Using Trig Ratios to Find a Missing Angle

Each trig ratio has an inverse trig ratio.

TRIG RATIO	INVERSE
sin	$\sin^{-1}$
cos	$\cos^{-1}$
tan	$\tan^{-1}$

Inverse operations UNDO each other.
For example...

1) $\frac{2x}{2} = \frac{6}{2}$

$x = 3$

2) $x^2 = 9$

$\sqrt{x^2} = \sqrt{9}$

$x = 3$

3) $x + 5 = 15$

$-5 \quad -5$

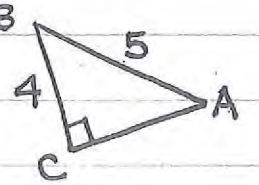
$x = 10$

4) $\frac{x}{5} = 15$

$5 \cdot \frac{x}{5} = 15 \cdot 5$

$x = 75$

If you want to undo the sine of an angle, you would take the inverse sine.



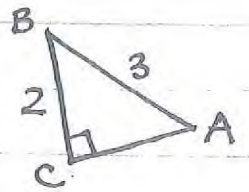
If $\sin A = \frac{4}{5}$ and you take the inverse sine of both sides...

$$\sin^{-1}(\sin A) = \sin^{-1}\left(\frac{4}{5}\right)$$

then $\sin^{-1}$ gets rid of sin and leaves you with A... which is the measure of the angle.

$A = \sin^{-1}\left(\frac{4}{5}\right)$ so... $A =$ 53.1°

If $\cos B = \frac{2}{3}$ and you take the inverse cosine of both sides...



$\cos^{-1}(\cos B) = \cos^{-1}(\frac{2}{3})$

then $\cos^{-1}$ gets rid of cos and leaves you with B... which is the measure of the angle. $B = \cos^{-1}(\frac{2}{3})$

so... $B = 48.2°$

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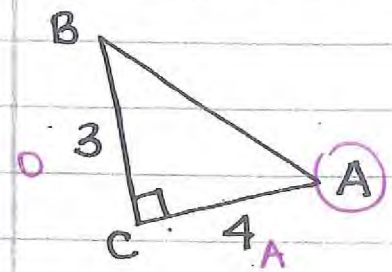
* Steps for Finding a Missing Angle: *

1) Determine which trig ratio to use.
2) Find the trig ratio of that angle.
3) Apply the inverse trig ratio to both sides of the equation.
4) Find the measure of the angle.

Example 1: Find the m∠A.



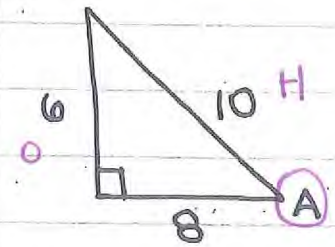
$\tan A = \frac{3}{4}$

$\tan^{-1}(\tan A) = \tan^{-1}(\frac{3}{4})$

$A = \tan^{-1}(\frac{3}{4})$

$A = 36.9°$

Example 2: Find the m∠A using sine.



$\sin A = \frac{6}{10}$

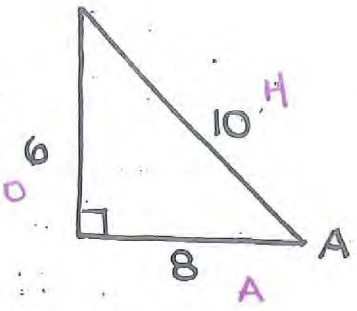
$\sin^{-1}(\sin A) = \sin^{-1}(\frac{6}{10})$

$A = \sin^{-1}(\frac{6}{10})$

$A = 36.9°$

Example 3:

i) Find the m∠A using cosine.



$\cos A = \frac{8}{10}$

$\cos^{-1}(\cos A) = \cos^{-1}(\frac{8}{10})$

$A = \cos^{-1}(8/10)$

$A = 36.9°$

ii) Find the m∠A using tangent.

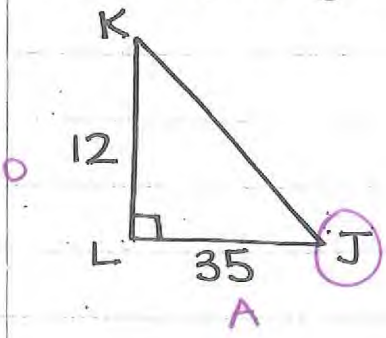
$\tan A = \frac{6}{8}$

$\tan^{-1}(\tan A) = \tan^{-1}(\frac{6}{8})$

$A = \tan^{-1}(\frac{6}{8})$

$A = 36.9°$

Example 4: Find m∠J. Round to the nearest degree.



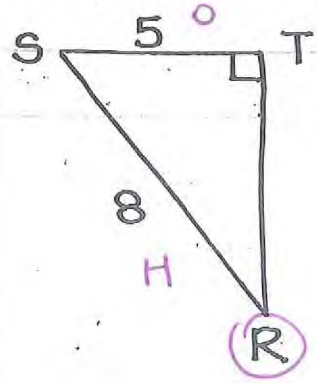
$\tan J = \frac{12}{35}$

$\tan^{-1}(\tan J) = \tan^{-1}(\frac{12}{35})$

$J = \tan^{-1}(\frac{12}{35})$

$J = 18.9°$

Example 5: Find m∠R. Round to the nearest degree.



$\sin R = \frac{5}{8}$

$\sin^{-1}(\sin R) = \sin^{-1}(\frac{5}{8})$

$R = \sin^{-1}(\frac{5}{8})$

$R = 38.7°$