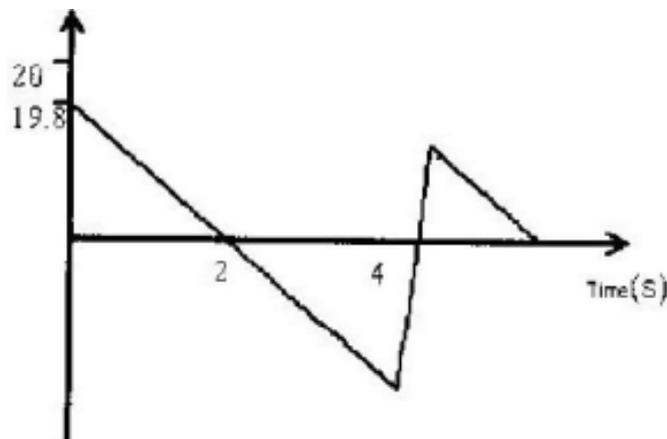# Linear Motion Questions and Answers - Physics Form 3 Topical Revision

Questions

1. The diagram below shows part of the motion of a tennis ball, which is projected vertically upwards from the ground and allowed to bounce on the ground. Use this information to answer questions that follow.

   a. Describe the motion of the ball relating it to different positions of the ball along the following AB, BC, CDE.
   b. From the graph, calculate the acceleration due to gravity.
   c. How high does the ball rise initially?
   d. Explain why E is not at the same level as A.
2. Sketch a velocity- time graph showing the motion of a ball vertically upwards with an initial velocity of u.
3. Calculate the acceleration shown by the tickers-tape that was made using a ticker timer vibrating at 50Hz.
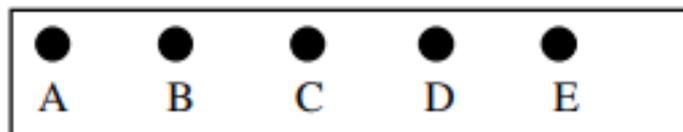
4. What is the difference between speed and velocity?
5. An object is projected vertically upwards at a speed of 15m/s. How long will it take to return to the same level of projection?
6. A block slides off a horizontal table 4 meters high with a velocity of 12-m/s. Find:
   a. The horizontal distance from the table at which the block hits the floor.
   b. The horizontal and vertical components of the velocity when it reaches the floor.
7. A particle initially at A moves along an arc AB of a horizontal circle of radius 4m and centre O.A is south of O and angle AOB is 600. Determine the displacement AB.
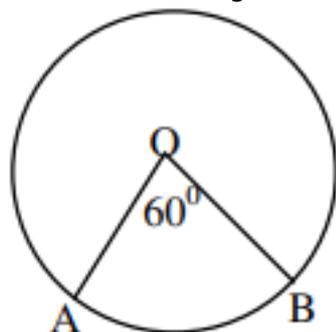
22. An airplane is flying horizontally over a camp at 250m/s and drops a pack. How far from the camp will the pack land if the plane was flying 300m above the ground?
23. An object is projected horizontally at a velocity of 40m/s from a cliff 20m high. Calculate:
    a. The time taken to hit the ground
    b. The distance from the foot of the cliff when the object hits the ground.
24. A ball-bearing X is dropped vertically downwards, from the edge of a table and it takes 0.5s to hit the floor below. Another bearing Y leaves the edge of the table horizontally with a velocity of 5m/s. find:
    a. The time taken for bearing Y to reach the floor.
    b. The horizontal distance traveled by Y before hitting the floor.
    c. The height of the table-top above the floor level.
25. A helicopter, which was ascending vertically at a steady velocity of 20m/s, released a parcel that took 20 second to reach the ground.
    i. State the direction in which the parcel moved immediately it was released.
    ii. Calculate the time taken by the parcel to reach the ground from the maximum height.
    iii. Calculate the velocity of the parcel when it strikes the ground.
    iv. Calculate the maximum height above the ground the parcel reached.
    v. What was the height of the helicopter at the instant the parcel was dropped.
26. A stone is thrown horizontally from a building that is 50 m high above a horizontal ground. The stone hits the ground at a point, which is 65m from the foot of the building. Calculate the initial speed of the stone.

Answers

1.

    a. AB - ball rising to max height
       BC - ball falling to ground
       CDE- ball rebouncing/ changing velocity from +ve to –ve
    b. Acceleration = gradient = 19.8 = 9.9 m/s^2
    c. Displacement = area
       = ½ x 2 x 19.8 = 19.8m
    d. Upon hitting the ground the ball looses some energy.

2.
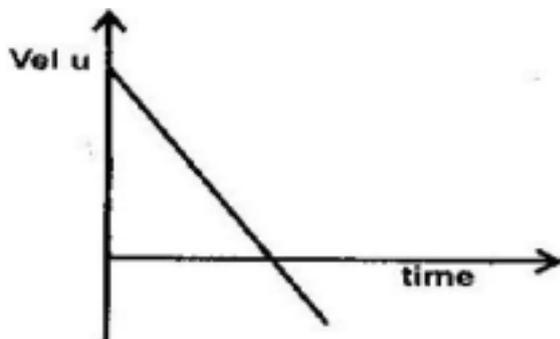
3. Time interval between any two dots = $^1/_{50}$ =0.02s
   Dist d_1 between 1st and 2nd dots = 2.2 cm
   = V_1 = <u>0.022</u> m = 1.1ms^{-1}
        0.02 s
   Dist d_2 between 4th and 5th dots = 3.3cm, v_2 = <u>0.033</u> =1.65m/s
                                0.02
   Note: the average velocity between any two dots = the velocity of a point half way between the pts. Label the pts A.B.C.D & E label a pt x and y half way between D and E respectively (i.e.