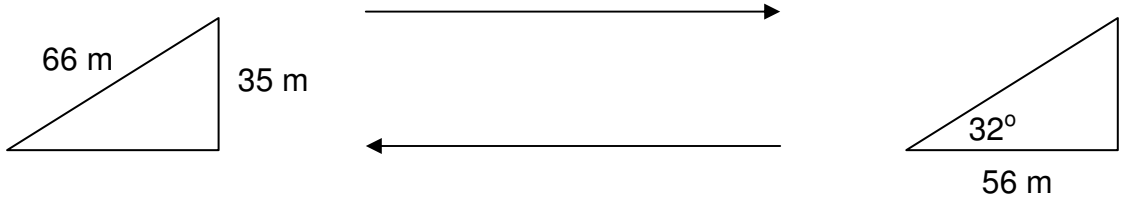
Applications of Right Angle Triangles – Day 2

In some applications of right angle trigonometry, we know one property of the hypotenuse (its length or angle) and one of the perpendicular lengths.

(if we know the hypotenuse then it is easy to apply the sine or cosine ratio)



(if we do not know the hypotenuse then it is easy to apply the tangent ratio)

Example – A 24 m long guy wire is being attached to a radio communication tower at a point that is 19 m above the ground. Determine the angle that the guy wire will make with the ground when it is anchored as far as possible from the tower.

We can solve for the length of a hypotenuse in one step (reciprocal equation) or two steps (the tangent ratio and Pythagorean theorem).

Example – Determine the length of a guy wire that is anchored 6.8 m from the base of a radio communication tower, with an angle of elevation of 57^{o}.

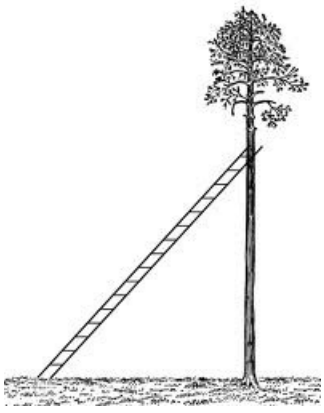
An angle of depression is measured below a horizontal line.

Example – The observation deck of a lighthouse is 31 m above sea level. A boat is located on the ocean at an angle of depression of 12^{o} from the observation deck. How far is the boat, horizontally, from the lighthouse?

Homework – Please solve the following problems and answer questions
1, 2a, 3, 11, 14, 20 and 21 on page 380.

1. A 35 m long guy wire is connected to the west side of a radio communication tower at a point that is 31 m above the ground. A 26 m long guy wire is anchored to the ground on the east side of the tower at a point that is 19 m away from the base of the tower. Determine the angle that each wire makes with the ground.

2. When a ladder is rested against a tree, the foot of the ladder is 11 ft from the base of the tree and forms an angle of 62° with the ground. How far up the tree does the ladder reach?



3. Determine the length of a guy wire that is anchored 8.4 m from the base of a radio communication tower, with an angle of elevation of 52^{o}.

4. A chairlift transports skiers along an 18^{o} slope from the base of a ski hill (elevation 3400 ft) to the summit (elevation 6100 ft). Determine the length of the chairlift along the slope. Include a diagram to illustrate this scenario.

Answers:

1. The first wire makes an angle of 62^{o} and the second wire makes an angle of 43^{o}.

2. The ladder reaches 20.7 ft up the tree.

3. The wire is 13.6 m long.

4. The length of the chairlift is 8737 ft.