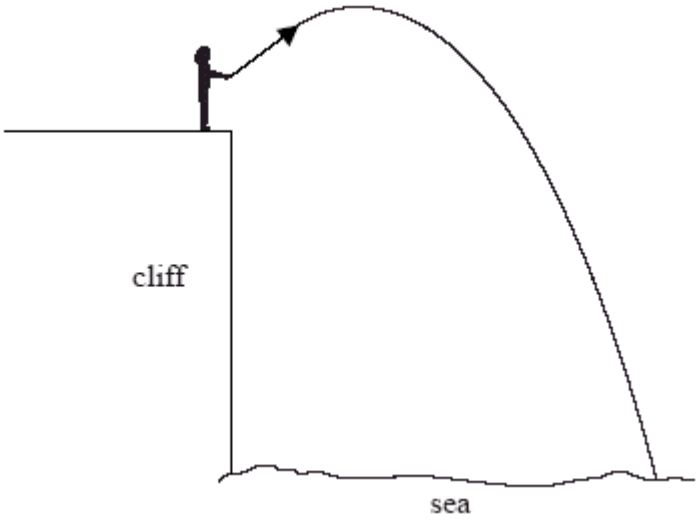
1. A stone is thrown from a cliff and it lands in the sea as shown below. Air resistance is negligible.



Which of the following statements is correct whilst the stone is in motion?

A. The vertical component of the stone's displacement is constant.

B. The horizontal component of the stone's displacement is constant.

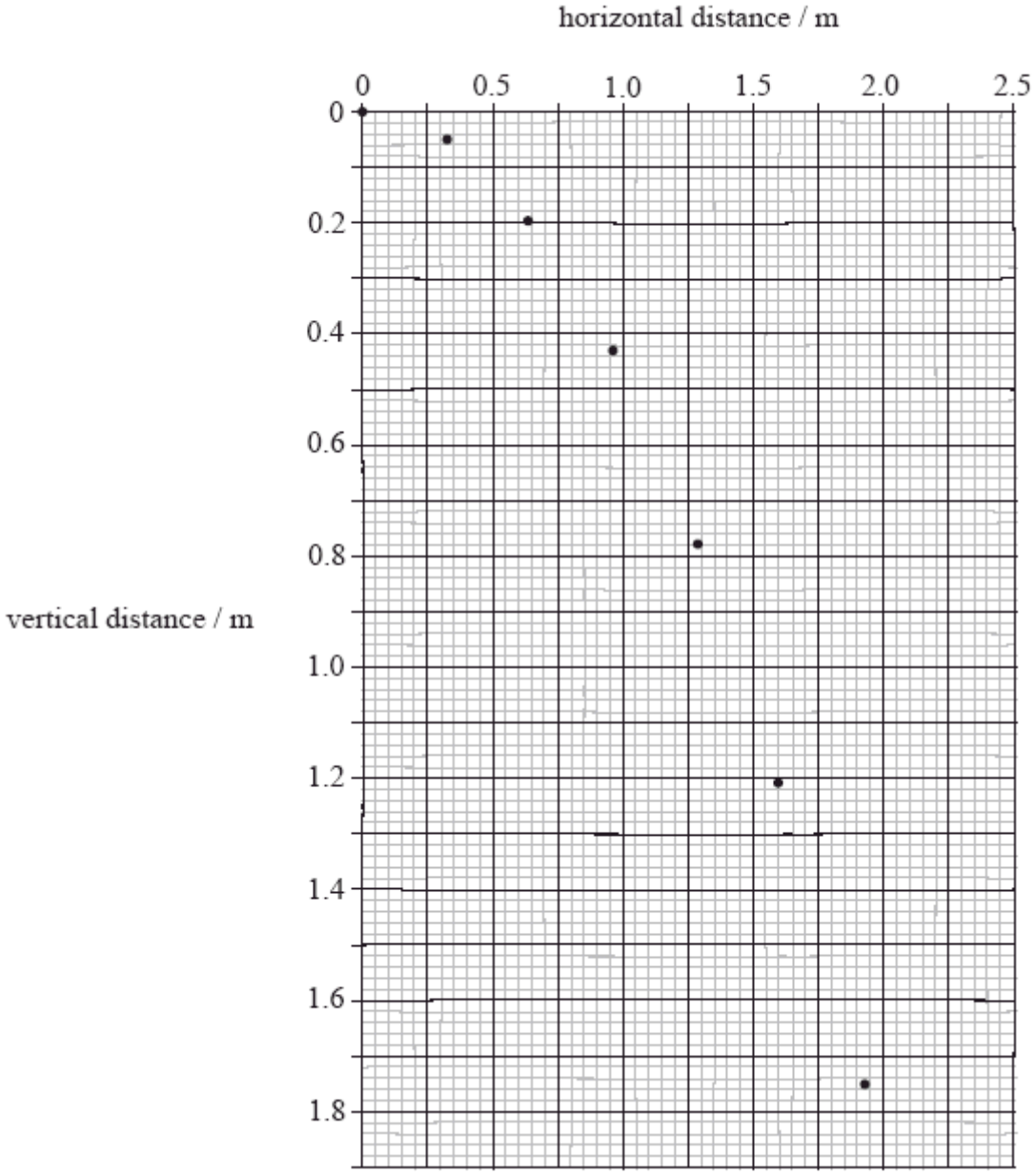
C. The vertical component of the stone's velocity is constant.

D. The horizontal component of the stone's velocity is constant.

(Total 1 mark)

2. This question is about projectile motion.

A sphere is projected horizontally. The sphere is photographed at intervals of 0.10 s. The images of the sphere are shown against a grid on the diagram. Air resistance is negligible.



(a) Use data from the diagram to determine the acceleration of free fall.

.....

.....

.....

.....

.....

.....

(3)

(b) Determine the speed of the sphere 1.2 s after release.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

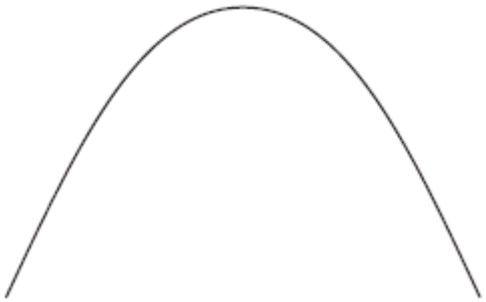
(5)

(c) On the grid, draw the path of the sphere assuming air resistance is not negligible.

(2)

(Total 10 marks)

3. The diagram shows the path of a projectile that is launched with velocity *v*. Air resistance is negligible.

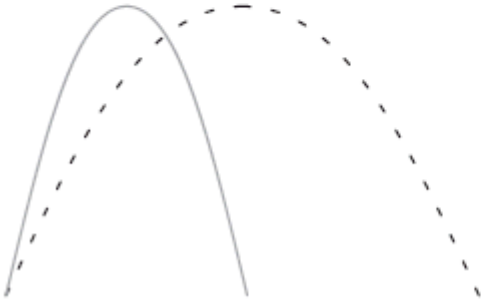


A second projectile has double the mass of the first projectile and is launched with the same velocity. Air resistance is still negligible. Which of the following paths best represents the path of the projectile? (*The original path is shown as a dotted line*)

A.

B.

C.

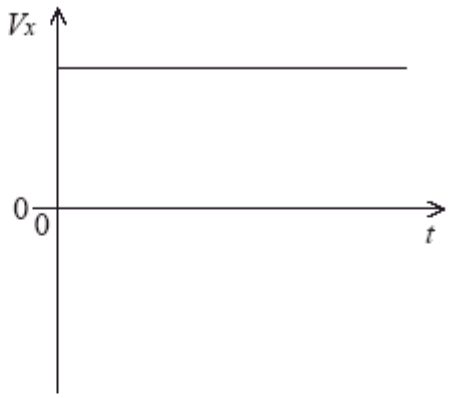


D.

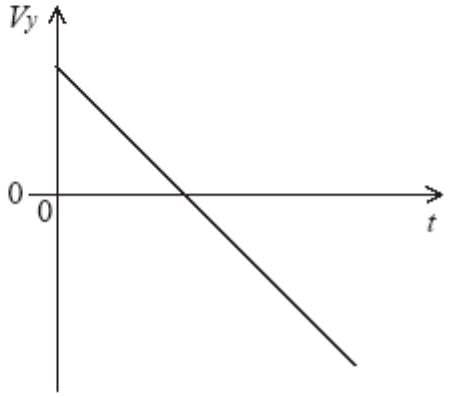
(Total 1 mark)

4. An object moves in the *x*-*y* plane. The graphs below show how the component of its velocity V_x in the *x*-direction and the component of its velocity V_y in the *y*-direction, vary with time *t*.

x-direction component



y-direction component



The particle is moving

A. in a parabola.

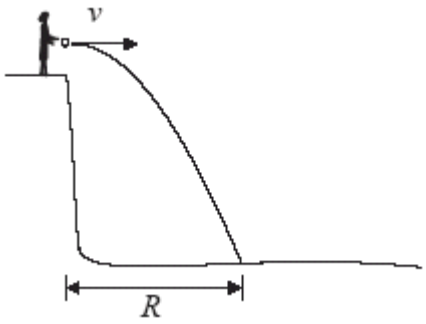
B. with simple harmonic motion.

C. with constant velocity in a straight line.

D. in a circle.

(Total 1 mark)

5. A stone is thrown horizontally from the top of a cliff with an initial speed *v*.



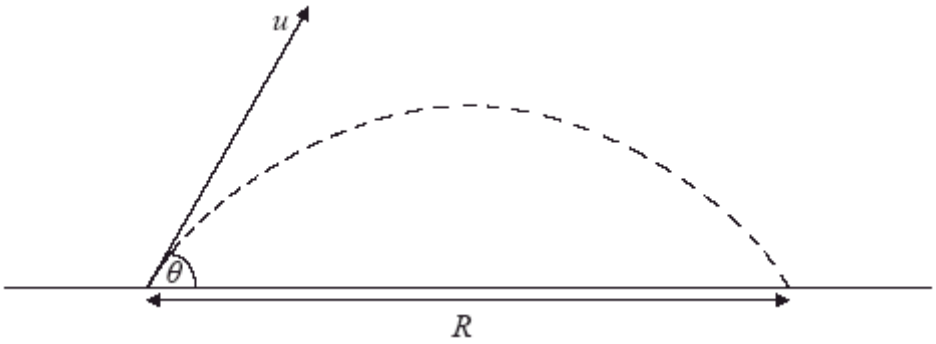
The time of flight of the stone is *t* and its range *R*. Air resistance is negligible.

For a stone that is thrown horizontally from the top of the cliff with an initial speed 3*v*, which of the following is correct?

	Time of flight	**Range**
A.	*t*	*R*
B.	3*t*	3*R*
C.	*t*	3*R*
D.	3*t*	*R*

(Total 1 mark)

6. A football is kicked with an initial velocity u at an angle θ to the horizontal and reaches the ground t seconds later.



Ignoring air resistance what is the range R of the football?

A. ut

B. $ut \cos \theta$

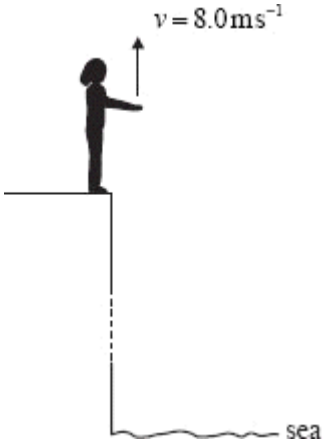
C. $ut \sin \theta$

D. $ut \tan \theta$

(Total 1 mark)

7. This question is about throwing a stone from a cliff.

Antonia stands at the edge of a vertical cliff and throws a stone vertically upwards.



The stone leaves Antonia's hand with a speed v =8.0 m s^{-1}. Ignore air resistance, the acceleration of free fall g is 10 m s^{-2} and all distance measurements are taken from the point where the stone leaves Antonia's hand.

(a) Determine,

(i) the maximum height reached by the stone.

.....

.....

.....

(2)

(ii) the time taken by the stone to reach its maximum height.

.....

.....

(1)

(b) The time between the stone leaving Antonia's hand and hitting the sea is 3.0 s. Determine the height of the cliff.

.....

.....

.....

.....

.....

(3)

(Total 6 marks)