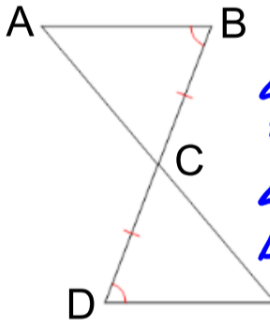
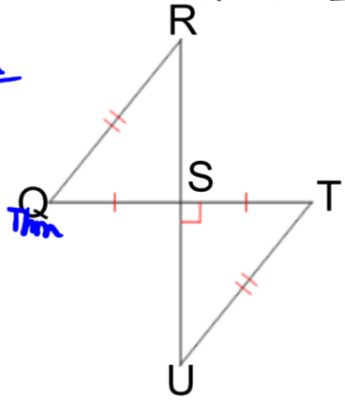
Warm Up Prove the following.

1. $\Delta ABC \cong \Delta EDC$



Statement	Reason
$\angle ABC \cong \angle EDC$	Given
$\overline{BC} \cong \overline{DC}$	Given
$\angle BCA \cong \angle DCE$	Vert. $\angle$'s Thm
$\Delta ABC \cong \Delta EDC$	ASA

2. $\angle QRS \cong \angle TUS$



Statement	Reason
$\overline{QR} \cong \overline{TU}$	Given
$\overline{SQ} \cong \overline{ST}$	Given
$\Delta QRS \cong \Delta TUS$	HL
$\angle QRS \cong \angle TUS$	CPCTC

Goals for today

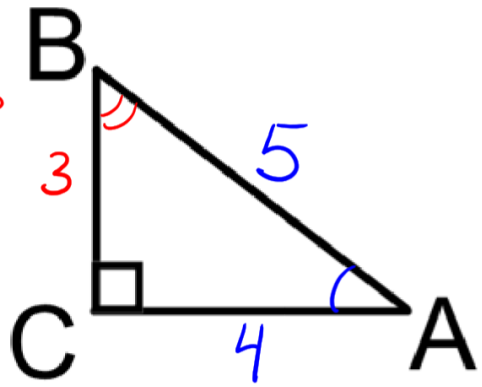
-Given 1 trig function, identify all others

- Learn to use trigonometric inverses to find acute angle measures in right triangles.

Ex. 1

In ΔABC $\cos(A) = \frac{4}{5}$ (adj / Hyp), and $\tan(B) = \frac{4}{3}$ (opp / adj)

Find the cos(B), sin(B), and the tan (A).



$\cos(B) = \frac{3}{5}$

$\sin(B) = \frac{4}{5}$

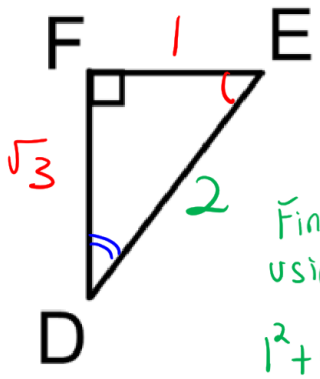
$\tan(A) = \frac{3}{4}$

Ex. 2

In Δ DEF, $\tan(E) = \frac{\sqrt{3}}{1}$, opp / adj

what are the following?

Leave answers in simplest radical form.



Find missing side using pythagorean Thm.

$1^2 + (\sqrt{3})^2 = c^2$

$1 + 3 = c^2$

$4 = c^2$

$c = 2$

$\cos(E) = \frac{1}{2}$ $\quad$ $\sin(D) = \frac{1}{2}$

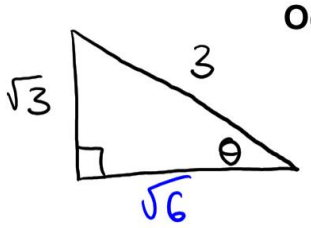
$\sin(E) = \frac{\sqrt{3}}{2}$ $\quad$ $\cos(D) = \frac{\sqrt{3}}{2}$

$\tan(D) = \frac{1}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{\sqrt{3}}{3}$

October 11, 2016

Ex. 3

In a given triangle, $\sin(\theta) = \frac{\sqrt{3}}{3}$



Find missing side

$(\sqrt{3})^2 + b^2 = 3^2$

$3 + b^2 = 9$

$b^2 = 6$

$b = \sqrt{6}$

Find the following values. Leave answers in simplest radical form.

$\cos(\theta) = \frac{\sqrt{6}}{3}$ $\quad$ $\sin(90-\theta) = \frac{\sqrt{6}}{3}$

$\tan(\theta) = \frac{\sqrt{3}}{\sqrt{6}} \cdot \frac{\sqrt{6}}{\sqrt{6}} = \frac{3\sqrt{2}}{6} = \frac{\sqrt{2}}{2}$ $\quad$ $\cos(90-\theta) = \frac{\sqrt{3}}{3}$

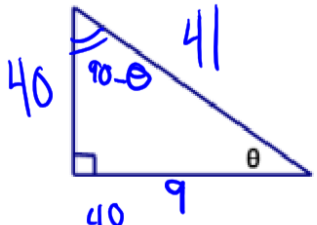
$\tan(90-\theta) = \frac{\sqrt{6}}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{3\sqrt{2}}{3} = \sqrt{2}$

You try 1 and 5

1. Given the following trigonometric values, label the triangle's sides.

$\sin\Theta = \frac{40}{41}$ opp/hyp $\tan\Theta = \frac{40}{9}$ opp/adj

$\cos\Theta =$ $\frac{9}{41}$

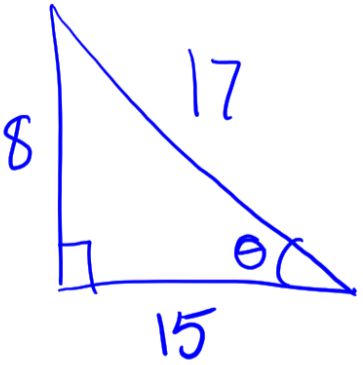


$\sin(90-\Theta) =$ $\frac{9}{41}$ $\cos(90-\Theta) =$ $\frac{40}{41}$ $\tan(90-\Theta) =$ $\frac{9}{40}$

5. Given $\sin\theta = \frac{8}{17}$ opp/hyp $\cos\theta =$ $\frac{15}{17}$ $\tan\theta =$ $\frac{8}{15}$

$\sin(90-\theta) =$ $\frac{15}{17}$ $\cos(90-\theta) =$ $\frac{8}{17}$

$\tan(90-\theta) =$ $\frac{15}{8}$



Find missing side

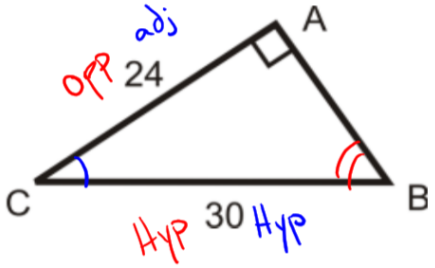
$8^2 + b^2 = 17^2$

$64 + b^2 = 289$

$\sqrt{b^2} = \sqrt{225}$

$b = 15$

Now we know all about finding side lengths, but what about finding angle measures?



Find the m∠C.

$\cos(C) = \frac{24}{30}$

$C = \cos^{-1}\left(\frac{24}{30}\right) = 36.870$

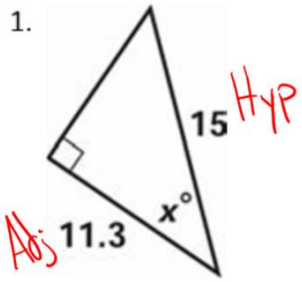
Find the m∠B.

$\sin(B) = \frac{24}{30}$

$B = \sin^{-1}\left(\frac{24}{30}\right) = 53.130$

Let's look at the first problem

1.



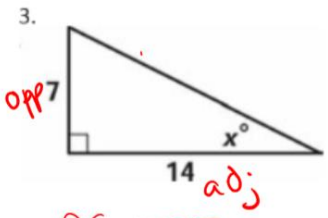
x = _____

$\cos(x) = \frac{11.3}{15}$

$x = \cos^{-1}\left(\frac{11.3}{15}\right) = 41.120$

You try 3, 5 and 7.

3.

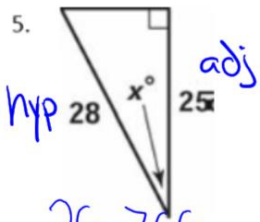


x = 26.565

$\tan(x) = \frac{7}{14}$

$x = \tan^{-1}\left(\frac{7}{14}\right) = 26.565$

5.

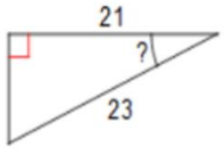


x = 26.766

$\cos(x) = \frac{25}{28}$

$x = \cos^{-1}\left(\frac{25}{28}\right) = 26.766$

7.

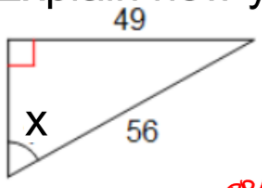


$\cos(?) = \frac{21}{23}$

$? = \cos^{-1}\left(\frac{21}{23}\right) = 24.071$

Recap

Explain how you would find the value of x.



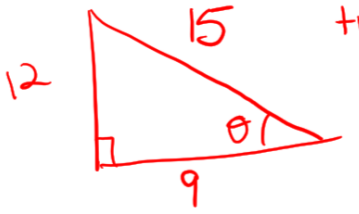
Use the inverse sine of $\frac{49}{56}$ to find the measure of angle X.

If sin(θ) = 12/15, find the following. (opp/hyp)

cos(θ)= $\frac{9}{15}$

tan(θ)= $\frac{12}{9}$

sin(90-θ)= $\frac{9}{15}$



Use 3-4-5 triangle times 3.

or use pythagorean theorem to find it.

$12^2 + b^2 = 15^2$

$144 + b^2 = 225$

$b^2 = 81$

$b = 9$

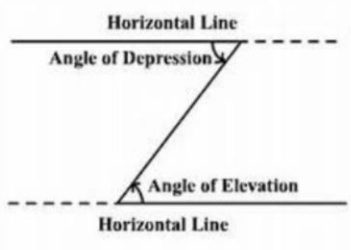
A crow is on the ground 80 feet from the base of a 45 foot tall tree. It then flies straight through the air to the top of the tree. What is the angle of the crow's flight path relative to the ground?

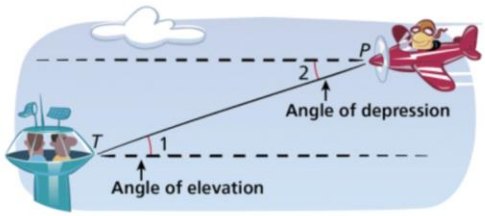
$\tan(x) = \frac{45}{80}$

$x = \tan^{-1}\left(\frac{45}{80}\right)$

$x = 29.358$

Before we continue, there are two terms we need to learn.





Elevation → looking up
Depression → looking down
} both the same angle. They are alt. int. ∠'s of the horizontal parallel lines.

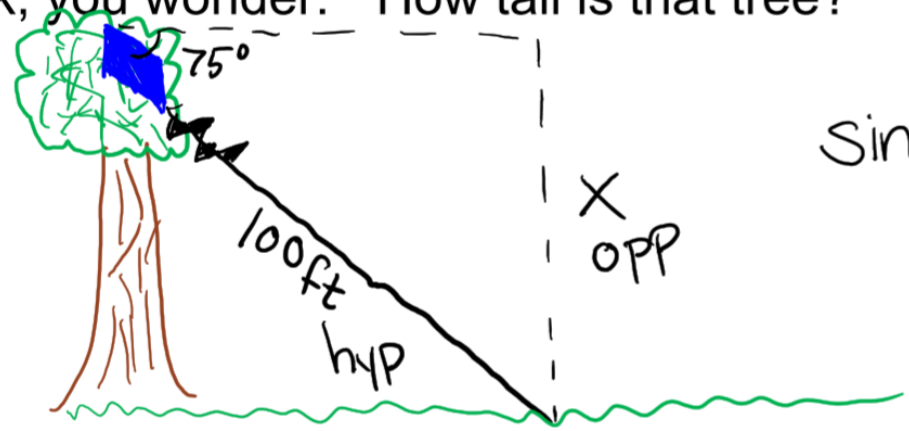
A building which is 30 feet tall casts a 5 foot shadow. What is the angle of elevation to the sun?

$$\tan(x) = \frac{30}{5}$$

$$x = \tan^{-1}\left(\frac{30}{5}\right)$$

$$x = 80.538$$

Suppose you're flying a kite, and it gets caught at the top of the tree. You've let out all 100 feet of string for the kite, and the angle of depression from the top of the tree is 75 degrees. Instead of worrying about how to get your kite back, you wonder. "How tall is that tree?"



$$\sin(75) = \frac{x}{100}$$

$$x = 100 \cdot \sin(75)$$

$$x = 96.593 \text{ ft.}$$