AVIRAL
JEE | NEET | FOUNDATIONS

WEEKLY TEST TYJ TEST - 11 Balliwala SOLUTION Date 30-06-2019

[PHYSICS]

1. $$\text{Average speed} = \frac{\text{total distance covered}}{\text{total time taken}}$$

$$v_{av.} = \frac{\frac{x}{2}+\frac{x}{2}}{\frac{x/2}{40}+\frac{x/2}{60}} = \frac{x}{\left(\frac{x}{80}+\frac{x}{120}\right)}$$

$$= \frac{80\times 120}{(120+80)} = 48 \text{ km/h}$$

2. $200 = u \times 2 - (1/2)\, a(2)^2$ or $u - a = 100$ ....(i)
$200 + 220 = u(2 + 4) - (1/2)\,(2 + 4)^2 a$
or $u - 3a = 70$ .....(ii)
Solving eqns. (i) and (ii), we get; $a = 15\ \text{cm/s}^2$ and $u = 115$ cm/s.
Further, $v = u - at = 115 - 15 \times 7 = 10$ cm/sec.

3. When a body slides on an inclined plane, component of weight along the plane produces an acceleration

$$a = \frac{mg\sin\theta}{m} = g\sin\theta = \text{constt.}$$

If s be the length of the inclined plane, then

$$s = 0 + \frac{1}{2}at^2 = \frac{1}{2}g\sin\theta \times t^2$$

$$\therefore \frac{s'}{s} = \frac{t'^2}{t^2} \text{ or } \frac{s}{s'} = \frac{t^2}{t'^2}$$

Given t = 4 sec and $s' = \frac{s}{4}$

$$\therefore t' = t\sqrt{\frac{s'}{s}} = 4\sqrt{\frac{s}{4s}} = \frac{4}{2} = 2\,\text{sec}$$

4. Given that; a = 3t + 4 or $\frac{dv}{dt} = 3t + 4$

$$\therefore \int_0^v dv = \int_0^t (3t+4)dt \text{ or } v = \frac{3}{2}t^2 + 4t$$

$$v = \frac{3}{2}(2)^2 + 4(2) = 14 \text{ ms}^{-1}$$

5. **For first body** :

$$\frac{1}{2}gt^2 = 176.4 \quad \text{or} \quad t = \sqrt{\frac{176.4 \times 2}{10}}$$

or t = 5.9 s

For second body : t = 3.9 s

$$u(3.9) + \frac{1}{2}g(3.9)^2 = 176.4$$

$$3.9u + \frac{10}{2}(3.9)^2 = 176.4$$

or u = 24.5 m/s

6. The resultant velocity of the boat and river is 1.0 km/0.25 h = 4 km/h.

Velocity of the rive $= \sqrt{5^2 - 4^2} = 3\ \text{km/h}$

7. Let he be the height of the tower.

Using $v^2 - u^2 = 2as$, we get;

Here, u = u, a = – g, s = – h and v = – 3u (upward direction + ve)

∴ $9u^2 - u^2 = 2gh$ or $h = 4u^2/g$

8. $$t = \sqrt{\frac{2h}{g}}$$

$$s = 10 \times \frac{t}{2} - \frac{1}{2}g \times \frac{t^2}{4} = 5\sqrt{\frac{2h}{g}} - \frac{g}{8}\frac{2h}{g}$$

$v^2 - u^2 = 2gh$ or $100 = 2gh$ or $10 = \sqrt{2gh}$

$$s = \sqrt{\frac{2gh \times 2h}{4 \times g}} - \frac{h}{4} = h - \frac{h}{4} = \frac{3h}{4}$$

9. $$t = \frac{1}{u+v} = \frac{1}{\frac{l}{t_1} + \frac{l}{t_2}}$$

or $$\frac{1}{t} + \frac{1}{t_1} + \frac{1}{t_2} \quad \text{or} \quad t = \frac{t_1 t_2}{(t_1 + t_2)}$$

10. **For first body** :

$v^2 = u^2 + 2gh$ or $(3)^2 = 0 + 2 \times 9.8 \times h$

or $$h = \frac{(3)^2}{2 \times 9.8} = 0.46\ \text{m}$$

For second body :

$v^2 = (4)^2 + 2 \times 9.8 \times 0.46$

∴ $v = \sqrt{(4)^2 + (2 \times 9.8 \times 0.46)} = 5\ \text{m/s}$

11. Given y = 0

Distance travelled in 10 s,

$$S_1 = \frac{1}{2}a \times 10^2 = 50a$$

Distance travelled in 20 s,

$$S_2 = \frac{1}{2}a \times 20^2 = 200a$$

∴ $S_2 = 4S_1$

12. During the first 5 seconds of the motion, the acceleration is – ve and during the next 5 seconds it becomes positive. (Example : a stone thrown upwards, coming to momentary rest at the highest point). The distance covered remains same during the two intervals of time.

13. Gain in angular KE = loss in PE

If l = length of the pole, moment of inertial of the pole about the edge $= M\left[\frac{l^2}{12}+\frac{l^2}{4}\right]=\frac{Ml^2}{3}$

Loss in potential energy $=\frac{Mgl}{2}$

Gain in angular $KE=\frac{1}{2}I\omega^2=\frac{1}{2}\times\frac{Ml^2}{3}\times\omega^2$

$\therefore \quad \frac{1}{2}\frac{Ml}{3}\omega^2=\frac{Mgl}{2}$ or $(l\omega)^2 = 3gl$

or $l\omega = v = \sqrt{3gl}$

$= \sqrt{3\times 10\times 30} = 30ms^{-1}$

14. Let the velocity of the scooter be v ms^{-1}. Then (v – 10)100 = 100 or v = 20 ms^{-1}

15. Let x be the distance between the particles after t second. Then

$x = vt - \frac{1}{2}at^2$ .....(i)

For x to be maximum,

$\frac{dx}{dt}=0$

or v – at = 0

or $t=\frac{v}{a}$

Putting this value in eqn. (i), we get;

$x = v\left(\frac{v}{a}\right)-\frac{1}{2}a\left(\frac{v}{a}\right)^2=\frac{v^2}{2a}$

[CHEMISTRY]

16.
17. Within a group IE_1 decreases from top to bottom.
18. After the removal of second electron, the ion acquires noble gas configuration and it becomes difficult to remove the third electron.
19.
20.
21.
22.
23. With negative sign the chlorine has highest electron gain enthalpy (in magnitude)
24.
25. All have 18 electrons.
26. The ionic radii follow the order : $C^{4-} > N^{3-} > O^{2-}$ and therefore, N^{3-} would have value between 2.60 and 1.40 Å.
27.
28.
29.
30. The general electronic configuration of d-block elements is $(n-1)d^{1-10}, ns^{1-2}$. They show variable oxidation state because d-electrons also take part in bond formation. They have take part in bond formation. They have degenerated orbitals. s and p-block elements in general do not show variable oxidation states.