ILLAWARRA TUTORING

In this worksheet you will apply your trigonometric skills to solve practical real-world problems. You will use trigonometric ratios in right-angled triangles to determine unknown sides and angles in various scenarios.

Easy Questions

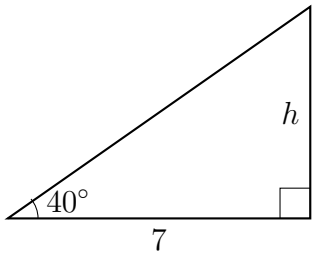
1. In a right-angled triangle, if one acute angle is 30° and the hypotenuse is 10, use the sine function to find the length of the side opposite the 30° angle.

2. In a right-angled triangle, if one acute angle is 60° and the hypotenuse is 8, determine the length of the adjacent side to the 60° angle using the cosine function.

3. A right-angled triangle has an angle of 45°. If the side opposite this angle is 5, compute the length of the adjacent side using the tangent ratio.

4. A person stands 12 metres from a wall. If the angle of elevation from the ground to a point on the wall is 30°, use the tangent function to find the height of that point on the wall.

5. Refer to the diagram below. In a right-angled triangle, the angle at the base is 40° and the adjacent side is 7 metres. Calculate the height of the triangle using the tangent function.



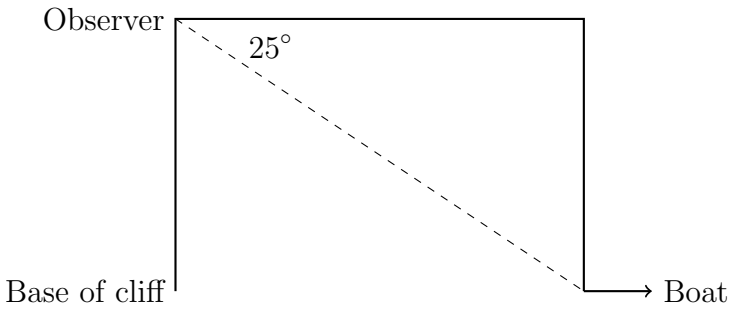
Intermediate Questions

6. A ladder of length 10 metres leans against a vertical wall making an angle of 65° with the ground. Calculate the distance from the base of the ladder to the wall.

7. A flagpole casts a shadow of length 30 metres when the angle of elevation of the sun is 45°. Find the height of the flagpole.

8. An observer stands 100 metres from a building and measures the angle of elevation to the top as 40°. Determine the height of the building above the observer's eye level.

9. An observer at the top of a cliff observes a boat on the sea with an angle of depression of 25°. If the height of the cliff is 50 metres, calculate the horizontal distance from the base of the cliff to the boat.



10. An observer on level ground sees a balloon flight at an angle of elevation of 30°. If the horizontal distance from the observer to the point directly below the balloon is 50 metres, find the height of the balloon.

11. A ladder of length 12 metres leans against a wall making an angle of 70° with the ground. Find the height at which the ladder touches the wall.

12. From a point on level ground, the angle of elevation to the top of a tree is 35°. If the observer is 20 metres away from the base of the tree, calculate the height of the tree.

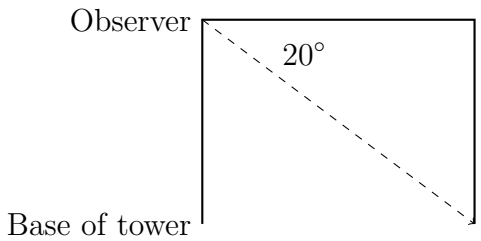
13. A ramp is built with an inclination angle of 15°. If the length of the ramp is 8 metres, determine the vertical rise (height) of the ramp.

14. An observer measures the angle of elevation to the top of a tower as 50°. If the tower is known to be 20 metres tall, compute the horizontal distance from the observer to the tower.

15. In a right-angled triangle, the adjacent side to an acute angle is 9 metres and the hypotenuse is 15 metres. Calculate the measure of the acute angle using the cosine function.

16. A building is 25 metres tall. If the angle of elevation of the sun is 60°, find the length of the shadow cast by the building.

17. A person on top of a 30 metre tower observes a car on level ground at an angle of depression of 20°. Determine the horizontal distance from the base of the tower to the car.



18. An observer stands 18 metres away from a pole. If the angle of elevation to the top of the pole is 55°, calculate the height of the pole.

19. A surveyor measures the angle of elevation to the top of a mural on a wall as 42° from a point 15 metres away. Find the height of the mural.

20. From a certain point, an observer notes the angle of elevation to the top of a monument as 38°. If the observer is 22 metres from the monument, determine the height of the monument.

Hard Questions

21. From a point on level ground, the angles of elevation to the tops of two trees are 30° and 45° respectively. If the trees are 15 metres apart and lie in the same vertical plane, determine the difference in their heights.

22. A 13-metre ladder initially leans against a wall at an angle of 60°. If the foot of the ladder is then pulled outwards by 2 metres, determine the new height at which the ladder touches the wall. (Assume the ladder remains straight.)

23. Two observers at different points along a horizontal line measure the angle of elevation to the peak of a mountain as 25° and 30°. If the distance between the observers is 50 metres and the observer with the larger angle is closer to the mountain, estimate the height of the mountain above their eye level.

24. An aircraft flying at a constant altitude observes two points on the ground in the same direction at angles of depression of 15° and 10° respectively. If the horizontal distance between these two points is 500 metres, determine the altitude of the aircraft.

25. From a point on level ground, the angle of elevation to the top of a building is 35°. From the same point, the angle of elevation to the top of a flagpole mounted on the building is 42°. If the building's base is at the point of observation level, determine the height of the flagpole given that the horizontal distance to the building is 40 metres.

26. An observer measures the angle of elevation to the top of a tower as 50° from point A and 35° from point B. If point A is 20 metres closer to the tower than point B, determine the height of the tower.

27. From the top of a 60-metre cliff, an observer notes the angles of depression to two boats are 18° and 30° respectively. Calculate the distance between the two boats.

28. A ramp is needed to access a platform that is 1.5 metres high and 4 metres horizontally from the platform's edge. Determine both the length of the ramp and the angle of inclination.

29. A hot-air balloon is tethered to a point on the ground. The rope makes an angle of 20° with the vertical, and the point of tethering is 30 metres from the point on the ground directly beneath the balloon. Find the length of the rope if the balloon is 40 metres above the ground.

30. Two adjacent buildings have different heights. From a point on the ground, the angle of elevation to the top of the first building is 28° and to the top of the second building is 36°. If the second building is 10 metres closer to the point of observation than the first and the horizontal distance to the first building is 70 metres, determine the difference in heights between the two buildings.