



Attempt questions first; check the separate key afterward. Show steps and draw labelled diagrams where asked.

A. Very short answers - 1 mark each

1. Define angle of elevation.
2. Define angle of depression.
3. Draw a horizontal line of sight.
4. Is an angle of depression measured from the vertical?
5. A pole height equals its shadow length. Find sun elevation.
6. A 10 m ladder is at 30° to ground. Find height reached.
7. A tree casts 10 m shadow at 45° elevation. Find height.
8. Which ratio relates opposite height and horizontal distance?

B. Short answers / practice - 2 marks each

9. A tower observed from 20 m away has elevation 30° . Find height.
10. A pole is 15 m tall. Find shadow at 60° elevation.
11. A ladder reaches 12 m height at 60° to ground. Find its length.
12. A kite string is 40 m at 30° to horizontal. Find height above its attachment point.
13. From a 30 m tower, a car has depression 45° . Find horizontal distance.
14. A person 1.5 m tall sees a tower top at 45° from 20 m away. Find tower height.
15. A tower has $20\sqrt{3}$ m shadow at 30° elevation. Find height.
16. At 60° elevation, a tree height is 18 m. Find viewing distance.
17. A ramp rises 2 m at 30° . Find ramp length.
18. A balloon is 60 m high and observed at 30° . Find horizontal distance.
19. Explain why observer eye height must sometimes be added.
20. A 10 m ladder makes 60° with ground. Find base distance from wall.

C. Application / reasoning - 3 marks each

21. A tower is viewed at 30° , then 60° after moving 20 m towards it. Find height.

22. Two points on the same side of a tower are 30 m apart, with elevations 45° and 30° at nearer/farther points. Find height.

23. From a 24 m building, another building's foot has depression 45° and top elevation 30° . Find second height.

24. A tree breaks and its top touches ground 8 m from base at 30° to ground. Find original height.

25. Two poles 6 m and 14 m high are 8 m apart. Find elevation of taller top from shorter top.

26. Explain why angle of elevation equals corresponding angle of depression.

27. A tower casts a 25 m shadow at 45° solar elevation. Find its height.

28. An observer 30 m from a tower sees its top at 60° . Ignoring eye height, find tower height.

29. A 12 m ladder makes 60° with the ground. Find vertical reach and horizontal distance.

30. A tower is viewed at 45° , then at 60° after moving 10 m nearer. Find its height.

31. From a 40 m cliff, two boats in the same direction have depressions 45° and 30° . Find their separation.

D. Extended practice - 5 marks each

32. A tower is between two points 40 m apart. Its elevations at these points are 30° and 60° . Find height and distances.

33. From the top of a 50 m lighthouse, boats on opposite sides have depression 30° and 45° . Find their separation.

34. A plane at constant height sees a landmark at depressions 30° then 60° after travelling 200 m towards it. Find height.

35. A statue on a 20 m pedestal has bottom/top elevations 45° and 60° . Find statue height.

ANSWER KEY - Numerical / closed questions

- 4) No, from horizontal. 5) 45° . 6) 5 m. 7) 10 m.
8) Tangent. 9) $20/\sqrt{3}$ m. 10) $5\sqrt{3}$ m. 11) $8\sqrt{3}$ m.
12) 20 m. 13) 30 m. 14) 21.5 m. 15) 20 m. 16) $6\sqrt{3}$ m. 17) 4 m. 18) $60\sqrt{3}$ m. 20) 5 m. 21) $10\sqrt{3}$ m. 22) $15(\sqrt{3}+1)$ m. 23) $24+8\sqrt{3}$ m. 24) $8\sqrt{3}$ m. 25) 45° . 27) 25 m. 28) $30\sqrt{3}$ m. 29) $6\sqrt{3}$ m; 6 m. 30) $5(3+\sqrt{3})$ m. 31) $40(\sqrt{3}-1)$ m. 32) $10\sqrt{3}$ m; 30 m and 10 m. 33) $50(\sqrt{3}+1)$ m. 34) $100\sqrt{3}$ m. 35) $20(\sqrt{3}-1)$ m.