

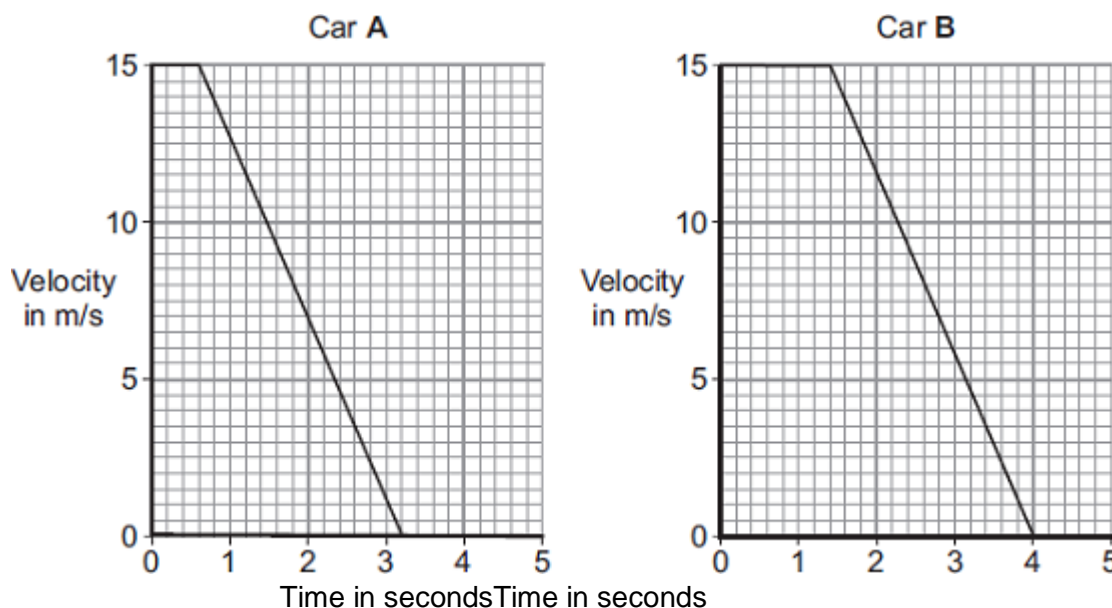
Name of the Student: _____

Max. Marks : 18 Marks

Time : 18 Minutes

Q1.

- (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)

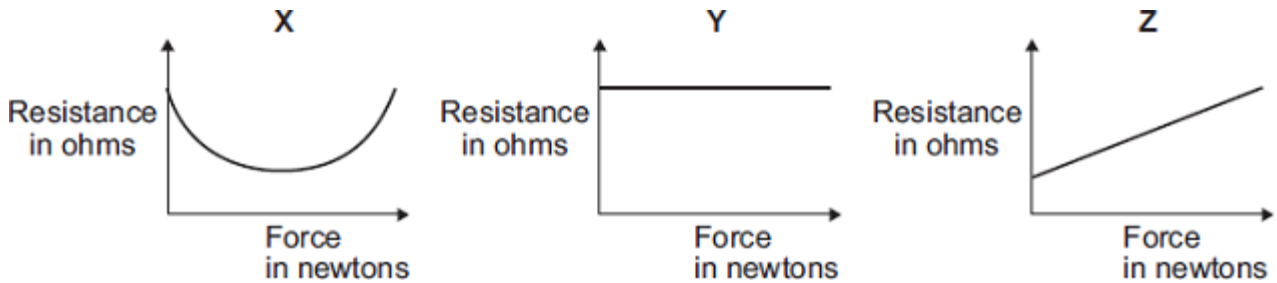
- (iii) Use the graphs to calculate how much further car **B** travels before stopping compared to car **A**.

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)

Q2.

- (a) In any collision, the total momentum of the colliding objects is usually conserved.

(i) What is meant by the term 'momentum is conserved'?

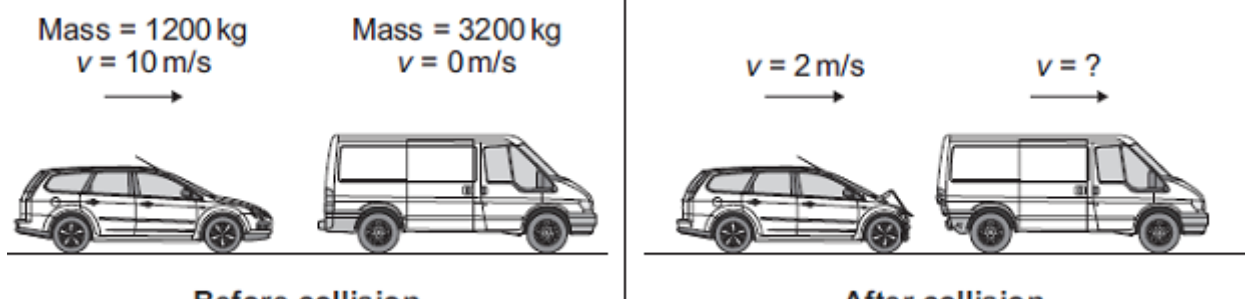
(1)

(ii) In a collision, momentum is **not always** conserved.

Why?

(1)

- (b) The diagram shows a car and a van, just before and just after the car collided with the van.



- (i) Use the information in the diagram to calculate the **change** in the momentum of the car.
Show clearly how you work out your answer and give the unit.

Change in momentum = _____

(3)

- (ii) Use the idea of conservation of momentum to calculate the velocity of the van when it is pushed forward by the collision.

Show clearly how you work out your answer.

Velocity = _____ m/s forward

(2)

(Total 7 marks)

Q3.

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



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)