

Forces and motion – GCSE Physics Paper 2

1. No.8

0	8
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Figure 15 shows an electric super-car.

Figure 15

0	8
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1

The battery in an electric car needs to be recharged.

Suggest **two** factors that affect the distance an electric car can travel before the battery needs to be recharged.

[2 marks]

1 _____

2 _____

Use the Physics Equations Sheet to answer questions 08.2 and 08.3.

08.2

Write down the equation which links acceleration (a), change in velocity (Δv) and time taken (t).

[1 mark]

08.3

The maximum acceleration of the car is 20 m/s^2 .

Calculate the time taken for the speed of the car to change from 0 m/s to 28 m/s at its maximum acceleration.

[3 marks]

Time taken = _____ s

08.4

In a trial run, the car accelerates at 10 m/s^2 until it reaches its final velocity.

distance travelled by the car = 605 m

initial velocity of the car = 0 m/s

Calculate the final velocity of the car.

Use the Physics Equations Sheet.

[3 marks]

Final velocity = _____ m/s

Use the Physics Equations Sheet to answer questions 08.5 and 08.6.

08.5

Write down the equation which links distance (s), force (F) and work done (W).

[1 mark]

08.6

When travelling at its maximum speed the air resistance acting on the car is 4000 N.

Calculate the work done against air resistance when the car travels a distance of 7.5 km at its maximum speed.

[3 marks]

Work done = _____ J

2. No.1

0	1
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Figure 1 shows an electric super-car.

Figure 1



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The battery in an electric car needs to be recharged.

Suggest **two** factors that affect the distance an electric car can travel before the battery needs to be recharged.

[2 marks]

1 _____

2 _____

Use the Physics Equations Sheet to answer questions 01.2 and 01.3.

01.2

Write down the equation which links acceleration (a), change in velocity (Δv) and time taken (t).

[1 mark]

01.3

The maximum acceleration of the car is 20 m/s^2 .

Calculate the time taken for the speed of the car to change from 0 m/s to 28 m/s at its maximum acceleration.

[3 marks]

Time taken = _____ s

01.4

In a trial run, the car accelerates at 10 m/s^2 until it reaches its final velocity.

distance travelled by the car = 605 m

initial velocity of the car = 0 m/s

Calculate the final velocity of the car.

Use the Physics Equations Sheet.

[3 marks]

Final velocity = _____ m/s

Use the Physics Equations Sheet to answer questions 01.5 and 01.6.

01.5

Write down the equation which links distance (s), force (F) and work done (W).

[1 mark]

01.6

When travelling at its maximum speed the air resistance acting on the car is 4000 N.

Calculate the work done against air resistance when the car travels a distance of 7.5 km at its maximum speed.

[3 marks]

Work done = _____ J

3. No.3

0 3

Speed limits on roads increase safety.

0 3

. 1

The braking distance of a car increases as the speed of the car increases.

Give two **other** factors that **increase** the braking distance of a car.

[2 marks]

1 _____

2 _____

0 3

. 2

Explain why the driver's reaction time affects the thinking distance of a car.

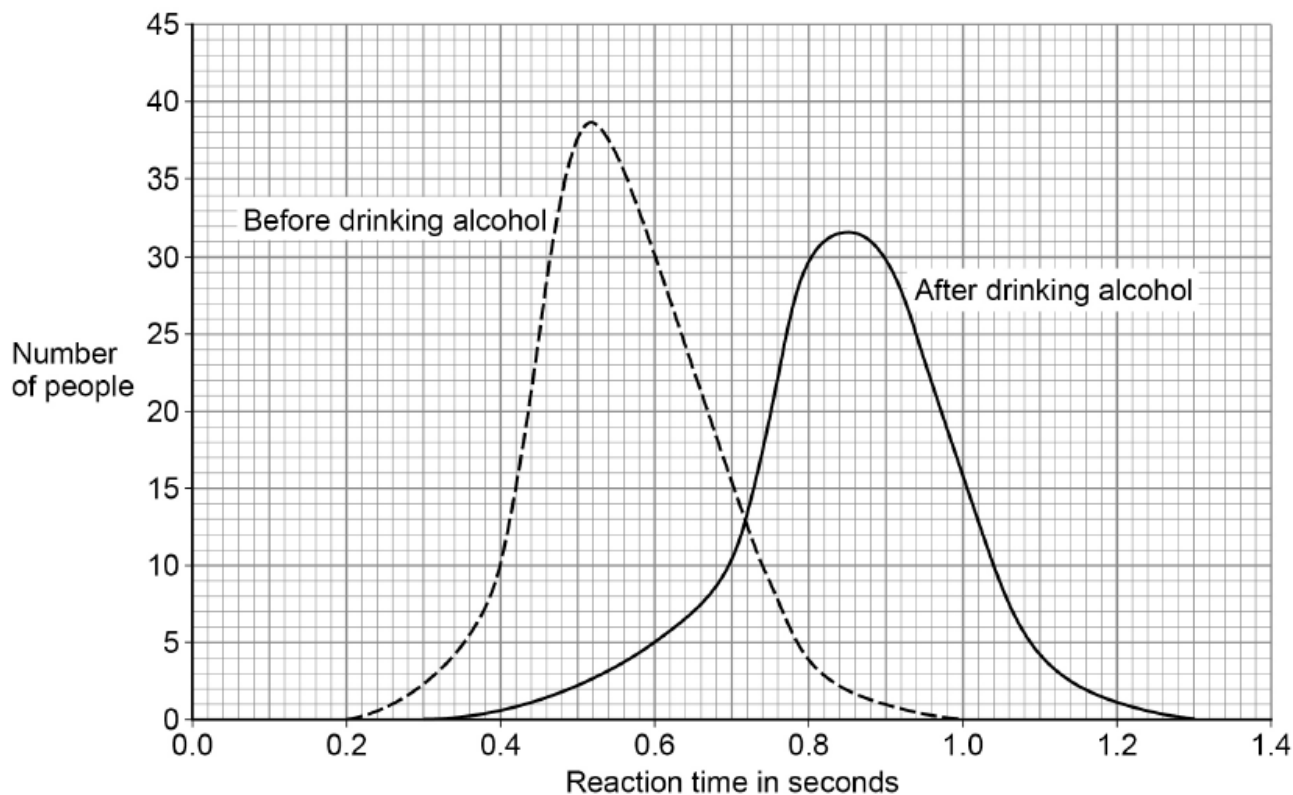
[2 marks]

0 3 . 3

Scientists have investigated how drinking alcohol affects a person's reaction time.

Figure 5 shows the results of the investigation.

Figure 5



Which of the following conclusions can be made using Figure 5?

[2 marks]

Tick (✓) **two** boxes.

Every person's reaction time increases after drinking alcohol.

☐

Mean reaction time increases after drinking alcohol.

☐

Some people's reaction time is not affected by drinking alcohol.

☐

The change in reaction time is not the same for all people after drinking alcohol.

☐

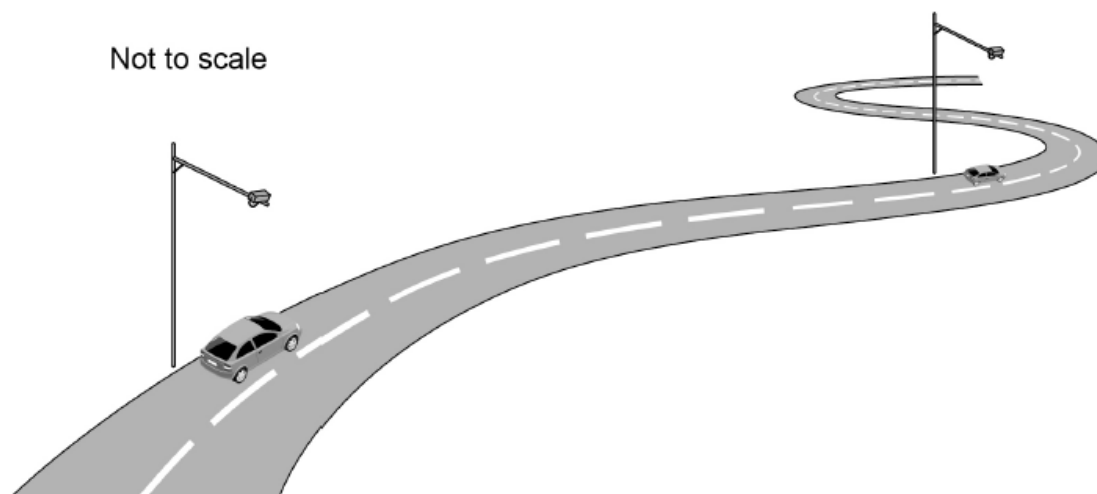
There is a smaller range of reaction times after drinking alcohol.

☐

Figure 6 shows some speed cameras on a road.

The speed cameras determine the average speed of cars on the road.

Figure 6



0 3 . 4 The speed limit on the road in **Figure 6** is 20 m/s.

The cameras in **Figure 6** are 1.5 km apart.

Calculate the minimum time it takes to travel 1.5 km without breaking the speed limit.

Use the Physics Equations Sheet.

[4 marks]

Minimum time = _____ s

0	3	.	5
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The average speed of a car between the cameras and the average velocity of the car between the cameras are different.

Explain why.

[3 marks]
