

PACE-IIT & MEDICAL

ACE OF PACE
Sample Paper (Medical)
Grade X moving XI

(SOLUTION)

Physics

1. Sol: (3)

Force Solution: A vector quantity has both magnitude and direction. Force satisfies this condition, whereas work, energy, and power are scalars.

2. Sol: (2)

10 N Solution: By Newton's second law, $F = ma = 5 \times 2 = 10 \text{ N}$.

3. Sol: (3)

Mass Solution: Inertia is the tendency of a body to resist changes in its state of motion, and it depends directly on the mass of the object.

4. Sol: (2)

Downward gravitational force only Solution: Once released, no force is applied by the hand. Only gravity acts downward.

5. Sol: (3)

40 s Solution: Momentum initially = $mv = 1000 \times 20 = 20000 \text{ kg} \cdot \text{m/s}$.
Force $F = \Delta p / \Delta t \Rightarrow \Delta t = \frac{20000}{500} = 40 \text{ s}$.

6. Sol: (4)

All of the above Solution: Work is $W = Fd \cos \theta$. If $d = 0$, or $F = 0$, or $\theta = 90^\circ$, then $W = 0$.

7. Sol: (3)

400 J Solution: Work = $mgh = 20 \times 10 \times 2 = 400 \text{ J}$.

8. Sol: (3)

2000 J Solution: Work = Power \times Time = $200 \times 10 = 2000 \text{ J}$.

9. Sol: (2)
50 J Solution: $KE = \frac{1}{2}mv^2 = 0.5 \times 1 \times 100 = 50 J$.
10. Sol: (4)
100 J Solution: $PE = mgh = 2 \times 10 \times 5 = 100 J$.
11. Sol: (3)
60° Solution: By law of reflection, $\angle i = \angle r = 30^\circ$. Hence total angle = $30 + 30 = 60^\circ$.
12. Sol: (1)
Focus Solution: Rays coming from infinity are parallel and after reflection converge at the focus.
13. Sol: (1)
 2.0×10^8 m/s Solution: $v = \frac{c}{\mu} = \frac{3 \times 10^8}{1.5} = 2 \times 10^8$ m/s.
14. Sol: (2)
It bends towards the normal Solution: In a denser medium, speed decreases and ray bends towards the normal.
15. Sol: (2)
+2 D Solution: Power $P = 100/f$ (f in cm) = $100/50 = +2 D$.

Chemistry

16. Soln.: (1)
The true statement about a balanced chemical equation is that the total number of atoms of each element remains the same.
17. Soln.: (3)
As you move across a period in the periodic table, the number of protons in the nucleus increases, which leads to a stronger positive charge. This stronger pull on electrons makes it more difficult for other atoms to share them, resulting in a higher electronegativity.
18. Soln.: (4)
Chlorine (Cl) has the smallest atomic size among the given elements.
19. Soln.: (3)
Group 17 elements, also known as halogens, have seven electrons in their outermost shell and readily gain one electron to achieve a stable noble gas configuration.
20. Soln.: (3)
Mg, Al and Cl in the same period as Na (Period 3)
As you move from left to right across a period, the atomic radius decreases.
Therefore, Na has larger atomic radius than Mg, Al and Cl
Compare Na with K
Potassium (K) has a larger atomic radius than Sodium (Na)

21. Soln.: (2)
When calcium reacts with water, it forms calcium hydroxide (Ca(OH)_2) and hydrogen gas (H_2). The reaction can be represented by the following chemical equation:
- $$\text{Ca} + 2\text{H}_2\text{O} \rightarrow \text{Ca(OH)}_2 + \text{H}_2\uparrow$$
- Calcium hydroxide is commonly known as slaked lime or hydrated lime.
22. Soln.: (1)
In the reaction $\text{Na}_2\text{SO}_4 + \text{BaCl}_2 \rightarrow \text{BaSO}_4 + 2\text{NaCl}$, a precipitate forms. Specifically, BaSO_4 (barium sulfate) precipitates out as a solid, while NaCl (sodium chloride) remains dissolved in the solution. This is a classic example of a double displacement or precipitation reaction.
23. Soln.: (1)
The chemical properties of Li and Na are the most similar among the given pairs.
Explanation:
Li (Lithium) and Na (Sodium): both belong to Group 1 of the periodic table, also known as the alkali metals.
Elements within the same group share similar chemical properties because they have the same number of valence electrons (electrons in the outermost shell), leading to similar reactivity.
24. Soln.: (3)
"Change in mass," is not a characteristic of a chemical reaction because according to the law of conservation of mass, the total mass of the reactants in a chemical reaction always equals the total mass of the products, meaning mass does not change during the reaction.
25. Soln.: (1)
A decomposition reaction is one where a single compound breaks down into two or more simpler substances. In the given reaction, HCl and NaOH react to form NaCl and H_2O ; this is a combination of ions swapping partners, making it a double displacement reaction, not a decomposition where a single compound breaks down.
The reaction $\text{HCl} + \text{NaOH} \rightarrow \text{NaCl} + \text{H}_2\text{O}$ is not a decomposition reaction. This reaction is a double displacement reaction.
26. Soln.: (2)
Explanation: In this reaction, zinc (Zn) is being oxidized (loses electrons) to form Zn^{2+} ions, while hydrogen ions (H^+) in sulfuric acid (H_2SO_4) are being reduced (gains electrons) to form hydrogen gas (H_2).
The reaction $\text{Zn} + \text{H}_2\text{SO}_4 \rightarrow \text{ZnSO}_4 + \text{H}_2$ is a redox reaction.
27. Soln.: (2)
Identify the type of reaction by observing how elements and compounds interact
The reactants are elemental copper (Cu) and Silver nitrate (AgNO_3)
The products are copper (II) nitrate ($\text{Cu(NO}_3)_2$) and elemental silver (Ag)
The reaction is a displacement reaction.
28. Soln.: (1)
The modern periodic law was given by Henry Mosley and his periodic table was based on the fact that "The physical and chemical properties of the elements are periodic functions of their atomic numbers". The atomic number is equal to the number of electrons or protons in a neutral atom."

29. Soln.: (4)
The answer is (4) Arranged elements by increasing atomic number.
Explanation: Mendeleev's periodic table was arranged based on increasing atomic mass, which is not a limitation, but rather a key feature of his system.
30. Soln.: (2)
The correct answer is (2) Constant throughout the group.
Explanation:
Valency is determined by the number of valence electrons in an atom's outermost shell. Elements in the same group have the same number of valence electrons because they are in the same column on the periodic table. Therefore, their valency remains constant as you move down the group.

Biology

31. Sol: (2)
Cell is the basic structural & functional unit of life
32. Sol: (4)
33. Sol: (2)
Anaphase is a phase where spindle fibre moves away from each other in opposite poles leads to separation of sister chromatids
34. Sol: (4)
35. Sol: (3)
Fly has chromosome present in pairs (2n). Egg is a gamete which is haploid fuses with sperm (n) to form (2n) Zygote.
36. Sol: (3)
37. Sol: (4)
38. Sol: (2)
39. Sol: (4) Bryophyllum shows vegetative propagation through leaf.
40. Sol: (1)
41. Sol: (3)
Common cold and AIDS both are viral disease.
42. Sol: (1)
43. Sol: (3)
Fungi shows Fragmentation, budding, etc but not regeneration while Planaria truly regenerate during its life cycle. Mosses show fragmentation for propagation of their progenies. Thallus tip, protonema fragments and even rhizoids can grow into new moss thallus.

44. Sol: (1)

45. Sol: (1)

Golgi apparatus is a cellular organelle which is involved in in the modifying, sorting and packaging of proteins for secretion. Mitochondria are known as the power house of the cell as they are the site of chemical reactions that transfer energy from organic compounds in ATP. Vacuole is a membrane bound organelle and filled with water containing inorganic and organic molecules including enzymes in solution. Vacuoles might store food or any variety of nutrients a cell might need to survive. Grana are a stacked membranous structure within the chloroplasts of plants and green algae that contains the chlorophyll and is the site of the light reactions of photosynthesis.

46. Sol: (2)

47. Sol: (1)

48. Sol: (1)

49. Sol: (3)

50. Sol: (4)