

UNIT 11

TRIGONOMETRY

11.1 Introduction

Trigonometry is the mathematical study of triangles. Trigonometry is used to determine three-phase voltage systems, size power factor correction capacitors, and determine alternating-current wire impedance. In this unit you will learn:

- ▶ what right triangles are
- ▶ what the Pythagorean Theorem is
- ▶ what signs, cosines, and tangents are

11.5 Practical Use of Trigonometry

Trigonometry can be used to find the height of a structure with just a carpenter's speed square and a calculator.

Speed Square Method of Measuring Height

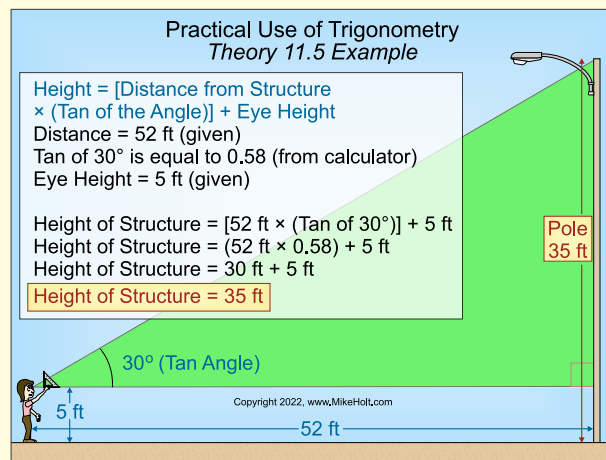
- Step 1:** Walk away from the structure until you can see the top without titling your head up.
- Step 2:** Hold a speed square at eye level in your line of sight with the bottom of the speed square level with the ground.
- Step 3:** Note the angle mark on the speed square that lines up with the top of the structure.
- Step 4:** Measure (in feet) the distance you are standing away from the structure.
- Step 5:** Find the approximate height of the structure using the formula:

$$\text{Height} = [\text{Distance from Structure} \times (\text{Tan of the Angle})] + \text{Eye Height}$$

▶ Example

Question: What is the height of a structure if you are standing 52 ft away from the structure, the angle on the speed square is 30° , and your eyes are 5 ft above the ground? ▶ **Figure 11-6**

- (a) 25 ft (b) 35 ft (c) 45 ft (d) 55 ft



▶ **Figure 11-6**

Solution:

**Height = [Distance from Structure × (Tan of the Angle)] +
Eye Height**

Distance = 52 ft (given)

Tan of 30° is equal to 0.58 (from calculator)

Eye Height = 5 ft (given)

Height of Structure = [52 ft × (Tan of 30°)] + 5 ft

Height of Structure = (52 ft × 0.58) + 5 ft

Height of Structure = 30 ft + 5 ft

Height of Structure = 35 ft

Answer: (b) 35 ft