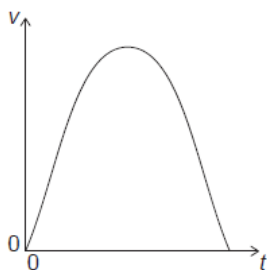


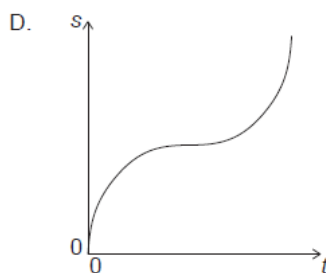
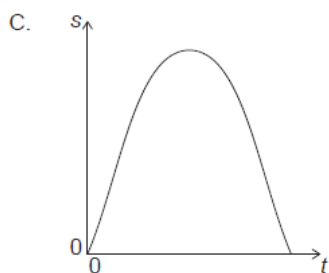
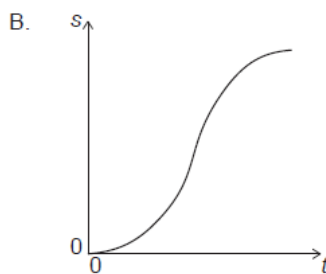
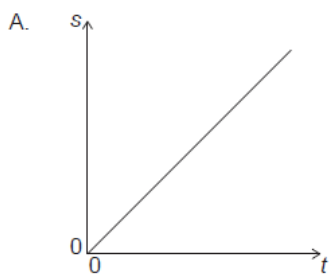
New test - February 19, 2018 [47 marks]

1. The graph shows the variation of speed v of an object with time t .

[1 mark]



Which graph shows how the distance s travelled by the object varies with t ?



2. A ball is tossed vertically upwards with a speed of 5.0 m s^{-1} . After how many seconds will the ball return to its initial position? [1 mark]

[1 mark]

- A. 0.50 s
- B. 1.0 s
- C. 1.5 s
- D. 2.0 s

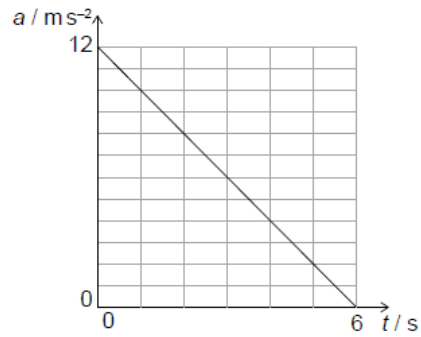
3. A projectile is fired horizontally from the top of a cliff. The projectile hits the ground 4 s later at a distance of 2 km from the base of the cliff. What is the height of the cliff? [1 mark]

[1 mark]

- A. 40 m
- B. 80 m
- C. 120 m
- D. 160 m

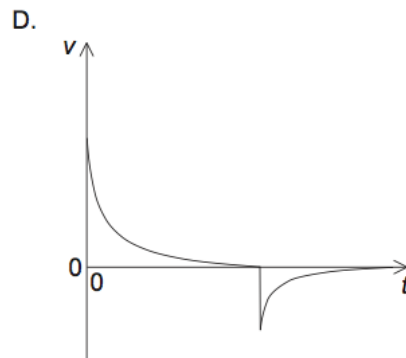
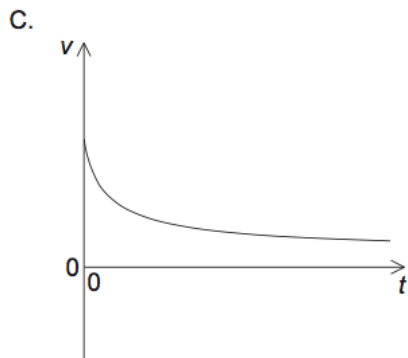
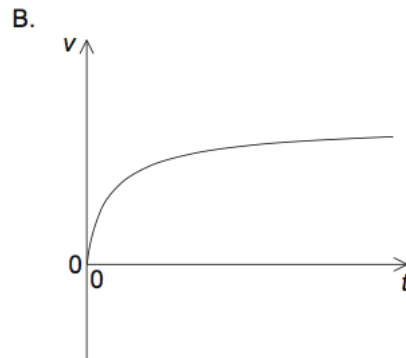
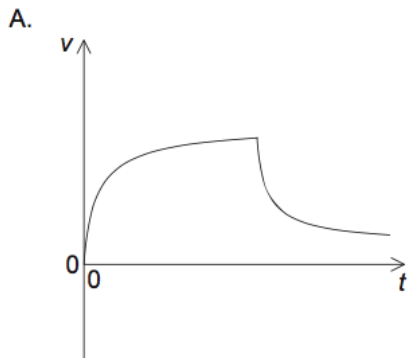
4. The graph shows the variation of the acceleration a of an object with time t .

[1 mark]

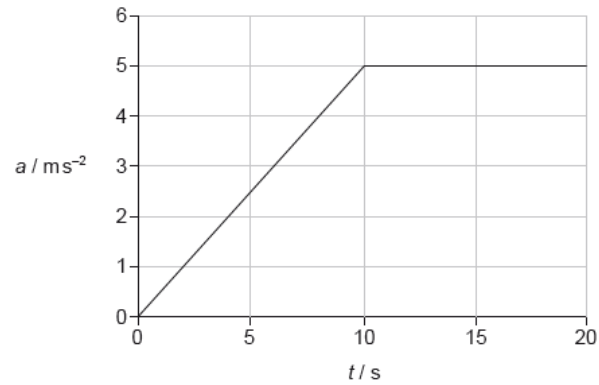


What is the change in speed of the object shown by the graph?

- A. 0.5 m s^{-1}
B. 2.0 m s^{-1}
C. 36 m s^{-1}
D. 72 m s^{-1}
5. An object of weight W is falling vertically at a constant speed in a fluid. What is the magnitude of the drag force acting on the object? [1 mark]
- A. 0
B. $\frac{W}{2}$
C. W
D. $2W$
-
6. An aircraft is moving horizontally. A parachutist leaves the aircraft and a few seconds later opens her parachute. Which graph [1 mark] shows the variation of the vertical speed v with time t for the parachutist from the time she leaves the aircraft until just before landing?



7. An object is at rest at time $t = 0$. The variation with t of the acceleration a of the object is shown from $t = 0$ to $t = 20$ s. [1 mark]

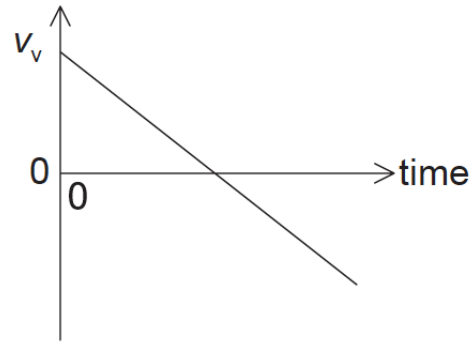
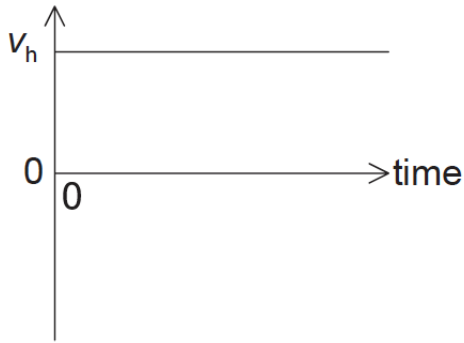


What is the speed of the object when $t = 15$ s?

- A. 25 ms^{-1}
B. 50 ms^{-1}
C. 75 ms^{-1}
D. 100 ms^{-1}
8. A tennis ball is released from rest and falls vertically through a small distance in air. What is the change in the speed of the ball and the change in the acceleration of the ball as it falls? [1 mark]

	Speed of the ball	Acceleration of the ball
A.	increases	decreases
B.	decreases	increases
C.	increases	increases
D.	decreases	decreases

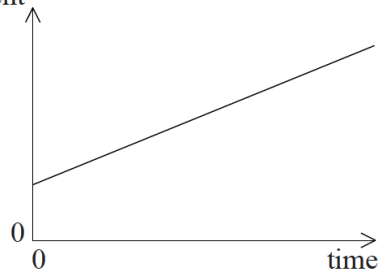
9. The horizontal component v_h and the vertical component v_v of velocity of an object are shown on the graphs. Air resistance is negligible. [1 mark]



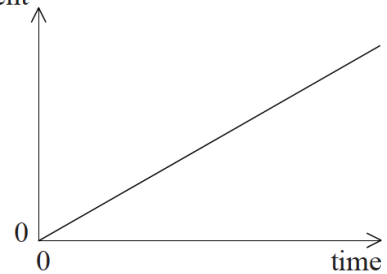
These graphs could represent the motion of an object fired from a cliff

- A. vertically upwards.
 - B. at an angle above the horizontal.
 - C. horizontally.
 - D. at an angle below the horizontal.
10. A body moves on a straight line. The graphs show the variation of displacement with time. Which graph shows motion with negative [1 mark] acceleration?

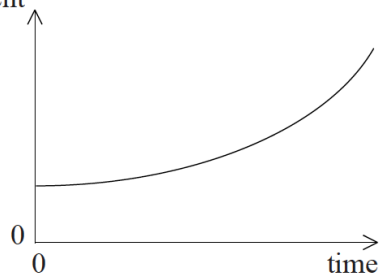
A. displacement



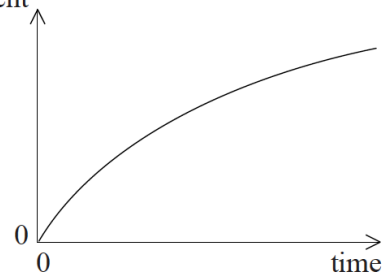
B. displacement



C. displacement

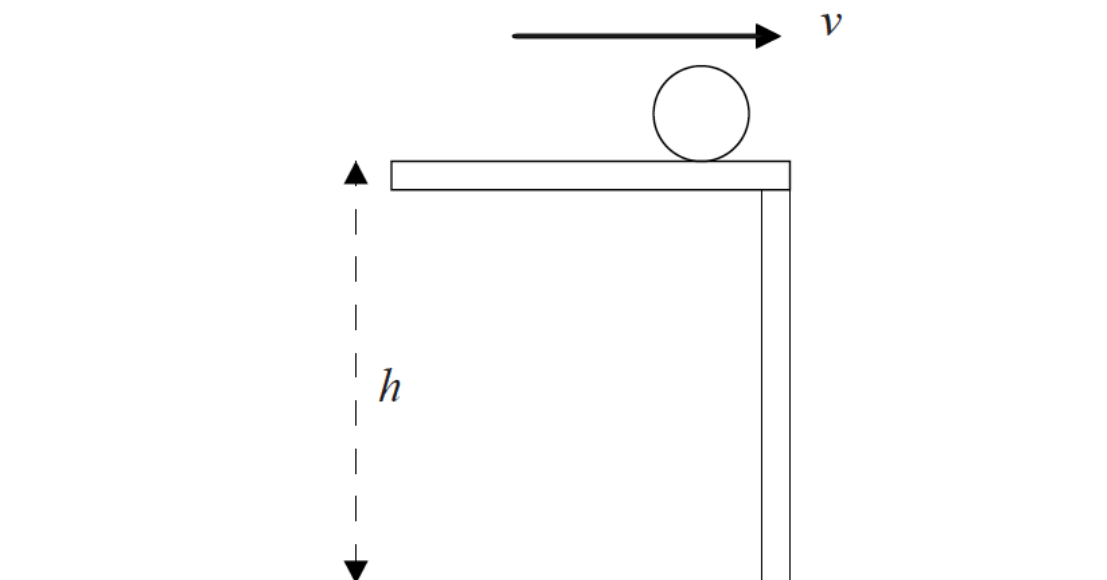


D. displacement



11. A ball of mass m is projected horizontally with speed v from a height h above the floor. Air resistance is negligible.

[1 mark]



- The horizontal distance travelled by the ball to the point where it lands on the floor depends on
- A. m and h only.
B. m and v only.
C. h and v only.
D. m , h and v .
12. Two identical balls are dropped from a tall building, one a few seconds after the other. Air resistance is **not** negligible. As the balls fall, the distance between the balls will [1 mark]
- A. decrease.
B. increase.
C. increase then remain constant.
D. remain constant.
13. An object, initially at rest, travels a distance d in a time t at a constant acceleration. What is the time taken for the object to travel $16d$ from rest at the same acceleration? [1 mark]
- A. $16t$
B. $8t$
C. $4t$
D. $2t$
14. An object is thrown horizontally from the edge of a high crater on the Moon. The Moon has no atmosphere. Which of the following describes the changes, if any, to the horizontal and vertical components of the velocity of the object? [1 mark]

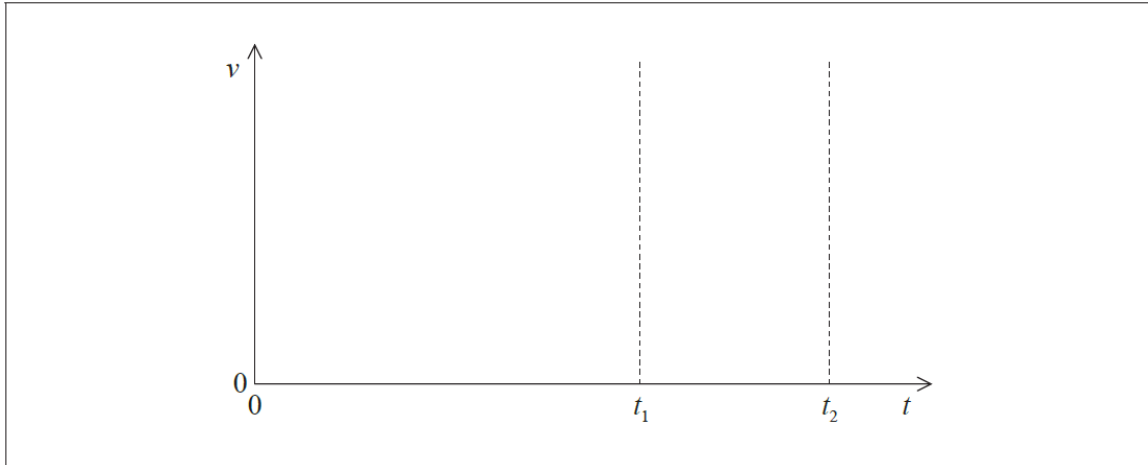
	Horizontal velocity	Vertical velocity
A.	stays constant	increases at a constant rate
B.	decreases	increases at a constant rate
C.	stays constant	increases at a non-constant rate
D.	decreases	increases at a non-constant rate

15a. Fiona drops a stone from rest vertically down a water well. She hears the splash of the stone striking the water 1.6 s after the stone leaves her hand. Estimate the [3 marks]

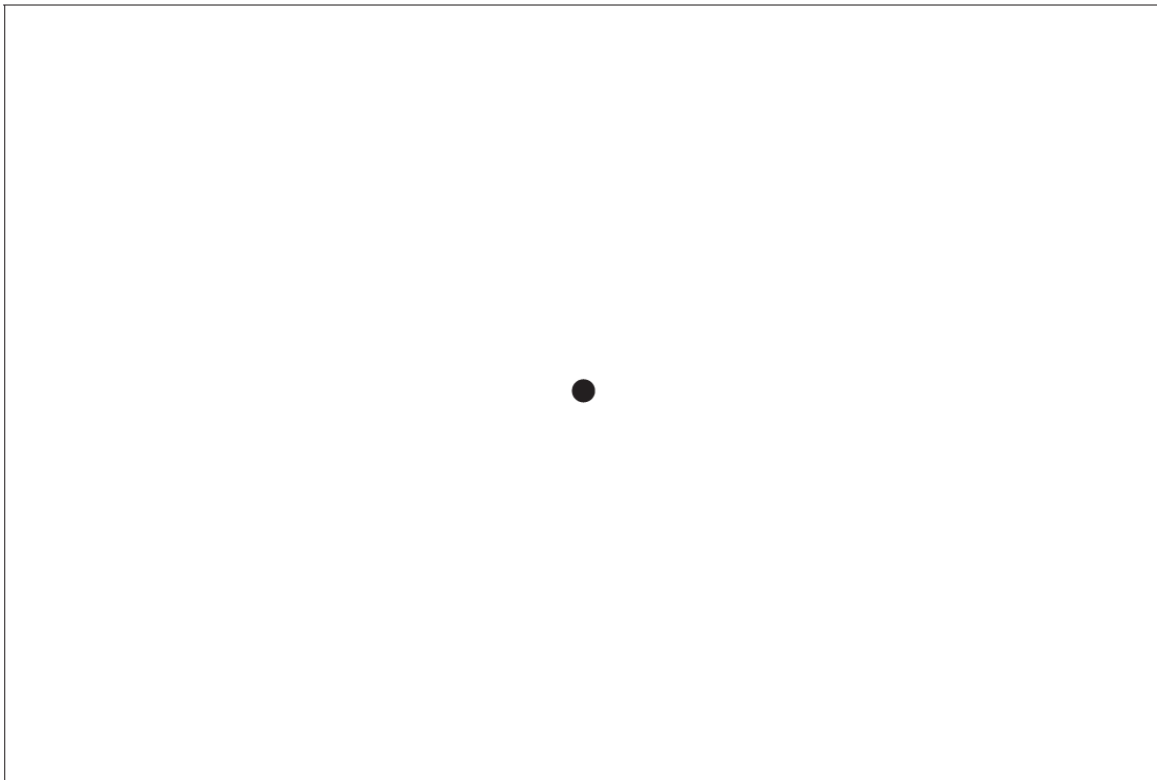
(i) distance between Fiona's hand and the water surface.

(ii) speed with which the stone hits the water.

15b. After the stone in (a) hits the water surface it rapidly reaches a terminal speed as it falls through the water. The stone leaves Fiona's hand at time $t = 0$. It hits the water surface at t_1 and it comes to rest at the bottom of the water at t_2 . Using the axes below, sketch a graph to show how the speed v of the stone varies from time $t = 0$ to just before $t = t_2$. (There is no need to add any values to the axes.) [3 marks]

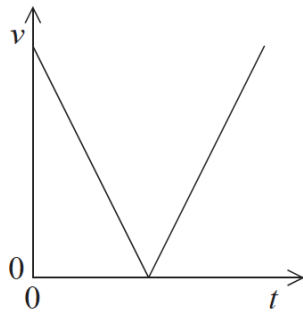


15c. Draw and label a free-body diagram representing the forces acting on the stone as it falls through the water at its terminal speed. [2 marks]

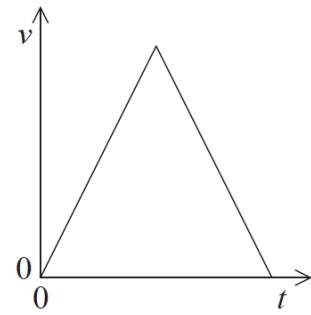


16. An object is thrown upwards leaving the thrower's hand at time $t=0$. Which graph shows how speed v varies with t as the object rises and falls? [1 mark]

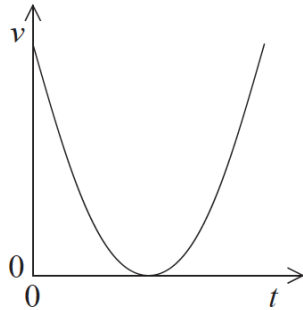
A.



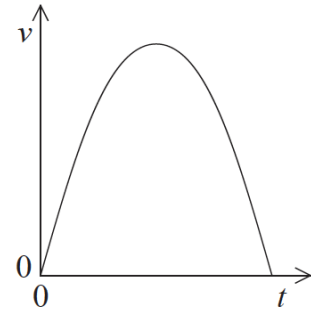
B.



C.



D.

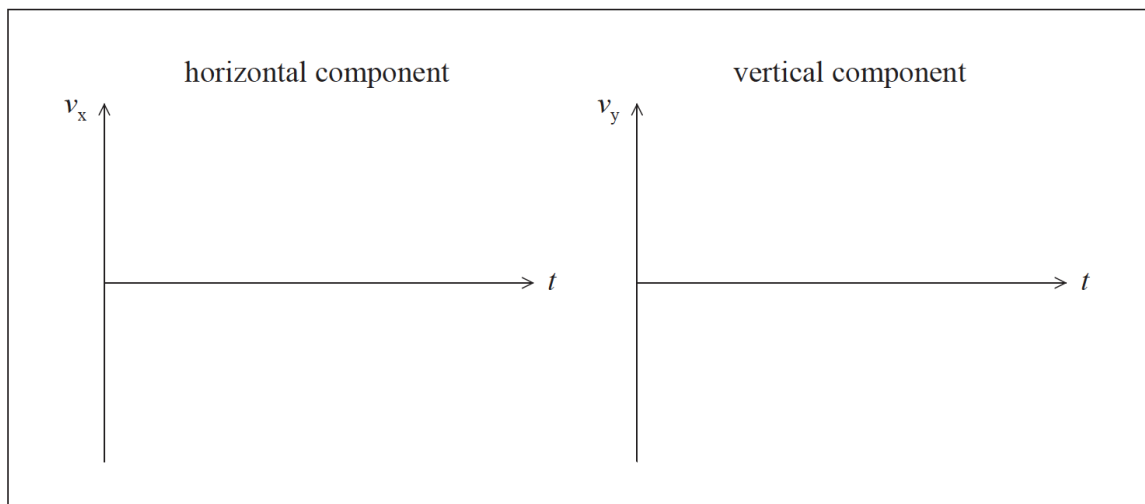


17. A gun fires a bullet of mass m at a horizontal velocity of v . Air resistance on the bullet is negligible. A change in which of the following will affect the time for the bullet to hit the ground? [1 mark]

- A. m only
- B. v only
- C. m and v
- D. neither m nor v

- 18a. (i) State the magnitude of the horizontal component of acceleration of the ball after it leaves the cliff. [3 marks]

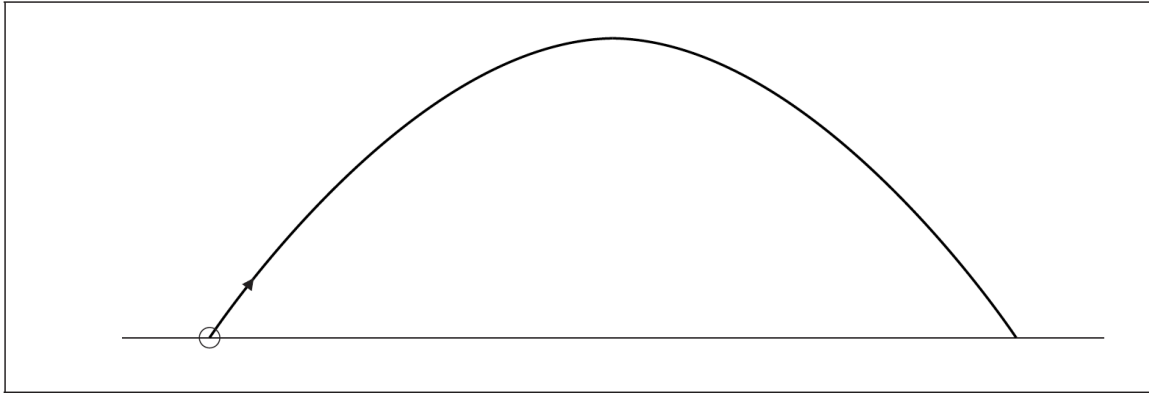
(ii) On the axes below, sketch graphs to show how the horizontal and vertical components of the velocity of the ball, v_x and v_y , change with time t until just before the ball hits the ground. It is not necessary to calculate any values.



- 18b. (i) Calculate the time taken for the ball to reach the ground. [4 marks]

(ii) Calculate the horizontal distance travelled by the ball until just before it reaches the ground.

- 18c. Another projectile is launched at an angle to the ground. In the absence of air resistance it follows the parabolic path shown below. [3 marks]

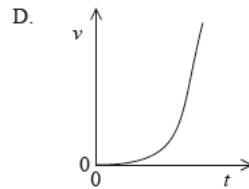
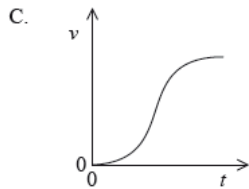
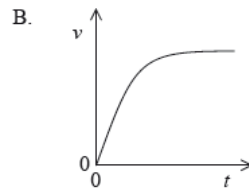
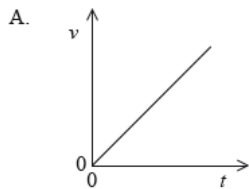


On the diagram above, sketch the path that the projectile would follow if air resistance were not negligible.

- 19a. Calculate the maximum height reached by the stone as measured from the point where it is thrown. [2 marks]

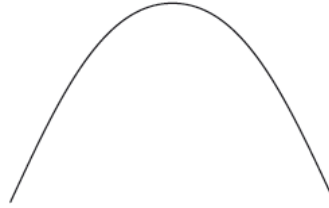
- 19b. Determine the time for the stone to reach the surface of the sea after leaving Lucy's hand. [3 marks]

20. A raindrop falling from rest at time $t = 0$ reaches terminal velocity. Which graph best represents how the speed v varies with time t ? [1 mark]



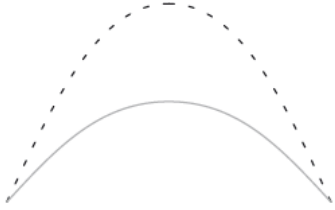
21. The diagram shows the path of a projectile that is launched with velocity v . Air resistance is negligible.

[1 mark]

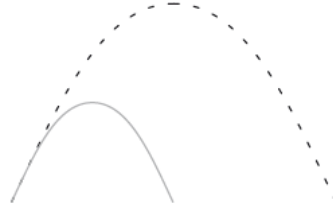


A second projectile has double the mass of the first projectile and is launched with the same velocity. Air resistance is still negligible. Which of the following paths best represents the path of the projectile? (*The original path is shown as a dotted line*)

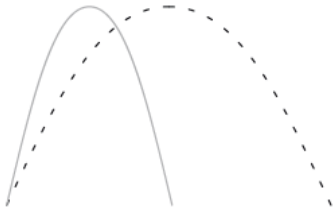
A.



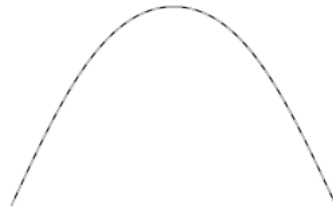
B.



C.



D.



22a. average acceleration of the car in stage 1.

[1 mark]

22b. average net force required to accelerate the car in stage 2.

[3 marks]

22c. total distance travelled by the car in 12 s.

[2 marks]