ACE OF PACE
3 YRS. MEDICAL

SOLUTIONS

1. (D)

$$F = \frac{GMm}{R^2} \Rightarrow G = \frac{FR^2}{Mm}$$

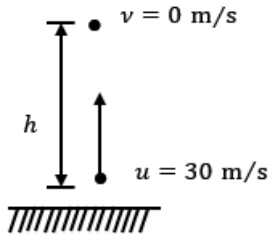
Performing dimensional analysis.

$$[G] = \frac{[F][R]^2}{[M][m]} = \frac{\left[M^1L^1T^{-2}\right]\left[M^0L^1T^0\right]^2}{\left[M^1L^0T^0\right]\left[M^1L^0T^0\right]} = \left[M^{-1}L^3T^{-2}\right]$$

2. (B)

1 light year = Distance travelled by light in 1 year time in vacuum.

3. (D)



Let h be the max height achieved by ball.

$\upsilon = 0$ at h.

$\therefore\ \upsilon^2 - u^2 = 2as$ and $a = -10\ m/s^2$

$\therefore\ 0^2 - (30)^2 = 2(-10)h$

$\therefore h = 45\ m$

Now, the ball travels n distance when it comes back to the ground.

4. (C)

$s = 75\,m,\ u = 10\ m/s$ and $3sec$

$$s = ut + \frac{1}{2}at^2 \Rightarrow 75 = 10 \times 3 + \frac{1}{2} \times a \times 3^2 \Rightarrow a = 10\ m/s^2$$

Now, $t' = 4sec,\ u = 10\ m/s,\ a = 10\ m/s^2$

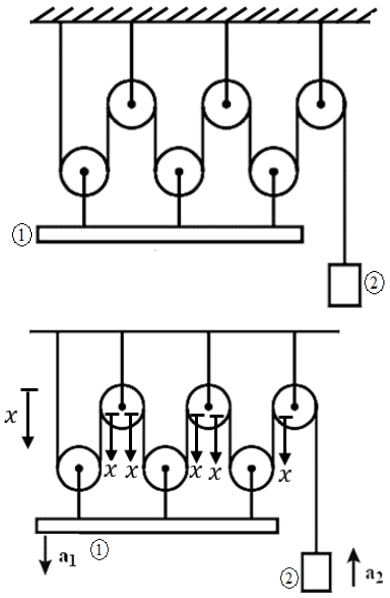
$$\upsilon = u + ay = 10\,m/s + 10\,m/s^2 \times 4sec \Rightarrow \upsilon' = 50\ m/s$$

5. (B)

$$\text{Avg velocity} = \frac{\text{Total displacemt}}{\text{total time}}$$

Since the displacement is zero, avg velocity will also be zero.

6. (A)



When mass (1) is shifted downwards by x lengths, mass (2) mores upwards by 6x lengths.

$\therefore a_2 = 6a_1$

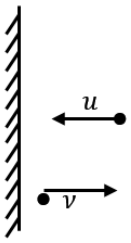
7. (A)

$m = 200g = 0.2\,kg$

$u = -20\ m/s$

$v = -(80\%\ of\ u) = -\frac{80}{100} \times (-20\ m/s) = +16\ m/s$

$t = 0.1\ sec$



Impulse = Change in momentum

$= mv - mu$

$= m(v - u)$

$= 0.2\ kg \times (16 - (-20))m/s$

$= 7.2\ kg\ m/s$

$\text{Force} = \frac{\text{Impulse}}{\text{time}} = \frac{7.2\ kg\ m/s}{0.1s} = 72\,N$

8. (B)

Theory.

9. (A)

Unit of power : 1 W = kg m^2/s^3

Let new units of mass, length, time and power be kg′, m′, s′ and W′ .

then $1W' = \frac{1kg'(m')^2}{(s')^3}$

Now, $1kg' = 2kg,\ 1m' = 2m, 1s' = 2s$

$\therefore 1W' = \frac{1\times(2kg)(2m)^2}{(25)^2} = 1W$

$\therefore$ we multiply W by 1 to get new unit of power.

10. (D)

$F = 20N, S = 1m, \theta = 60°$

Work $W = \vec{F}\cdot\vec{s} = Fs\cos\theta$

$\therefore W = (20N)(1m)\cos 60°$

$= 20\times\frac{1}{2}J$

$W = 10\ J$

11. (C)

Ernest Rutherford's alpha particle scattering experiment in 1911 led to the discovery of the atomic nucleus.

12. (D)

According to Dalton's atomic theory, atoms can't be divided. Therefore, the statement "atoms can be divided" is incorrect.

13. (B)

Metals react with acids. So food items with acidic components may react with the metal to produce toxic materials

14. (C)

Calcium hydroxide $Ca(OH)_2$ is the chemical name of lime water.

15. (D)

Valency of metal is +2 by formula MO so its phosphate would be $M_3(PO_4)_2$ because valency of PO_4 is – 3.

16. (B)

Potassium (K) has oxidation number +1; oxygen(O) has oxidation number – 2

$K_2Cr_2O_7 = (+1)2 + 2x + (-2)7 = 0$

$x = \frac{12}{2} = +6$

Hence, the oxidation number of Cr is +6.

17. (C)

P and Q both have two valence electrons, it will be easier for them to loose those electrons and complete their octets.

18. (B)
Number of atoms = moles $\times N_A \times$ Atomicity

Methane $CH_4 = \frac{10}{16} \times N_A \times 5 = 3.125\, N_A$

Sodium $Na = \frac{10}{23} \times N_A \times 1 = 0.43\ N_A$

Hydrogen fluoride $HF = \frac{10}{20} \times N_A \times 2 = N_A$

Carbon $= \frac{10}{12} \times N_A \times 1 = 0.83\ N_A$

19. (D)
An aqueous solution of aluminium sulphate gives $Al(OH)_3$ and H_2SO_4. So, it's a solution of weak base and strong acid and it will be acidic.

20. (B)
A bond that exists between two oppositely charged species is called an electrovalent linkage.
It is the force of attraction between two species.
CH_4: Both carbon and hydrogen are non-metals, therefore the linkage is not electrovalent.
$SiCl_4$: Both silicon and chlorine are non-metals, therefore the linkage is not electrovalent.
BF_2 : Both boron and fluorine are non-metals, therefore the linkage is not electrovalent.
$MgCl_2$: Magnesium is a metal with a positive charge and chlorine is a non-metal with a negative charge. Therefore they are electrovalently linked.

21. (C)
22. (C)
23. (C)
24. (D)
25. (C)
26. (C)
27. (A)
28. (B)
29. (D)
30. (B)
31. (C)
32. (B)
33. (C)
34. (C)
35. (C)
36. (B)
37. (C)
38. (D)
39. (D)
40. (C)