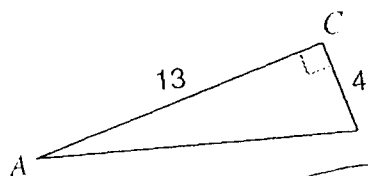


# Solving **Right Triangles** using Pythagorean Theorem and Trigonometric Ratios

NOTE

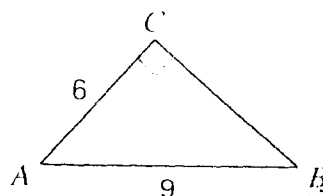
## Solving for a missing side when given the other 2 sides

\* use the Pythagorean Theorem



Pythagorean Theorem

$$\begin{aligned} c^2 &= a^2 + b^2 \\ c^2 &= 13^2 + 4^2 \\ c^2 &= 169 + 16 \\ c^2 &= 185 \\ c &= 13.6 \end{aligned}$$

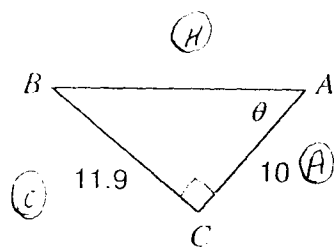


Pythagorean Theorem

$$\begin{aligned} c^2 &= a^2 + b^2 \\ 9^2 &= 6^2 + b^2 \\ 81 &= 36 + b^2 \\ 45 &= b^2 \\ 6.7 &= b \end{aligned}$$

## Solving for a missing angle when given 2 other sides

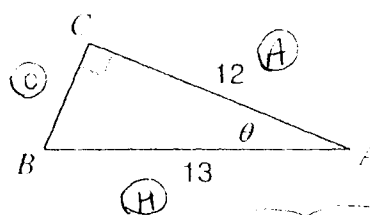
\* use trig ratios (sin - cos - tan)



$$\begin{aligned} \sin \theta &= \frac{\text{opp}}{\text{hyp}} \\ \cos \theta &= \frac{\text{adj}}{\text{hyp}} \\ \tan \theta &= \frac{\text{opp}}{\text{adj}} \end{aligned}$$

Trig Ratios

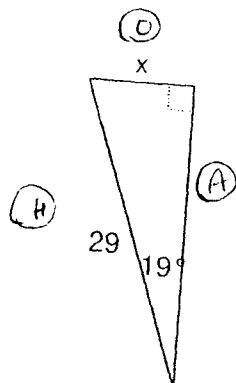
$$\begin{aligned} \tan \theta &= \frac{\text{opp}}{\text{adj}} \\ \tan \theta &= \frac{11.9}{10} \\ \theta &= \tan^{-1} \left( \frac{11.9}{10} \right) \\ \theta &\approx 50.0^\circ \end{aligned}$$



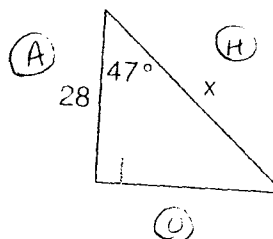
$$\begin{aligned} \cos \theta &= \frac{\text{adj}}{\text{hyp}} \\ \cos \theta &= \frac{12}{13} \\ \theta &= \cos^{-1} \left( \frac{12}{13} \right) \\ \theta &\approx 22.6^\circ \end{aligned}$$

## Solving for a missing side when given one other side and an angle

\* use trig ratios (sin - cos - tan)



$$\begin{aligned} \sin \theta &= \frac{\text{opp}}{\text{hyp}} \\ \sin 19^\circ &= \frac{x}{29} \\ 29(\sin 19^\circ) &= x \\ 9.44 &\approx x \end{aligned}$$



$$\begin{aligned} \cos \theta &= \frac{\text{adj}}{\text{hyp}} \\ \cos 47^\circ &= \frac{28}{x} \\ x &= \frac{28}{\cos 47^\circ} \\ x &\approx 41.06 \end{aligned}$$