

Name of the Student: _____

Max. Marks : 17 Marks

Time : 17 Minutes

Mark Schemes

Q1.

- (a) the downward force on the balance increased
allow when there is a current in the wire there is a magnetic field around the wire (which causes a magnetic force) 1

therefore the wire must experience an equal and opposite force (which is upwards) 1

- (b) calculate the difference between the two mass readings
allow $254.8 - 252.3 = 2.5$ 1

convert to kg **and** multiply by gravitational field strength
allow $(2.5 / 1000) \times 9.8 = 0.02375$ (N) 1

- (c) gradient = $\frac{(0.0210 - 0.0)}{(0.70 - 0.02)}$ 1

gradient = 0.031
allow answer correctly given to any number of significant figures 1

$0.031 = B \times 0.125$
allow correct substitution using correctly calculated value given to any number of significant figures 1

$B = 0.25$ T
allow answer correctly given to any number of significant figures
any rounding must be correct for subsequent marks to be awarded.
max 2 marks if a pair of readings from the graph are used instead of gradient calculation 1

[8]

Q2.

- (a) distance 1
- speed 1
- (b) (both have magnitude) only a vector has direction
allow scalar does not have a direction 1
- (c) any **two** from:
- mass
allow weight
 - velocity
allow speed or direction
 - friction
allow air resistance or drag
 - power of the motor 2
- (d) total momentum is zero after the collision (because the bumper cars are stationary) 1
- because the momentum of each car before the collision was equal (in magnitude) and opposite (in direction) 1
- so the total momentum of the bumper cars was zero before the collision 1
- and momentum is conserved

OR

- total momentum is zero after the collision (because the bumper cars are stationary) (1)
- because the momentum of each car before the collision was equal (in magnitude) and opposite (in direction) (1)
- both cars exert an equal and opposite force on each other (for equal periods of time) (1)
- so the cars accelerate (in opposite directions) (1)

[9]