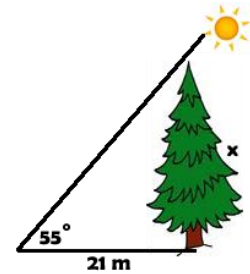
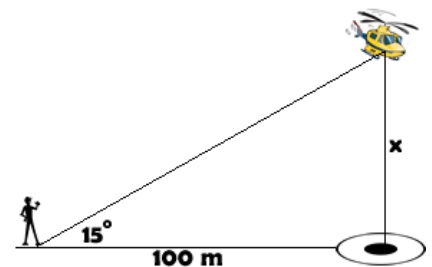


1. Solve the following problems. (All answers to 2 decimals places, unless otherwise instructed.)

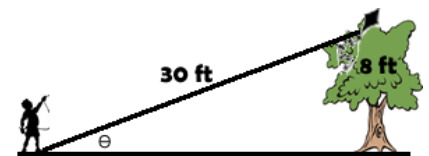
a) A tree casts a shadow 21 m long. The angle of elevation of the sun is  $55^\circ$ . What is the height of the tree?



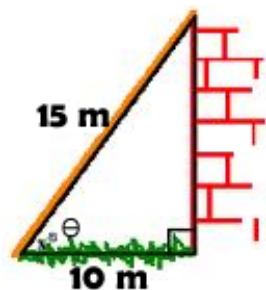
b) A helicopter is hovering over a landing pad 100 m from where you are standing. The helicopter's angle of elevation with the ground is  $15^\circ$ . What is the altitude of the helicopter?



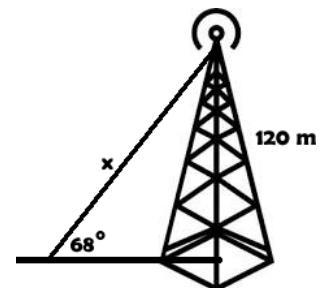
c) You are flying a kite and have let out 30 ft of string but it got caught in a 8 ft tree. What is the angle of elevation to the location of the kite?



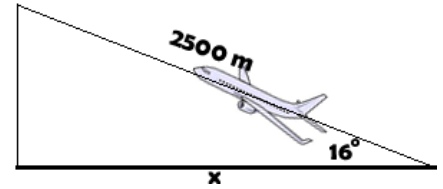
d) A 15 m pole is leaning against a wall. The foot of the pole is 10 m from the wall. Find the angle that the pole makes with the ground.



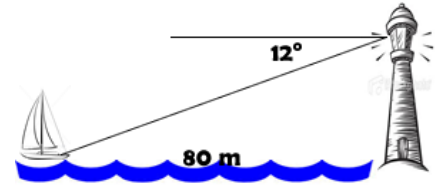
e) A guy wire reaches from the top of a 120 m television transmitter tower to the ground. The wire makes a  $68^\circ$  angle with the ground. Find the length of the guy wire.



f) An airplane climbs at an angle of  $16^\circ$  with the ground. Find the ground distance the plane travels as it moves 2500 m through the air.



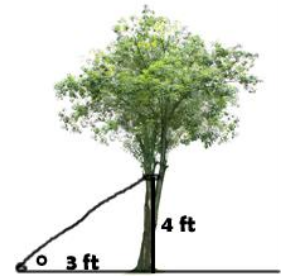
g) A lighthouse operator sights a sailboat at an angle of depression of  $12^\circ$ . If the sailboat is 80 m away, how tall is the lighthouse?



Solve the following problems.

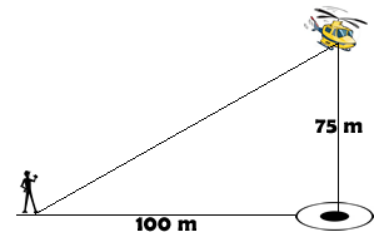
2. a) How long is the guy wire?

b) What is the angle formed between the guy wire and the ground?



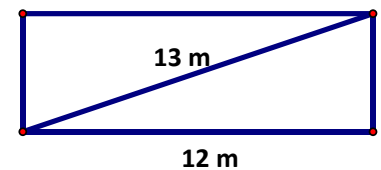
3.a) What is the length of the line of sight from the man to the helicopter?

b) What is the angle of elevation from the man to the helicopter?

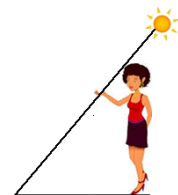


4.a) A rectangle has a length of 12 cm and a diagonal of 13 cm. What is the width?

b) What is the angle formed between the diagonal and the width?



5.a) A 5 ft 11 inch women casts 3 ft shadow. What is the angle that the sun's rays make with the ground?

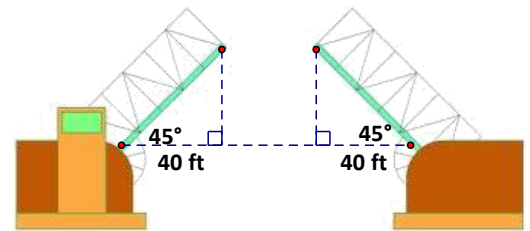


6. a) A ramp is 17 m long, if the horizontal distance of the ramp is 15 m. What is the vertical distance?

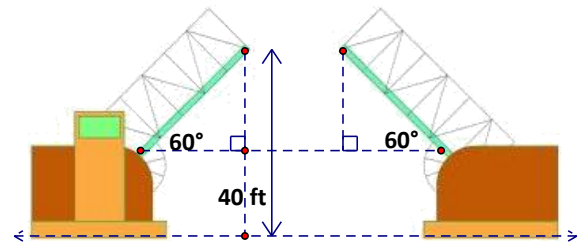
b) What is the angle of elevation of the ramp?



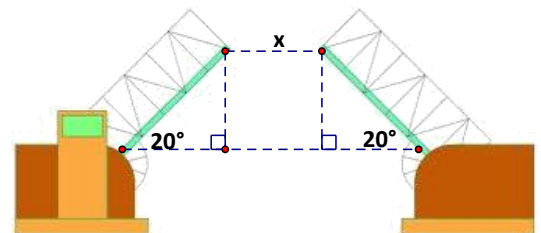
7. a) Using the drawbridge diagram, determine the distance from one side to the other. (exact answer)



b) Now that you know the distance from side to side, determine how high the drawbridge would be if the angle of elevation was  $60^\circ$ . (exact answer)

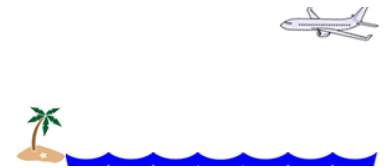


c) How far apart would the drawbridge be if the angle of elevation of the drawbridge was  $20^\circ$ ?



8. Sharon is flying a kite on a string 130 m long. Determine the height of the kite if the string is at an angle of  $37^\circ$  to the ground.

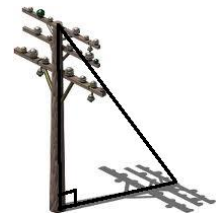
9. An airplane is flying at an altitude of 6000 m over the ocean directly toward an island. When the angle of depression of the coastline from the airplane is  $14^\circ$ , how much farther does the airplane have to fly before it crosses the coast?



10. A loading ramp is 25 m long with a height of 10 m. What is the horizontal distance of the ramp and what is the angle of incline that the ramp forms with the ground?



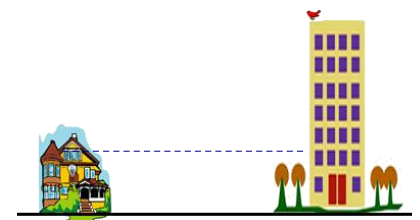
11. A telephone pole casts a shadow 18 m long when the sun's rays strike the ground at an angle of  $70^\circ$ . How tall is the pole?



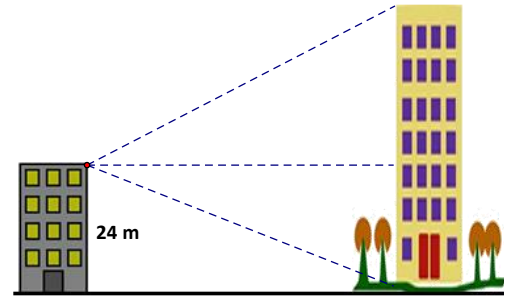
12. How long must a brace to a Satellite Dish be if it is attached to the antenna 3 ft above the ground and forms an angle of  $68^\circ$  with the antenna?



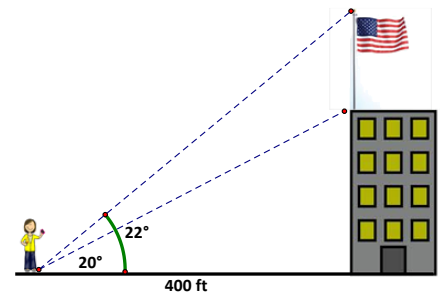
13. Mike Patterson looks out the attic window of his home, which is 22 ft above the ground. At an angle of elevation of  $35^\circ$  he sees a bird sitting at the very top of the large high rise apartment building down the street. How tall is the high rise apartment building, if the two buildings are 75 ft apart?



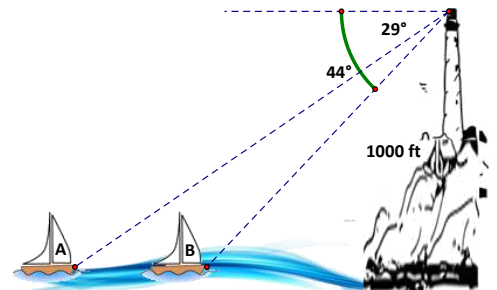
14. From an apartment window 24 m above the ground, the angle of depression to the base of a nearby building is  $38^\circ$  and the angle of elevation to the top is  $63^\circ$ . Find the height of the nearby building (to the nearest meter).



15. A flagpole is at the top of a building. 400 ft from the base of the building, the angle of elevation of the top of the pole is  $22^\circ$  and the angle of elevation of the bottom of the pole is  $20^\circ$ . Determine the length of the flagpole (to the nearest foot).



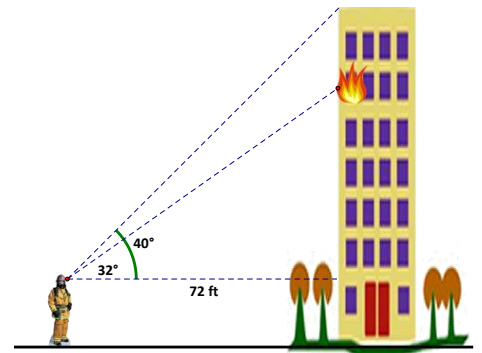
16. From a lighthouse 1000 ft above sea level, the angle of depression to a boat (A) is  $29^\circ$ . A little bit later the boat has moved closer to the shore (B) and the angle of depression measures  $44^\circ$ . How far (to the nearest foot) has the boat moved in that time?



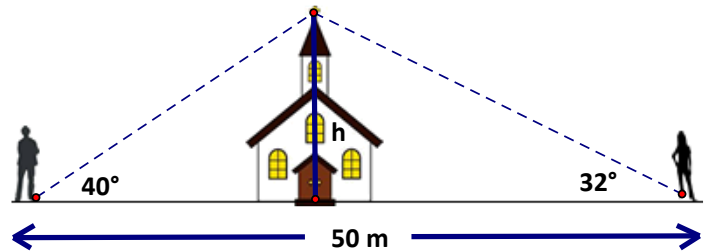
17. Two trees are 100 m apart. From the exact middle between them, the angles of elevation of their tops are  $12^\circ$  and  $16^\circ$ . How much taller is one tree than the other (2 decimal places)?



18. A firefighter on the ground sees the fire break through a window. The angle of elevation to the windowsill is  $32^\circ$ . The angle of elevation to the top of the building is  $40^\circ$ . If the firefighter is 72 ft from the building, what is the distance from the roof to the window sill?



19. Jack and Jill are on either side of the church and 50 m apart. Jack sees the top of the steeple at  $40^\circ$  and Jill sees the top of the steeple at  $32^\circ$ . How high is the steeple?



20. Jack and Jill are 20 m apart. Jack sees the top of the building at  $30^\circ$  and Jill sees the top of the building at  $40^\circ$ . What is the height of building?

