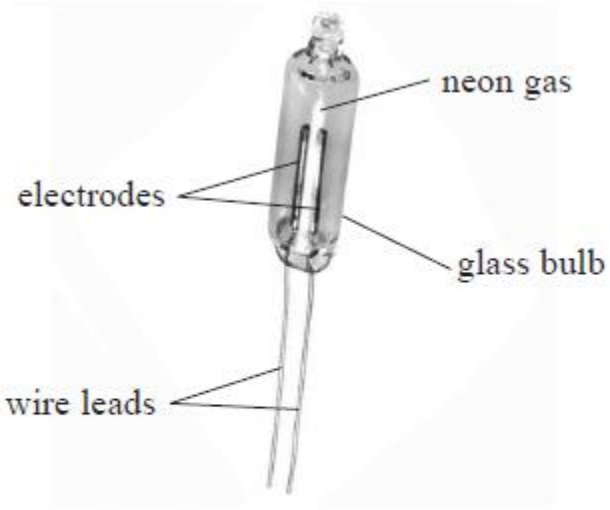
Name of the Student:_____
Max. Marks : 25 Marks **Time : 25 Minutes**

Q1.

The neon lamp shown is a glass bulb filled with neon gas at low pressure.



(Source: https://media.digikey.com/Photos/Visual%20Communications%20Company%20VCC/A1A.JPG)

* When in use, the neon gas between the electrodes emits electromagnetic radiation.
Explain why this happens when there is an electric current between the electrodes.

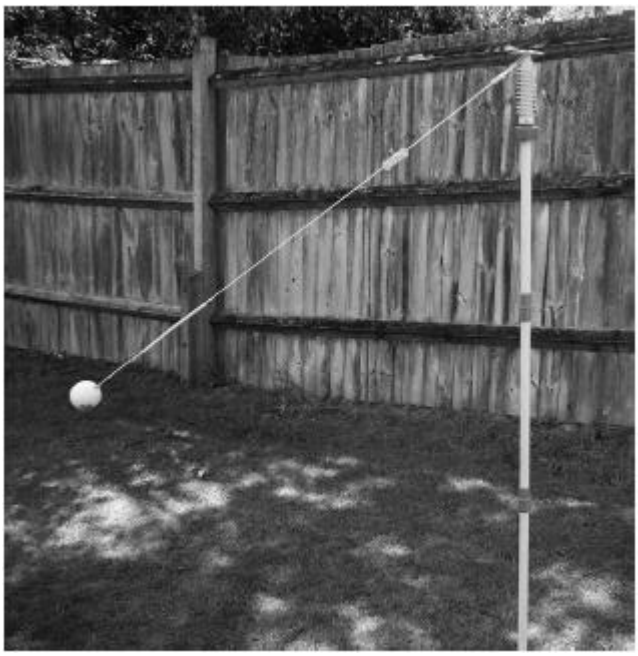
(6)

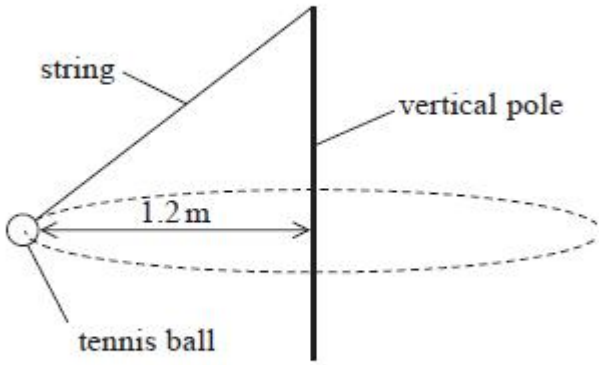
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....

(Total for question = 6 marks)

Q2.

A 'tennis trainer' consists of a tennis ball suspended by a string from the top of a vertical pole. When the ball is hit it travels in a horizontal circle around the pole, as shown in both the photograph and the diagram.





The radius of the path of the ball is 1.2 m and the speed of the ball is 3.8 m s^{-1}.

Deduce whether these values are consistent with the angle between the string and the vertical pole shown in the photograph.

(5)

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

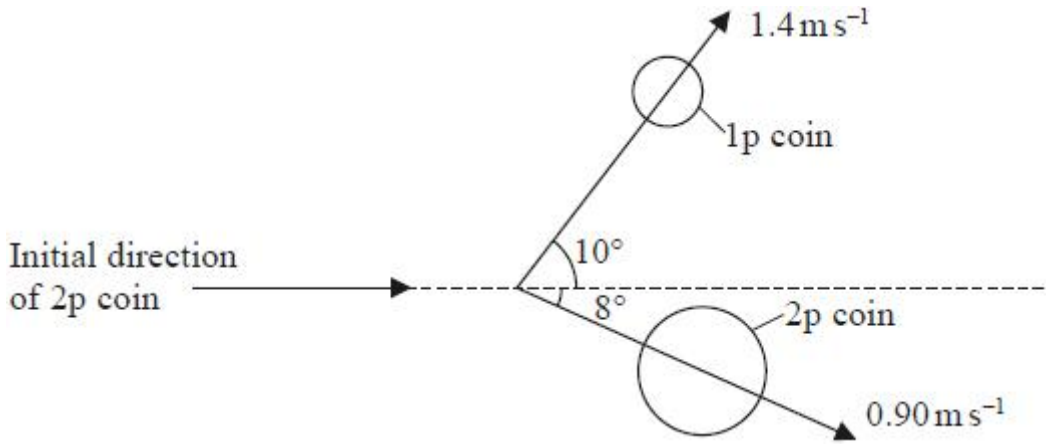
.....

(Total for question = 5 marks)

Q3.

A student carried out an experiment with coins.

She arranged a collision between a 2p coin and a stationary 1p coin. She noted the directions in which the coins moved after the collision and determined their velocities.



(i) Show that the velocity of the 2p coin just before the collision was about 2 m s^{-1}.

mass of 2p coin = 7.1 g
mass of 1p coin = 3.6 g

(4)

.....

.....

.....

.....

.....

.....

.....

(ii) Show that the collision was inelastic.

(2)

.....

.....

.....

.....

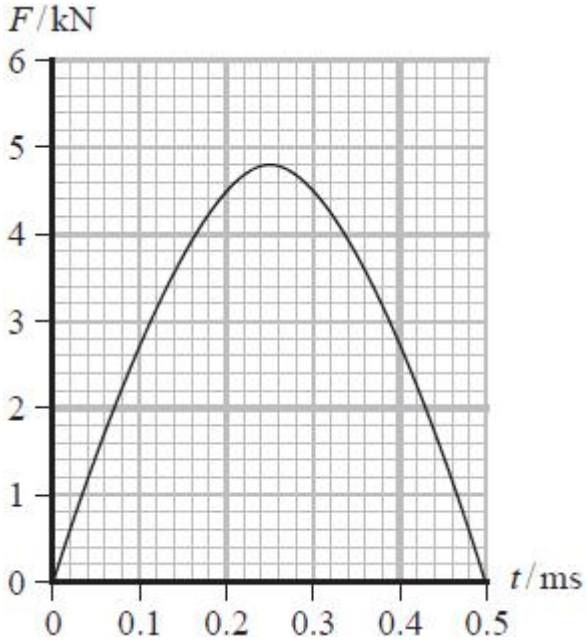
.....

(Total for question = 6 marks)

Q4.

In the game of golf a stationary ball is hit by a club. One of the aims of the game is to land the ball on a patch of ground called the green.

The graph shows how the force *F* exerted by the club on the ball varies with time *t* as the ball is hit.



(i) Show that the velocity of the ball is about 30 m s^{-1} immediately after it is hit by the club.

mass of ball = 0.046 kg

(3)

.....

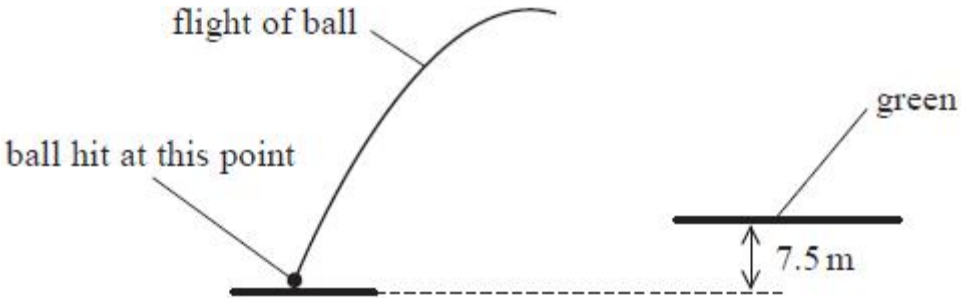
.....

.....

.....

.....

(ii) The ball has a time of flight of 3.5 s before landing. The green is a vertical distance of 7.5 m above the point at which the ball was hit, as shown. The green is about seventy metres away from where the ball is hit.



Deduce whether, if air resistance is ignored, the ball could land on the green after a flight time of 3.5 s.

(5)

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(Total for question = 8 marks)