**COMET BAY COLLEGE**

**Physics 2A/2B**

**Motion Test 1**

**Name: Total Marks /57**

Note: Maximum of 1 mark will be awarded to questions where only the answer is shown.

**Question 1** **[4 mark]**

At the 2011 Davis Cup, Ivo Karlovic broke the record for the fastest tennis serve. Over the length of the court (23.78 m) the ball took only 0.341 seconds to reach the opponent.

a) What is the speed in m s-1? (2 marks)

v = = (1 mark)

v = 69.73 m s-1  (1 mark)

b) What is the speed in km h-1? (2 marks)

v = 69.73 × (1 mark)

v = 251.05 km h-1  (1 mark)

**Question 2** **[2 marks]**

Thomas the turtle at Perth zoo travels 0.3m in 10.8 seconds on average. What is the average speed of this reptile in ms-1?

v = = (1 mark)

v = 0.0278 ms-1 (1 mark)

**Question 3** **[4 marks]**

A car is travelling Northwest at a speed of 35 ms-1 when a man throws a can out of the right window at a speed of 10 ms-1 at right angles to the car. What is the resultant of the can relative to the ground?

R2 = 352 + 102 (1 mark)

R = 36.4 ms-1 (1 mark)

Ø = tan-1 () = 16o (1 mark)

Angle is 16o + 45o = 61o

R = 36.4 ms-1 W61oN (1 mark)

10

Ø

35

R

45

**Question 4** **[9 marks]**

Below is a graph showing the displacement over time of a moving car. NOTE: between t = 0 and t = 10 the displacement is parabolic.

Displacement (m)

Tangent of Line AB at Point B

**E**

**D**

**B**

**C**

**A**

Time (s)

Tangent of Line AB at Point B

2

1

0

-1

-2

S1: vi= 0 (1)

vf = = 2.5 (1)

S2: v = 0 (1)

S3: v = = -2(1)

S4: v = = 2 (1)

S1

S2

S3

S4

On the two blank graphs below, draw up the corresponding ;

a) velocity versus time graph (show working on side), and

b) acceleration versus time graph (show working on side).

0.2

0.1

0

-0.1

-0.2

S1: a = = 0.25 (1)

S2: a = 0 (1)

S3: a = 0 (1)

S4: a = 0 (1)

S1

S2

S3

S4

**Question 5**  **[7 marks]**

James was driving home at night when a kangaroo jumped out onto the road 48m in front of the car. Being dazzled by the car’s headlights, it stopped, staring at the oncoming vehicle. It took James 0.18 s before he applied the brakes that slowed his car from 18.2 ms-1 to zero with a deceleration of 3.75 ms-2. Did James miss the kangaroo?

Two displacements to consider

s1: u = 18.2 ms-1 and t = 0.18 s

v = , hence s1 = v × t = 18.2 × 0.18 = 3.276 m (2 marks)

s2: u = 18.2 ms-1, v = 0 (1 mark) and a = 3.75 ms-1

v2 = u2 + 2as

0 = 18.22 + 2 × -3.75 × s (1 mark)

s = 44.165 m (1 mark)

sT = s1 + s2

sT = 3.276 + 44.165 (1 mark)

sT = 47.44m (1 mark)

Yes he just misses the kangaroos by 0.56 m (1 mark)