Physics ATAR - Year 11

Linear Motion
Unit Test 1
2018

| Name:	Mark: / 32
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Time Allowed: 30 Minutes

Notes to Students:

1. You must include **all** working to be awarded full marks for a question.
2. Marks will be deducted for incorrect or absent units or direction and answers stated to an incorrect number of significant figures.
3. **No** graphics calculators are permitted – scientific calculators only.

Question 1 (7 marks)

Cart A and Cart B are in a race. Their V-T graphs are displayed to the right.

(b) Calculate the acceleration of Cart A in the first 40 seconds. Express your answer to 2 significant figures.
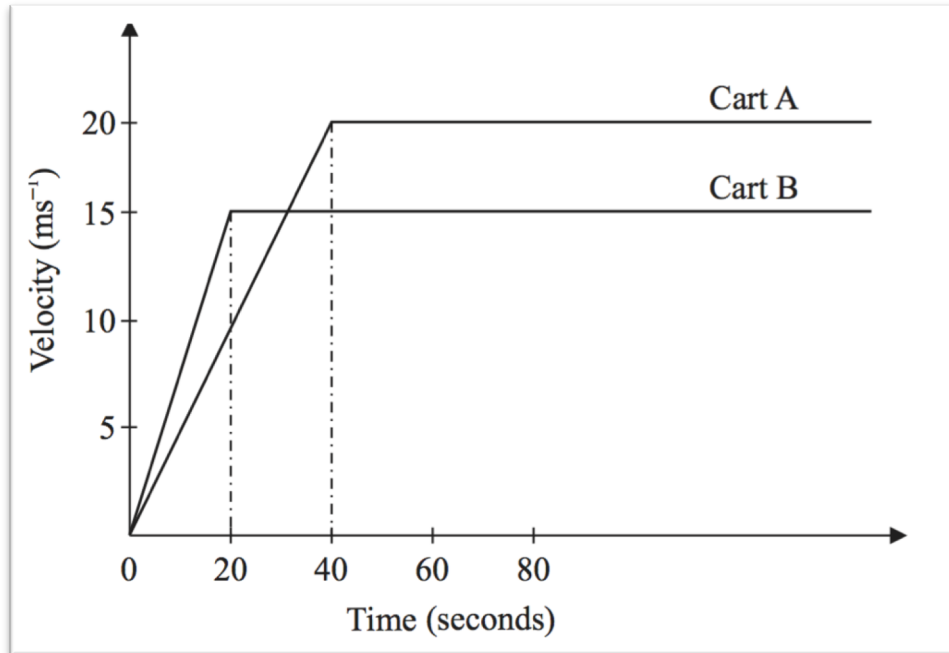
(2 marks)

(b) Calculate the distance Cart B travels in the first 40 seconds. Express your answer to 2 significant figures.

(2 marks)

(c) Cart B completes the 0.750 km race in a time of 60 seconds, determine through appropriate calculations which cart wins the race.

(3 marks)

Question 2 **(7 marks)**

A plane initially travelling 20.0 ms^{-1} North changes its velocity to 18.0 ms^{-1} East in a time of 15.0 seconds.

(a)   Calculate the change in velocity of the plane, including a vector diagram to support your answer.

(4 marks)

(b)   Calculate the average acceleration of the plane during its turn. If you could not complete (a), use Δv = 22.0 ms^{-1} South East.

(3 marks)

Question 3   **(9 marks)**

A student throws a rock vertically upwards. It leaves his hand at a height of 1.60 m above the ground. A second student on a balcony 4.40 m above the ground sees the rock continuing past him upwards with a speed of 4.00 ms^{-1}.

(a)   Calculate the speed of the rock when it was initially thrown.

(3 marks)

(b)   Calculate the maximum height above the second student on the balcony that the rock reaches.

(3 marks)

The rock is then allowed to fall back down past both students.

(c)   Calculate the velocity of the rock as it strikes the ground.

(3 marks)

Question 4   (3 marks)

It is always said that cats land on their feet. A cat is perched on top of a 1.83 m fence when it falls off. Calculate the time the cat has to arrange its feet correctly before hitting the ground.

Question 5   (6 marks)

A ball approaches an inclined ramp with a speed of 2.30 ms⁻¹. It is seen to travel 1.55 m up the ramp before coming to rest.

(a)   Assuming a constant acceleration, calculate the time taken to come to rest.

(3 marks)

(b)   Calculate the acceleration of the ball as it is on the ramp.

(3 marks)