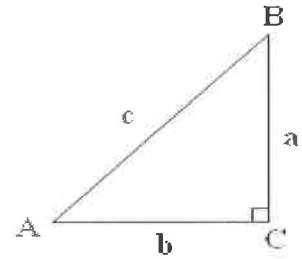
7.0 – Trigonometry Review

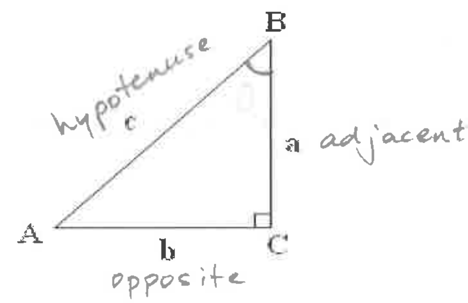
In trigonometry problems, all vertices (corners or angles) of the triangle are labeled with capital letters. The right angle is usually labeled *C*. Sides are usually labeled with lower case letters. The side opposite to <*A* will be labeled *a* and so on.



Whenever we do trigonometry problems on a right triangle, we focus on a target angle. The target angle can be any of the two angles that are **not** the right angle.

Once we have a target angle, we can name each side of the triangle. Let's suppose *A* is the target angle. Then side *a* is called the OPPOSITE side because it is on the other side of the triangle. Side *c* is always called the HYPOTENUSE because it is the longest side, and side *b* is called the ADJACENT side as it is beside <*A*. If the target angle does not have an angle measurement on it, we represent it with the greek letter theta, θ.

Suppose *B* is the target angle in the triangle on the right. Label all appropriate parts.



The three trigonometric ratios for right triangles are:

SINE	COSINE	TANGENT
$\sin\theta = \frac{opposite}{hypotenuse}$	$\cos\theta = \frac{adjacent}{hypotenuse}$	$\tan\theta = \frac{opposite}{adjacent}$
S O H	C A H	T O A

What is the point of the trigonometric ratios?

to provide proportional side-to-side comparisons of right triangles.

Example 1 – Solve each to the nearest hundredth.

a) $\cos 42°$

0.74

b) $\tan 67° = \frac{x}{7}$

$x = 16.49$

c) $\sin\theta = \frac{5}{9}$

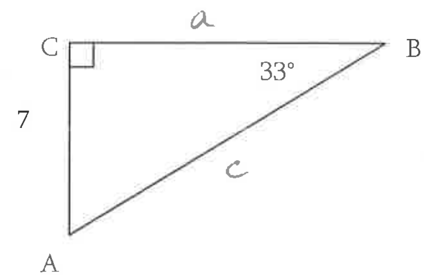
$\theta = 33.75°$

d) $\cos 35° = \frac{8}{x}$

$x = 9.77$

In order to solve a right triangle, you must find the measurement of all three sides and all three angles.

Example 2 - Solve ΔABC to the nearest tenth.



$\angle A = 180° - 90° - 33°$

$= \underline{\underline{57°}}$

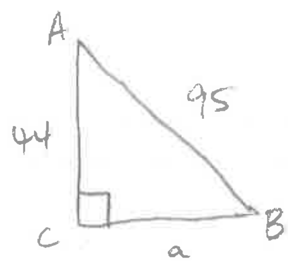
$\tan 33° = \frac{7}{a}$

$a = 10.78$

$\sin 33° = \frac{7}{c}$

$c = \underline{12.85}$

Example 3 – Sketch & solve ΔABC to the nearest tenth where $<C=90°$, c =95cm & b =44cm



$\cos A = \frac{44}{95}$

$A = \underline{\underline{62.41°}}$

$B = 180° - 62.41° - 90°$

$= \underline{\underline{27.59°}}$

$\sin A = \frac{a}{95}$

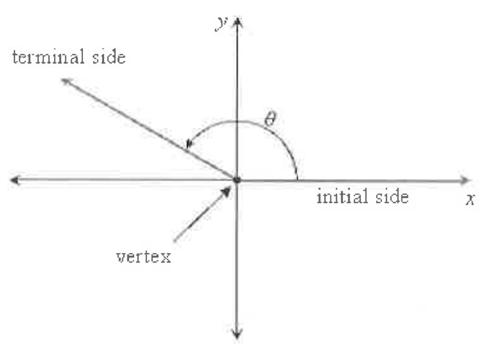
$\sin 62.41° = \frac{a}{95}$

$\underline{\underline{a = 84.20 \text{ cm}}}$

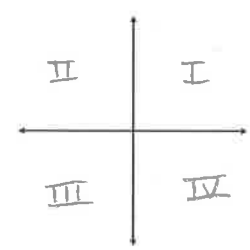
angles in standard position

An angle that is drawn in **standard position** must have its vertex at the origin of the Cartesian plane, and its initial arm must coincide with the positive x-axis.

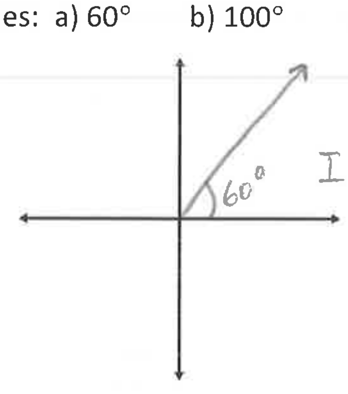
To draw angles in standard position, we use an **initial arm** (always the positive x-axis) and a **terminal arm** (the final position after a rotation). The angle is labeled **θ** (*theta*). The **vertex** of the angle must be at the origin (0, 0) of a Cartesian plane. Positive angles are measured in a counterclockwise direction. Here is an example:

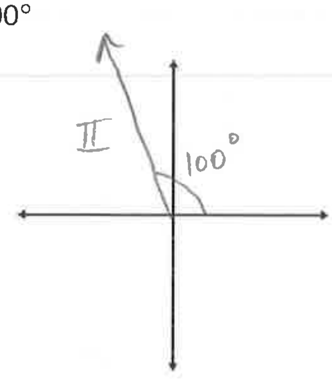


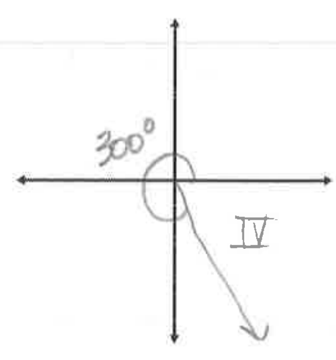
Label the four quadrants of a Cartesian plane:



Example 4 – Draw each angle in standard position and identify the quadrant in which it lies: a) 60° b) 100° c) 300°







Name: ______________________ Date: Key

7.0 - Right Triangle Trigonometry Worksheet

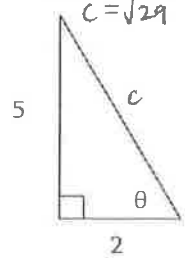
1) Find the hypotenuse for each triangle, then find the three trig ratios as a fraction and decimal (to the nearest thousandth) for each triangle. Then find the unknown angle for each (to the nearest degree).

a) $2^2+5^2=c^2$

$4+25=c^2$

$29=c^2$

$c=\sqrt{29}$



$\theta = 68°$

$\tan\theta = \frac{5}{2} = 2.5$ $\sin\theta = \frac{5}{\sqrt{29}} = \frac{5\sqrt{29}}{29} = 0.928$

$\cos\theta = \frac{2}{\sqrt{29}} = \frac{2\sqrt{29}}{29} = 0.371$

b) $4^2+5^2=c^2$

$16+25=c^2$

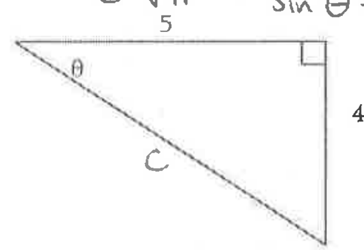
$41=c^2$

$c=\sqrt{41}$

$\tan\theta = \frac{4}{5} = 0.8$

$\cos\theta = \frac{5}{\sqrt{41}} = \frac{5\sqrt{41}}{41} = 0.781$

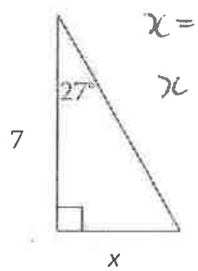
$\sin\theta = \frac{4}{\sqrt{41}} = \frac{4\sqrt{41}}{41} = 0.625$



$\theta = 39°$

2) Find x to the nearest tenth.

a)

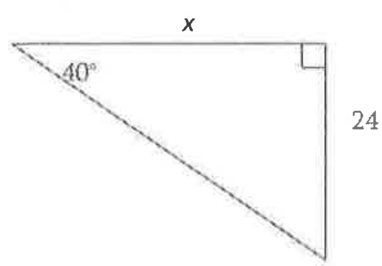


$\tan 27° = \frac{x}{7}$

$x = 7\tan 27°$

$x = 3.6$

b)

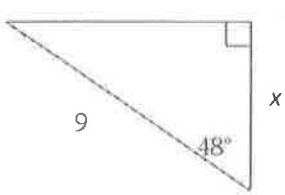


$\tan 40° = \frac{24}{x}$

$x = \frac{24}{\tan 40°}$

$x = 28.6$

c)

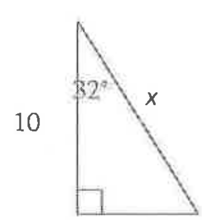


$\cos 48° = \frac{x}{9}$

$x = 9\cos 48°$

$x \approx 6.0$

d)



$\cos 32° = \frac{10}{x}$

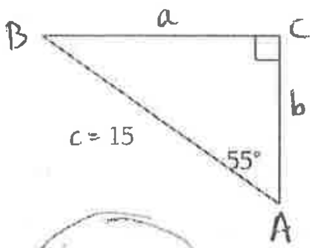
$x = \frac{10}{\cos 32°}$

$x = 11.8$

3) Solve the following triangles to the nearest tenth.

a)

$\angle A = 55°$	$a =$
$\angle B =$	$b =$
$\angle C = 90°$	$c = 15$



$\angle B$

$180 - 90 - 55$

$\angle B = 35°$

side a:

$\sin 55° = \frac{a}{15}$

$a = 15 \sin 55° = 12.29$

$= 12.3$

side b

$\cos 55° = \frac{b}{15}$

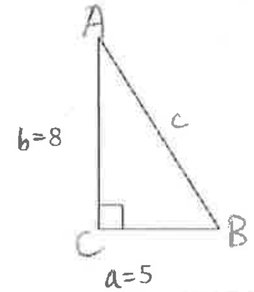
$b = 15 \cos 55°$

$b = 8.6$

$\angle B = 35°$
$a = 12.3$
$b = 8.6$

b)

$\angle A =$	$a = 5$
$\angle B =$	$b = 8$
$\angle C = 90°$	$c =$



$\tan A = \frac{5}{8}$

$\angle A = \tan^{-1}\frac{5}{8} = 32°$

$\angle B = 180 - 90 - 32 = 58°$

side c:

$5^2 + 8^2 = c^2$

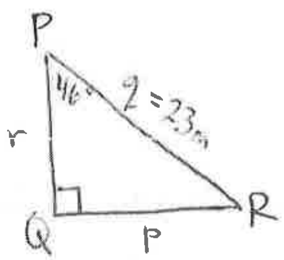
$25 + 64 = c^2$

$89 = c^2$

$c = \sqrt{89} = 9.4$

$\angle A = 32°$
$\angle B = 58°$
$c = 9.4$

4) Sketch and solve ΔPQR: $<P = 46°$, $<Q = 90°$, & $q = 23m$



$\angle P = 46°$	$p =$
$\angle Q = 90°$	$q = 23m$
$\angle R =$	$r =$

$\angle R$:

$180 - 90 - 46°$

$\angle R = 44°$

$\sin 46° = \frac{p}{23}$

$p = 23 \sin 46°$

$p = 16.545m$

$\cos 46° = \frac{r}{23}$

$r = 23 \cos 46°$

$r = 15.977m$

$\angle R = 44°$
$p = 16.5m$
$r = 16.0m$

In the text, do p.257 #1acegi, 2aceg