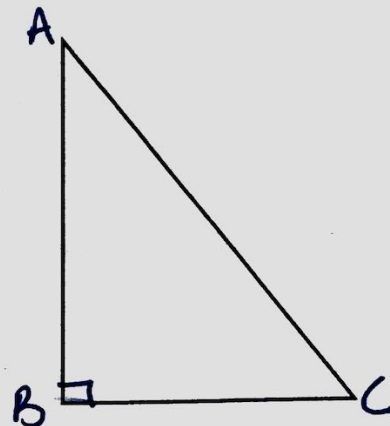


Geometry – Day 6.2
Trigonometry Co-Functions

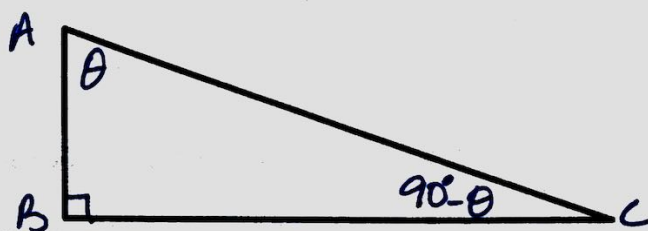
Name: _____

Let's look at the relationship between our trig ratios.

- Start with a right triangle $\triangle ABC$ where $\angle B = 90^\circ$ *(totals 90°)*
- The acute angles will always be Complementary.
 - If $\angle A = 30^\circ$, then $\angle C = \underline{60^\circ}$
 - If $\angle A = 45^\circ$, then $\angle C = \underline{45^\circ}$
 - If $\angle A = 22^\circ$, then $\angle C = \underline{68^\circ}$



- Let's summarize:
 - If $\angle A = \theta$, then $\angle C = \underline{90^\circ - \theta}$



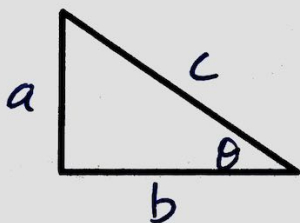
For each of the following find the trigonometric ratio.

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$\sin \theta = \frac{a}{c}$

$\cos \theta = \frac{b}{c}$

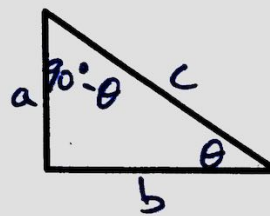
$\tan \theta = \frac{a}{b}$



$\sin(90 - \theta) = \frac{b}{c}$

$\cos(90 - \theta) = \frac{a}{c}$

$\tan(90 - \theta) = \frac{b}{a}$



Trigonometry Co-Functions

$\sin \theta^\circ = \cos(90^\circ - \theta)$ $\cos \theta^\circ = \sin(90^\circ - \theta)$ $\tan \theta^\circ = \text{reciprocal of } \tan(90^\circ - \theta)$

Use co-functions to answer the following:

1. $\sin \theta = \frac{21}{29}$
 $\cos(90 - \theta) = \frac{21}{29}$

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

3. $\tan \theta = \frac{12}{37}$
 $\tan(90 - \theta) = \frac{37}{12}$

4. $\sin 15 = \cos \underline{75^\circ}$
 $\cos(90 - 15^\circ)$

5. $\sin \underline{36^\circ} = \cos 54$
 $\sin(90 - 54^\circ)$

6. $\sin 11 = \cos \underline{79^\circ}$
 $\cos(90 - 11^\circ)$

7. Is it ever possible that $\sin(x) = \cos(x)$. Explain your reasoning.

Complementary (total 90°)

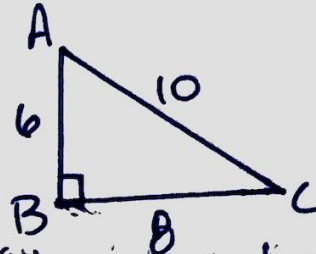
$$\begin{aligned} x + x &= 90^\circ \\ 2x &= 90^\circ \\ x &= 45^\circ \end{aligned} \quad \text{yes!}$$

Draw $\triangle ABC$ where $\angle B = 90^\circ$ and $\cos A = \frac{6}{10}$.

8. What is the length of AB? 6

9. What is $\cos C$? $\frac{8}{10} = \frac{4}{5}$

10. What is $\sin A$? $\frac{8}{10} = \frac{4}{5}$



Pythagorean Triple!

3, 4, 5
6, 8, 10

OR
 $6^2 + x^2 = 10^2$
 $x^2 = 64 \quad x = 8$

~~The sin of an angle equals the cos of its complementary \angle .~~

11. In right $\triangle ABC$: $m\angle C = 90^\circ$. If $\sin A = m$, then $\cos B =$ _____.

A. $90 - m$

B. $45 - m$

C. $90 + m$



D. m

12. If $\cos 40 = \sin \theta$, then $\theta =$ _____.

A. 40°

B. 50°

C. 60°

D. 90°

13. If $\sin 71 = \cos \theta$, then $\theta =$ _____.

A. 71°

B. 35°

C. 29°

D. 19°

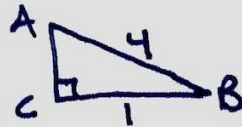
14. In $\triangle ABC$: $m\angle C = 90^\circ$. If $\sin A = \frac{1}{4}$, then _____ = $\frac{1}{4}$. (There are 2 answers!)

A. $\sin(B)$

B. $\cos(B) = \frac{1}{4}$

C. $\cos(90-A) = \frac{1}{4}$

D. $\cos(90-B)$



15. In $\triangle ABC$: $m\angle C = 90^\circ$. If $\sin A = 3x - 0.6$ and $\cos B = 4x - 0.9$, then $x =$ _____.

A. 0.3

B. 0.4

C. 0.6

D. 1.5

$$\begin{aligned} 3x - .6 &= 4x - .9 \\ .3 &= x \end{aligned}$$