Name of the Student:_____
Max. Marks : 24 Marks **Time : 24 Minutes**

Mark Schemes

Q1.

(a) (vector quantity) has magnitude and a direction **1**

(scalar quantity) has magnitude only **1**

(b) resistive force acts on the ball
allow friction or air resistance **1**

so (resultant) force in opposite direction to velocity

or

so work is done on the ball **1**

(c) momentum = mass × velocity

or

p = mv **1**

(d) 26 = m × 5.0 **1**

m = $\frac{26}{5.0}$ **1**

5.2 (kg) **1**

(e) momentum is conserved in the collision (assuming no external forces) **1**

momentum of the pin increases **1**

therefore the momentum of the ball must decrease.
*if no other mark is awarded, allow **1** mark for when the ball exerts a force on the pin, the pin exerts an equal and opposite force on the ball* **1**

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Q2.

(a) $13.5 \times \frac{2}{3}$

1

9.0 (m/s)

allow 9 (m/s)

OR

$13.5 \times \frac{1}{3} = 4.5$ (1)

13.5 - 4.5 = 9.0 (m/s) (1)

1

(b) reduced speed reduces stopping distance

allow reduces thinking / braking distance

1

means less chance of collision

OR

the car will have less kinetic energy (1)

so less likely to cause injury in the event of a collision (1)

1

(c) $14 = v \times 0.70$

1

$v = \frac{14}{0.70}$

1

v = 20 (m/s)

1

$0^2 - 20^2 = 2 \times (-6.25) \times s$

1

$s = \frac{20^2}{(2 \times 6.25)}$

ignore minus signs throughout

1

s = 32 (m)

1

(d) same maximum force applied by the brakes

1

because mass is less there is a greater deceleration

allow momentum for mass

1

braking distance is less

OR

reducing the mass reduced the kinetic energy of the van (at a given speed) (1)

less work needed to be done to bring the van to a stop (1)

(force from the brakes is the same) so braking distance is less (1)

1

[13]