[PHYSICS]

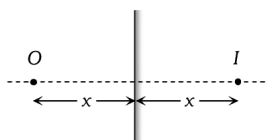1. (d) $\delta = (360 - 2\theta) = (360 - 2 \times 60) = 240°$

2. (b) When converging beam incident on plane mirror, real image is formed as shown
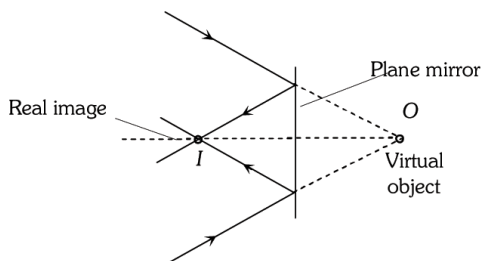
3. (c, d) By keeping the incident ray is fixed, if plane mirror rotates through an angle θ reflected ray rotates through an angle 2θ.
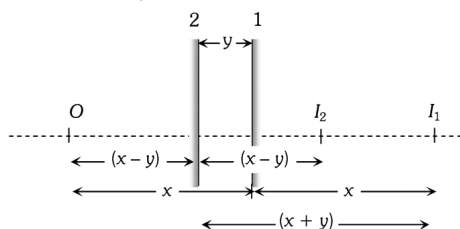

4. (c) Suppose at any instant, plane mirror lies at a distance x from object. Image will be formed behind the mirror at the same distance x.
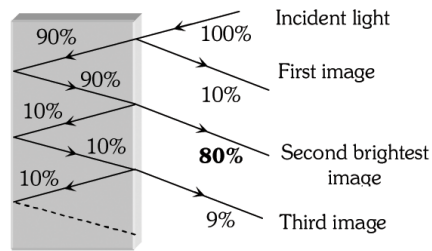

When the mirror shifts towards the object by distance 'y' the image shifts $= x + y - (x - y) = 2y$
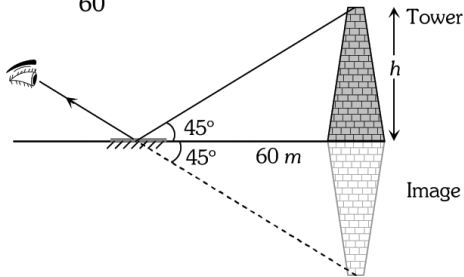
So speed of image $= 2 \times$ speed of mirror

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5. (b) Several images will be formed but second image will be brightest

90%
100% Incident light
90%
10% First image
10%
10%
80% Second brightest image
10%
9% Third image

6. (b) $\tan 45° = \dfrac{h}{60} \Rightarrow h = 60\,m$

Tower
h
45°
45° 60 m
Image

7. (b) In two images man will see himself using left hand.

8. (b) Size of image formed by a plane mirror is same as that of the object. Hence its magnification will be 1.

9. (c)

Incident ray
30° 30° Reflected ray
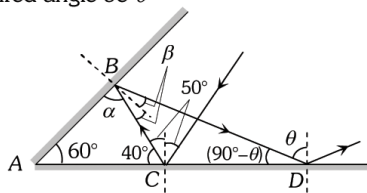60°
30° Surface
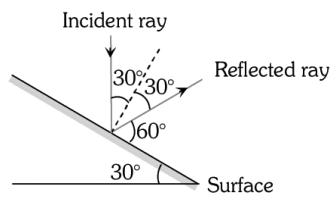
10. b

11. (c) $n = \left(\dfrac{360}{\theta} - 1\right) \Rightarrow n = \left(\dfrac{360}{72} - 1\right) = 4$

12. (c) $n = \left(\dfrac{360}{\theta} - 1\right) \Rightarrow 3 = \left(\dfrac{360}{\theta} - 1\right) \Rightarrow \theta = 90°$

13. (c) $n = \dfrac{360}{45} - 1 = 7$

14. (b) Diminished, erect image is formed by convex mirror.

15. (c) Let required angle be θ

From geometry of figure

In ΔABC; $\alpha = 180° - (60° + 40°) = 80°$

$\Rightarrow \beta = 90° - 80° = 10°$

In ΔABD; $\angle A = 60°$, $\angle B = (\alpha + 2\beta)$

$= (80 + 2 \times 10) = 100°$ and $\angle D = (90° - \theta)$

$\because \angle A + \angle B + \angle D = 180° \Rightarrow 60° + 100° + (90° - \theta)$

$= 180° \Rightarrow \theta = 70°$

[CHEMISTRY]

16.

17. Octahedral complex has 6 centres for coordination to the central metal ion. EDTA has 6 centres for coordination. Hence, only **one** molecule is required.

18.
19.
20.
21.

22. CO is a strong ligand. 6 electrons of $3d^5 4s^1$ form pairs and no unpaired electron is left.

23. Though NH_3 and CN^- both are strong ligands yet NH_3 cannot vacate two d-orbitals from

   Ni^{2+}: $[Ar] 3d^8$ | ↑↓ | ↑↓ | ↑↓ | ↑ | ↑ |. Here hybridisation is sp^3d^2.

24. $[Ni(CN)_4]^{4-}$: $x - 4 = -4 \Rightarrow x = 0$

25. In $[MnCl_4]^{2-}$, Mn^{2+}: $[Ar] 3d^5$ has 5 unpaired electrons.

   In $[CoCl_4]^{2-}$, Co^{2+}: $[Ar] 3d^7$ has 3 unpaired electrons.

   In both Cl^- is a weak ligand.

   In $[Fe(CN)_6]^{4-}$, CN^- is a strong ligand. Fe^{2+}: $[Ar] 3d^6$ will have no unpaired electron.

26. Mn^{2+}, $3d^5$ will have **five** unpaired electrons because H_2O is a weak ligand.

27. $[Cr(NH_3)_6]Cl_3$ gives four ions in water.

28.

29. $2Cl^-$ of ionic sphere out of total $3Cl^-$ *i.e.*, **2/3rd** will be precipitated as AgCl.

30. (i) $[Cu^{II}(NH_3)_4]^{2+}[Pt^{II}Cl_4]^{2-}$

   (ii) $[Cu^{II}Cl(NH_3)_3]^{1+}$ $[Pt^{II}Cl_3(NH_3)]^{1-}$

   (iii) $[Cu^{II}Cl_2(NH_3)_2]^0$ $[Pt^{II}Cl_2(NH_3)_2]^0$ not possible

   (iv) $[Pt^{II}Cl(NH_3)_3]^{1+}$ $[Cu^{II}Cl_3(NH_3)]^{1-}$

   (v) $[Pt^{II}(NH_3)_4]^{2+}[Cu^{II}Cl_4]^{2-}$