ILLAWARRA TUTORING

In this worksheet you will apply your trigonometric skills to solve practical problems. You will use tangent and sine and cosine ratios in right-angled triangles to find unknown heights, distances and angles. Solve each question carefully and show your working.

Easy Questions

1. Calculate the height of a tree that casts a shadow of 4 m when the angle of elevation of the sun is 45°. Express your answer in metres.

2. A ramp makes an angle of 20° with the horizontal. If the length along the base is 3 m, determine the vertical height of the ramp.

3. A flagpole casts a shadow of 10 m when the angle of elevation of the sun is 60°. Find the height of the flagpole.

4. An observer standing 50 m from a building sees the top at an angle of elevation of 35°. Determine the height of the building, assuming the observer's eye level is at ground level.

5. A person stands 15 m from a tower and measures the angle of elevation to its top as 17°. Calculate the height of the tower.

Intermediate Questions

6. A person observes the top of a building from two positions along a straight path. From the first position the angle of elevation is 14°. After walking 40 m towards the building the angle of elevation is 20°. Determine the height of the building and the distance from the second (closer) position to the building.

7. A driver, standing 25 m from a billboard, measures the angle of elevation to the top of the billboard as 22°. Calculate the height of the billboard.

8. An observer on level ground is 30 m from a tower. If the angle of elevation from the observer to the top of the tower is 38°, find the height of the tower.

9. From a point on level ground, the angle of elevation to the top of a tree is 25°. After approaching the tree by 8 m, the angle of elevation increases to 40°. Determine the height of the tree and the distance from the closer point to its base.

10. A person on the ground, 50 m from a balloon rising vertically, measures the angle of elevation to the balloon as 30°. Calculate the height of the balloon at that moment.

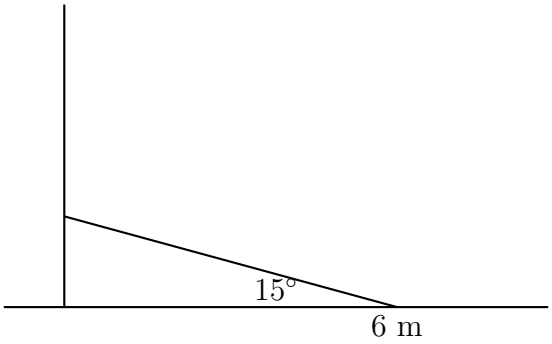
11. A child is flying a kite while standing 20 m from a point directly below the kite. If the angle of elevation to the kite is 45°, what is the height of the kite above the ground?

12. A surveyor stands 12 m from a wall and measures the angle of elevation to the top as 50°. Determine the height of the wall.

13. From the top of a tower, the angle of depression to a car on level ground is 65°. If the tower is 30 m tall, how far is the car from the base of the tower?

14. A person stands on a river bank and sights the top of a bridge with an angle of elevation of 28°. If the person is 40 m from the point on the bank directly beneath the bridge, compute the height of the bridge.

15. Using the diagram below, determine the height at which a ramp meets a wall. A ramp makes an angle of 15° with the horizontal, and its base is 6 m from the wall.



16. A boat is 80 m from a vertical cliff. The angle of elevation from the boat to the top of the cliff is 25°. Determine the height of the cliff.

17. When the sun is low in the sky, a building casts a shadow of 18 m. If the angle of elevation of the sun is 30°, find the height of the building.

18. From a point on level ground the angle of elevation to the top of a tree is 32°. After walking 5 m closer to the tree, the angle becomes 41°. Calculate the height of the tree and the distance from the second point to the base of the tree.

19. On a construction site, an observer stands 22 m from a building. The top of the building is observed at an angle of elevation of 48°. Find the height of the building.

20. A flag is situated on top of a pole. Observed from 10 m away at ground level, the angle of elevation to the top of the flag is 55°. Determine the total height of the pole.

Hard Questions

21. Two observers at different positions measure the angle of elevation to the top of a tower. From point A the angle is 31° and from point B, which is 20 m closer to the tower than A, the angle is 37°. Establish the height of the tower and the distance from point B to its base.

22. An observer at ground level stands 30 m from a building. The angle of elevation to the top of the building is 40°. If the observer's eyes are 1.5 m above ground level, compute the actual height of the building.

23. A person standing on a platform 2 m above the ground calculates the angle of elevation to the top of a nearby monument as 50°. If the horizontal distance from the platform to the monument is 25 m, determine the height of the monument.

24. A boat at sea observes the top of a coastal cliff. At one position the angle of elevation is 22°. After moving 30 m closer, the angle increases to 28°. Determine the height of the cliff and the distance from the closer position to the cliff.

25. A surveyor wishes to determine the height of a chimney. From a point on level ground, 50 m from the base of the building, the angle of elevation to the top of the chimney is 33°. However, the top of the chimney is obscured by a parapet of height 6 m midway along. Given that the angle of elevation to the top of the parapet is 20°, estimate the height of the chimney.

26. From a boat on level water, the angle of elevation to the top of a cliff is measured as 24°. After sailing 40 m directly towards the cliff, the angle becomes 30°. Determine both the height of the cliff and the initial distance from the boat to the cliff.

27. A hiker on level ground first measures the angle of elevation to the peak of a mountain as 18°. After hiking 100 m towards the mountain, the angle increases to 25°. Calculate the height of the mountain above the hiker's initial position, assuming a right-angled scenario.

28. A builder is installing a spire on top of a flat roof. From a point 12 m from the building, the angle of elevation to the top of the spire is 42°. If the roof is 10 m high, determine the height of the spire.

29. An engineer measures the angle of elevation to the top of a water tower from a point on level ground to be 15°. After walking 60 m towards the tower, the angle becomes 20°. Determine the height of the water tower and the distance from the second position to its base.

30. A park contains a monument whose height is to be determined. From point P on level ground, 70 m from the monument's base, the angle of elevation to its top is 38°. From a second point Q, which is 30 m nearer to the monument than P, the angle of elevation is 47°. Calculate the height of the monument.