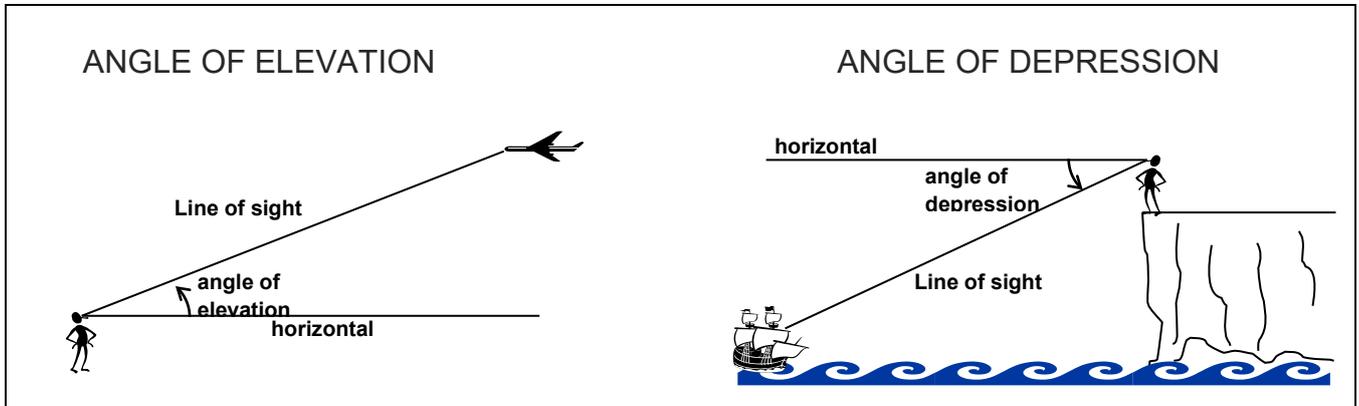


TRIGONOMETRY

APPLICATIONS

ANGLES OF ELEVATION AND DEPRESSION



Q1. The angle of elevation from a yacht to the top of a cliff is 18° . If the yacht is 1.7km from the base of the cliff, find how high the cliff is.

Q2. The pilot of a rescue helicopter spots a swimmer in distress at an angle of depression of 12° . If the helicopter is at an altitude of 200m, how far away (horizontally) is the swimmer?

Q3. The shadow of a building is 30m long when the angle of elevation of the sun is 56° . Calculate the:

(a) height of the building

(b) length of shadow when the sun is at an angle of 32° .

Q4. Bert likes to watch yachts from the top of a 40m vertical cliff. He spots his favourite craft at an angle of depression of 11° . How far away from the base of the cliff is the yacht?

Q5. A surveyor measures the angle and the sloped distance from the bottom to the top of a hill as 39° and 250m respectively. How high is the hill?

Q6. A flag pole is held vertically by 2 wires, both 18m long. Each wire makes an angle of 62° with the horizontal. How high is the flag pole?

Q7. A ladder rests against a wall. The base is 3m from the wall. The top makes an angle of 38° with the wall. How long is the ladder?

Q8. An observer in a lighthouse 55m high sights a ship at sea at an angle of depression of 18° . If the foot of the lighthouse is at sea level, how far is the ship from the base of the lighthouse?

Q9. A park has 2 flagpoles 20m apart. One pole is 12m high and the other is 27m high. Calculate the angle of depression from the top of the taller pole to the top of the shorter pole.

Q10. An airline pilot flying in an aircraft at an altitude of 800 metres searches for a location to make an emergency landing. He spots a runway at an angle of depression of 53° . In a direct line of flight, how far away is the runway?

Q11. A snail crawls 7 cm up a smooth slope which makes an angle of 58° with the horizontal. What is the vertical height?

Q12. A balloon is attached to a string 15 metres long. The balloon is 8 m above the ground. If the string is straight, what angle does the string make with the ground?

Q13. A seesaw is 4.5 m long. When one end is on the ground, the tip of the other end is 1.3 m above the ground. Find the angle the seesaw makes with the ground.

Q14. A ship is 450 m out to sea from a lighthouse. If the angle of elevation to the top of the lighthouse is 12° , how high is the lighthouse?

Q15. An observer in a spotter airplane at an altitude of 400m spots a wreck in the ocean at an angle of depression of 42° . How far is the wreck from the point directly below the plane?

Q16. If a road has a gradient of 1 in 10 (i.e. it rises one metre vertically for each 10 metres travelled horizontally), what angle will the road make to the horizontal?

Q17. Calculate the angle of elevation of the sun if a flagpole 5 metres high casts a shadow 15 metres long.

Q18. From the top of a cliff 45m high the angle of depression to a yacht at sea is 15° . How far is the boat from the foot of the cliff?

Q19. A building casts a shadow 50 metres long. If the angle of elevation to the top of the building is 35° , how tall is the building?



Q20. A goal post is 10 metres high. It casts a shadow 30 metres long. What is the angle of elevation of the sun?

Q21. A girl on the top of a cliff looks down at an angle of depression of 35° and sees a boat out to sea. If the boat is 400 metres from the foot of the cliff, how high is the cliff?

Q22. A plane is 1 km above a ranch. If the angle of depression to the landing strip is 28° , what is the direct flying distance to the airstrip?

Q23. Bob hikes 8 km due South, then 5 km due West. What is the compass bearing back to her starting point?

Q24. A scout walks $N37^\circ E$ from his camp for a distance of 350 m. How far is he:
 (a) east of his camp?
 (b) north of his camp?

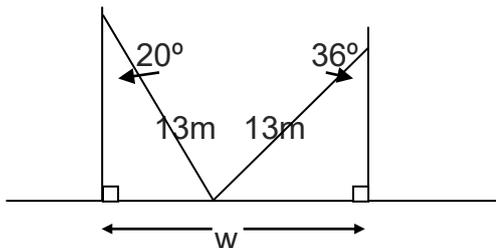
Q25. A ship leaves a port and sails due west for a while. It then sails south for 96km. If the distance from the ship straight back to the port is 120km, what is the compass bearing of the port from the ship?

Q26. The base angles of an isosceles triangle are 41° . If the equal sides are 9.5 cm long, find the length of the base.

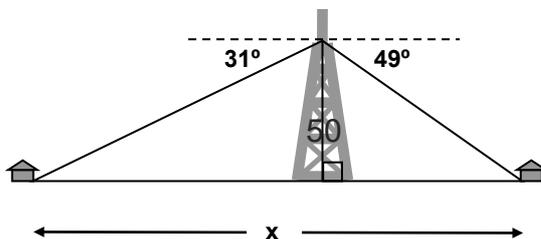
Q27. The base of an isosceles triangle is 18cm long and the perpendicular height is 76mm. Find the size of the base angles.

Q28. A ship has two masts 15 m apart. One mast is 6.4 m high while the other one is 13.9m. Find the angle of elevation from the top of the short mast to the top of the tall mast.

Q29. The top of an extension ladder, 13m long, rests against a building on one side of a street, making an angle of 20° with the vertical wall of the building. The top of the ladder is swung across to the building on the other side of the street, and the ladder makes an angle of 36° with the vertical wall of the building. The foot of the ladder is not moved. Find the width of the street.



Q30. An observer at the top of a 50m tower notes that the angle of depression of a house lying due east is 49° and the angle of depression of a house lying due west is 31° . Find the distance between the houses.



ANSWERS

Q1. 0.55 km

Q2. 940.93 m

Q3. (a) 44.48 m
(b) 71.18 m

Q4. 205.78 m

Q5. 157.33 m

Q6. 15.89 m

Q7. 4.87 m

Q8. 169.27 m

Q9. 36.87°

Q10. 1001.71 m

Q11. 5.94 cm

Q12. 32.23°

Q13. 16.79°

Q14. 95.65 m

Q15. 444.25 m

Q16. 5.71°

Q17. 18.43°

Q18. 167.94 m

Q19. 35.01 m

Q20. 18.43°

Q21. 28.01 m

Q22. 2.13 km

Q23. 058

Q24. (a) 210.64 m

(b) 279.52 m

Q25. 36.87°

Q26. 14.34 cm

Q27. 40.18°

Q28. 26.57°

Q29. 12.09 m

Q30. 126.68 m