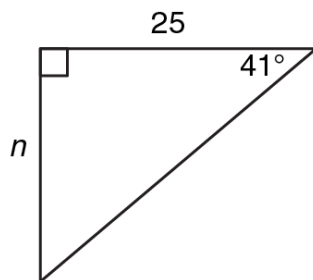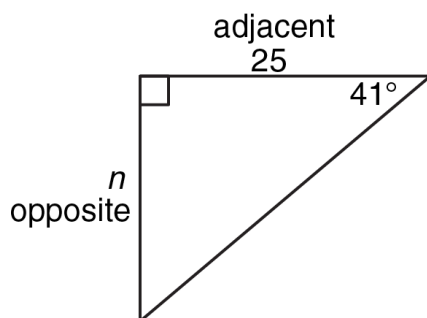**Using the Tangent Ratio with a Calculator**

1. Determine the value of n, to the nearest tenth.

25
41°
n

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

adjacent
25
41°
n
opposite

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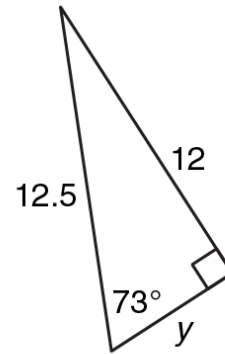
$$tan\;\theta = \frac{opp}{adj}$$

$$tan\;41° = \frac{n}{25}$$

$$25 \times tan\;41° = \frac{n}{\cancel{25}} \times \cancel{25}$$
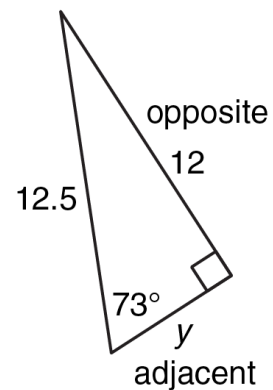
$$21.7 = n$$

The value of n is approximately 21.7.

2. Determine the length of side y, to the nearest tenth.

12.5 \ 12 \ 73° \ y

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.

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

opposite
12
12.5
73°
y
adjacent

Step 3: Substitute known values, and calculate the unknown value.
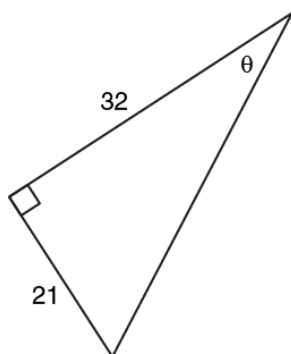
$$\tan\ \theta = \frac{opp}{adj}$$

$$\tan 73° = \frac{12}{y}$$

$$y \times \tan 73° = \frac{12}{\cancel{y}} \times \cancel{y}$$

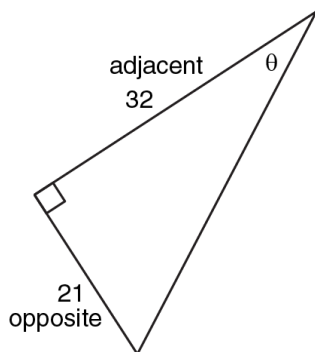$$\frac{y \times \cancel{\tan 73°}}{\cancel{\tan 73°}} = \frac{12}{\tan 73°}$$

$$y = 3.7$$

The value of y is approximately 3.7.

3. Determine the measure of angle θ, to the nearest degree.

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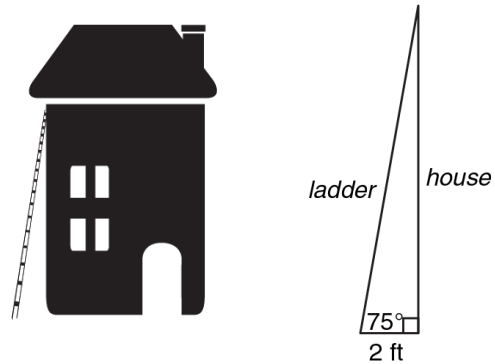
$$tan\; \theta = \frac{opp}{adj}$$

$$tan\; \theta = \frac{21}{32}$$

$$\theta = tan^{-1}\left(\frac{21}{32}\right)$$
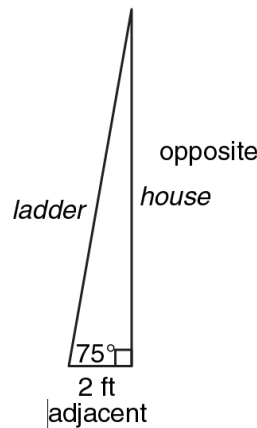
$$\theta = 33°$$

The measure of angle θ is approximately 33°.

4. A ladder, leaning up against a house, makes a 75° angle with the ground. If the base of the ladder is 2 feet away from the wall of the house, how far up the wall does the ladder reach?

ladder   *house*

75°
2 ft

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

opposite

house

ladder

75°
2 ft
adjacent

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.

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

$$tan\,75° = \frac{h}{2\ ft}$$

$$2\ ft\ \times tan\,75° = \frac{h}{2\,ft} \times 2\,ft$$

$$7.5 = h$$

The ladder reaches approximately 7.5 feet up the wall.