of 720 N.

Calculate the resultant force on the actor.

[1 mark]

Resultant force = _____ N

Question 5 continues on the next page

Another actor has a mass of 65 kg.

This actor is attached to the wire and the motor pulls her vertically upwards.

The resultant force on the actor is 25 N.

0 5 . **6** Write down the equation that links acceleration, mass and resultant force.

[1 mark]

Equation _____

0 5 . **7** Calculate the acceleration of the actor.

[3 marks]

Acceleration of actor = _____ m/s²

Turn over for the next question

0 6

Four students tested their reaction times using a computer program.

When a green light appeared on the screen the students had to press a key.

Table 3 shows their results.

Table 3

Student	Reaction time in s			Mean reaction time in s
	Test 1	Test 2	Test 3	
Boy 1	0.28	0.27	0.26	0.27
Boy 2	0.28	0.47	0.22	0.25
Girl 1	0.31	0.29	0.27	0.29
Girl 2	0.32	0.30	0.29	0.30

0 6**. 1**

What is meant by 'reaction time' in this experiment?

[1 mark]

0 6**. 2**

Boy 2 had an anomalous result in **Test 2**.

Suggest a reason why.

[1 mark]

0 6**. 3**

Give **one** conclusion that can be made from the results in **Table 3**.

[1 mark]

0 6 . **4** Suggest further evidence that you could collect to support your conclusion.

[1 mark]

Reaction time is important at the start of a race.

Table 4 shows the time taken by a boy to run different distances.

Table 4

Distance in m	Time in s
100	12.74
200	25.63
800	139.46

0 6 . **5** Reaction time is more important in a 100 m race than in an 800 m race.

Explain why.

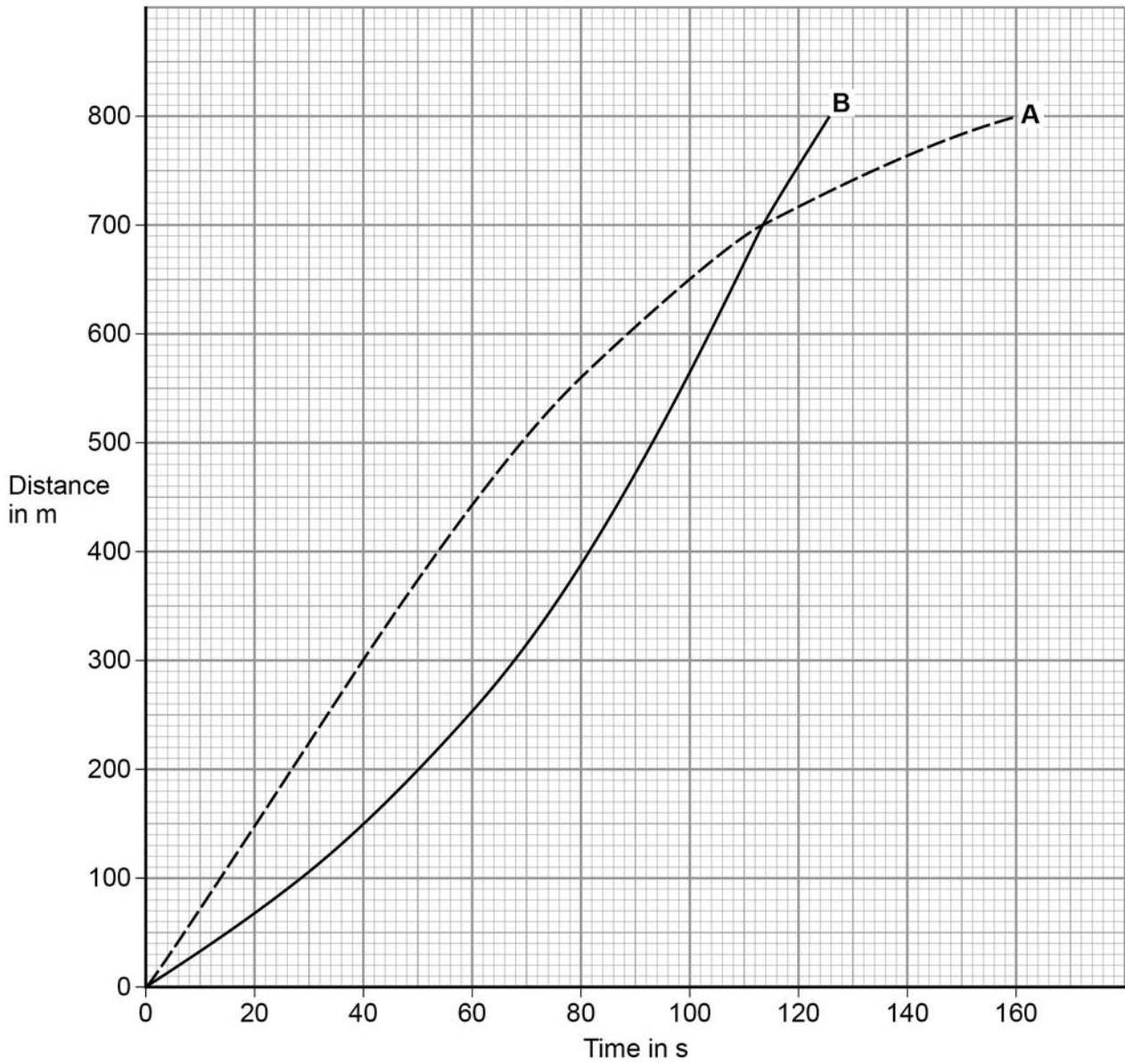
[2 marks]

Question 6 continues on the next page

Two girls, **A** and **B**, ran an 800 m race.

Figure 11 shows how the distance changed with time.

Figure 11



0 6 . 6 Compare the motion of runners **A** and **B**.

Include data from **Figure 11**.

[6 marks]

Turn over for the next question

0 7 . **2** The sensor unit can detect infrared and visible light.

Suggest **one** advantage of being able to detect infrared.

[1 mark]

0 7 . **3** Write down the equation that links frequency, wave speed and wavelength.

[1 mark]

Equation _____

0 7 . **4** The signals for the monitor unit are transmitted as electromagnetic waves with a wavelength of 0.125 m.

Wave speed of electromagnetic waves = 3×10^8 m/s

Calculate the frequency of the signal.

[3 marks]

Frequency = _____ Hz

END OF QUESTIONS

There are no questions printed on this page

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