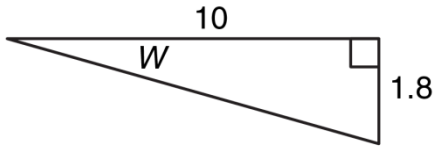
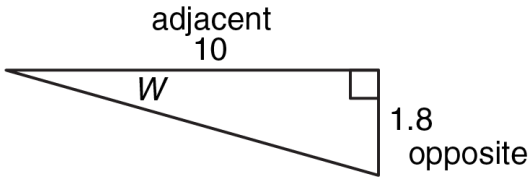
Solving Problems Involving the Tangent Using a Ratio Table

1. Determine the measure of angle *w*.



Step 1: Identify and label the sides as being adjacent to, opposite, or the hypotenuse, in relation to the angle indicated.



Step 2: State the appropriate ratio.

$$tan\,gent\ \ of\ \ angle\,\theta = \frac{length\ opposite\ \theta}{length\ adjacent\ to\ \theta}$$

Step 3: Substitute known values, and calculate the unknown value.

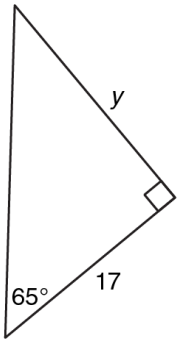
$$tan\ \ w = \frac{opp}{adj}$$

$$tan\ w = \frac{1.8}{10}$$

$$tan\ w = 0.18$$

Looking at the table, it can see that tan 10° = 0.18, so w = 10°.

2. Determine the value of *y*, to the nearest tenth.



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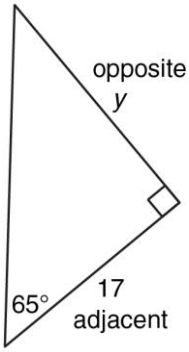


Step 2: State the appropriate ratio.

$$tan\ gent\ \ of\ \ angle\ \theta = \frac{length\ opposite\ \theta}{length\ adjacent\ to\ \theta}$$

Step 3: Substitute known values, and calculate the unknown value.

$$tan\ \theta = \frac{opp}{adj}$$

$$tan\ 65° = \frac{y}{17}$$

$$2.14 = \frac{y}{17}$$

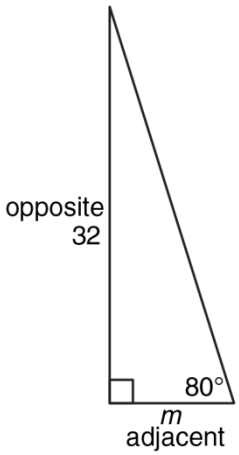
$$2.14 \times 17 = \frac{y}{\cancel{17}} \times \cancel{17}$$

$$36.4 = y$$

The value of y is approximately 36.4.

3. Use the tangent ratio table to determine the unknown side length, to the nearest tenth.

Step 1: Identify and label the sides as being adjacent to, opposite, or the hypotenuse, in relation to the angle indicated.



Step 2: State the appropriate ratio.

$$tan\ gent\ of\ \ angle\ \theta = \frac{length\ opposite\ \theta}{length\ adjacent\ to\ \theta}$$

Step 3: Substitute known values, and calculate the unknown value.

$$tan\ \theta = \frac{opp}{adj}$$

$$tan\ 80° = \frac{32}{m}$$

$$5.67 = \frac{32}{m}$$

$$5.67 \times m = \frac{32}{\cancel{m}} \times \cancel{m}$$

$$5.67\ m = 32$$

$$\frac{\cancel{5.67}\ m}{\cancel{5.67}} = \frac{32}{5.67}$$

$$m = 5.6$$

The value of m is approximately 5.6.