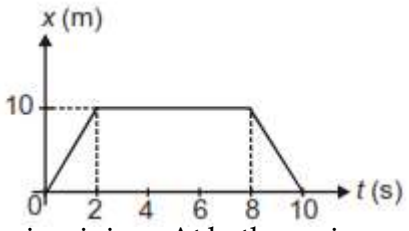
11. (3)The total distance travelled from 0 to 2 s is 10 m
2 s to 8 s $\rightarrow$ Zero distance

and from 8 s to 10 s $\rightarrow$10 m So, distance = 10 + 0 + 10 = 20 m



12. (3) As there are two extremes in the graph one is maxima and other is minima. At both maxima and minima the slope is zero. So, it comes to rest twice.

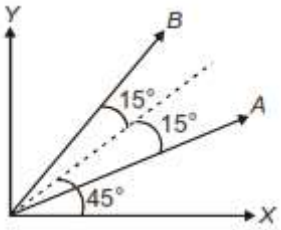
13. (3) Maximum instantaneous velocity will be at that point which has maximum slope. As clear from the graph 'C' has maximum slope.

14. (1) The angle made by the tangent at point 'C' is obtuse hence tan Q_E = negative, so slope = negative hence, velocity is also negative.

15. (3) Velocity at the mid-point = $\sqrt{\frac{v^2+u^2}{2}}$ (Final velocity, Initial velocity) (When acceleration is constant)

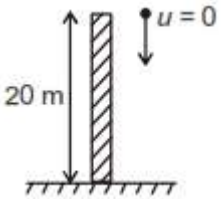
Given, v = 3u, u = u $So, v_{mid} = \sqrt{\frac{9u^2+u^2}{2}} = \sqrt{\frac{10u^2}{2}}$; $v_{mid} = \sqrt{5}u^2 = \sqrt{5}u = v_{mid}$

16. (4)The slope of line A is tan30° and B = tan60°



$$\frac{V_A}{V_B} = \frac{\tan 30°}{\tan 60°} = \frac{\frac{1}{\sqrt{3}}}{\sqrt{3}} = \frac{1}{3} \Rightarrow V_A : V_B = 1:3$$

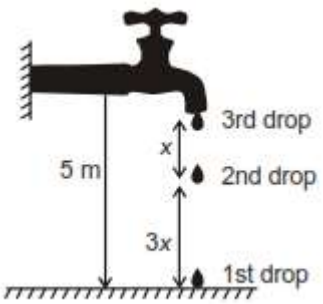
17. (3) $V^2 = u^2 + 2as$
$V^2 = 0 + 2 \times 10 \times 20$
$V^2 = 400$
$V = 20\ ms^{-1}$



18. (1) x = 3x = 5 m $\Rightarrow$ 4x = 5 m

$x = 1.25m$

So, second drop is at 3x $\Rightarrow 3 \times 1.25 = 3.75m$ above ground.

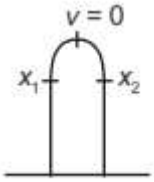


19. (1)As the motion under gravity is symmetric, so distance travelled in last second of ascent is equal to first second of descent.

$t = 1s \quad (1^{st}\,\text{sec}\,ond) \quad -X_2 = ut - \frac{1}{2}g \times 1^2$

$X_2 = \frac{1}{2} \times 9.8 \times 1^2 \quad (\because u = 0)$

$\Rightarrow X_2 = 4.9m$



This distance is constant for every body thrown with any speed.

20. (2) As $S = ut + \frac{1}{2}at^2 \;\therefore S_1 = \frac{1}{2}a(10)^2 = 50a$ … (i)

As $v = u + at \;\therefore$ velocity acquired by particle in 10 sec $v = a \times 10$

For next 10 sec, $S_2 = (10a) \times 10 + \frac{1}{2}(a) \times (10)^2$

$S_2 = 150a$ … (ii)

From (i) and (ii) $S_1 = S_2 / 3$