TRIGONOMETRY

SINE, COSINE, AND TANGENT

TRIGONOMETRIC RATIOS

Sine
Opposite
Hypotenuse
Cosine
Adjacent
Hypotenuse
Tangent
Opposite
Adjacent

$$\sin A = \frac{\text{opp}}{\text{hyp}} \text{ or } \frac{a}{c}$$

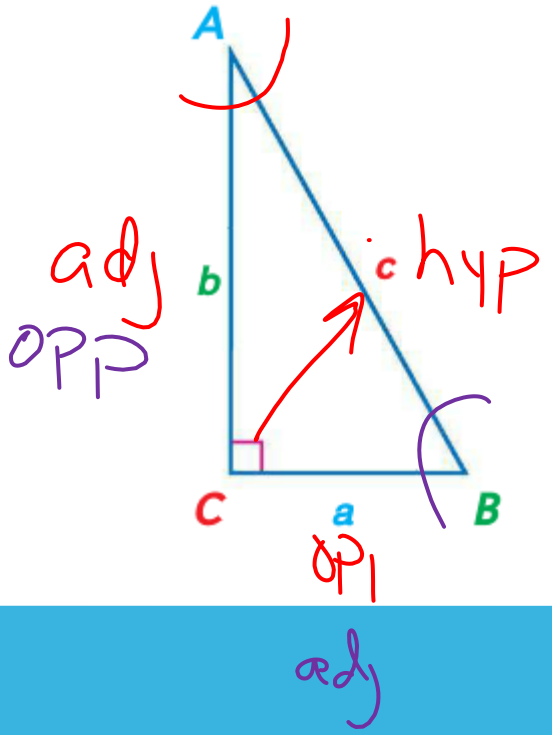
$$\sin B = \frac{\text{opp}}{\text{hyp}} \text{ or } \frac{b}{c}$$

$$\cos A = \frac{\text{adj}}{\text{hyp}} \text{ or } \frac{b}{c}$$

$$\cos B = \frac{\text{adj}}{\text{hyp}} \text{ or } \frac{a}{c}$$

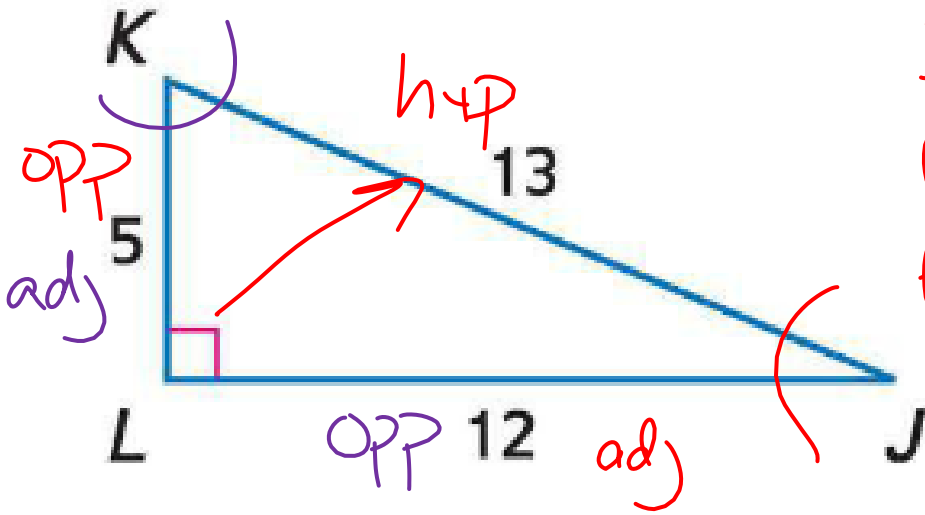
$$\tan A = \frac{\text{opp}}{\text{adj}} \text{ or } \frac{a}{b}$$

$$\tan B = \frac{\text{opp}}{\text{adj}} \text{ or } \frac{b}{a}$$



EXAMPLES

Find sin J, cos J, tan J, sin K, cos K, and tan K. Express each ratio as a fraction and as a decimal to the nearest hundredth.



$\sin J = \frac{5}{13} = .38$

$\cos J = \frac{12}{13} = .92$

$\tan J = \frac{5}{12} = .42$

$\sin K = \frac{12}{13} = .92$

$\cos K = \frac{5}{13} = .38$

$\tan K = \frac{12}{5} = 2.4$

EXAMPLES

sin J = 5/13 = .38

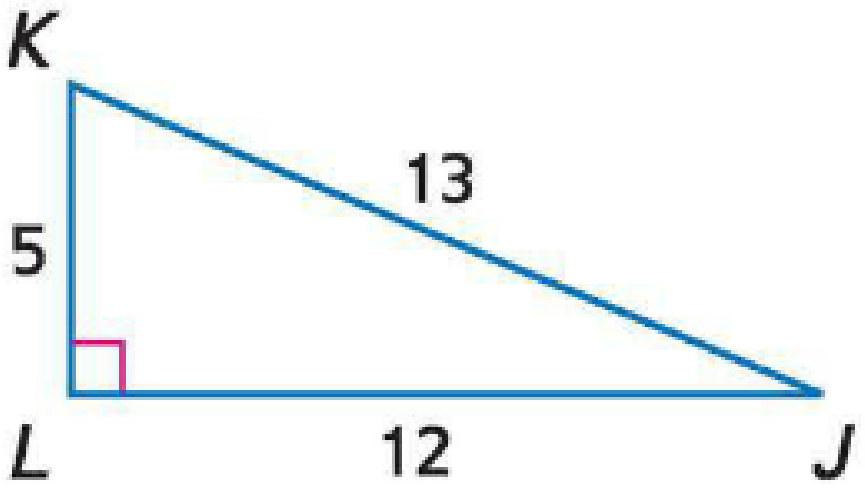
cos J = 12/13 = .92

tan J = 5/12 = .42

sin K = 12/13 = .92

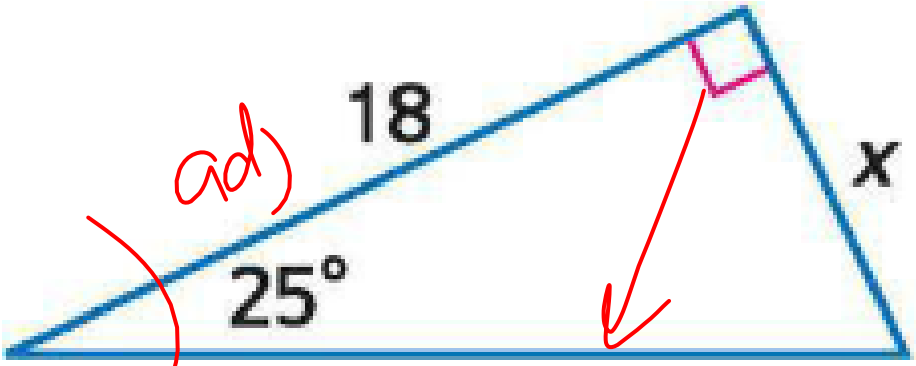
cos K = 5/13 = .38

tan K = 12/5 = 2.4



EXAMPLES

Find *x* to the nearest hundredth.



adj

opp

hyp

$18 \cdot \tan 25 = \frac{x}{18}$ (18)

$18 \tan 25 = x$

$x = 8.39$

$\tan 25 = .466$

25 tan = .466

DEG = DEG

RAD = DEG

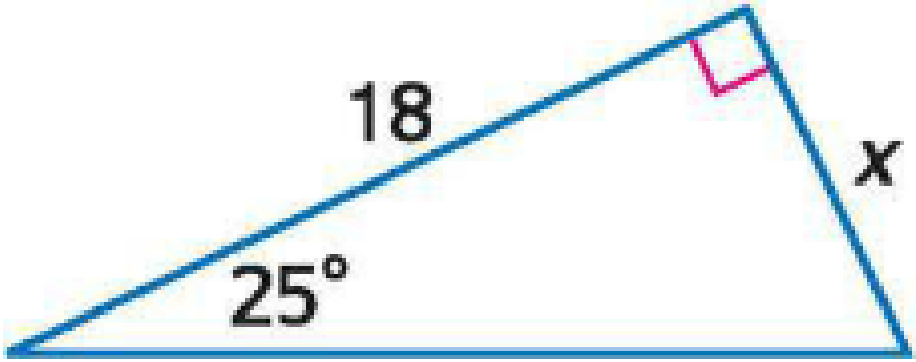
EXAMPLES

Find *x* to the nearest hundredth.

tan 25 = x/18

18*tan 25 = x

x = 8.39



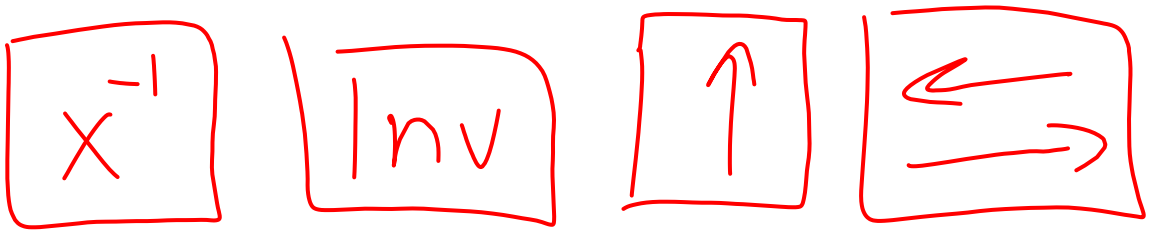
INVERSE TRIGONOMETRIC RATIOS

Inverse trigonometric ratios give the measure of the angle.

$\sin^{-1} x = m\angle A$

$\cos^{-1} x = m\angle A$

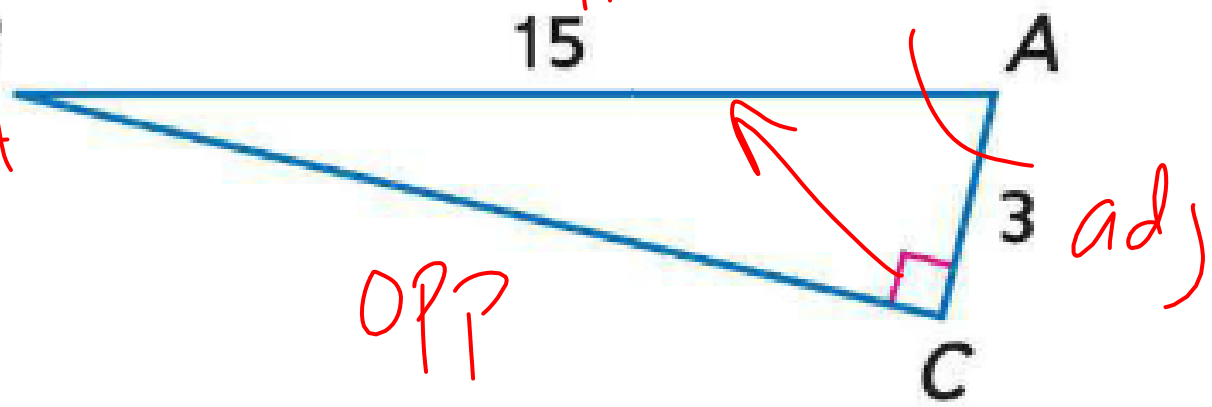
$\tan^{-1} x = m\angle A$



EXAMPLES

Use a calculator to find the measure of ∠A to the nearest tenth.

$\cos A = \frac{adj}{hyp}$



$\cos^{-1}\frac{adj}{hyp} = A$

$\cos^{-1}\frac{3}{15} = A$

$78.5 = A$

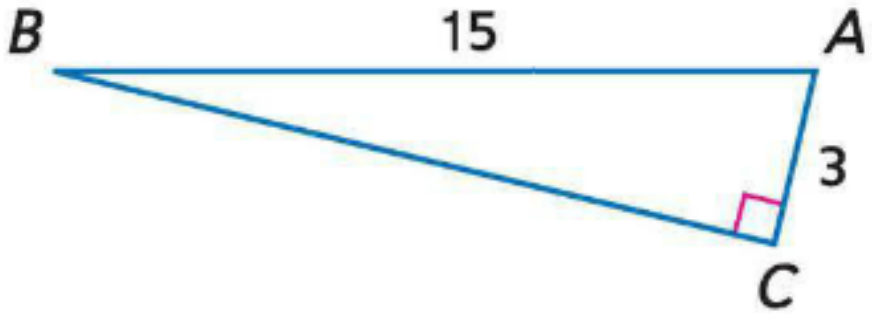
EXAMPLES

Use a calculator to find the measure of ∠A to the nearest tenth.

$\cos A = 3/15$

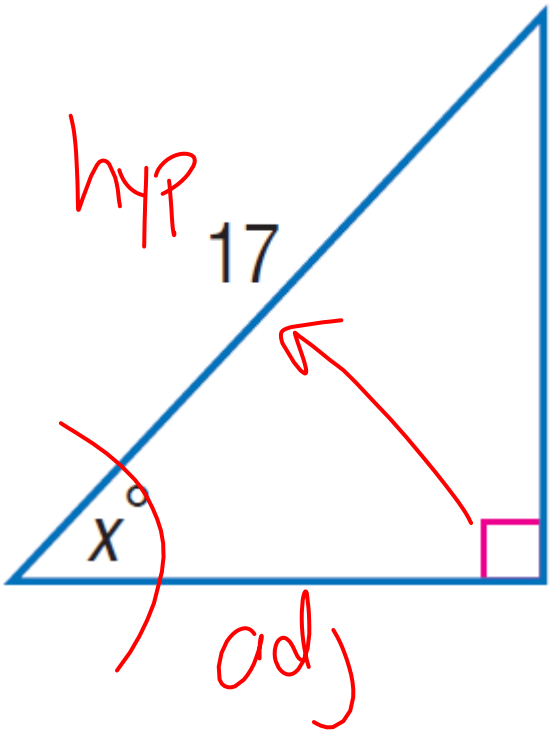
$\cos^{-1}(3/15) = A$

$A = 78.5$



EXAMPLES

Find x. Round to the nearest tenth.



$\sin X = \frac{12}{17}$

$\sin^{-1} \frac{12}{17} = X$

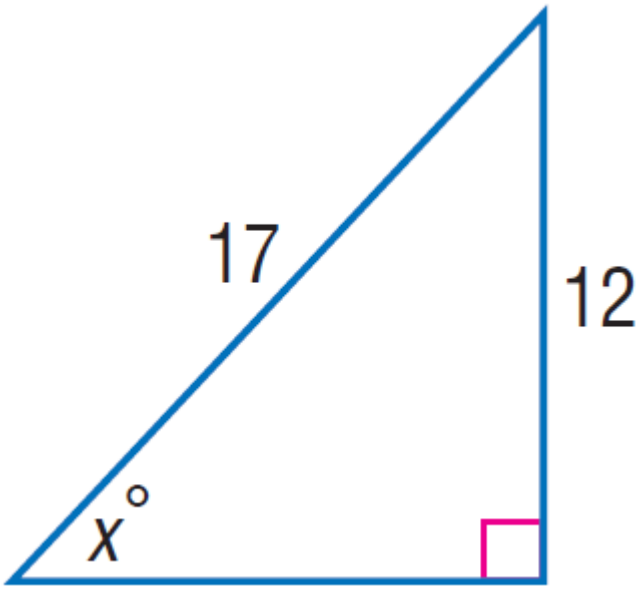
$44.9 = X$

$X = 35.2$

45.1

EXAMPLES

Find x. Round to the nearest tenth.



$\sin x = \frac{12}{17}$

$x = \sin^{-1} \frac{12}{17}$

$x = 44.9$

SOLVING A RIGHT TRIANGLE

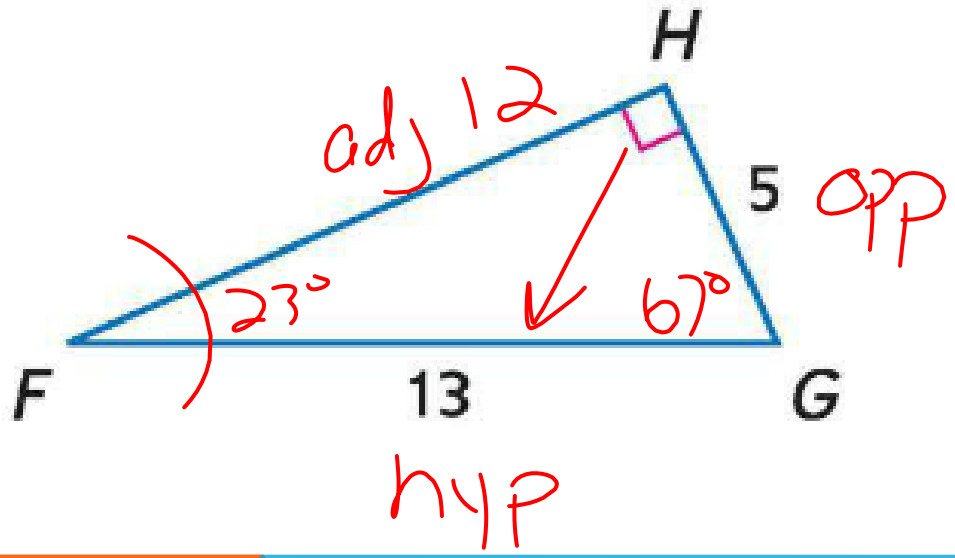
To solve a right triangle, you need to know:

Two side lengths or

One side length and the measure of one acute angle

EXAMPLES

Solve the right triangle. Round side measures to the nearest tenth and angle measures to the nearest degree.



$\sin F = \frac{5}{13}$

$\sin^{-1}\frac{5}{13} = F = 23^\circ$

$13^2 = 5^2 + adj^2$

$169 = 25 + x^2$

$\sqrt{144} = \sqrt{x^2}$

$12 = x$

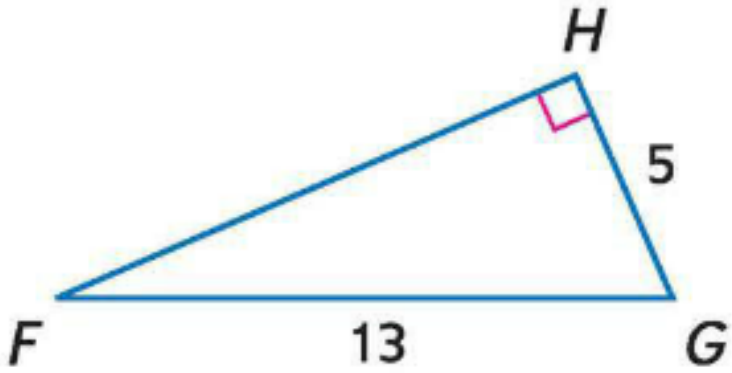
EXAMPLES

Solve the right triangle. Round side measures to the nearest tenth and angle measures to the nearest degree.

HF = 12

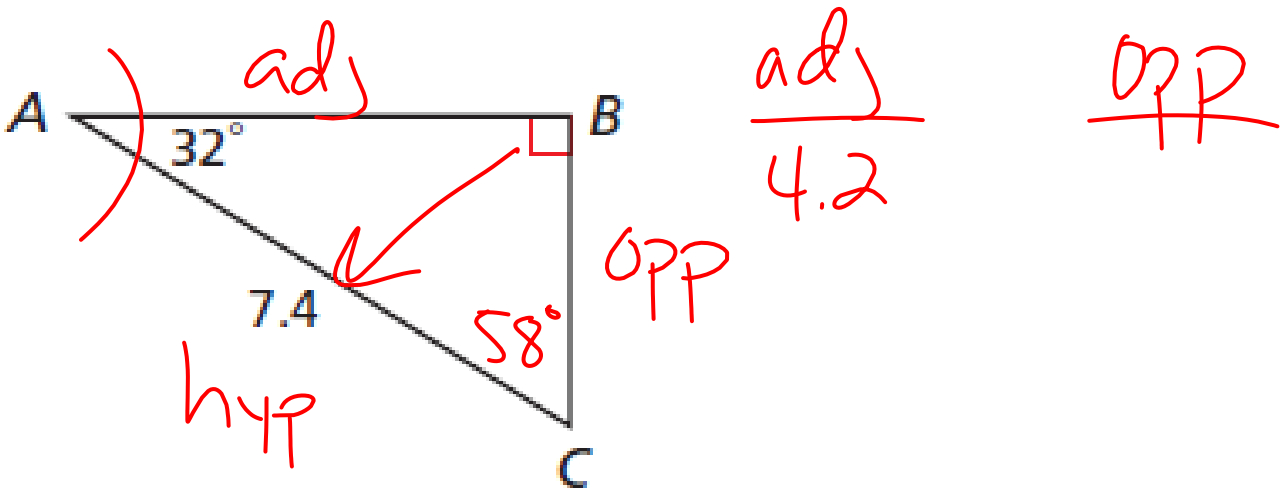
$\angle F = \sin^{-1} 5/13 = 22.6 = 23$

$\angle G = \cos^{-1} 5/13 = 67.4 = 67$



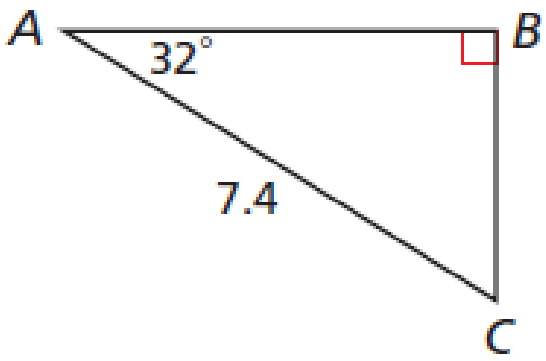
EXAMPLES

Solve the right triangle. Round side measures to the nearest tenth and angle measures to the nearest degree.



EXAMPLES

Solve the right triangle. Round side measures to the nearest tenth and angle measures to the nearest degree.



AB: $\cos 32 = \frac{AB}{7.4}$

$AB = 7.4 \cos 32$

$AB = 6.3$

BC: $\sin 32 = \frac{BC}{7.4}$

$BC = 7.4 \sin 32$

$BC = 3.9$

$\angle C = 90 - 32 = 58$