

Name of the Student: _____

Max. Marks : 24 Marks

Time : 24 Minutes

Mark Schemes

Q1.

- (a) (i) distance travelled under the braking force
accept distance travelled between applying the brakes and stopping 1
- (ii) any **one** from:
• icy / wet roads
accept weather (conditions)
• (worn) tyres
• road surface
accept gradient of road
• mass (of car and passengers)
accept number of passengers
• (efficiency / condition of the) brakes.
friction / traction is insufficient 1
- (iii) greater the speed the greater the braking force (required)
must mention both speed and force 1
- (b) 22.5
allow 1 mark for showing correct use of the graph with misread figures
or
for showing e.g. $90 \div 4$
an answer 17 gains 1 mark
any answer such as 17.4 or 17.5 scores 0 2
- (c) (i) momentum before = momentum after
or
(total) momentum stays the same
accept no momentum is lost
accept no momentum is gained
ignore statements referring to energy 1
- (ii) 5
allow 2 marks for correctly obtaining momentum before as 12 000
or
allow 2 marks for

$$1500 \times 8 = 2400 \times v$$

or

allow **1** mark for a relevant statement re conservation of momentum

or

allow **1** mark for momentum before = 1500×8

3

- (d) the seat belt stretches

1

driver takes a longer (*impact*) time to slow down and stop (than a driver hitting a hard surface / windscreen / steering wheel)

1

for the (same) change of momentum

accept so smaller deceleration / negative acceleration

1

a smaller force is exerted (so driver less likely to have serious injury than driver without seat belt)

or

the seat belt stretches (**1**)

do not accept impact for force

driver travels a greater distance while slowing down and stopping (than a driver hitting a hard surface / windscreen / steering wheel) (**1**)

for (same) amount of work done (**1**)

accept for (same) change of KE

a smaller force is exerted (so driver less likely to have serious injury than driver without seat belt) (**1**)

do not accept impact for force

1

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Q2.

- (a) (i) decreases (to zero)

1

resultant force acts in opposite direction to motion

accept air resistance and weight for resultant force

accept resultant force acts downwards

*do **not** accept air resistance increases*

1

- (ii) velocity includes direction

or

velocity is a vector (quantity)

1

- (b) (i) 3.6

allow 1 mark for correct substitution i.e.

$\frac{1}{2} \times 0.05 \times 12^2$ provided no subsequent step

2

- (ii) 3.6 **or** their (i)

(iii) 7.2

or

their (ii) $\div 0.5$ correctly calculated

allow 1 mark for correct substitution i.e.

3.6 or their (ii) = $0.05 \times 10 \times h$

2

(iv) **B**

1

(c) range increases up to 45°

1

range decreases from 45°

the range is a maximum at 45° gains both marks

for any two angles that add up

to 90° the range is the same gains both marks

the range increases then decreases gains 1 mark

1

[11]