

# NOTES: Multiple Right Triangles

Date: Dec. 11

In this section, we will use trigonometric ratios to solve problems in contexts that require multiple steps. We'll need to find values from one triangle to solve another right triangle that shares a common edge.

## SOH CAH TOA

### Example

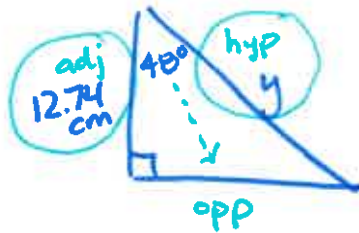
Find x and y.

$$a^2 + b^2 = c^2$$

$$8.6^2 + 9.4^2 = x^2$$

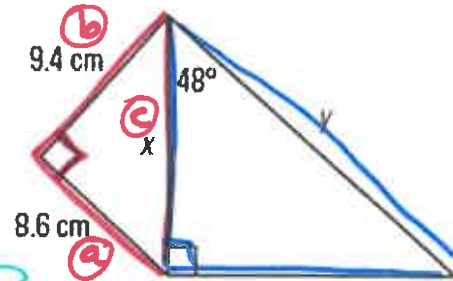
$$\sqrt{162.32} = x$$

$$12.74 \text{ cm} = x$$



$$\cos 48^\circ = \frac{12.74}{y}$$

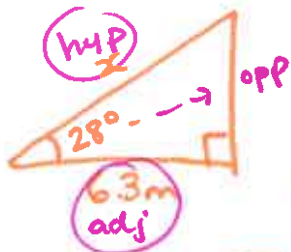
$$y = 19.04 \text{ cm}$$



### Example

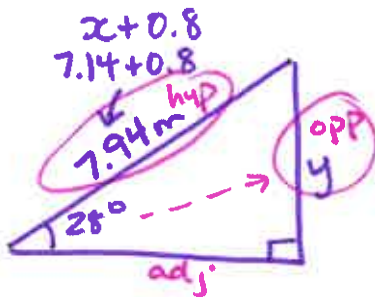
Find x and y.

## SOH CAH TOA



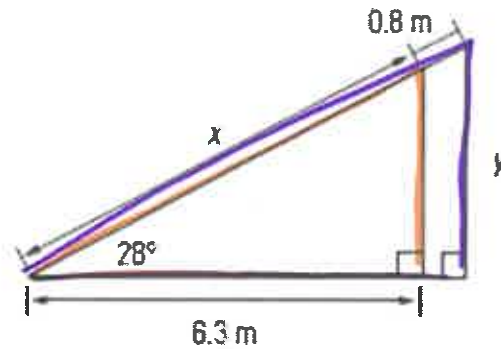
$$\cos 28^\circ = \frac{6.3}{x}$$

$$x = 7.14 \text{ m}$$



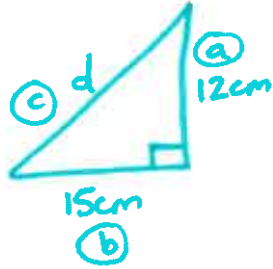
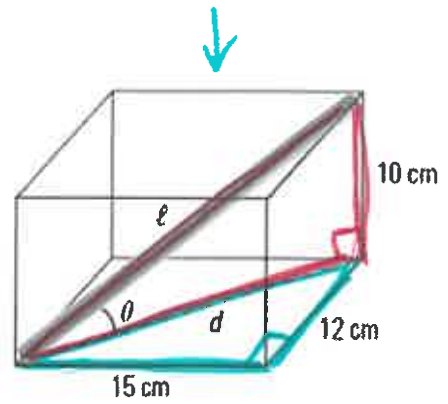
$$\sin 28^\circ = \frac{y}{7.94}$$

$$y = 3.73 \text{ m}$$



### Example

A box is 10 cm by 12 cm by 15 <sup>cm</sup>. What is the length of the longest rod that can be carried in it? What angle does the rod make with the bottom of the box?

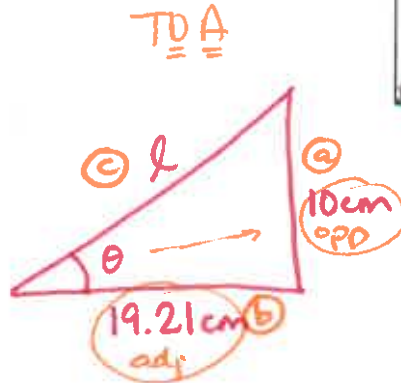


$$a^2 + b^2 = c^2$$

$$12^2 + 15^2 = d^2$$

$$\sqrt{369} = d$$

$$19.21 \text{ cm} = d$$



$$\theta = \tan^{-1} \left( \frac{10}{19.21} \right)$$

$$\theta = 27^\circ$$

$$a^2 + b^2 = c^2$$

$$10^2 + 19.21^2 = l^2$$

$$\sqrt{469.024} = l$$

$$21.66 \text{ cm} = l$$