



2017 Year 12 PHYSICS ATAR

Semester 1

Task 6: Test 1

TASK TYPE: Test

CONTENT: Vectors, Forces and Projectile Motion – 5%

| | Possible Marks | Your Mark |
|------------|----------------|-----------|
| Total | 45 | |
| Percentage | 100% | |

Student Name: _____

Date: _____

Teacher: J. Wijaya

Instruction:

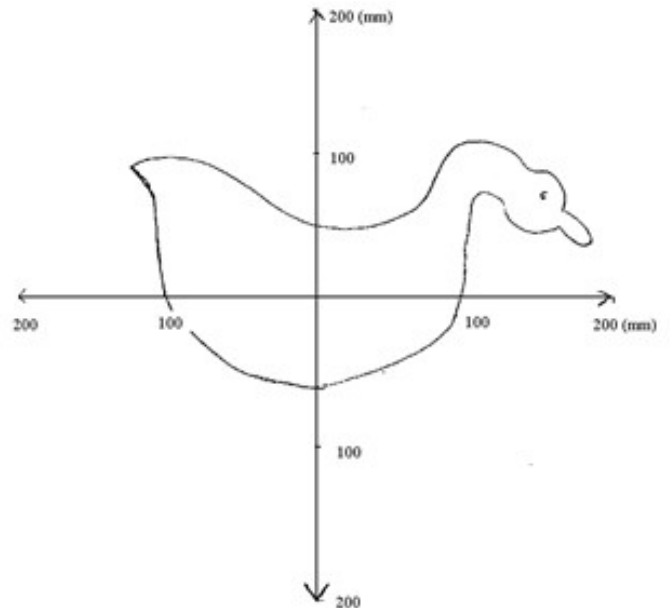
- 1) Answer all questions.
- 2) All numeric answers are to be corrected to three significant figures unless specified.

1) The air rifles for the “duck shooting” at a fun fair fire the pellets at 30.0 ms^{-1} . A girl fires the rifle at a duck 5.00 m away. She aims horizontally (at point (0,0), origin) at the “duck” which moves sideways at 0.500 ms^{-1} . Ignore air resistance.

- a) How long does the pellet take to reach the duck? [2]

Answer: _____

- b) How far **below origin** will the girl's pellet hit? Show your calculations. [4]



Answer: _____

- c) Calculate the horizontal distance from the origin that this girl's will hit. Write the answer in the space provided. [3]

Answer: _____ **Left / Right (circle the correct answer) to the origin.**

2) Marvin takes 15.0 minutes to paddle his canoe 500 m (West to the opposite of the bank) in still water.

a) Calculate Marvin's velocity.

[2]

Answer: _____ **Direction:** _____

After 15.0 minutes, Marvin returns to the opposite direction with the same speed. This time, due to the strong wind, the river flows at 3.00 m s^{-1} to the south.

b) Draw a vector diagram to show the motion of going back, showing the net velocity. Give appropriate labels.

[2]

c) Calculate the net velocity.

[3]

Answer: _____ **Direction:** _____

- 3) A car enters an intersection at 20.0 m s^{-1} to the North where it collides with a truck. The impact rotates the car 90.0° clockwise and gives it a speed of 15.0 m s^{-1} .

a) Use the space below, using appropriate vectors to show the change of velocity of the car.

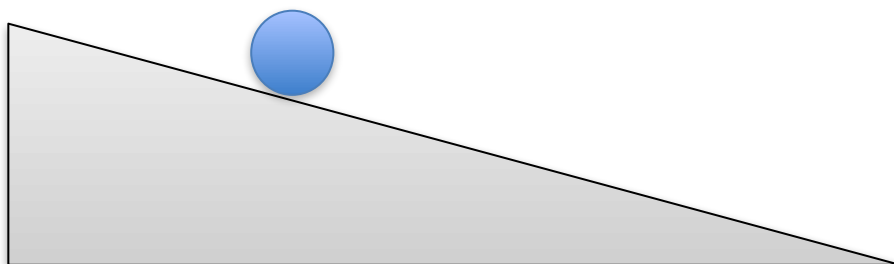
[2]

b) Calculate the change of velocity. Include direction.

[4]

Answer: _____ Direction: _____

- 4) The diagram below shows a ball is rolling down a hill and accelerates. Ignore friction.



- a) On the diagram **below**, with the reference to the ball, show all forces including the net force.

[3]



- b) If the mass of the ball is 60.0 kg and the incline is 15.0° , calculate magnitude the net force acting on the ball.

[3]

Answer: _____

- c) Explain if this motion relates to the Newton's first law of motion.

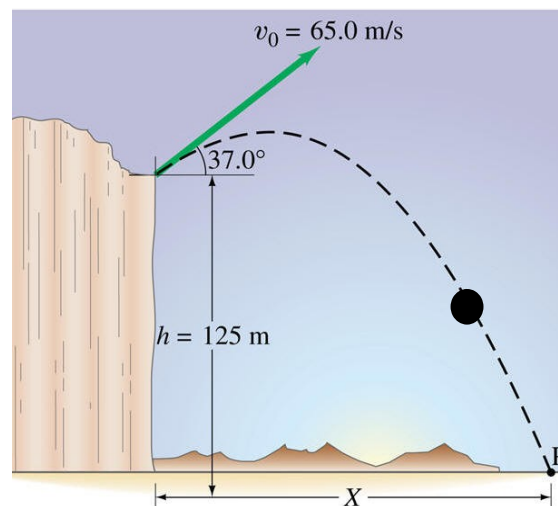
[2]

- 5) A cannon is projected at 37.0° at 65.0 m s^{-1} at the 125 m cliff. On the diagram below, it shows the position of the cannon at a certain time.

a) On the diagram,

- Use letter **W** to show the net force of the cannon.
- Use letter **V** to show the instantaneous velocity of the cannon.

[2]



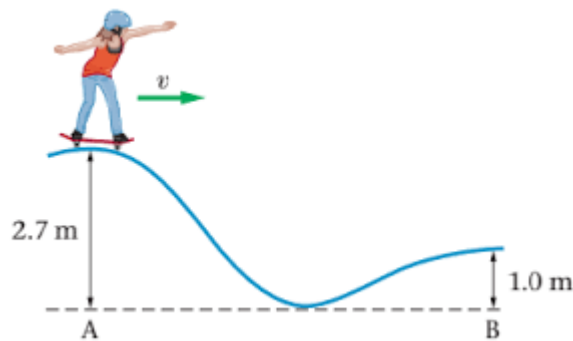
- b) Use the information to calculate the horizontal distance that the cannon can reach.

[6]

Answer: _____

- 6)
- a) A skateboarder at a skate park rides along the path shown in the diagram below. If the speed of the skateboarder at point A is 1.30 m s^{-1} , what is her speed at point B? Assume that friction is negligible.

[4]



[Reference <https://www.physicsforums.com/threads/find-final-speed-using-mechanical-energy-formula.893415>]

Answer: _____

- b) If the skater rides from the top of the path (with the height of h metres) from rest, prove that the speed at the bottom of the path is:

[3]

$$v_{\text{bottom}} = \sqrt{2gh}$$

End of the Test