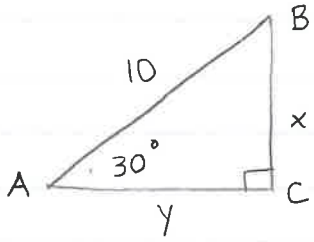
Trigonometric Ratios

1-8-19

Q: When can you use the three trigonometric ratios to solve for an unknown angle in right triangles?

low
ould I
olve for
and y
n a Δ?

Interior Angles Δ: 180°



Why do
ne trig
atios
work?

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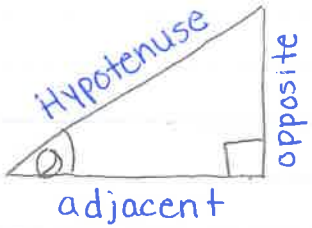
$\sin(\theta) = \frac{opp}{hyp}$

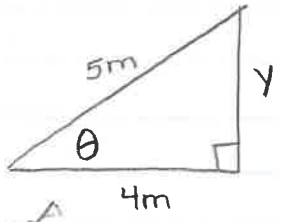
$\cos(\theta) = \frac{adj}{hyp}$

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



θ: Theta
(θ): angle
$\frac{x}{y}$: side-lengths
α: alpha
B: beta
γ: gamma

When do
use
aw of
sin
and
cos?



θ = ?
hyp = 5m
a = 4m
opp = y

$\cos(\theta) = \frac{4m}{5m}$ $\cos^{-1}$

$\theta = \cos^{-1}\left(\frac{4}{5}\right)$

$\theta = 36.9°$

Law of Sin: $\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$

Law of Cosine: $c^2 = a^2 + b^2 - 2(a)(b)\cos C$

$A = \frac{1}{2}(b)(h)$ or $A = \frac{1}{2}(a)(b)\sin C$

ig ratios help determine the degree or a missing angle of right triangle. Trig ratios are also helpful in the ense of proving they work well with the Pythagorean thm

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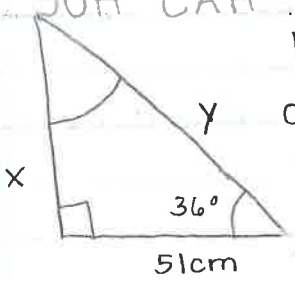
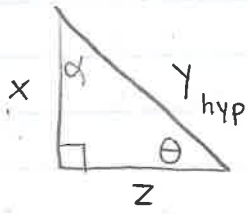


hyp = y
opp = x
$\theta = 36°$
adj = 51cm



$\sin(\alpha) = \frac{y}{z}$ $\cos(\theta) = \frac{z}{y}$

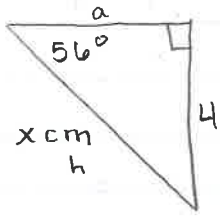
$\cos(\alpha) = \frac{x}{y}$

$\tan(\alpha) = \frac{z}{x}$

$y \cdot \cos(36°) = \frac{51cm}{y} \cdot y$

$y \cdot \frac{\cos(36°)}{\cos(36°)} = \frac{51cm}{\cos(36°)}$

$y = 63.04cm$

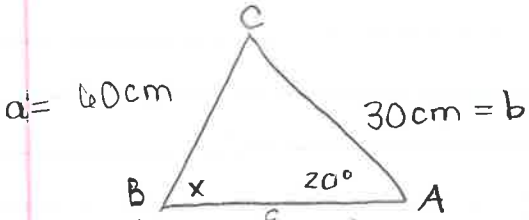


$x \cdot \sin(56°) = \frac{4}{x} \cdot x$

$\frac{\sin(56°)}{\sin(56°)} = \frac{4}{\sin(56°)}$

$x = 4.82cm$

Law of Sine



$\frac{\sin(A)}{a} = \frac{\sin(B)}{b} = \frac{\sin(C)}{c}$ ← angles

c ← side lengths

*angle will always be opposite of side length

*only use 2 out of 3 equations

$\frac{\sin(20)}{60cm} = \frac{\sin(B)}{30cm} \cdot 30cm$

$\left(\frac{\sin(20°)}{60cm}\right) = \sin(B) \cdot \sin^{-1}$

$\sin^{-1}\left(\frac{30 \cdot \sin(20°)}{60cm}\right) = B$

$9.85° = B$