

Name of the Student: _____

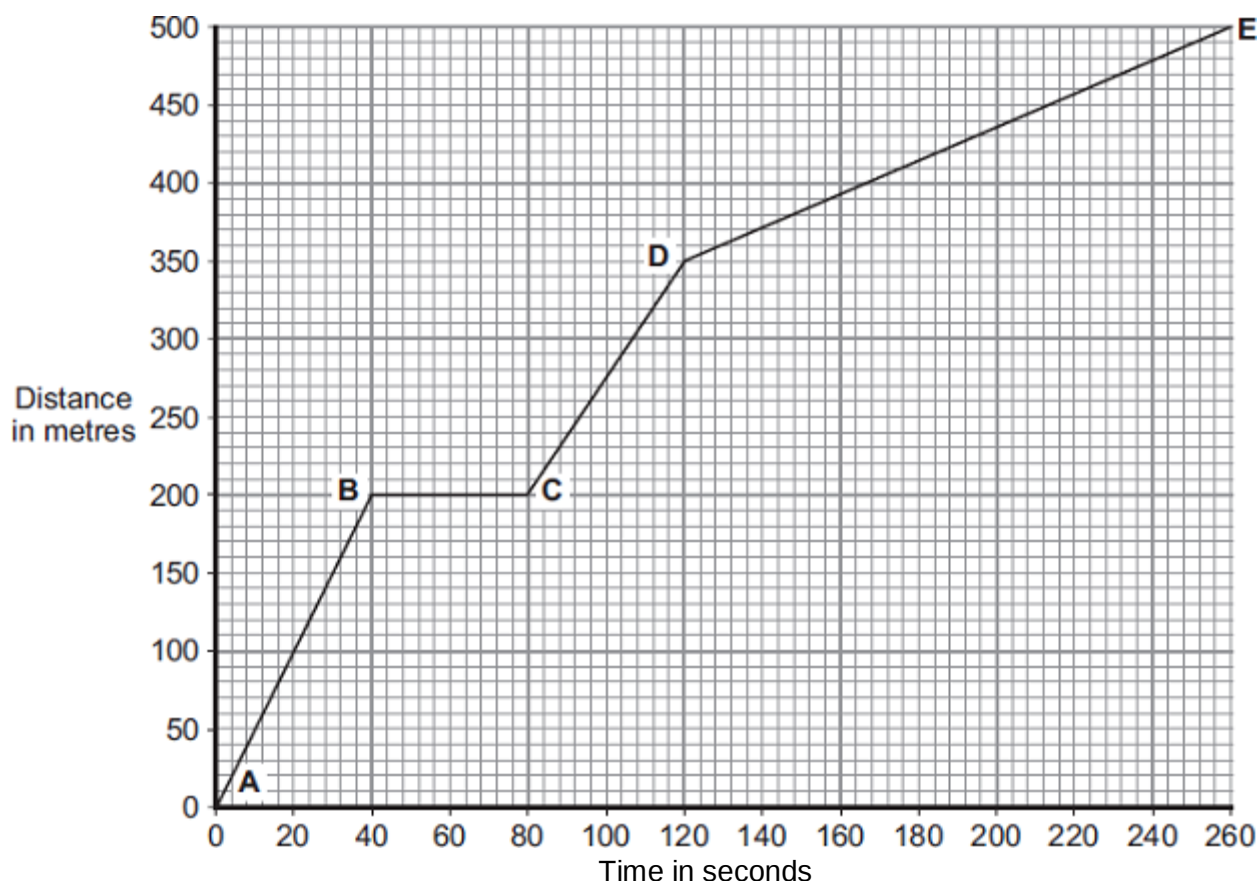
Max. Marks : 18 Marks

Time : 18 Minutes

Q1.

Part of a bus route is along a high street.

The distance-time graph shows how far the bus travelled along the high street and how long it took.



- (a) Between which two points was the bus travelling the slowest?

Put a tick (✓) in the box next to your answer.

Points	Tick (✓)
A – B	
C – D	
D – E	

Give a reason for your answer.

(2)

- (b) The bus travels at 5 m/s between points **A** and **B**.
The bus and passengers have a total mass of 16 000 kg.

Use the equation in the box to calculate the momentum of the bus and passengers between points **A** and **B**.

$$\text{momentum} = \text{mass} \times \text{velocity}$$

Show clearly how you work out your answer.

Momentum = _____ kg m/s

(2)

- (c) A cyclist made the same journey along the high street.
The cyclist started at the same time as the bus and completed the journey in 220 seconds. The cyclist travelled the whole distance at a constant speed.

- (i) Draw a line on the graph to show the cyclist's journey.

(2)

- (ii) After how many seconds did the cyclist overtake the bus?

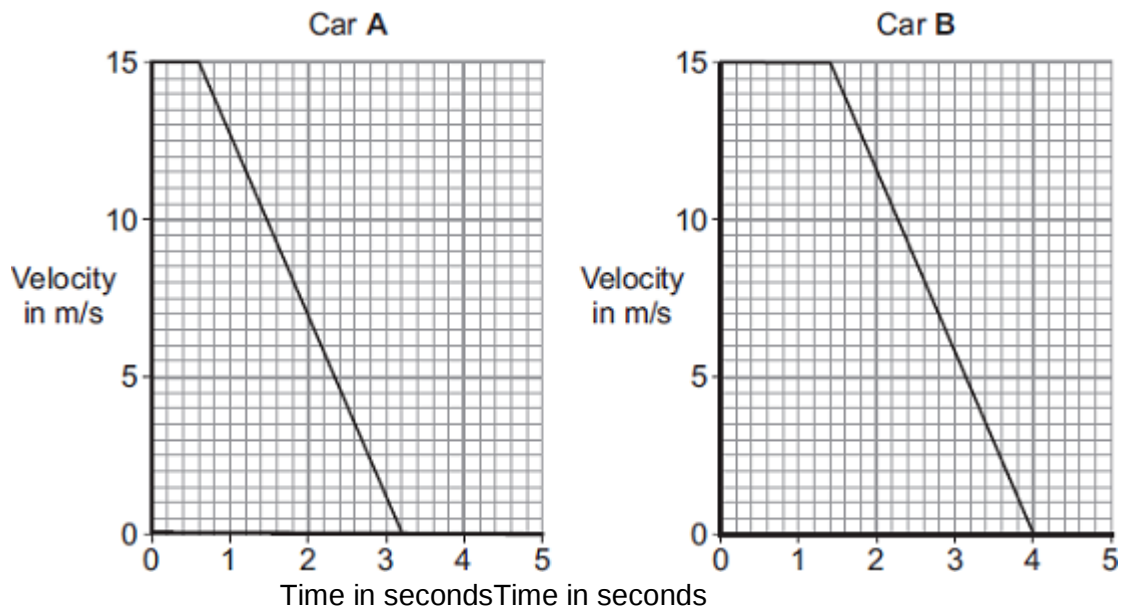
The cyclist overtook the bus after _____ seconds.

(1)

(Total 7 marks)

Q2.

- (a) The graphs show how the velocity of two cars, **A** and **B**, change from the moment the car drivers see an obstacle blocking the road.



One of the car drivers has been drinking alcohol. The other driver is wide awake and alert.

- (i) How does a comparison of the two graphs suggest that the driver of car **B** is the one who has been drinking alcohol?

(1)

- (ii) How do the graphs show that the two cars have the same deceleration?

(1)

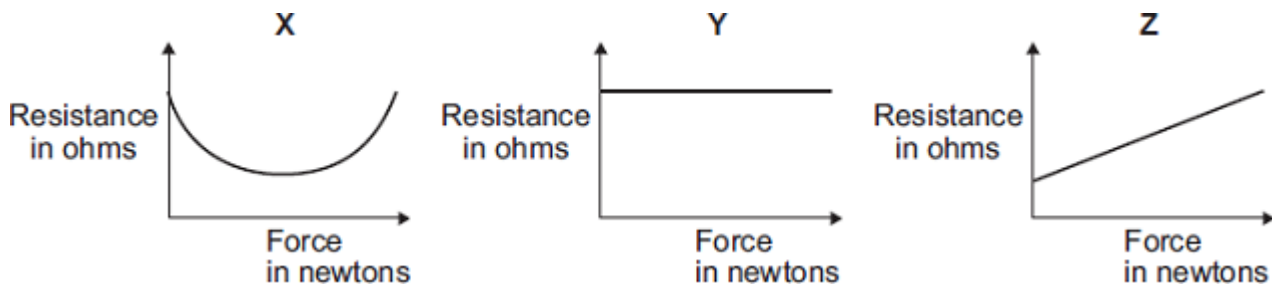
- (iii) Use the graphs to calculate how much further car **B** travels before stopping compared to car **A**.

Show clearly how you work out your answer.

Additional stopping distance = _____ m

(3)

- (b) In a crash-test laboratory, scientists use sensors to measure the forces exerted in collisions. The graphs show how the electrical resistance of 3 experimental types of sensor, **X**, **Y**, and **Z**, change with the force applied to the sensor.



Which of the sensors, **X**, **Y** or **Z**, would be the best one to use as a force sensor?

Give a reason for your answer.

(2)

(Total 7 marks)

Q3.

The London Eye is one of the largest observation wheels in the world.



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The passengers ride in capsules. Each capsule moves in a circular path and accelerates.

- (a) Explain how the wheel can move at a steady speed and the capsules accelerate at the same time.

(2)

- (b) In which direction is the resultant force on each capsule?

(1)

- (c) The designers of the London Eye had to consider **three** factors which affect the resultant force described in part (b).

Two factors that increase the resultant force are:

- an increase in the speed of rotation
- an increase in the total mass of the wheel, the capsules and the passengers.

Name the other factor that affects the resultant force and state what effect it has on the resultant force.

(1)

(Total 4 marks)