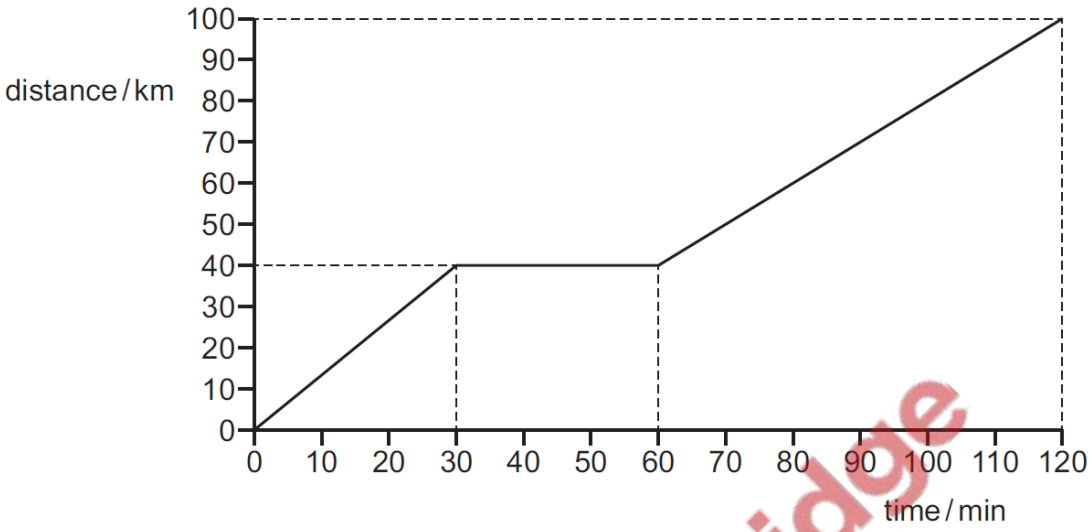
Motion – 2021 IGCSE 0625

1. June/2021/Paper_11/No.3

The distance–time graph for a motorway journey is shown.



What is the average speed for the journey?

A 50 km / h **B** 67 km / h **C** 70 km / h **D** 83 km / h

2. June/2021/Paper_13/No.3

A cyclist rides 300 m up a slope in 50 s.

She then rides down the slope in 25 s.

What is her average speed for the whole journey?

A 4.0 m / s **B** 8.0 m / s **C** 9.0 m / s **D** 16 m / s

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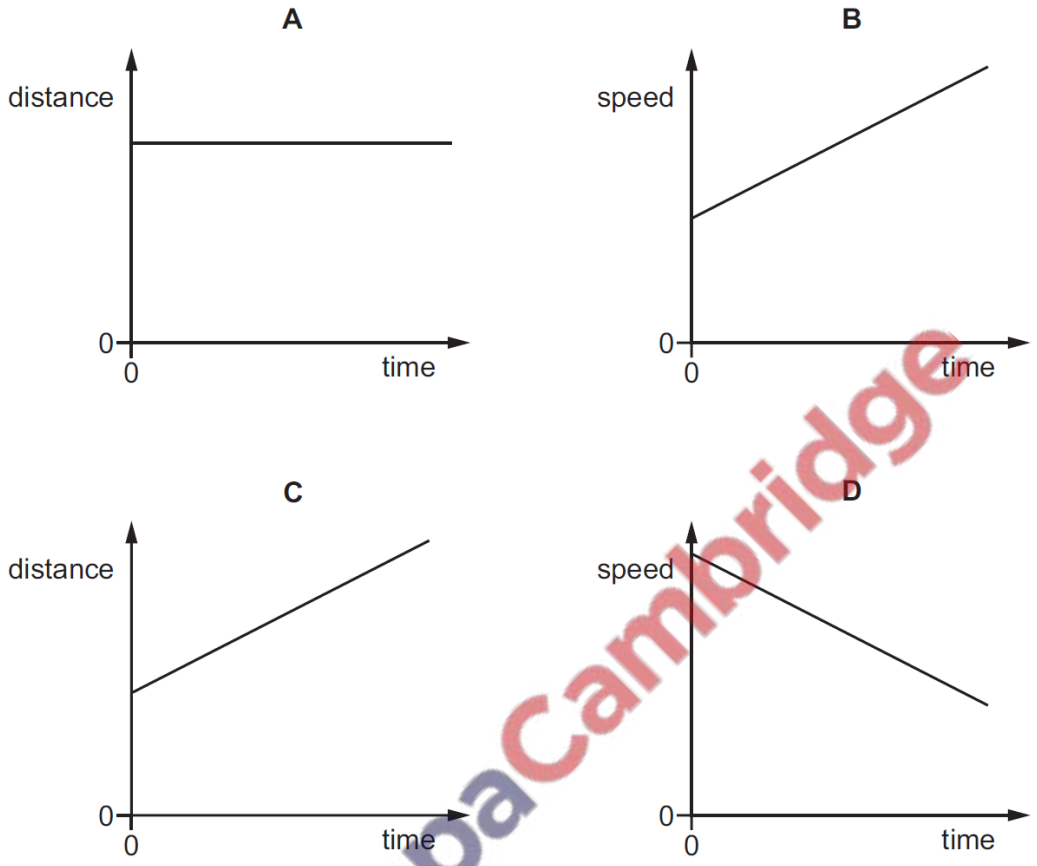
3. June/2021/Paper_12/No.2

A cyclist records his speed and the distance travelled during a journey.

He then plots the data against time for different sections of his journey.

Which graph shows a section when he is moving with constant speed?



4. June/2021/Paper_21/No.2

Which row describes speed and velocity?

	speed	velocity
A	scalar	scalar
B	scalar	vector
C	vector	scalar
D	vector	vector

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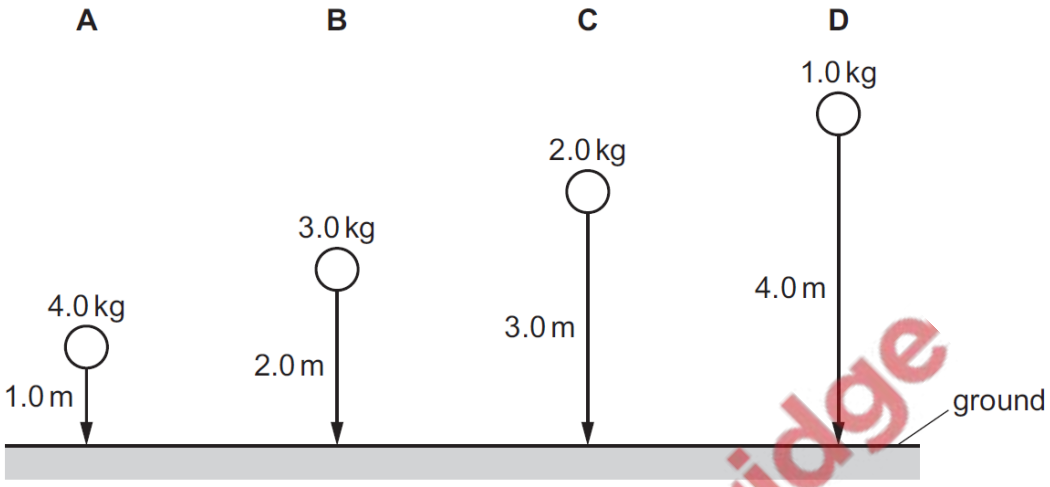
5. June/2021/Paper_21,22&23/No.3,2

Four balls with different masses are dropped from the heights shown.

Air resistance may be ignored.

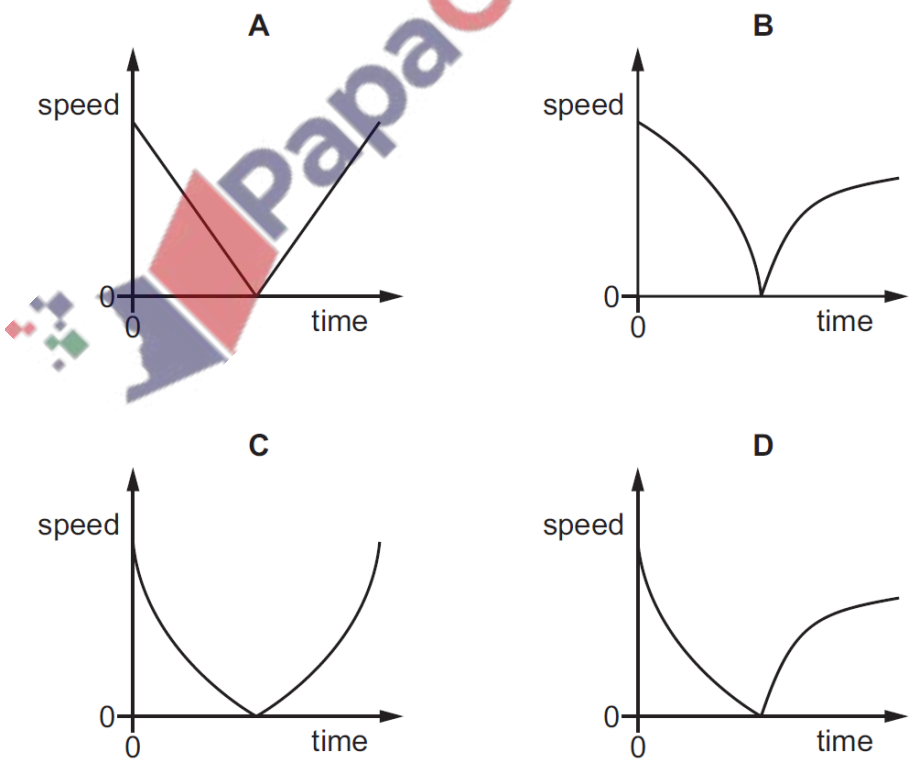
Which ball has the smallest average speed?



6. June/2021/Paper_22/No.3

A ball is thrown vertically upwards through the air. Air resistance acts on the ball.

Which graph shows how its speed varies with time?



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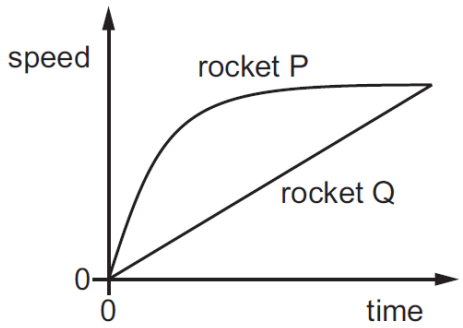
7. March/2021/Paper_12/No.2

Two rockets are launched at the same time from the surface of the Earth. The graph shows how the speeds of the rockets change with time.



Which statement about the rockets is correct?

A Both rockets travel the same distance.

B Rocket P accelerates and then decelerates.

C Rocket P travels further than rocket Q.

D Rocket Q has zero acceleration.

8. March/2021/Paper_12&22/No.3

A train begins a journey from a station and travels 60 km in a time of 20 minutes.

What is the average speed of the train?

A 3.0 m/s **B** 5.0 m/s **C** 50 m/s **D** 60 m/s

9. March/2021/Paper_22/No.2

A ball hits a bat with a velocity of 30 m/s, and leaves the bat travelling with a velocity of 20 m/s in the opposite direction. The ball is in contact with the bat for 0.10 s.

What is the magnitude of the acceleration of the ball whilst it is in contact with the bat?

A 1.0 m/s^2 **B** 5.0 m/s^2 **C** 100 m/s^2 **D** 500 m/s^2

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10. June/2021/Paper_31/No.1

Fig. 1.1 shows a speed–time graph for a car.

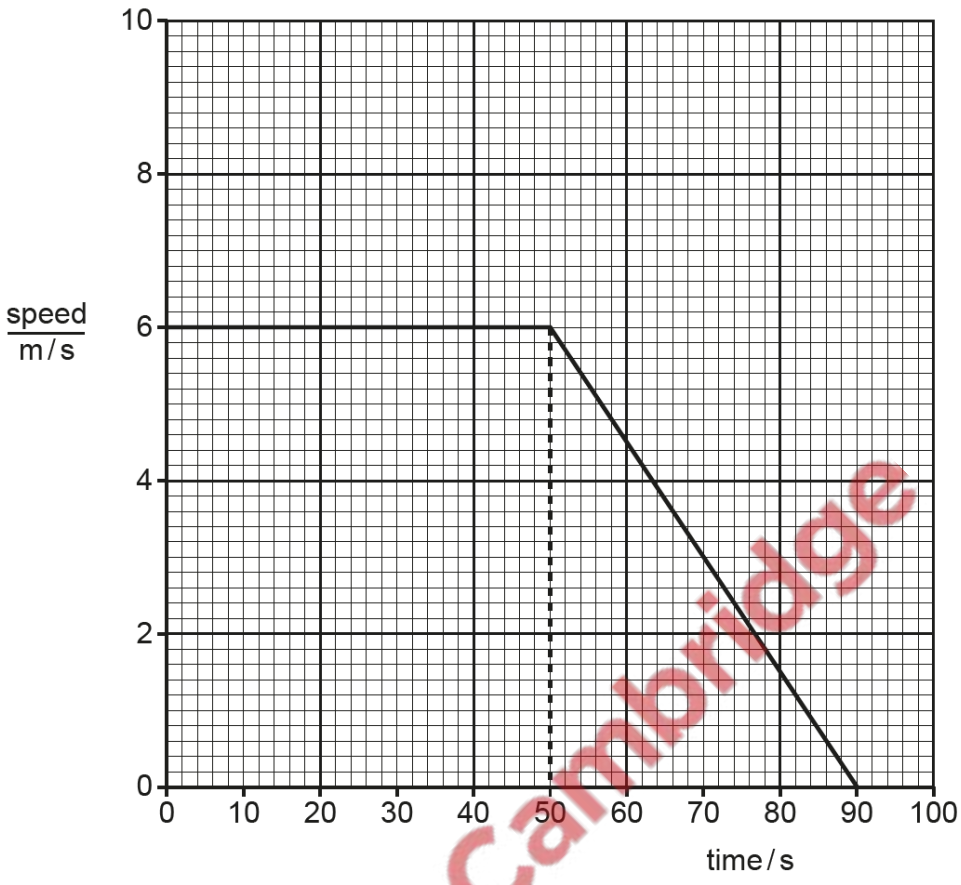

Fig. 1.1

(a) (i) Describe the motion of the car from 0 to 50 s, as shown in Fig. 1.1.

..... [1]

(ii) Describe the motion of the car from 50 s to 90 s, as shown in Fig. 1.1.

.....

..... [1]

(iii) Calculate the distance travelled by the car between 50 s and 90 s.

distance travelled = ... m [3]

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(b) A motorcycle travels at a constant speed.

(i) The motorcycle travels 710 m in 87 s.

Calculate the speed of the motorcycle and show that it is close to 8 m/s.

[3]

(ii) The motorcycle in part **(b)(i)** travels at a constant speed for 87 s.

On Fig. 1.1, draw the speed–time graph for the motorcycle. [2]

[Total: 10]

11. June/2021/Paper_32/No.2

Fig. 2.1 shows how the speed of a car varies between 0 and 60.0 s.

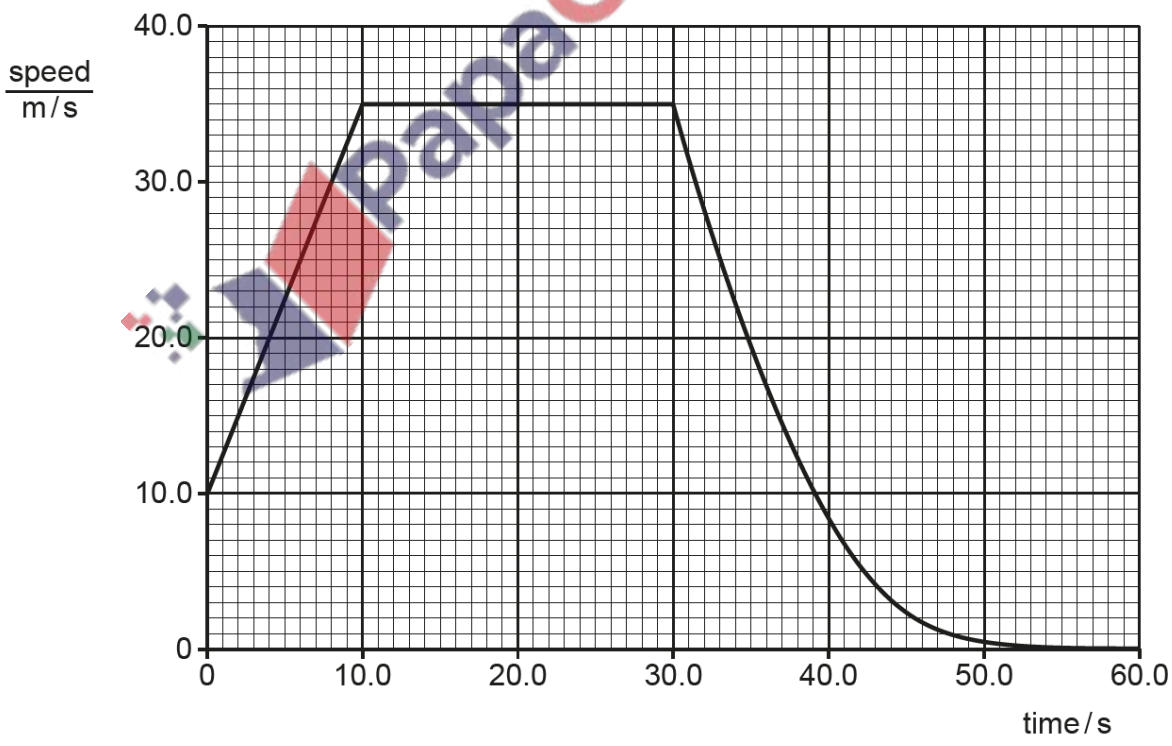

Fig. 2.1

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(a) Determine the speed of the car using information from Fig. 2.1:

(i) when the time is 5.0 s

speed = ... m/s [2]

(ii) when the car is moving with a constant speed.

speed = ... m/s [1]

(b) Describe how the speed of the car changes between 30.0 s and 60.0 s.

..... [2]

(c) Determine the distance travelled by the car between 10.0 s and 30.0 s.

distance travelled = ... m [3]

(d) The total distance travelled by the car in the last 30.0 s is 226 m.

Calculate the average speed of the car in the last 30.0 s.

average speed = ... m/s [3]

[Total: 11]

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12. June/2021/Paper_33/No.1

Fig. 1.1 shows the speed–time graph for a car travelling along a road.

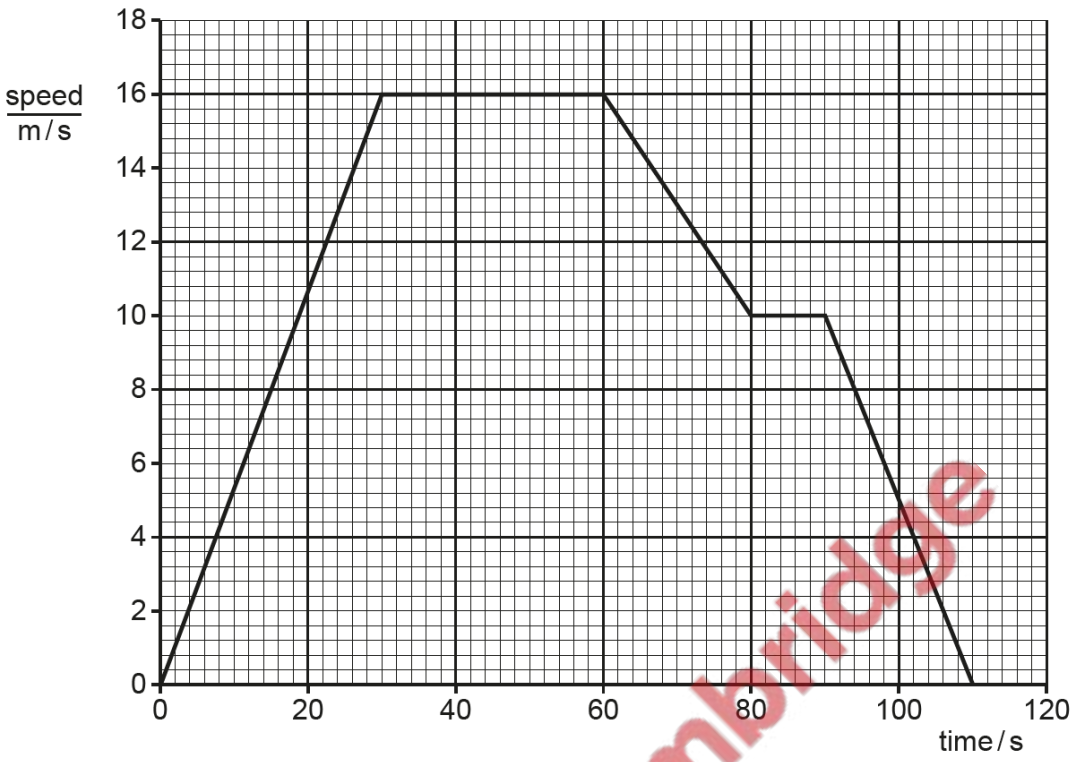

Fig. 1.1

(a) Determine the distance travelled by the car between 30 s and 60 s.

distance travelled = ... m [3]

(b) The distance travelled by the car between 60 s and 110 s is 460 m.

Calculate the average speed of the car between 60 s and 110 s.

average speed = ... m/s [4]

(c) Describe the motion of the car between 30 s and 60 s.

..... [1]

(d) Describe the motion of the car between 60 s and 80 s.

..... [1]

[Total: 9]

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13. June/2021/Paper_41/No.1

A skydiver of mass 76 kg is falling vertically in still air. At time $t = 0$, the skydiver opens his parachute.

Fig. 1.1 is the speed–time graph for the skydiver from $t = 0$.

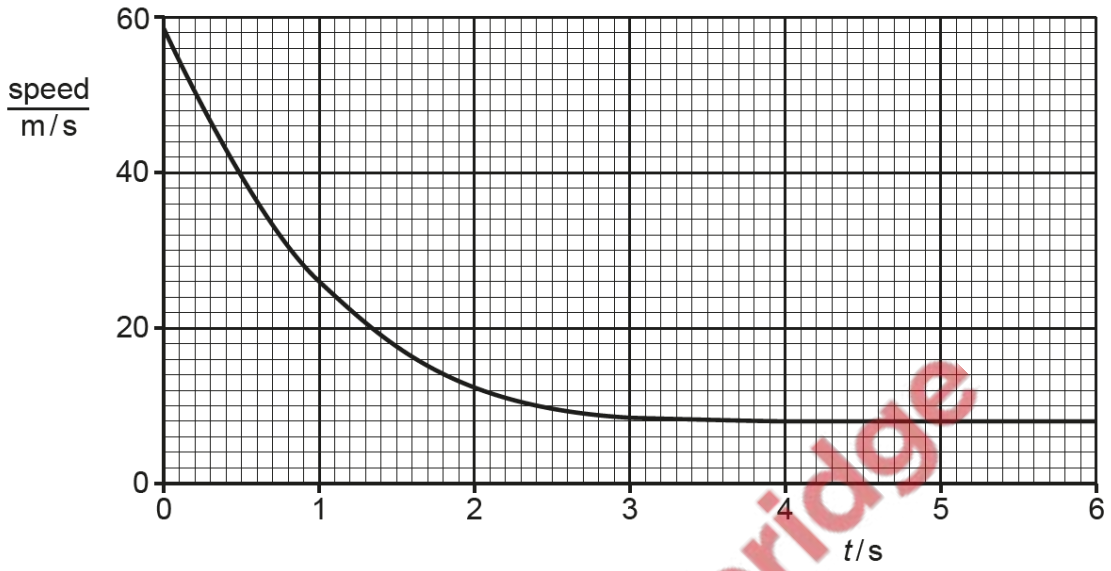

Fig. 1.1

(a) Using Fig. 1.1, determine:

(i) the deceleration of the skydiver immediately after the parachute opens

deceleration = ... [2]

(ii) the force due to air resistance acting on the skydiver immediately after the parachute opens.

force = ... [3]

(b) Explain, in terms of the forces acting on the skydiver, his motion between $t = 0$ and $t = 6.0$ s.

.....

.....

.....

..... [3]

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(c) Explain why opening the parachute cannot reduce the speed of the skydiver to zero.

.....

.....

..... [2]

[Total: 10]

14. June/2021/Paper_43/No.3

A car travels at constant speed v on a horizontal, straight road. The driver sees an obstacle on the road ahead.

(a) The distance travelled in the time between the driver seeing the obstruction and applying the brakes is the thinking distance.

Explain why the thinking distance is directly proportional to v.

.....

..... [1]

(b) When the brakes are applied, the car decelerates uniformly to rest. The frictional force applied by the brakes is constant. The distance travelled between first applying the brakes and the car stopping is the braking distance.

Explain why the braking distance is proportional to v^2.

.....

.....

.....

..... [3]

(c) The car is travelling at 22 m/s.

(i) The thinking distance is 15 m.

Calculate the time taken to travel the thinking distance.

time = ... [2]

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(ii) The car has a mass of 1400 kg. The time taken for the car to stop after the brakes are applied is 2.1 s.

Calculate the force required to stop the car in this time.

force = ... [2]

[Total: 8]

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