

PROJECTIONS OF STRAIGHT LINES

9

9-1 INTRODUCTION

A straight line is defined as the locus of a point which moves linearly. A straight line is the shortest distance between two points. The projections of straight lines are drawn by joining the respective projections of its end points. We have used the word 'line' for straight lines for the sake of simplicity. The actual length of the line is known as true length and is denoted by TL.

9-2 ORIENTATIONS OF STRAIGHT LINES

The possible orientations of straight lines with respect to the principal planes are as following.

1. Line parallel to both HP and VP.
2. Line perpendicular to HP (and parallel to VP).
3. Line perpendicular to VP (and parallel to HP).
4. Line inclined to HP and parallel to VP.
5. Line inclined to VP and parallel to HP.
6. Line situated in HP.
7. Line situated in VP.
8. Line situated in both HP and VP (i.e. on the reference line).
9. Line inclined to both the reference planes.
 - a. Line inclined to both HP and VP such that $\theta + \phi \neq 90^\circ$.
 - b. Line inclined to both HP and VP such that $\theta + \phi = 90^\circ$.

Let us first consider the projections of straight lines situated in the first quadrant, is inclined to one of the reference planes. Projections of a straight line lying in the first quadrant will have its front view above the xy line (reference line) and the top view below xy line. Concept of projections of points and orthographic projections is required to understand the projections of straight lines.

MULTIPLE CHOICE QUESTIONS

Choose the most appropriate answer out of the given alternatives:

- i) If a line is parallel to both HP and VP, its true length will be seen in
(a) Front View (b) Top View (c) Side view (d) Both front and top views

- ii) If the apparent and the true inclinations of a line with HP are equal, the line is
 (a) Parallel to horizontal plane (b) Parallel to vertical plane
 (c) Parallel to profile plane (d) Inclined to both reference planes
- iii) The point at which the line intersects the VP, extended if necessary, is known as
 (a) Profile trace (b) Horizontal trace (c) Vertical trace (d) Auxiliary trace
- iv) If the front view of a line is parallel to the xy line its true length is shown in
 (a) Front View (b) Top View (c) Side view (d) Both front and top views
- v) If top view of a line is a point, its front view is
 (a) Parallel to xy line and of true length
 (b) Parallel to xy line and of apparent length
 (c) Perpendicular to xy line and of true length
 (d) Perpendicular to xy line and of apparent length
- vi) Horizontal trace of a line exists when the line is
 (a) Parallel to horizontal plane (b) Inclined to horizontal plane
 (c) Perpendicular to vertical plane (d) Perpendicular to profile plane
- vii) If a line is inclined at 45° to the HP and 30° to the VP, its front view is inclined at
 (a) 30° to xy (b) 45° to xy (c) Between 30° and 45° (d) Greater than 45°
- viii) If a line is inclined at 30° to the HP and 60° to the VP, its front and top views are inclined at an angle of
 (a) 30° and 60° to xy respectively (b) 60° and 30° to xy respectively
 (c) Both at 90° to xy (d) Both greater than 30° but less than 90°
- ix) For a line situated in the first angle which of the following is **not** correct
 (a) HT and VT may lie below xy (b) HT lies below xy and VT lies above xy
 (c) HT and VT may lie above xy (d) HT lies above xy and VT lies below xy
- x) A 90 mm long line PQ, inclined at 30° to the HP and 45° to the VP has end P 15 mm above HP and 25 mm in front of VP. The other end Q will lie in
 (a) First angle (b) Third angle (c) Second or fourth angle (d) Any of these
- xi) If the front and top views of a line are inclined at 30° and 45° to the reference line, the true inclination of the line with HP will be
 (a) 30° (b) 45° (c) Less than 30° (d) Greater than 45°
- xii) If both the front and top views of a line are perpendicular to the reference line, the true inclination of the line with HP and VP may be respectively
 (a) 15° and 75° (b) 30° and 60° (c) Both 45° (d) Any of these

Answer: (i) d (ii) b (iii) c (iv) b (v) c (vi) b (vii) d (viii) c (ix) d (x) d (xi) c (xii) d