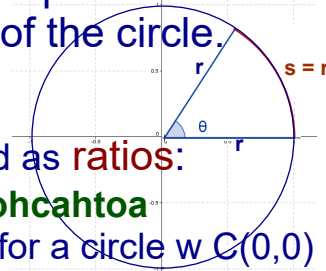


5.1 Angles and Radian Measure

GOALS:

- Angles have measures in degrees or radians.
- There are $360^\circ = 2\pi$ radians in a complete circle.
1 radian subtends an arc = radius of the circle.

$s = r\theta$ G: $r = 9 \text{ yds}$, $\theta = 315^\circ$ F: $s = 63\pi/4 \text{ yds}$



- Trig functions of an angle are defined as ratios:
 - the sides of the associated triangle: **sohcahtoa**
 - the coordinates of pt.(x,y) & the radius r for a circle w C(0,0)

$\sin\theta = y/r$ $\csc\theta = r/y$ | $\cos\theta = x/r$ $\sec\theta = r/x$ | $\tan\theta = y/x$ $\cot\theta = x/y$

- Signs (+ or -) of trig functions are determined by the quadrant with the terminal ray.

$\sin\theta, \csc\theta$ positive in Q1, Q2 ($y > 0$) | $\cos\theta, \sec\theta$ positive in Q1, Q4 ($x > 0$)
 $\tan\theta, \cot\theta$ positive in Q1, Q3 (x, y same sign)

- To convert degrees to radians mult. by $\pi / 180^\circ$.
To convert radians to degrees mult. by $180^\circ / \pi$.

$60^\circ \cdot \frac{\pi}{180^\circ} = \frac{\pi}{3}$

$-\frac{7\pi}{4} \cdot \frac{180^\circ}{\pi} = -7(45^\circ) = -315^\circ$

Class Notes: Prof. G. Battaly, Westchester Community College, NY

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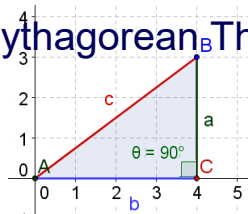
Homework

5.2 Right Triangle Trigonometry

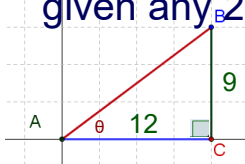
GOALS:

- Understand and use the Pythagorean Theorem

$c^2 = a^2 + b^2$



- Define trig functions for a right triangle: **soh cah toa**
- Find values of all the trig functions for a triangle, given any 2 parts of the triangle.



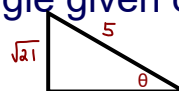
F: $\sin \theta$	$\csc \theta$	$\tan \theta = 3/4$	$\cot \theta = 4/3$
$\cos \theta$	$\sec \theta$	$\sec \theta = 5/4$	$\csc \theta = 5/3$
$\tan \theta$	$\cot \theta$	$\csc \theta = 5/3$	$\tan \theta = 3/4$

- Learn how to recognize the special triangles:
 $30^\circ, 60^\circ, 90^\circ$ $45^\circ, 45^\circ, 90^\circ$

- Evaluate the special triangles using:
 $\sin 30^\circ = 1/2$ $\tan 45^\circ = 1$

- Find trig functions of an angle given other trig funct.

G: $\sin \theta = \frac{\sqrt{21}}{5}$ F: $\cos \theta$



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Homework

5.3 Trig Functions of Any Angle

GOALS:

1. Identify angles using a point (x,y) on the terminal ray.

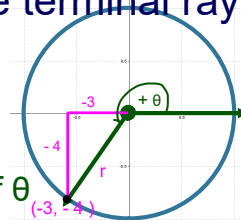
2. Evaluate trig functions for all angles using a point (x,y) on the terminal ray.

G: $(-3, -4)$ on terminal ray of θ F: all 6 trig functions of θ

$$\sin \theta = \frac{y}{r} = \frac{-4}{5} \quad \csc \theta = \frac{-5}{4}$$

$$\cos \theta = \frac{x}{r} = \frac{-3}{5} \quad \sec \theta = \frac{-5}{3}$$

$$\tan \theta = \frac{y}{x} = \frac{-4}{-3} = \frac{4}{3} \quad \cot \theta = \frac{3}{4}$$



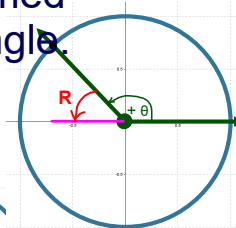
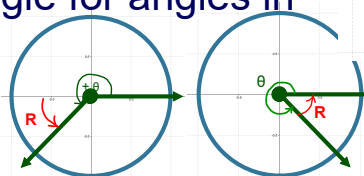
3. Understand that the reference angle is formed by the x-axis and the terminal ray of the angle.

Reference angle is: the positive acute angle between the terminal ray of θ and the x-axis

4. Identify the reference angle for angles in all 4 quadrants.

G: 210° F: Reference angle

$$R = 210^\circ - 180^\circ = 30^\circ$$



5.5 Graphing sine and cosine functions

GOALS:

1. Recognize that $f(x) = \sin x$ and $g(x) = \cos x$ are functions. (Each value of x results in exactly 1 y -value.)
2. For both functions, the domain is the set of real numbers; and the range is $-1 \leq y \leq 1$
3. Both functions are periodic and repeat after a period of 2π
4. For $f(x) = A_1 \sin x$ and $g(x) = A_2 \cos x$ the domain is all real numbers, the period is 2π , but the range is $-A_1 \leq y \leq A_1$ and $-A_2 \leq y \leq A_2$ respectively.
5. For $f(x) = A_1 \sin B_1 x$ and $g(x) = A_2 \cos B_2 x$ the period changes to $2\pi/B_1$ and $2\pi/B_2$, respectively, the range remains $-A_1 \leq y \leq A_1$ and $-A_2 \leq y \leq A_2$ respectively.
6. $f(x) = A_1 \sin(B_1 x - C_1) + D_1$ and $g(x) = A_2 \cos(B_2 x - C_2) + D_2$
 $- C$ shifts right and left, D shifts up and down

graphing video