

# Forces and Braking

## Question Paper 1

Level	GCSE (9-1)
Subject	Combined Science: Trilogy - Physics
Exam Board	AQA
Topic	6.5 Forces
Sub-Topic	Forces and Braking
Difficulty Level	Silver Level
Booklet	Question Paper 1

**Time Allowed:** 44 minutes

**Score:** /41

**Percentage:** /100

**Grade Boundaries:**

**Q1.** 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 1** shows their results.

**Table 1**

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	0.29
Girl 1	0.31	0.29	0.27	0.29
Girl 2	0.32	0.30	0.29	0.30

(a) What is meant by 'reaction time' in this experiment?

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(1)

(b) Boy 2 had an anomalous result in **Test 2**.

Suggest a reason why.

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(1)

(c) Give **one** conclusion that can be made from the results in **Table 1**.

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(1)

(d) Suggest further evidence that you could collect to support your conclusion.

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(1)

- (e) Reaction time is important at the start of a race.

**Table 2** shows the time taken by a boy to run different distances.

**Table 2**

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

Reaction time is more important in a 100 m race than in an 800 m race.

Explain why.

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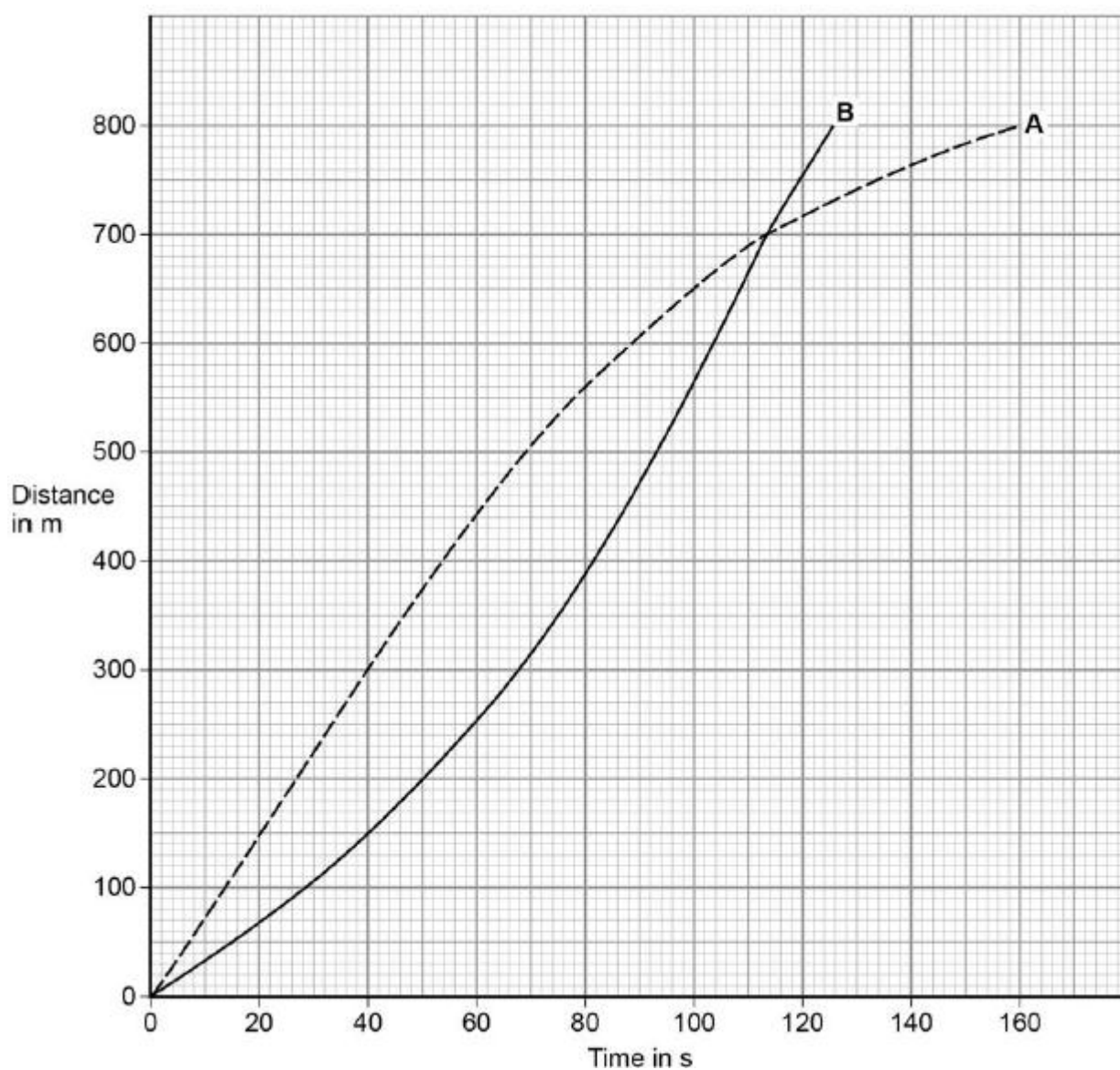
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(2)

- (f) Two girls, **A** and **B**, ran an 800 m race.

The figure below shows how the distance changed with time.



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

Include data from the figure above.

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(6)  
 (Total 12 marks)

**Q2.** 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 1** shows their results.

**Table 1**

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	0.29
Girl 1	0.31	0.29	0.27	0.29
Girl 2	0.32	0.30	0.29	0.30

(a) What is meant by 'reaction time' in this experiment?

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(1)

(b) Boy 2 had an anomalous result in **Test 2**.

Suggest a reason why.

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(1)

(c) Give **one** conclusion that can be made from the results in **Table 1**.

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(1)

- (d) Suggest further evidence that you could collect to support your conclusion.

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 .....

(1)

- (e) Reaction time is important at the start of a race.

**Table 2** shows the time taken by a boy to run different distances.

**Table 2**

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

Reaction time is more important in a 100 m race than in an 800 m race.

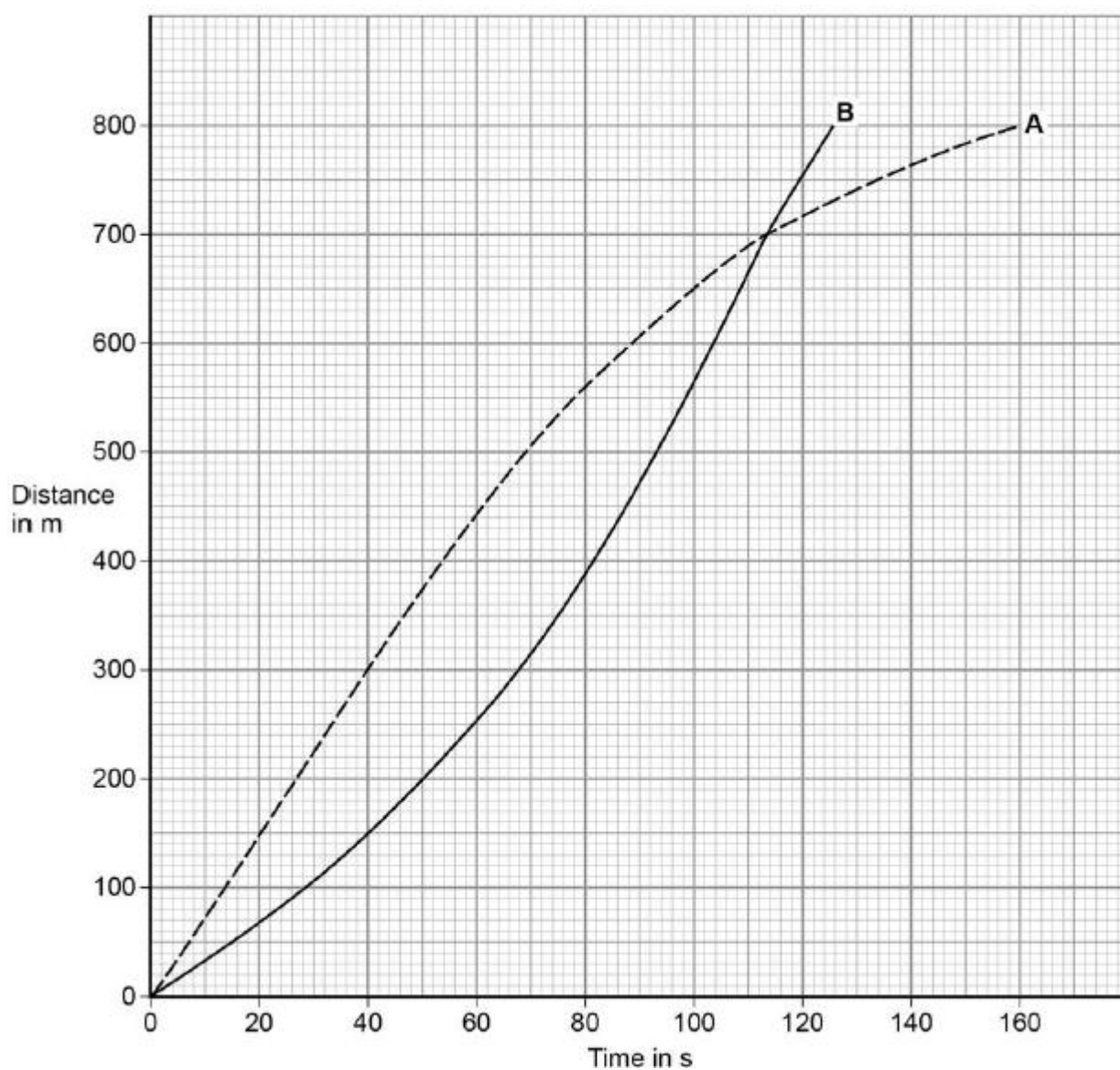
Explain why.

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(2)

- (f) Two girls, **A** and **B**, ran an 800 m race.

The figure below shows how the distance changed with time.



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

Include data from the figure above.

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(6)

- (g) Use above **Figure** to determine Girl **B**'s speed at 60 s.

Show how you use the graph to obtain your answer.

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Speed = ..... m / s

(3)

(Total 15 marks)

**Q3.** This question is about speed.

- (a) What is a typical value for the speed of sound?

Tick **one** box.

3.3 m / s

☐

$3.3 \times 10^2$  m / s

☐

$3.3 \times 10^3$  m / s

☐

$3.3 \times 10^6$  m / s

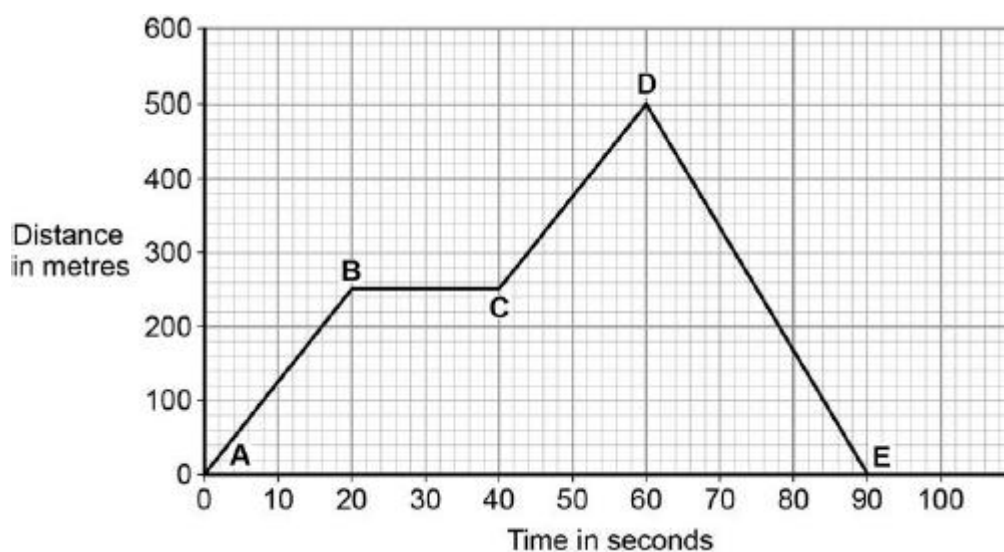
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(1)

- (b) **Figure 1** shows a distance–time graph of a car.

**Figure 1**





Explain what **Figure 1** shows about the motion of the car between point **A** and point **E**.

You should use values from **Figure 1** in your answer.

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(4)

- (c) The kinetic energy of a moving car depends on the car's mass and speed.

Write down the equation that links kinetic energy, mass and speed.

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(1)

- (d) A car has a mass of 1 650 kg.

The table below shows the kinetic energy of the car moving at 11 m / s.

Mass of car in kg	Speed in m / s	Kinetic energy in J
1 650	11	99 825
1 650	30	

Calculate the missing value in the table above.

Give your answer in kilojoules (kJ).

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Kinetic energy = ..... kJ

(2)

- (e) A man is driving his car at a constant speed on a wet road.

He sees a fallen tree on the wet road and tries to stop quickly to prevent an accident.

**Figure 2**



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Explain why the man may not be able to stop in time.

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(6)  
(Total 14 marks)