11.1 Trig Ratios

What is a trigonometric ratio?

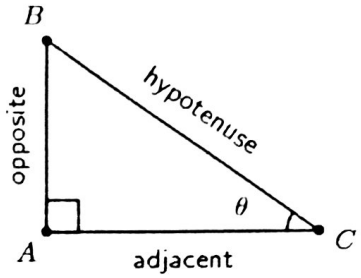
A ratio (fraction) of two side lengths in a right triangle

Reference angle: Angle you base ratios off of θ (theta)

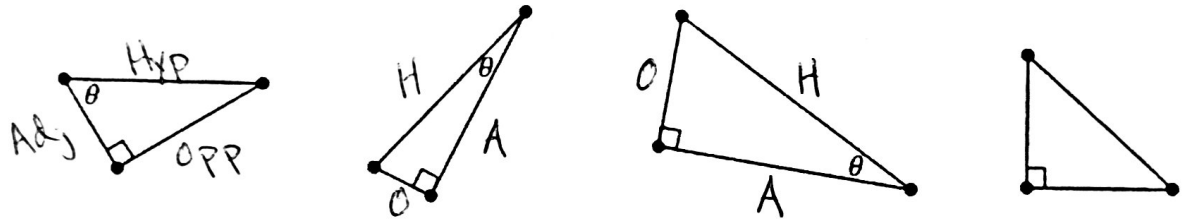
Opposite side: Side opposite reference angle

Adjacent side: Side that creates reference angle with hypotenuse

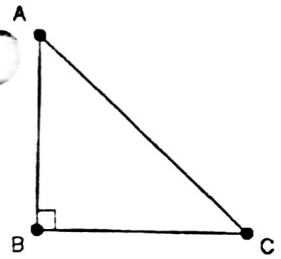
Hypotenuse: Largest side of triangle



1) Given the reference angle θ, label the three sides of the triangle as *opposite*, *adjacent*, or *hypotenuse*.



2) Given ΔABC and the listed reference angle, fill in the blanks:



Reference: $\angle A$

Opposite is $\overline{BC}$

Adjacent is $\overline{AB}$

Hypotenuse is $\overline{AC}$

Reference: $\angle C$

Opposite is $\overline{AB}$

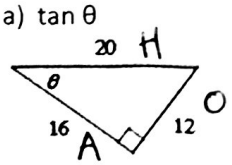
Adjacent is $\overline{BC}$

Hypotenuse is $\overline{AC}$

SOH	CAH	TOA
$\sin(\theta) = \frac{\text{opposite}}{\text{hypotenuse}}$	$\cos(\theta) = \frac{\text{adjacent}}{\text{hypotenuse}}$	$\tan(\theta) = \frac{\text{opposite}}{\text{adjacent}}$

3) Find the value of the trig ratio:

a) tan θ

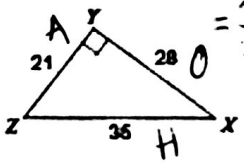


TOA

$\tan\theta = \frac{O}{A}$

$= \frac{12}{16} = \boxed{\frac{3}{4}}$

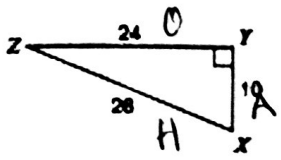
b) cos Z



CAH $\cos\theta = \frac{A}{H}$

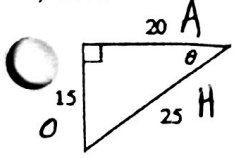
$= \frac{21}{35} = \boxed{\frac{3}{5}}$

c) cos X



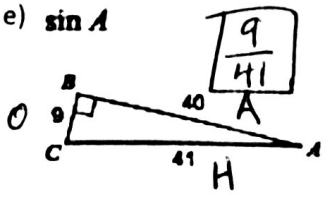
$\frac{10}{26} = \boxed{\frac{5}{13}}$

d) sin θ



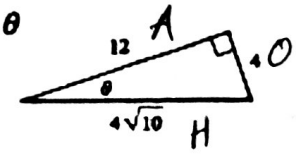
$\frac{15}{25} = \boxed{\frac{3}{5}}$

e) sin A



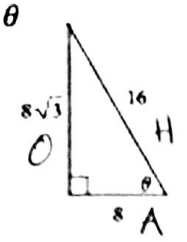
$\boxed{\frac{9}{41}}$

f) tan θ



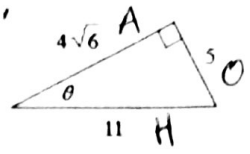
$\frac{4}{12} = \boxed{\frac{1}{3}}$

g) $\sin\theta$



$\frac{8\sqrt{3}}{16} = \boxed{\frac{\sqrt{3}}{2}}$

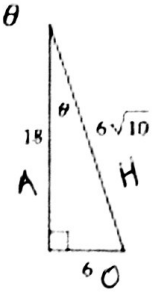
h) $\tan\theta$



$\frac{5}{4\sqrt{6}} \cdot \frac{\sqrt{6}}{\sqrt{6}} = \frac{5\sqrt{6}}{4 \cdot 6}$

$= \boxed{\frac{5\sqrt{6}}{24}}$

i) $\sin\theta$



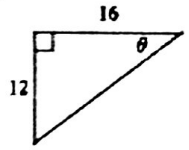
$\frac{6}{6\sqrt{10}} = \frac{1}{\sqrt{10}} \cdot \frac{\sqrt{10}}{\sqrt{10}} = \boxed{\frac{\sqrt{10}}{10}}$

If there is a square root in the bottom of a fraction, you need to multiply top & bottom by the root of the bottom.

To find a missing side of a triangle when you are already given two sides, you can use the Pythagorean Theorem. $a^2 + b^2 = c^2$

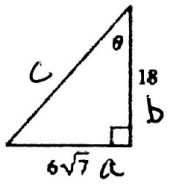
4) Find each missing side.

a)



*When you type this in your calculator, you must have the parentheses around the whole thing

b)



$(6\sqrt{7})^2 + 18^2 = c^2$

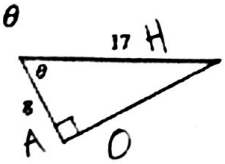
$252 + 324 = c^2$

$\sqrt{576} = \sqrt{c^2}$

$\boxed{24 = c}$

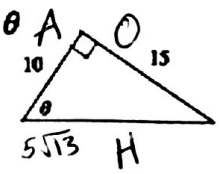
5) Find the value of each trig ratio.

a) $\cos\theta$



$\boxed{\frac{8}{17}}$

b) $\sin\theta$



$10^2 + 15^2 = c^2$

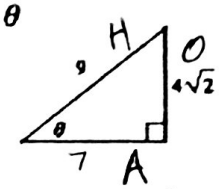
$\sqrt{325} = \sqrt{c^2}$

5 | 65 $\quad c = 5\sqrt{13}$

5 | 13 $\quad \sin\theta = \frac{15}{5\sqrt{13}} = \frac{3}{\sqrt{13}}$

$\frac{3}{\sqrt{13}} \cdot \frac{\sqrt{13}}{\sqrt{13}} = \boxed{\frac{3\sqrt{13}}{13}}$

c) $\cos\theta$



$(4\sqrt{2})^2 + b^2 = 9^2$

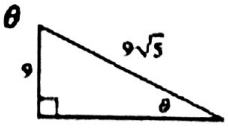
$32 + b^2 = 81$

$b^2 = 49$

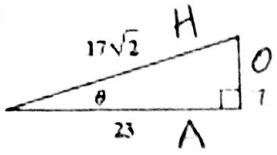
$b = 7$

$\cos\theta = \boxed{\frac{7}{9}}$

d) $\tan\theta$



e) **sin θ**



$23^2 + b^2 = (17\sqrt{2})^2$

$529 + b^2 = 578$

$b^2 = 49$

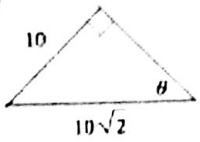
$b = 7$

$\sin\theta = \frac{7}{17\sqrt{2}}$

$\frac{7}{17\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{7\sqrt{2}}{17 \cdot 2}$

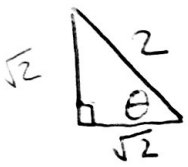
$= \boxed{\frac{7\sqrt{2}}{34}}$

f) **cos θ**



6) Find the value of each trig ratio.

a) **Find sin θ if cos θ = $\frac{\sqrt{2}}{2}$** A / H



$(\sqrt{2})^2 + b^2 = 2^2$

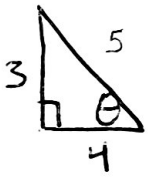
$2 + b^2 = 4$

$b^2 = 2$

$b = \sqrt{2}$

$\sin\theta = \boxed{\frac{\sqrt{2}}{2}}$

b) **Find sin θ if tan θ = $\frac{3}{4}$** O / A



$3^2 + 4^2 = c^2$

$25 = c^2$

$5 = c$

$\sin\theta = \boxed{\frac{3}{5}}$

c) **Find cos θ if sin θ = $\frac{\sqrt{7}}{4}$** O / H

$(\sqrt{7})^2 + b^2 = 4^2$

$7 + b^2 = 16$

$b^2 = 9$

$b = 3$

$\cos\theta = \boxed{\frac{3}{4}}$

d) **Find tan θ if sin θ = $\frac{4}{5}$** O / H

$a^2 + 4^2 = 5^2$

$a^2 + 16 = 25$

$a^2 = 9$

$a = 3$

$\tan\theta = \boxed{\frac{4}{3}}$

What should I do in this situation?

Draw it!