Shreeji Education
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Question 1
Particle at the origin has an initial velocity of -6.0 m s^{-1} and moves with an acceleration of 2 m s^{-2} Determine when its position will become 16 m.

Question 2
A car is travelling at 40 m s^{-1} The driver sees an emergency ahead 0.50 seconds later slams on the brakes. The deceleration of the car is 4.0 m s^{-2}.
a. Find the distance travelled before the car stops.
b. Calculate the stopping distance if the driver could apply the brakes, instantaneously without a reaction time.
c. Calculate the difference in your answers to a and b above.
d. Assume now that the car was travelling at 30.0 m s^{-1} instead. Without performing any calculations, state, whether the answer to c above would now be less than, equal to or larger than before. Explain your answer.

Question 3
Two balls are dropped from rest from the same height. One of the balls is dropped 1.00 seconds after the other. Air resistance is ignored.
a. Find the distance that separates the two balls 2.00 seconds after the second ball is dropped.
b. Explain what happens to the distance, separating the balls as time goes on.

Question 4
Your brand-new convertible is parked 50 m from its garage when it begins to rain. You do not have time to get the keys so you begin to push the car towards the garage. The maximum acceleration you can give the car is 2.0 m s^{-2} by pushing and 3.0 m s^{-2} by pulling back on the car. Find the least time it takes to put the car in the garage. (Assume that the car and the garage are objects)

Question 5
A ball is thrown upwards from the edge of a cliff with velocity 20 m s^{-1}. It reaches the bottom of the cliff 6.0 seconds later. Take g is equal to 10 m s^{-2}.
a. Determine the height of the cliff.
b. Calculate the speed of the ball as it hit the ground.

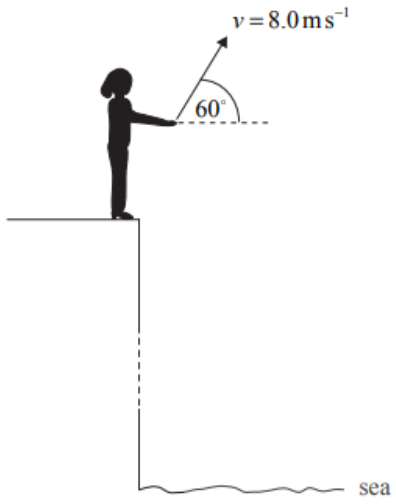
Question 6
A toy rocket is launched vertically upward with acceleration 3 m s^{-2}. The fuel runs out when the rocket reaches a height of 85 m.
a. Calculate the velocity of the rocket when the fuel runs out.
b. Determine the maximum height reached by the rocket.
c. Draw graph to show the variation of
(i) the velocity of the rocket.
(ii) the position of the rocket from launch until it reaches its maximum height.
d. Calculate the time the rocket takes to fall to the ground from its maximum height.

Question 7
Antonia stands at the edge of a vertical cliff and throws a stone vertically upwards. The stone leaves her hand with a speed of 8.0 m s^{-1}. The acceleration of free fall g is 10 m s^{-2} and all distances measured are taken from the point where the stone leaves her hand.
(a) Ignoring air resistance, calculate
(i) The maximum height reached by the stone. [1]
(ii) The time taken by the stone to reach the maximum height. [2]
The time between the stone leaving her hand and hitting the sea is 3.0 s
(b) Determine the height of the cliff [2]

Question 8
A stone is thrown towards a wall with an initial speed of 13 m s^{-1} at an angle of 35^0 to the horizontal. The stone is initially 2.0 m above the ground and its horizontal distance to the wall is 12m. The wall is 4.5 m high.
a. Calculate the time taken for the stone to travel the horizontal distance to the wall. [1]
b. Show that the stone will hit the wall. [2]
c. Calculate the resultant of horizontal and vertical speed with which the stone hits the wall. [2]

Question 9
An arrow is fired horizontally from the top of a tower 35m above the ground. The initial horizontal speed
is 30 ms^{-1}. Assume that air resistance is negligible. Calculate
a. The time for which the arrow is in the air. [2]
b. The distance from the foot of the tower at which the arrow strikes the ground. [1]
c. The resultant of horizontal and vertical velocity at which the arrow strikes the ground [2]

Question 10
This question is about trajectory motion. Antonia stands at the edge of a vertical cliff and throws a stone upwards at an angle of 60◦ to the horizontal.



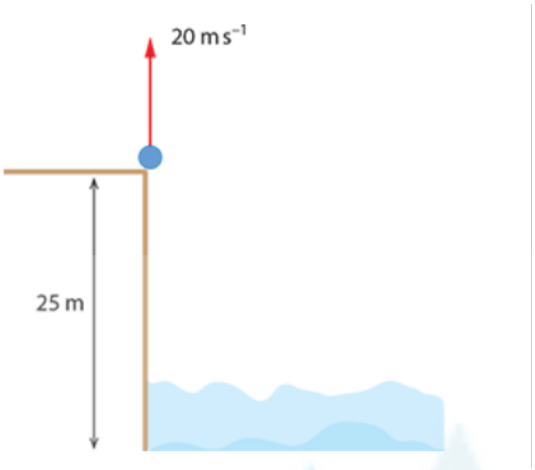
The stone leaves Antonia's hand with a speed = 8.0 ms^{-1}. The time between the stone leaving Antonia's hand and hitting the sea is 3.0 seconds.

The acceleration of free fall g is 10 ms^{-2} and all distance measurements are taken from the point where the stone leaves Antonia's hand.
Ignoring air resistance, calculate,

(a) the maximum height reached by the stone.
(b) the horizontal distance traveled by the stone.

Question 11
An object is thrown vertically upwards with an initial velocity of 20 $ms^{-1}$from the edge of a cliff that is 25 m from the sea below as shown in figure below.

a. Determine the ball's maximum height.
b. Determine the time taken for the ball to reach its maximum height.



c.Determine the time to hit the sea.
d.Determine the speed with which it hit the sea.

Question 12

A ball X starts moving to the right from rest with a constant acceleration of 2.0 ms^{-1} 2.0 seconds later, a second ball Y starts moving to the right with a constant velocity of 9.0 ms^{-1} . Both balls start from the same position.
Determine the position of the balls when they meet. Describe what is going on.

Question 13

When a parachute jumps from an aeroplane, he hit the ground with the landing speed of 6.0 ms^{-1}.
What is the minimum jump height required to simulate this landing speed?

Reference -
IBDP physics - Oxford
IBDP physics - K. A. Tsokos (Cambridge press)