Newton's Third Law

Question Paper

Level	GCSE (9-1)
Subject	Combined Science: Trilogy - Physics
Exam Board	AQA
Topic	6.5 Forces
Sub-Topic	Newton's Third Law
Difficulty Level	Silver Level
Booklet	Question Paper

Time Allowed: **21 minutes**

Score: **/20**

Percentage: **/100**

Grade Boundaries:

Q1. The figure below shows an ice skater standing on the ice.

Mass
70 kg

(a) Write down the equation that links acceleration, change in velocity and time.

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(1)

(b) As the skater pushes away across the ice there is a small frictional force.

After pushing, the skater starts to move with a velocity of 5 m / s.

He slows to 3 m / s in 6 seconds.

Calculate the acceleration of the skater.

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Acceleration = ... m / s^2

(2)

(c) Write down the equation that links acceleration, force and mass.

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(1)

(d) Friction reduces the speed of the skater.

Calculate the frictional force acting on the skater to slow him down.

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Frictional force = ... N

(2)

(e) The skater stands still on the ice.

He throws his bag to a friend.

As he throws his bag forwards, the skater moves backwards across the ice.

Use the idea of conservation of momentum to explain why he moves backwards.

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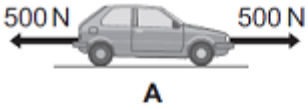
(4)
(Total 10 marks)

Q2. (a) A car is being driven along a straight road. The diagrams, **A**, **B** and **C**, show the horizontal forces acting on the moving car at three different points along the road.

Describe the motion of the car at each of the points, **A**, **B** and **C**.



A .....

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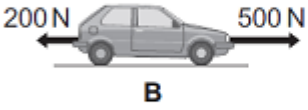

B .....

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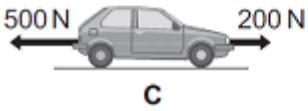

C .....

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(3)

(b) The diagram below shows the stopping distance for a family car, in good condition, driven at 22 m/s on a dry road. The stopping distance has two parts.

(i) Complete the diagram below by adding an appropriate label to the second part of the stopping distance.

The distance the car travels during the driver's reaction time

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(1)

(ii) State **one** factor that changes both the first part **and** the second part of the stopping distance.

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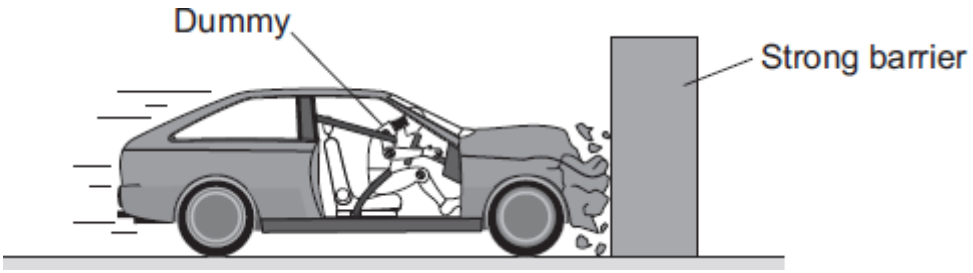
(1)

(c) The front crumple zone of a car is tested at a road traffic laboratory. This is done by using a remote control device to drive the car into a strong barrier. Electronic sensors are attached to the dummy inside the car.



(i) At the point of collision, the car exerts a force of 5000 N on the barrier.

State the size and direction of the force exerted by the barrier on the car.

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(1)

(ii) Suggest why the dummy is fitted with electronic sensors.

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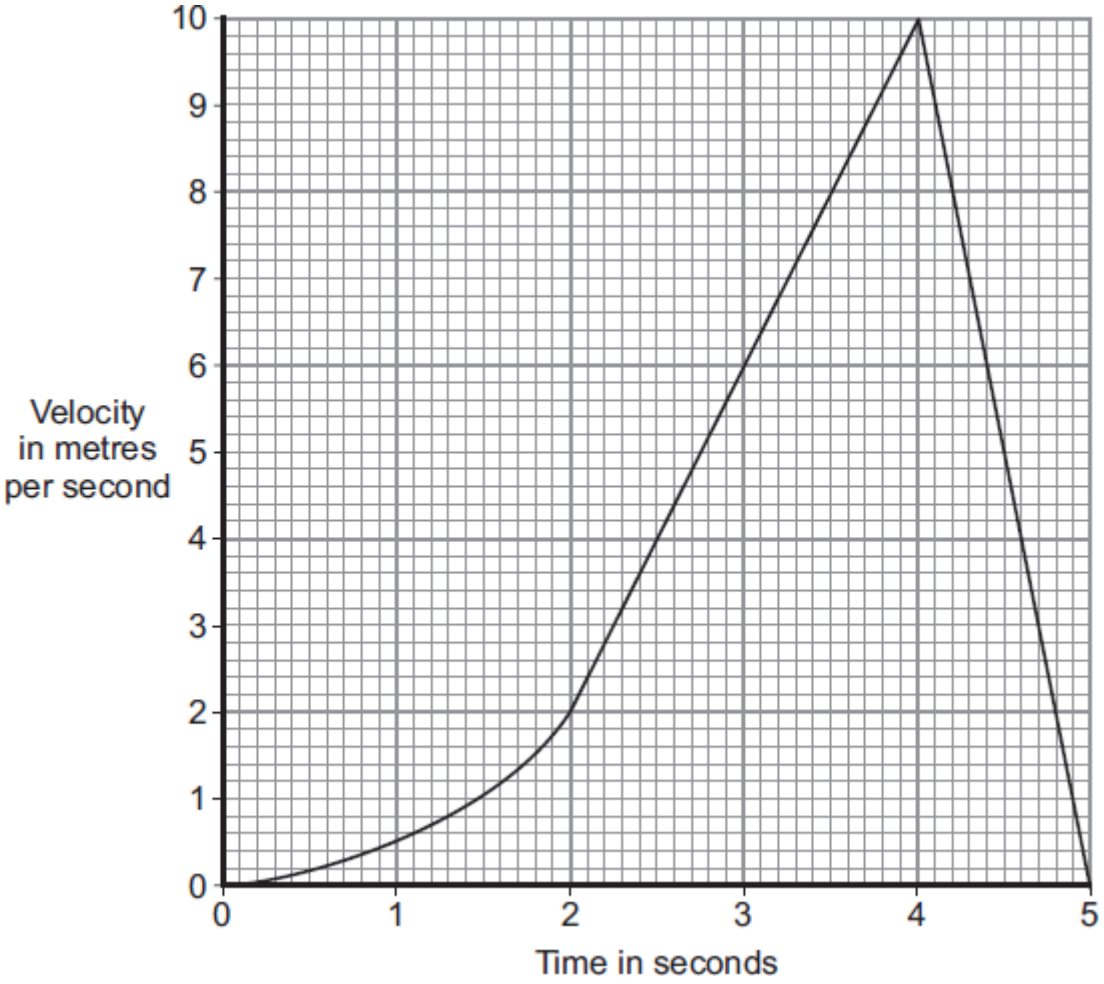
(1)

(iii) The graph shows how the velocity of the car changes during the test.



Use the graph to calculate the acceleration of the car just before the collision with the barrier.

Show clearly how you work out your answer, including how you use the graph, and give the unit.

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Acceleration = ...

(3)
(Total 10 marks)