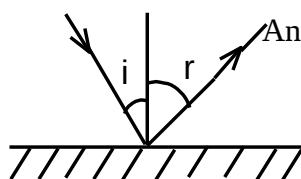


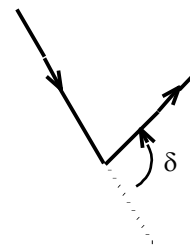
(SOLUTION)

Physics

1. **Soln.: (2)** $\pi - 2i$

Angle of deviation, $\delta = \pi - (i + r)$

$$= \pi - 2i$$



2. **Soln.: (2)**

When $i = 30^\circ$ $\delta = 180 - 2(30) = 120^\circ$

When mirror is rotated, i becomes 60°

$$\therefore \delta = 180 - 2(60^\circ) = 60^\circ$$

Change in $\delta = |60 - 120| = 60^\circ$

3. **Soln.: (4)** 15 cm

$$f = \frac{-20}{2} = -10 \text{ cm}$$

$$\mu = -30 \text{ cm}$$

$$\frac{1}{v} = \frac{1}{f} - \frac{1}{u} = \frac{-1}{10} + \frac{1}{30} = \frac{-2}{30} = \frac{-1}{15}$$

$$v = -15$$

Distance between object & image = 15cm

4. **Soln.: (4)**

12 cm behind the mirror

$$f = +20 \text{ cm} \quad \frac{1}{v} = \frac{1}{f} - \frac{1}{\mu}$$

$$\mu = -30 \text{ cm} \quad \frac{1}{v} = +\frac{1}{20} + \frac{1}{30} = \frac{5}{60} = \frac{1}{12}$$

$$\Rightarrow v = +12$$

5. **Soln.: (1)** 40°

$$\delta_1 = 180 - 2 \times 30 = 120^\circ$$

$$\delta_2 = 180 - 2 \times 10 = 160^\circ$$

Change : 40°

6. **Soln.: (4)** mg

Since the velocity is constant $\Rightarrow \sum \vec{F} = 0$

$$\Rightarrow \text{Contact force} = -m\vec{g}$$

$$\Rightarrow |\text{contact force}| = mg$$

7. **Soln.: (1)** 6

$$\text{Maximum acceleration} = \frac{10+6}{2} = 8 \text{ m/s}^2$$

$$\text{Minimum acceleration} = \frac{10-6}{2} = 2 \text{ m/s}^2$$

$$\text{Difference} : 6 \text{ m/s}^2$$

8. **Soln.: (1)** A

$$F_{\text{resultant}} = \sqrt{F^2 + F^2 + 2F^2 \cos \theta}$$

$\cos \theta$ is maximum for A

Hence the particle should be kept at A

9. **Soln.: 2**

$$a = g \sin \theta = g \sin 30 = g/2$$

10. **Soln.: 1** $F = ma$

If F is same then product of m & a should be constant, hence the greater mass will experience less acceleration and stop after the smaller or lesser mass

$$\Rightarrow m_A : \text{more height}, \quad m_B : \text{less height}$$

11. **Soln (4)** 1650 J

$$W = 55 \times 10 \times 3 \\ = 1650 \text{ J}$$

12. **Soln.: 4** $\sqrt{2gh}$

$$mgh = \frac{1}{2}mv^2 \Rightarrow v = \sqrt{2gh}$$

13. **Soln.: (1)** 3.76 m/s

$$v^2 = mg \frac{1}{\sqrt{2}} \Rightarrow v^2 = 10\sqrt{2} \\ = 14.14 \\ \Rightarrow v = 3.76 \text{ m/s}$$

14. **Soln.: (1)** $\sqrt{14}$ m/s

$$\frac{1}{2}m(6)^2 = \frac{1}{2}mv^2 + mg(1.1)$$

$$36 = v^2 + 22$$

$$v^2 = 14$$

$$v = \sqrt{14} \text{ m/s}$$

15. **Soln.: (3)** 25 N

$$\frac{1}{2}(2)(10)^2 = 4 \times F$$

$$F = 25 \text{ N}$$

Chemistry

16. **Soln.: (3)**
Metallic character increases down a group in the periodic table, and Cesium is located at the bottom of the alkali metal group (Group 1), making it the most metallic element from the provided choices.
17. **Soln.: (2)**
Group 15, Period 3
Find the period: The electronic configuration 2, 8, 5 shows that the element has three electron shells. Therefore, the element is in Period 3.
The outermost shell has 5 electrons. For elements in the p-block (which this element is, since it has more than 2 valence electrons), the group number is 10 + the number of valence electrons.
Group number = 10 + 5 = 15.
18. **Soln.: (4)**
- | Oxide | Type | Nature |
|--|------------------|---------------------|
| MgO | Metal oxide | Strongly basic |
| Al ₂ O ₃ | Amphoteric oxide | Weakly acidic/basic |
| SiO ₂ | Non-metal oxide | Weakly acidic |
| P ₂ O ₅ (or P ₄ O ₁₀) | Non metal oxide | Strongly acidic |
19. **Soln.: (2)**
Iron (Fe) can exhibit different oxidation states, such as +2 (ferrous) and +3 (ferric), making it a variable valency element.
20. **Soln.: (4)**
Atomic radius decreases as you move from left to right across a period on the periodic table. This is because the number of protons in the nucleus increases, creating a stronger electrostatic attraction between the nucleus and the electrons, pulling them closer together
21. **Soln.: (1)**
Fluorine is the most electronegative element, meaning it has the strongest tendency to attract electrons from other atoms, making it highly reactive with most other elements
22. **Soln.: (4)**
While most noble gases are very unreactive due to their full valence electron shells, xenon (Xe) is known to form a number of compounds, particularly with highly electronegative elements like fluorine, making it the only noble gas that readily forms compounds
23. **Soln.: (3)**
Mg and Cl will form an ionic compound. Ionic compounds typically form between a metal and a nonmetal, where electrons are transferred from the metal to the nonmetal.
24. **Soln.: (3)**
Fe₃O₄
When iron reacts with steam, the product is Fe₃O₄ (iron (II, III) Oxide) and hydrogen gas (H₂). The balanced chemical equation for this reaction is

$$3\text{Fe(s)} + 4\text{H}_2\text{O(g)} \rightarrow \text{Fe}_3\text{O}_4\text{(s)} + 4\text{H}_2\text{(g)}$$

25. **Soln.: (3)**
 $\text{CuSO}_4 + \text{Fe} \rightarrow \text{FeSO}_4 + \text{Cu}$
 In this reaction, the more reactive element iron (Fe) displaces the less reactive Element copper (Cu) from its compound, copper (II) sulfate (CuSO_4) to form iron (II) sulfate (FeSO_4) and solid copper.
26. **Soln.: (1)**
 When dilute hydrochloric acid (HCl) reacts with sodium bicarbonate (NaHCO_3), carbon dioxide (CO_2) gas is released.
27. **Soln.: (3)**
 Aluminum
 Aluminum cannot be used to store acid because it is a reactive metal. When most acids react with a metal like aluminum, they produce a salt and flammable hydrogen gas, which can cause the container to corrode, leak, or even explode
28. **Soln.: (2)**
 Pink
 Explanation: Phenolphthalein is a pH indicator that turns pink in basic solutions. It remains colorless in acidic solutions
29. **Soln.: (3)**
 White precipitate forms
 When silver nitrate solution reacts with sodium chloride solution, a white precipitate forms
 This reaction is a double displacement reaction where the silver ions (Ag^+) from silver nitrate (AgNO_3) exchange with the sodium ions (Na^+) from sodium chloride (NaCl) to form solid silver chloride (AgCl), which precipitates out as a white solid, and sodium nitrate (NaNO_3) remains in solution
30. **Soln.: (2)**
 $4\text{Fe} + 3\text{O}_2 \rightarrow 2\text{Fe}_2\text{O}_3$
 The oxidation state of iron changes from 0 in Fe to +3 in Fe_2O_3 . The oxidation state of oxygen changes from 0 in O_2 to -2 in Fe_2O_3

Biology

31. **Soln.: 2**
 Right side of the heart is filled with deoxygenated blood and atrium is the upper receiving chamber.
32. **Soln.: (2)**
 Large intestine has no role in digestion of food as it doesn't have any digestive enzymes. It only absorbs water and minerals.
33. **Soln.: (3)**
 Ethanol and carbon dioxide
34. **Soln.: (3)**
 Transport of food in plants through its phloem is called translocation.

35. **Soln. (3)**
Human heart is divided into four chambers through septum or wall to prevent mixing of oxygenated and deoxygenated blood. RA and LA separated by interatrial septum. Atria and ventricles are separated by AV septum.
36. **Soln.: (3)**
During inhalation, the ribs move outwards and the diaphragm becomes flat.
37. **Soln. (3)**
Process of selecting individuals with desired characters by man is called artificial selection or breeding.
38. **Soln.: (2)** catabolise the dead and decay
39. **Soln.: (1)**
Fathers sperm is either X or Y carrying whereas egg is always X carrying. So mothers X and fathers X carrying zygote (XX) will develop into a girl.
40. **Soln.: (2)**
Pollen grains, produced in the anthers of flowering plants, carry the male gametes required for fertilization. They transfer genetic material to the ovules in the ovary.
41. **Soln.: (2)**
Any change in the gene or chromosome of the gamete results in formation of new species over multiple generations.
42. **Soln.: (4)** (i) – B ; (ii) – C ; (iii) – A
43. **Soln.: (1)** Two individuals of a species
44. **Soln.: (2)**
Pacemaker – S A Node. Blood cancer – Leukemia. Osteoporosis – Brittle bones. Joint pain – arthritis. Platelets- blood clotting
45. **Soln.: (4)**
Lymph nodes destroy pathogens as they store lymphocytes (WBCs).
46. **Soln.: (2)**
Gametogenesis involves meiosis during which the number of chromosomes is reduced to half.
47. **Soln.: (2)**
Human cell has 22 pairs of autosomes and 1 pair of sex chromosome.
48. **Soln.: (2)**
Colour of skin, Colour of eyes and Texture of hair, all these characters are due to genes and hence inherited.
49. **Soln.: (4)**
A reflex arc is a simple, direct neural pathway that facilitates an immediate and automatic response to a stimulus, such as withdrawing a hand from a hot surface.
50. **Soln.: (1)**
Melatonin i.e sleep inducing hormone is secreted by pineal gland.