

Name of the Student: _____

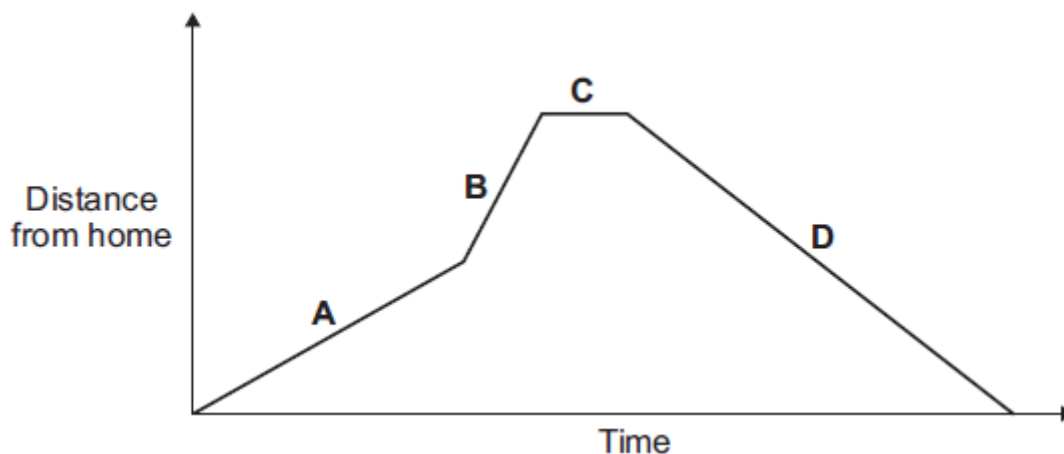
Max. Marks : 20 Marks

Time : 20 Minutes

Q1.

- (a) A person takes their dog for a walk.

The graph shows how the distance from their home changes with time.



Which part of the graph, **A**, **B**, **C** or **D**, shows them walking the fastest?

Write your answer in the box.

Give the reason for your answer.

(2)

- (b) During the walk, both the speed and the velocity of the person and the dog change.

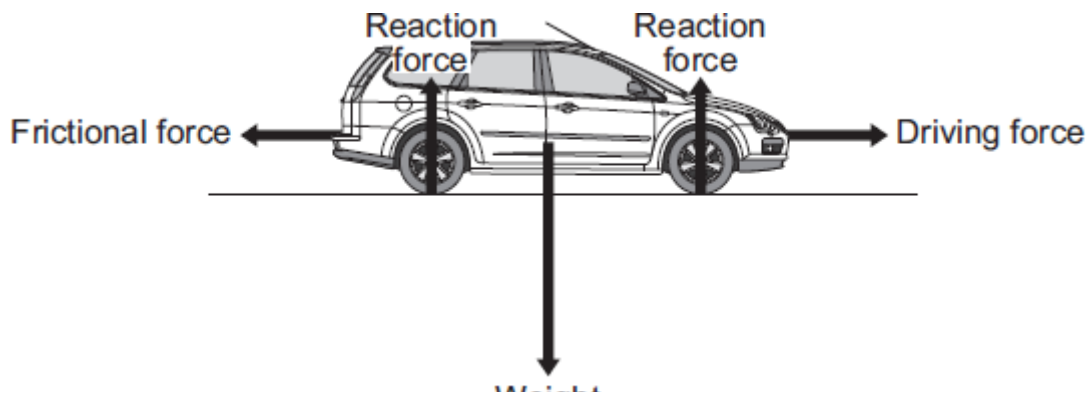
How is *velocity* different from *speed*?

(1)

(Total 3 marks)

Q2.

The diagram shows the forces acting on a car. The car is being driven along a straight, level road at a constant speed of 12 m/s.



- (a) The driver then accelerates the car to 23 m/s in 4 seconds.

Use the equation in the box to calculate the acceleration of the car.

$\text{acceleration} = \frac{\text{change in velocity}}{\text{time taken for change}}$
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Show clearly how you work out your answer and give the unit.

Acceleration = _____

(3)

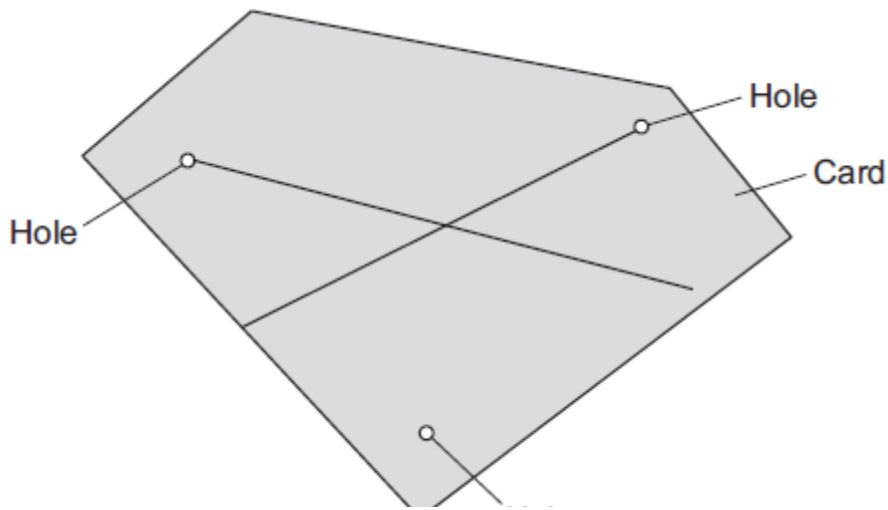
- (b) Describe how the horizontal forces acting on the car change during the first **two** seconds of the acceleration.

(3)

(Total 6 marks)

Q3.

A student was asked to find the centre of mass of a thin sheet of card. The diagram shows the result of the student's experiment. The student drew two lines onto the card. The centre of mass is where the two lines cross.



(a) Describe how the student found the correct positions to draw the **two** lines.

You may include a labelled diagram in your answer.

(3)

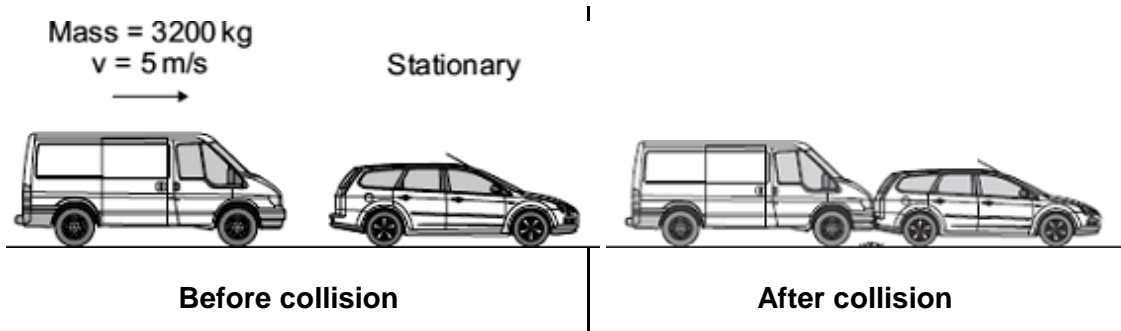
(b) Explain how the student can check that the position found for the centre of mass is accurate.

(2)

(Total 5 marks)

Q4.

- (a) A van has a mass of 3200 kg. The diagram shows the van just before and just after it collides with the back of a car.



Just before the collision, the van was moving at 5 m/s and the car was stationary.

- (i) Calculate the momentum of the van just before the collision.

Show clearly how you work out your answer.

Momentum = _____ kg m/s

(2)

- (ii) The collision makes the van and car join together.

What is the total momentum of the van and the car just after the collision?

Momentum = _____ kg m/s

(1)

- (iii) Complete the following sentence by drawing a ring around the correct line in the box.

The momentum of the car before the collision is

more than

the same as

the

less than

momentum of the car after the collision.

(1)

- (b) A seat belt is one of the safety features of a car.



In a collision, wearing a seat belt reduces the risk of injury.

Use words or phrases from the box to complete the following sentences.

decreases	stays the same	increases
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In a collision, the seat belt stretches. The time it takes for the person held by the seat belt to lose momentum compared to a person not wearing a seat belt,

_____.

The force on the person's body _____ and so reduces the risk of injury.

(2)
(Total 6 marks)