

AQA Style

GCSE

COMBINED SCIENCE: TRILOGY

Foundation Tier

Physics Paper 2

F

Time allowed: 1 hour 15 minutes

Materials

- A ruler
- A pen and pencil
- A calculator
- Physics Equation Sheet

Instructions and Information

- Answer all the questions using a black pen.
- Answer the questions in the space available and cross out any work you do not want to be marked.
- In any calculations make sure you show your working out.
- The marks for each question are shown in brackets.
- The maximum mark for the paper is 70.
- You must make your work as neat as possible and use good English in your answers.
- You should make sure you leave time to check your answers.

Question	Mark
1	
2	
3	
4	
5	
6	
7	
Total	

Name _____

Date _____

0 | 1

Figure 1 shows the waves that form the electromagnetic spectrum.

Figure 1

gamma rays	x-rays	A	visible light	infrared	B	radio waves
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Two electromagnetic waves are missing from **Figure 1**. Their positions are labelled **A** and **B**.

0 | 1 | 1

Draw **one** line from each letter to the correct wave.

[2 marks]

Letter

A

B

Wave

microwave

ripple

sound

ultraviolet

0 | 1 | 2

Name **one** type of electromagnetic wave that can be used for communication.

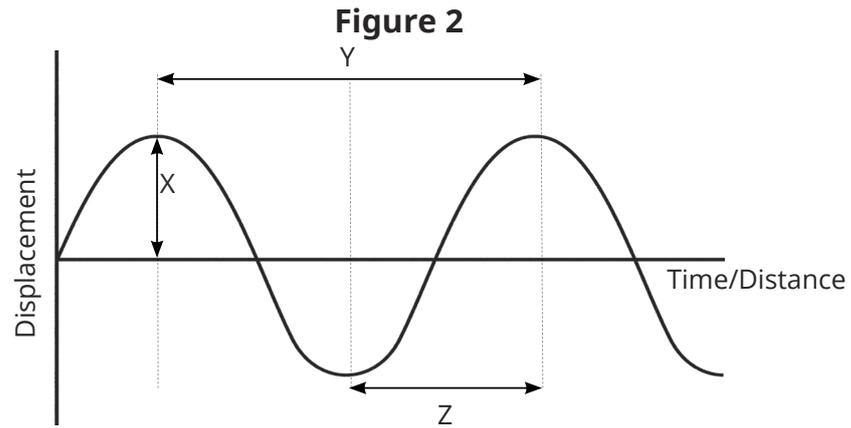
[1 mark]

0 | 1 | 3

Name **one** type of electromagnetic wave that could have a hazardous effect on human body tissues.

[1 mark]

0 1 . 4 **Figure 2** shows a diagram of a wave.



Which letter has been used to label the amplitude of the wave?

[1 mark]

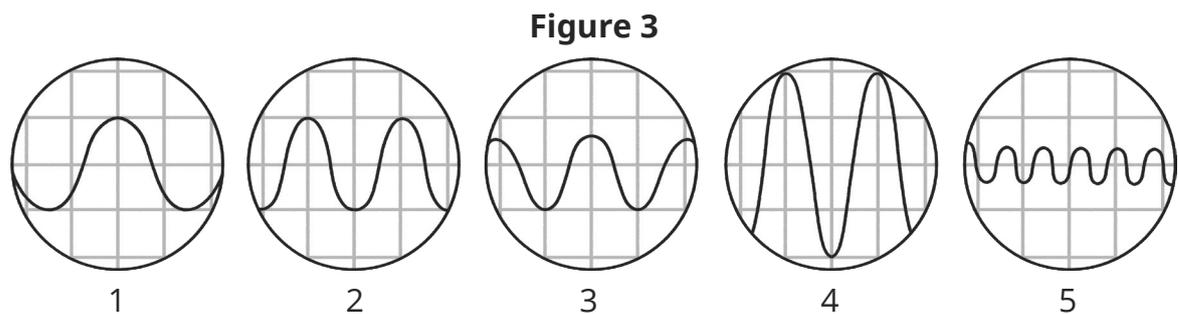
Tick **one** box.

X

Y

Z

0 1 . 5 **Figure 3** represents five different waves as traces on an oscilloscope.



Use numbers from **Figure 3** to complete the sentences.

[2 marks]

The wave with the longest wavelength is wave _____.

The wave with the highest frequency is wave _____.

0 1 . 6 A wave has a wavelength of 1.1m and a frequency of 4Hz.

Calculate the speed of the wave.

Use the equation:

$$\text{wave speed} = \text{frequency} \times \text{wavelength}$$

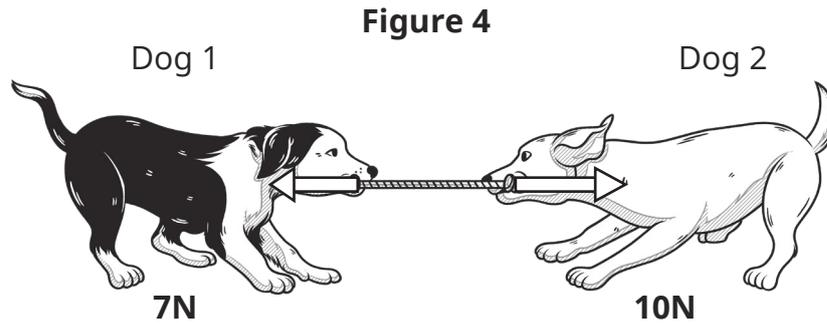
[2 marks]

wave speed = _____ m/s

9

0 2

Figure 4 shows two dogs pulling a toy.



0 2 . 1

Determine the resultant force.

[1 mark]

Tick **one** box.

0N

3N

17N

70N

0 2 . 2

In which direction does the resultant force act?

[1 mark]

Tick **one** box.

to the left

to the centre

to the right

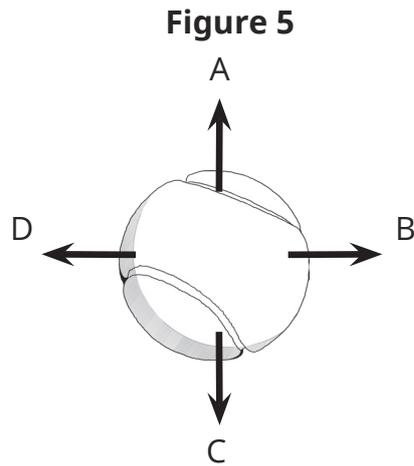
0 2 . 3

Dog 2 releases the toy.

[1 mark]

Describe what will happen to dog 1.

- 0 2 . 4 A ball is thrown for the dogs. **Figure 5** shows the forces that act on the ball.



Give the name of force **C**.

[1 mark]

- 0 2 . 5 Explain why the ball falls to the ground.

[1 mark]

- 0 2 . 6 The ball lands in the grass and remains stationary.

Give the resultant force acting on the ball when it is stationary.

[1 mark]

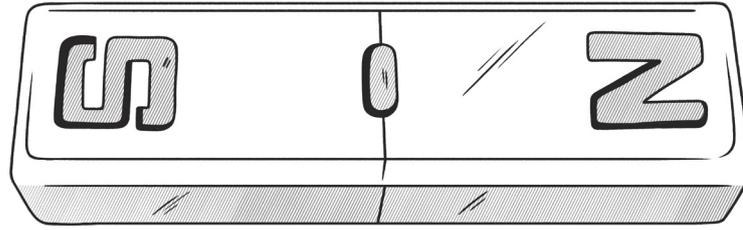
resultant force = _____ N

6

03

Figure 6 shows a bar magnet.

Figure 6



The region around a magnet where a force acts on a magnetic material is called a magnetic field.

03.1

Which of the following materials will be affected by the magnetic field of the magnet?

[1 mark]

Tick **one** box.

aluminium

copper

gold

iron

03.2

What type of magnet does the material become when it is placed in the magnetic field?

[1 mark]

Tick **one** box.

induced

magnetised

permanent

- 03.3 Describe how you would plot the magnetic field pattern of the bar magnet using a compass.

[2 marks]

- 03.4 **Figure 7** shows a diagram of the bar magnet.

Figure 7

Complete **Figure 7** to show the magnetic field pattern around the magnet.

You should include arrows to show the direction of the magnetic field.

[2 marks]

- 03.5 Draw an **X** on **Figure 7** to show the position where the magnetic field would be the strongest.

[1 mark]

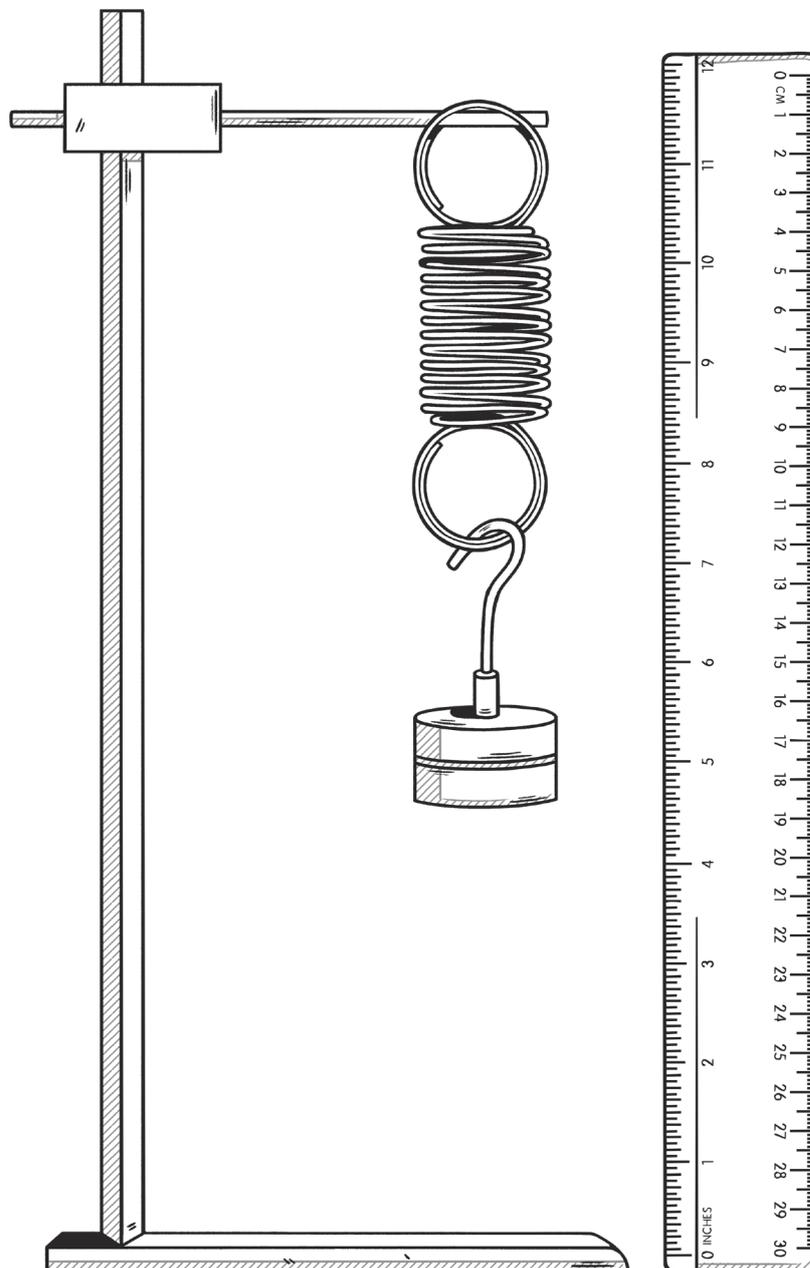
0 4

A student investigated the behaviour of springs using the method below.

1. Suspend a spring from a clamp stand.
2. Measure the length of the spring.
3. Apply a force to the spring by attaching a 100g mass hanger to the spring.
4. Measure the extension of the spring.
5. Add a 100g mass to the mass hanger and measure the new extension of the spring.
6. Repeat step 5 another three times.

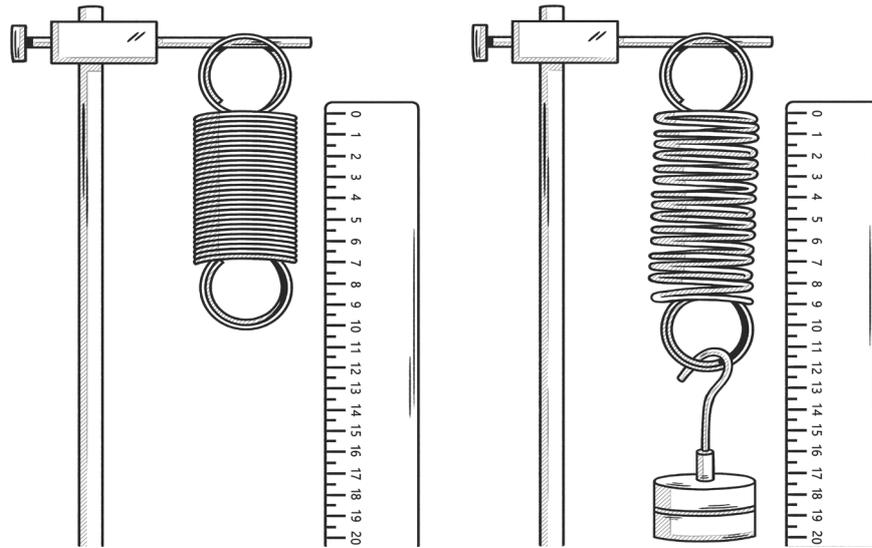
Figure 8 shows the equipment used in the investigation.

Figure 8



- 0 4 . 1 **Figure 9** shows the spring next to the ruler before and after a force is applied.

Figure 9



Determine the extension of the spring.

[2 marks]

extension = _____ cm

- 0 4 . 2 There are several variables in the investigation.

Draw **one** line from each variable to the correct description of that variable.

[3 marks]

Variable

Description

independent variable	The extension of the spring.
dependent variable	The force applied to the spring.
control variable	The spring used in each repeat.
	The height of the clamp stand.

Each 100g mass provided a force of 1N on the spring.

A second student's results are shown in **Table 1**.

Table 1

Force (N)	Extension (cm)			Mean Extension (cm)
	Repeat 1	Repeat 2	Repeat 3	
1	2.1	2.1	2.2	2.1
2	4.0	4.1	4.0	4.0
3	6.0	12.0	6.0	8.0
4	8.1	7.9	8.0	8.0
5	10.0	10.2	10.2	

04.3 Calculate the mean extension at 5N.

Give your answer to an appropriate number of significant figures.

[2 marks]

mean extension = _____ cm

04.4 Circle the anomalous result in **Table 1**.

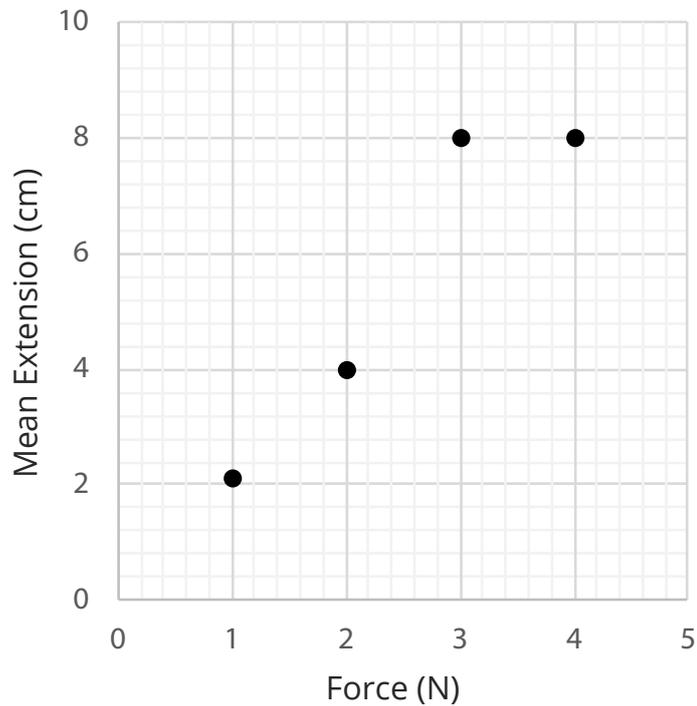
[1 mark]

04.5 Suggest how the anomalous result may have occurred.

[1 mark]

04.6 The student plotted a graph of their results. The graph is shown in **Figure 10**.

Figure 10



Draw a line of best fit on **Figure 10**.

[1 mark]

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

[1 mark]

04.8 Calculate the spring constant of the spring used by the student.

Use a force of 2N and an extension of 0.04m

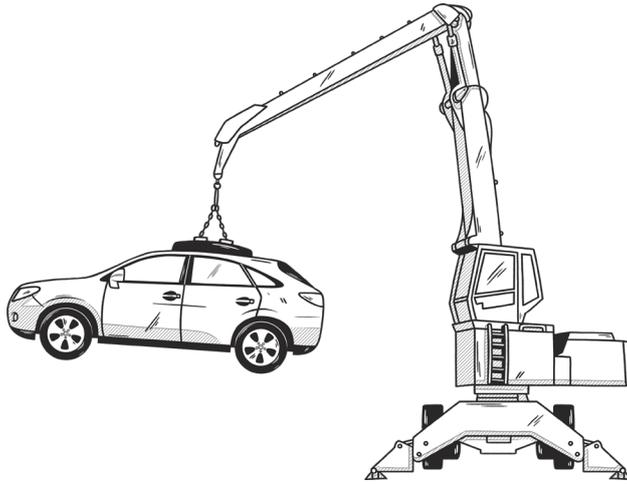
[3 marks]

spring constant = _____ N/m

0 5

Figure 11 shows a crane lifting a car in a scrapyard.

Figure 11



The car has a mass of 1200kg.

The gravitational field strength on Earth is 9.8N/kg.

0 5 . 1

Calculate the weight of the car.

Use the equation:

$$\text{weight} = \text{mass} \times \text{gravitational field strength}$$

[2 marks]

weight = _____ N

0 5 . 2 Write down the equation that links distance, force and work done.

[1 mark]

0 5 . 3 The crane lifts the car 5m off the ground.

Calculate the work done on the car by the crane.

Give the unit.

[3 marks]

work done = _____ unit _____

0 5 . 4 The crane needs to lift and release the cars to move them around the scrapyards. It uses an electromagnet to pick up the cars.

Suggest why an electromagnet is more useful than a permanent magnet for this job.

[2 marks]

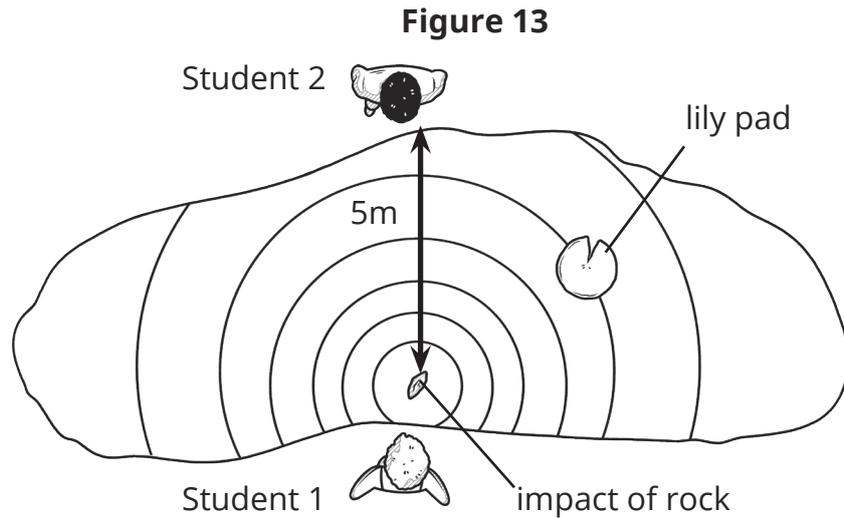
06

Some students want to investigate the properties of different waves.

Student 1 drops a rock into the pond.

Student 2 stands at the opposite side of the pond, 5m away, with a stopwatch.

The students are shown in **Figure 13**.



When the rock hits the water, it makes a sound and causes ripples on the surface of the water.

06.1

Student 2 observes the rock hitting the water.

Describe how the students could determine the speed of sound.

[2 marks]

0 6 . 2 Sound is transmitted by a longitudinal wave.

The ripples caused by the rock are transverse waves.

Describe the difference between transverse and longitudinal waves.

[2 marks]

0 6 . 3 The ripples caused a lily pad on the pond to move up and down.

The students concluded that it is the wave, not the water itself, that travels out from the impact site.

Explain whether the students' conclusion was correct.

[3 marks]

0 6 . 4 The lily pad moves up and down four times every second.

Give the frequency of the water waves.

[1 mark]

0 6 . 5 Calculate the period of the water waves.

Use the correct equation from the Physics Equation Sheet.

[2 marks]

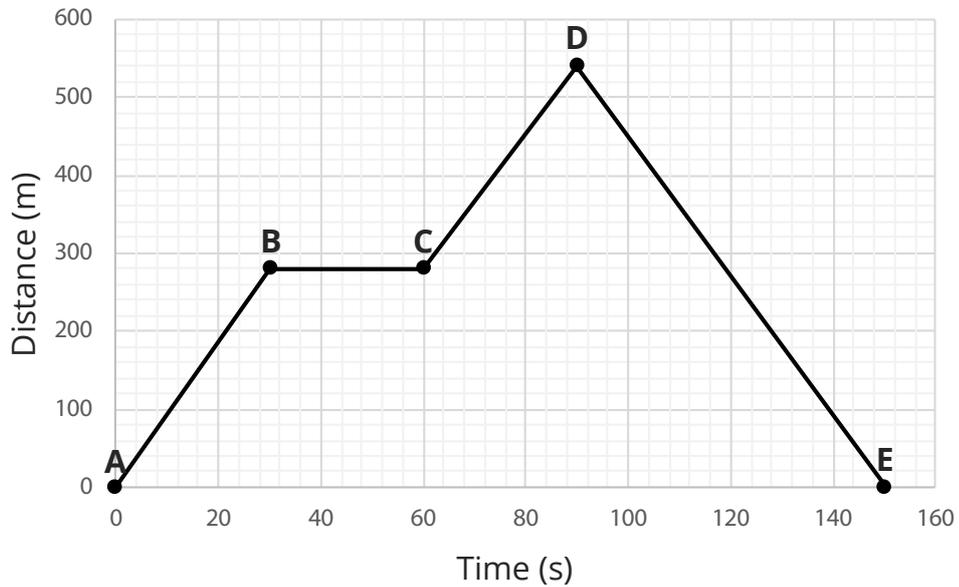
period = _____ s

10

07

Figure 14 shows a distance-time graph for the journey made by a car.

Figure 14



07.1

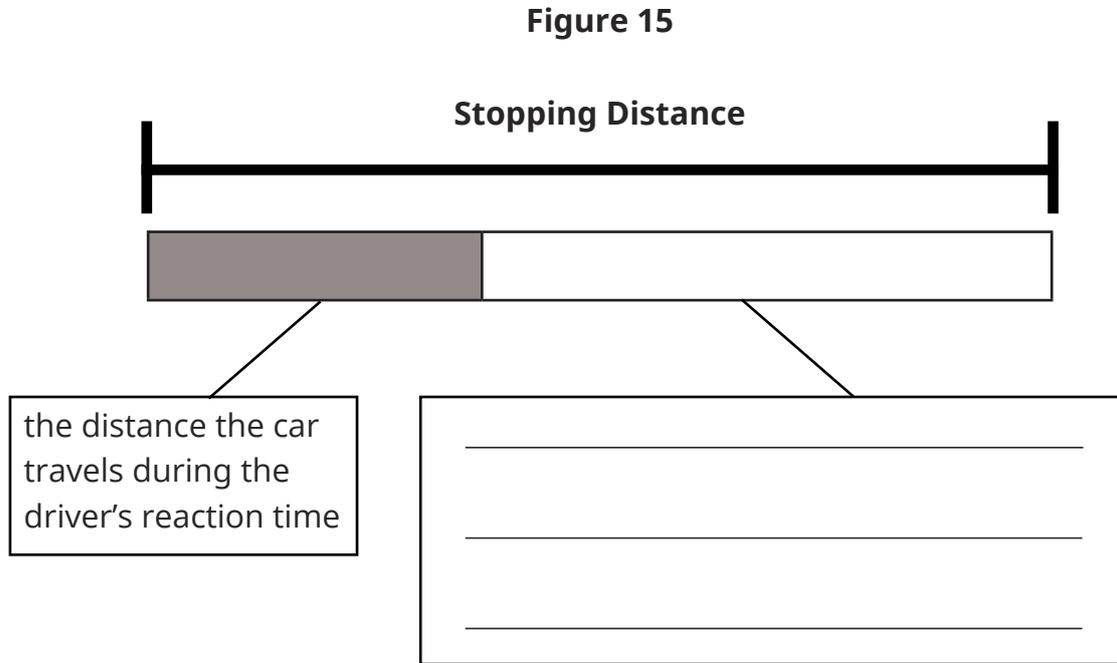
Describe what **Figure 14** tells you about the motion of the car between points **A** and **E**.

You should refer to data from **Figure 14** in your answer.

[4 marks]

- 07.2 A car is travelling at constant speed. When the driver applies the brakes, the car slows down and stops.

Figure 15 shows the two different sections that make up the total stopping distance of the car.



Complete **Figure 15** by labelling the second part of the stopping distance.

[1 marks]

- 07.3 Give **two** factors that could affect the distance the car travels during the driver's reaction time.

[2 marks]

1. _____

2. _____

0 7 . 4 When the driver applies the brakes, the car decelerates.

Write down the equation that links acceleration, change in velocity and time taken.

[1 mark]

0 7 . 5 Before the driver applies the brakes, the car is travelling at a speed of 17m/s. It takes 3.4s for the car to come to a complete stop.

Calculate the deceleration of the car between the driver first applying the brakes and the car coming to a complete stop.

[2 marks]

deceleration = _____ m/s²

10