4/30 Aim: Sine and Cosine of Complementary and Special angles

Do Now: Calculator

Worksheet fill in the top chart.

Homework out on your desk.

Homework:

Feb 6-7:30 AM

θ

α

β

<u>Theta</u> is a Greek letter that we use to represent angle measure.

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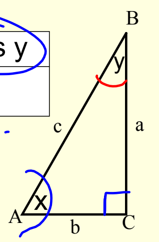
In right triangle ABC, the measurement of acute <A is denoted by x, and the measurement of acute angle <B is denoted by y.

sin x	sin y	cos x	cos y
$\frac{a}{c}$	$\frac{b}{c}$	$\frac{b}{c}$	$\frac{a}{c}$

SOH CAH TOA

$x + y = 90°$



What can you conclude from these results?

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If x and y are the measurements of complementary angles, then we are going to show that

$$\sin x = \cos y$$

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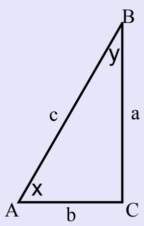
1. Consider the right triangle ABC so that <C is a right angle, and the degree measures of <A and <B are x and y, respectively.

a. What is the value x + y

$$x + y = 90$$



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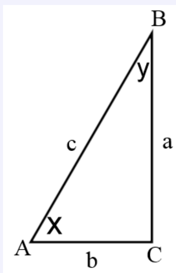
b. Use trigonometric ratios to describe BC/AB two different ways.

c. Use trigonometric ratios to describe AC/AB two different ways.



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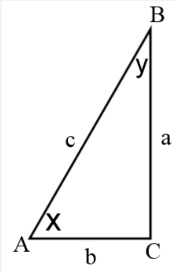
c. Use trigonometric ratios to describe AC/AB two different ways.



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d. What can you conclude about **sin** x and **cos** y?

sin of an ∡ = cos of its complement

sin x = cos y

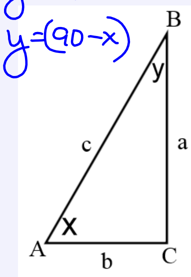
$\sin x = \cos(90 - x)$

$x + y = 90$

$y = (90 - x)$

e. What can you conclude about **cos x** and **sin y?**

cos x = sin y



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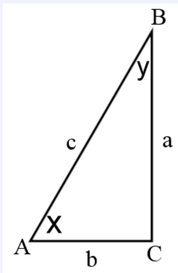
e. What can you conclude about **cos x** and **sin y?**



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2. Find the values for θ that make each statement true.

a. $\sin\theta = \cos(25)$ $\theta + 25 = 90$ $\theta = 65$

$\theta + 25 = 90$
$-25 \quad -25$
$\theta = 65$

b. $\sin 80 = \cos\theta$ $80 + \theta = 90$ $\theta = 10$

$80 + \theta = 90$
$-80 \quad -80$
$\theta = 10$

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c. $\sin\theta = \cos(\theta + 10)$

$\theta + \theta + 10 = 90$
$2\theta + \cancel{10} = 90$
$-10 \quad -10$
$\frac{2\theta}{2} = \frac{80}{2}$
$\theta = 40$

d. $\sin(\theta - 45) = \cos\theta$

$\theta - 45 + \theta = 90$
$2\theta - \cancel{45} = 90$
$+45 \quad +45$
$\frac{2\theta}{2} = \frac{135}{2}$
$\theta = 67.5°$

Apr 13-6:30 AM

3. For what angle measurement must sine and cosine have the same value? Explain how you know.

45° because $\sin x = \cos y$

$x + y$ must $= 90$

$\sin x = \cos y$

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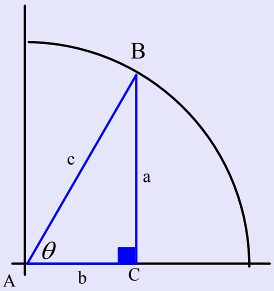
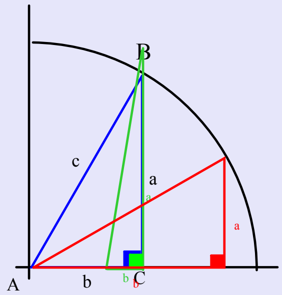
example 2

What is happening to a and b as θ changes?

What happens to sin θ and cosθ



Apr 8-7:49 AM



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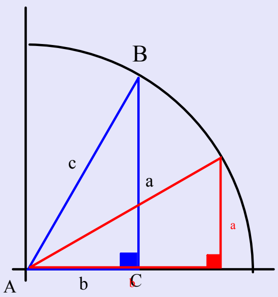

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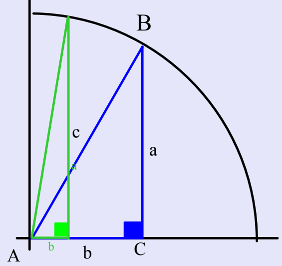
If we look at the θ becoming closer to 90 degrees
you notice the reverse is happening
sine is closer to 1 and cosine is closer to 0.



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<u>Theorem</u>: The sine of any acute angle is equal to the cosine if its complementary.

$$\sin(\theta) = \cos(90 - \theta)$$

$\cancel{\theta} + 90 - \cancel{\theta} = 90$

$90 = 90$

Feb 6-10:29 AM

1. Write the expression as a function of an acute angle whose measure is less than 45°.

90 - 80 =

Example: **sin(80) =** cos10 **cos (90-80)= cos (10)**

90 - 72 =

1. cos(72°) = sin18
2. sin(50°) = cos40
3. sin(54.3°) = cos35.7
4. cos(75°) = sin15
5. sin(56.9)°) = cos 33.1
6. cos(48°) = sin42
7. cos(88°) = sin 2
8. cos(67°) = sin23
9. sin(65°) = cos25
10. sin(47.7°) = cos 42.3
11. cos(63.96°) = sin 26.04
12. sin(54.845°) = cos 35.155

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2. The equation contains the measures of 2 acute angles. Find the value of x for which the statement is true.

***Example*: sin x = cos 10   x + 10 = 90   x = 9**

1. $\sin x^\circ = \cos x^\circ$
2. $\sin x^\circ + \cos(x + 60)^\circ$
3. $\sin(x + 8)^\circ = \cos(90 - 2x)^\circ$
4. $\cos(x + 5)^\circ = \sin(2x - 20)^\circ$
5. $\sin(x^\circ) = \cos(2x^\circ)$
6. $\sin(48^\circ) = \cos(x^\circ)$
7. $\text{Cos}(70^\circ) = \sin(x^\circ)$
8. $\text{Cos}(x^\circ) = \sin(2x+15)^\circ$

$x + 2x + 15 = 90$

$3x + 15 = 90$

$3x + 15 = 90$

$-15 \quad -15$

$\frac{3x}{3} = \frac{75}{3}$

$\boxed{x = 25}$

9. $\text{Cos}(4x^\circ) = \sin(8x^\circ)$
10. $\text{Sin}(x - 25^\circ) = \cos(3x+43)^\circ$

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11. Find the value of θ that makes each statement true.

a. $\sin\theta = \cos(\theta + 38)$

b. $\cos\theta = \sin(\theta - 30)$

c. $\sin\theta = \cos(3\theta + 20)$

d. $\sin\left(\frac{\theta}{3} + 10\right) = \cos\theta$

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12. Make a prediction about how the sum sin 30 + cos 60 will relate to the sum sin 60 + cos 30.

b. Use the sine and cosine values of special angles to find the sum: sin 30 + cos 60.

c. Find the sum: sin 60 + cos 30.

d. Was your prediction a valid prediction? Explain why or why not.

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13. Langdon thinks that the sum sin 30 + sin 30 is equal to sin 60. Do you agree with Langdon? Explain what this means about the sum of the sines of angles.

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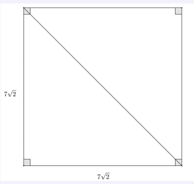
14. A square has side lengths of $7\sqrt{2}$. Use sine or cosine to find the length of the diagonal of the square. Confirm your answer using the Pythagorean Theorem.



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15. Given an equilateral triangle with sides of length9, find the length of the altitude. Confirm your answer using the Pythagorean Theorem.

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Apr 24-2:18 PM

Attachments

The Unit Circle