

## ACE OF PACE (SOLUTION)

1. (3)

$$\text{Magnitude of displacement} = \sqrt{(10)^2 + (12)^2 + (14)^2} = \sqrt{100 + 144 + 196} = \sqrt{440} \approx 21 \text{ m}$$

2. (3)

$$|\text{displacement}| \leq \text{distance}$$

3. (3)

In the case of freely falling body, initial velocity is zero.

So, distance travelled by the body in time  $t$  sec is

$$S = \frac{1}{2}gt^2$$

$$S \propto t^2$$

The distance covered by the body in 1 sec, 2 sec, 3 sec are in the ratio is

$$S_1 : S_2 : S_3 = 1 : 4 : 9$$

4. (3)

When a body is thrown vertically upwards, at the highest point, velocity of the body becomes zero and at highest point acceleration of the body is  $-g$  vertically downwards.

5. (1)

Initial velocity of the body is  $u = 5 \text{ m/s}$

Final velocity of the body is  $v = 0 \text{ m/s}$

Retardation force acting on the body is

$$F = ma$$

$$= m \left( \frac{v-u}{t} \right)$$

$$= (100 \text{ kg}) \left( \frac{0 - 5 \text{ m/s}}{\frac{1}{10} \text{ sec}} \right)$$

$$= -5000 \text{ N}$$

6. (2)

$$p = mv \quad \Rightarrow \quad p \propto v$$

7. (1)

Kinetic energy of a body in terms of its momentum is  $\text{KE} = \frac{p^2}{2m}$

As momentum of a body is constant, then  $\text{KE} \propto \frac{1}{m}$

8. (3)

Frequency

9. (4)

$$\text{Frequency (f) of the wave} = \frac{3600}{60} \text{ Hz} = 60 \text{ Hz}$$

Speed (v) of the wave = 960 m/s

Wavelength ( $\lambda$ ) of the wave is

$$\lambda = \frac{v}{f} = \frac{960 \text{ m/s}}{60 \text{ Hz}} = 16 \text{ m}$$

10. (3)

$$W = qV = (2 \text{ C})(24 \text{ V}) = 48 \text{ J}$$

11. (2)

Equivalent resistance when three resistances are connected in series is

$$R_{\text{eq}} = R_1 + R_2 + R_3$$

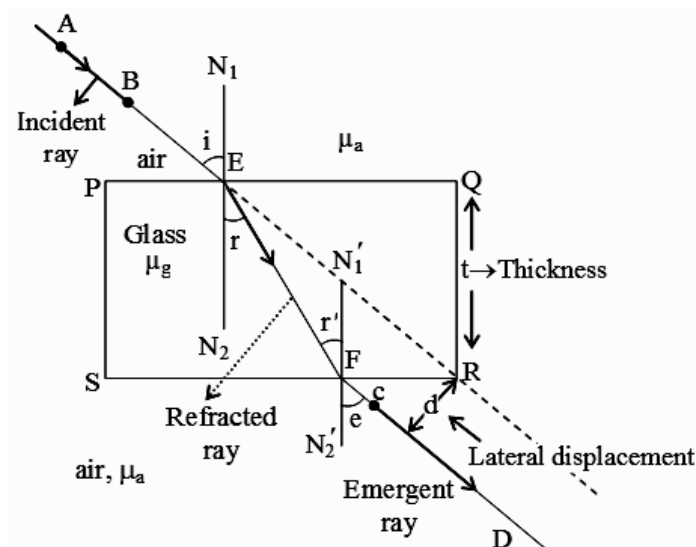
12. (2)

13. (4)

Ammeter is always connected in series and voltmeter is always connected in parallel.

14. (1)

15. (3)



16. (4)

When object is placed at focal point of a convex lens, then image will be formed at infinity.

17. (4)

According to charge quantization,  $q = ne$ 

$$n = \frac{q}{e}$$

$$= \frac{1 \text{ C}}{1.6 \times 10^{-19} \text{ C}}$$

$$= 6.25 \times 10^{18} \text{ electrons}$$

18. (2)

$$I = \frac{V}{R} = \frac{12 \text{ V}}{4 \Omega} = 3 \text{ A}$$

19. (1)

Resistivity of a wire depends upon the nature of material of the wire, and resistivity is independent on dimensions of the wire.

20. (2)

$$I = \frac{q}{t} = \frac{V}{R}$$

$$q = \frac{V}{R} t$$

$$= \frac{20 \text{ V}}{10 \Omega} (120 \text{ s})$$

$$= 240 \text{ C}$$

21. (2)

When two resistances  $R_1$  and  $R_2$  are connected in series, equivalent resistance is  $R_s = R_1 + R_2$ When two resistances  $R_1$  and  $R_2$  are connected in parallel, then equivalent resistance is

$$\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2}$$

22. (4)

Work is a scalar quantity

23. (3)

Slope of velocity vs time graph represents acceleration of the body.

24. (3)

When a body started from rest and moving with uniform acceleration, then the ratio of distances travelled by the body in 1<sup>st</sup> sec, 2<sup>nd</sup> sec, 3<sup>rd</sup> sec is 1 : 3 : 5

25. (4)

Initial velocity ( $u$ ) of the body = 200 m/sFinal velocity ( $v$ ) of the body = 100 m/sDistance ( $S$ ) travelled by the body = 0.10 mAcceleration ( $a$ ) of the body is

$$a = \frac{v^2 - u^2}{2S} = \frac{(100 \text{ m/s})^2 - (200 \text{ m/s})^2}{2(0.1 \text{ m})} = -15 \times 10^4 \text{ m/s}^2$$



36. (1)  
The reaction of iron (III) oxide ( $\text{Fe}_2\text{O}_3$ ) with aluminium is used to join railway tracks or cracked machine parts. This reaction is known as the thermite reaction.  
$$\text{Fe}_2\text{O}_{3(s)} + 2\text{Al}_{(s)} \rightarrow 2\text{Fe}_{(l)} + \text{Al}_2\text{O}_{3(s)}$$
37. (4)  
 $\text{CaCl}_2$  – Calcium chloride is used to dry any gas in the laboratory
38. (2)  
$$\text{NaCl}_{(aq)} \rightarrow \text{Na}^+_{(aq)} + \text{Cl}^-_{(aq)}$$
  
(Brine)  
Cathode:-  
$$\text{Na}^+ + e^-_{(aq)} \rightarrow \text{Na}(\text{Hg})$$
  
$$2\text{Na} + 2\text{H}_2\text{O} \rightarrow 2\text{NaOH} + \text{H}_{2(g)} \uparrow$$
39. (1)  
Vinegar contain acetic acid ( $\text{CH}_3\text{COOH}$ ) so Phenolphthalein remains colourless
40. (3)  
Au and Pt are soluble in aqua regia (royal water), a mixture of 3 parts of Conc. HCl and 1 part of Conc.  $\text{HNO}_3$ .
41. (2)  
'Hg' was obtained by heating mercuric oxide.  
$$2\text{HgO}_{(s)} \xrightarrow{\Delta} 2\text{Hg}_{(l)} + \text{O}_{2(g)}$$
42. (4)  
Tamarind – Tartaric acid  
Orange, lemon – citric acid  
Tomato – oxalic acid
43. (4)  
Alcohol contains – C – OH group.
44. (1)  
The metals high up in the reactivity series are very reactive. These metals are obtained by the electrolytic reduction of their molten chlorides.
45. (3)  
Silver bromide decomposes in the presence of sunlight. So it is an example of photochemical decomposition. It is an endothermic reaction as energy was obtained from sunlight.
46. (1)  
 $\text{Na}_2\text{CO}_3$  – Sodium carbonate is used for removing permanent hardness of water

47. (3)  
 $2\text{Na} + 2\text{CH}_3\text{CH}_2\text{OH} \rightarrow 2\text{CH}_3\text{CH}_2\text{O}^-\text{Na}^+ + \text{H}_{2(\text{g})}$   
 Sodium ethoxide  
 $2\text{Na} + 2\text{CH}_3\text{COOH} \rightarrow 2\text{CH}_3\text{COO}^-\text{Na}^+ + \text{H}_{2(\text{g})}$   
 Sodium acetate
48. (4)  
 $\text{C}_4\text{H}_9\text{OH}$  has higher boiling point here as the boiling points increase with increase in molecular mass
49. (2)  
 $\text{CH}_3\text{CH}_2\text{OH} \xrightarrow[\text{Conc. H}_2\text{SO}_4]{\text{H}^+} \text{CH}_2 = \text{CH}_2 + \text{H}_2\text{O}$
50. (2)  
 5-8% solution of acetic acid in water is called vinegar.
51. (4)  
 Pyrimidine in DNA is : Thymine and cytosine  
 Pyrimidine in RNA is : Uracil and cytosine  
 Sugar found in DNA is : Deoxyribose sugar  
 Sugar found in RNA is : Ribose sugar
52. (1)  
 The probability of Fourth child to be son is  $\frac{1}{2}$  or 50% As male gamete is of 2 types, one containing x-chromosome and other containing y-chromosome.  
 If x of father fuses  $\rightarrow$  DAUGHTER  
 If y of father fuses  $\rightarrow$  SON  
 Thus  $\frac{1}{2}$  or 50% is the probability.
53. (2)  
 Bryophytes are called amphibians of plant kingdom because, though they are established on land, but Still require water for fertilization.
54. (2)  
 Somatic cell =  $2n = 40$  chromosomes  
 Gamete =  $n = 20$  chromosomes  
 As gametes are formed after meiosis or reduction division.
55. (1)  
 Viruses are acellular organism.
56. (3)  
 Gymnosperm lack ovary, ovary matures to form fruit as ovary is absent, fruit is never seen.
57. (3)  
 Calvin cycle is exhibited by plants to produce food i.e. conduct photosynthesis.  
 During the cycle : 18 ATP and 12 NADPH<sub>2</sub> are utilized  
 $3 - \text{PGA} [3 - \text{Phosphoglyceric Acid}] \xrightarrow[12\text{NADPH}_2]{12\text{ATP}} 3 - \text{PGAL} [3 - \text{phosphoglyceraldehyde}]$   
 $\text{RUMP} [\text{Ribulose Mono Phosphate}] \xrightarrow{6\text{ATP}} \text{RUDP} [\text{Ribulos - Di - Phosphate}]$

58. (1)  
Double fertilization is a process of formation of zygote and endosperm.  
(i) Male gamete + Female gamete  $\Rightarrow$  Zygote  
(ii) Male gamete + Polar nuclei  $\Rightarrow$  Endosperm  
This is observed only in angiosperm.
59. (4)  
Chlorophyll is present in thylakoid
60. (2)  
Prokaryotic DNA does not show histone protein
61. (2)  
During the process of cell division, DNA is replicated for its equal distribution DNA replication occurs during interphase.
62. (2)  
Cytokinesis is a process referring to division of cytoplasm.
63. (2)  
Snake & lizard (reptiles) and frog (amphibian) have 3 - chambered heart
64. (4)  
opening of oesophagus is called gullet. Epiglottis covers glottis during swallowing
65. (2)  
Lymphocytes are a type of WBC
66. (3)  
Amphibians have moist & glandular skin
67. (2)  
Mosquito carries the pathogen & hence is a vector / carrier
68. (3)  
Proteins are body builders.
69. (1)  
Aorta carries oxygenated blood.
70. (1)  
Epidermis has epithelium & dermis has connective tissue
71. (4)  
Ammonia is most toxic & soluble nitrogenous waste
72. (4)  
Saliva has salivary amylase to digest starch
73. (2)  
Cones function only in visible light

74. (3)  
Progesterone means pregnancy hormone
75. (2)  
Blood cells are formed in bone marrow and proteins formed in liver.