

ACE OF PACE (SOLUTION)

1. (3)
From Newton's Second law, resultant force acting on a body is directly proportional to rate of change of momentum of the body.
$$\vec{F} = \frac{d\vec{p}}{dt}$$
So, direction of resultant force acting on the body is along the direction of change in momentum of the body.
2. (2)
$$\vec{P} + \vec{Q} + \vec{R} = 0$$
$$\vec{P} = -(\vec{Q} + \vec{R})$$
$$|\vec{P}| = |\vec{Q} + \vec{R}|$$
3. (2)
$$\vec{S}_1 = 3\text{m, towards east} = 3\hat{i}$$
$$\vec{S}_2 = 4\text{m, towards North} = 4\hat{j}$$
$$\vec{S}_3 = 5\text{m, vertically upwards} = 5\hat{k}$$
Therefore, resultant displacement of the person is
$$\vec{S} = 3\hat{i} + 4\hat{j} + 5\hat{k}$$
$$|\vec{S}| = \sqrt{3^2 + 4^2 + 5^2}$$
$$= 5\sqrt{2}\text{m}$$
4. (1)
Radius of curvature of plane mirror is infinity.
Focal length of the mirror is $f = \frac{R}{2} = \infty$
5. (4)
Theoretical
6. (1)
Amount of workdone required to displace a charged particle of charge q between any two points is
$$\Delta V = \frac{W}{q} = \frac{5\text{J}}{10\text{C}} = 0.5\text{V}$$
7. (3)
Resistance of a conductor increases with increase of temperature.
8. (2)
Theoretical
9. (1)
In the case of convex mirror, magnification is always less than one when object is kept anywhere in front of convex mirror

10. (3)
Theoretical

11. (2)

Time period is $T = \frac{20 \text{ sec}}{100} = 0.2 \text{ sec}$

Speed of the wave is

$$v = f \lambda = \frac{\lambda}{T} = \frac{6 \times 10^{-2} \text{ m}}{0.2 \text{ sec}} = 0.3 \text{ m/s}$$

12. (4)

Same retarding force (same retardation) is acting on the car, so according to kinematics equations of motion,

$$S = \frac{v^2 - u^2}{2a}$$

$$= \frac{0 - u^2}{2(-a)}$$

$$= \frac{u^2}{2a}$$

$$S \propto u^2$$

$$\frac{S_2}{S_1} = \left(\frac{u_2}{u_1} \right)^2 = 2^2 = 4$$

$$S_2 = 4S_1$$

13. (4)

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

If kinetic energy is constant, $p \propto \sqrt{m}$

$$\frac{p_1}{p_2} = \sqrt{\frac{m_1}{m_2}} = \sqrt{\frac{4 \text{ kg}}{9 \text{ kg}}} = \frac{2}{3}$$

14. (3)

From Kinematic equations of motion $a = \frac{v^2 - u^2}{2S}$

Retardation of the bullet while passing through one plank is

$$a = \frac{\left(\frac{19}{20} u \right)^2 - u^2}{2x}, \text{ here } x \text{ is thickness of one plank}$$

$$a = \frac{-39u^2}{(2x)(400)} \dots\dots(1)$$

While passing through n number of planks, bullet came to rest position.

$$a = \frac{0 - u^2}{2(nx)} = -\frac{u^2}{2nx} \dots\dots(2)$$

From (1) and (2)

$$\frac{-39u^2}{(2x)(400)} = -\frac{u^2}{2nx}$$

$$n = \frac{400}{39} = 10.3$$

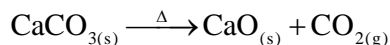
$$n \approx 11$$

15. (3)
Momentum, kinetic energy, total energy (KE + PE) depends upon mass. So, these parameters are different.
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

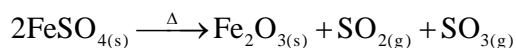
23. (3)
Slope of velocity vs time graph represents acceleration of the body.
24. (3)
When a body started from rest and moving with uniform acceleration, then the ratio of distances travelled by the body in 1st sec, 2nd sec, 3rd sec is 1 : 3 : 5
25. (4)
Initial velocity (u) of the body = 200 m/s
Final velocity (v) of the body = 100 m/s
Distance (S) travelled by the body = 0.10 m
Acceleration (a) of the body is

$$a = \frac{v^2 - u^2}{2S} = \frac{(100 \text{ m/s})^2 - (200 \text{ m/s})^2}{2(0.1 \text{ m})} = -15 \times 10^4 \text{ m/s}^2$$
26. (3) According to the reactivity series, the correct order of reactivity of the elements is given as
Al > Zn > Fe > Cu
27. (2) 'ZnO' is amphoteric as it reacts with both acids as well as bases to produce salts.
28. (4) Atomic radius decreases from left to right across a period
Li > Be > B > C > N > O

$$\text{CH}_3\text{CH}_2\text{OH} \xrightarrow[\Delta]{\text{Alkaline KMnO}_4} \text{CH}_3\text{COOH}$$
29. (2) Ethanol Ethanoic acid
30. (2)



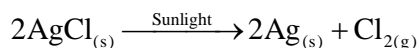
(Limestone) (Quick lime)



(Ferrous sulphate) (Ferric
oxide)



(Lead nitrate) (Lead oxide) (Nitrogen dioxide)
(Brown fumes)

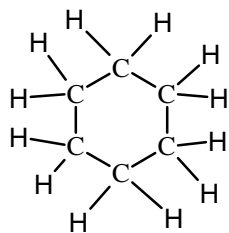


(silver chloride)

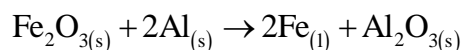
31. (4)

$$\begin{array}{c} \text{CH}_3 - \text{C} - \text{O} - \text{CH}_3 \\ \parallel \\ \text{O} \end{array}$$
 is an ester (methyl ethanoate) a sweet smelling substance used in making perfumes.

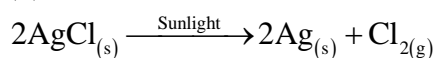
32. (4) Cyclohexane is C₆H₁₂



33. (1) The reaction of iron (III) oxide (Fe_2O_3) with aluminium is used to join railway tracks or cracked machine parts. This reaction is known as the thermite reaction.



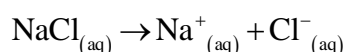
34. (3)



35. (2) Pb (Lead) is used in storage battery

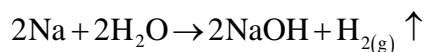
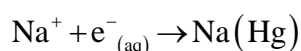
36. (4) CaCl_2 – Calcium chloride is used to dry any gas in the laboratory

37. (2)

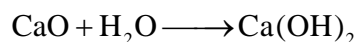


(Brine)

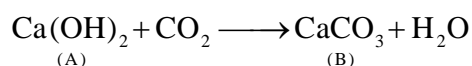
Cathode:-



38. (1)



Quick lime Slaked lime
(A)

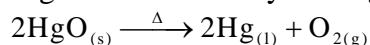


(A) (B)
 CaCO_3 is used in white wash

39. (1) In the reactivity series, Ag lies below Cu, so Ag cannot displace Cu.

40. (3) 'C' and 'Si' both are in group IV in the Mendeleev's periodic table. Hence both forms similar hydride and oxide.

41. (2) 'Hg' was obtained by heating mercuric oxide.



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) Na_2CO_3 – Sodium carbonate is used for removing permanent hardness of water
47. (3) $2\text{Na} + 2\text{CH}_3\text{CH}_2\text{OH} \rightarrow 2\text{CH}_3\text{CH}_2\text{O}^- \text{Na}^+ + \text{H}_{2(g)}$
Sodium ethoxide
 $2\text{Na} + 2\text{CH}_3\text{COOH} \rightarrow 2\text{CH}_3\text{COO}^- \text{Na}^+ + \text{H}_{2(g)}$
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. Ribosomes were discovered by George Palade
52. Mesophyll cells of leaves is composed of photosynthesis performing parenchyma tissue. This tissue exhibits the presence of chloroplast.
53. ICBN is an international body that has a set of rules for accepting the binomials of plants
54. Cyanobacteria or BGA (Blue Green Algae) are members of Kingdom Monera
55. Carolous Linnaeus, a Swedish naturalist introduced the binomial system of nomenclature
56. Gymnosperm lack ovary, ovary matures to form fruit as ovary is absent, fruit is never seen.
57. Calvin cycle is exhibited by plants to produce food i.e. conduct photosynthesis.
During the cycle : 18 ATP and 12 NADPH₂ are utilized
 $3\text{-PGA [3-Phosphoglyceric Acid]} \xrightarrow[12\text{NADPH}_2]{12\text{ATP}} 3\text{-PGAL [3-phosphoglyceraldehyde]}$
 $\text{RUMP [Ribulose Mono Phosphate]} \xrightarrow{6\text{ATP}} \text{RUDP [Ribulos - Di - Phosphate]}$
58. 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. Chlorophyll is present in thylakoid
60. Prokaryotic DNA does not show histone protein
61. During the process of cell division, DNA is replicated for its equal distribution DNA replication occurs during interphase.
62. Cytokinesis is a process referring to division of cytoplasm.
63. Hypothalamus is the centre for regulation of temperature, hunger, thirst.
64. Yolk is rich with lipid called lecithin and large quantity of it means a Macrolecithal or Megalecithal egg.
65. Olfaction means smell
66. Progesterone means pregnancy hormone that maintains the thickness of endometrium of uterus for pregnancy.
67. Diastole means relaxation and systole means contraction of cardiac muscles.
68. Diaabetes insipidus means increased uination due to deficiency of Vasopressin released by Pituitary.
69. Osmoregulation means salt water balance of body fluids done by kidneys.

70. Lamarck proposed theory of inheritance of acquired characters.
71. Ammonia is most toxic & soluble nitrogenous waste
72. Saliva has salivary amylase to digest starch
73. Cones function only in visible light
74. Progesterone means pregnancy hormone
75. Blood cells are formed in bone marrow and proteins formed in liver.