Warm up

Find the trig ratio for the following:

1. $\sin\frac{\pi}{3}$
2. $\cos\frac{\pi}{4}$
3. $\csc\frac{\pi}{6}$
4. $\tan 30°$
5. $\sec 45°$
6. $\cot 45°$

Find θ in degrees.

7. $\sin\theta = \frac{1}{\sqrt{2}}$
8. $\csc\theta = \frac{2}{\sqrt{3}}$
9. $\cot\theta = \sqrt{3}$
10. $\cos\theta = \frac{1}{2}$

Jan 4-3:55 PM

4.4 Trig Functions of any angle Day 1

Warm up

WB p 100 1-23 odds in pairs!

trig ratios for angles > 90 or $\frac{\pi}{2}$

ASTC

Quadrant angle values

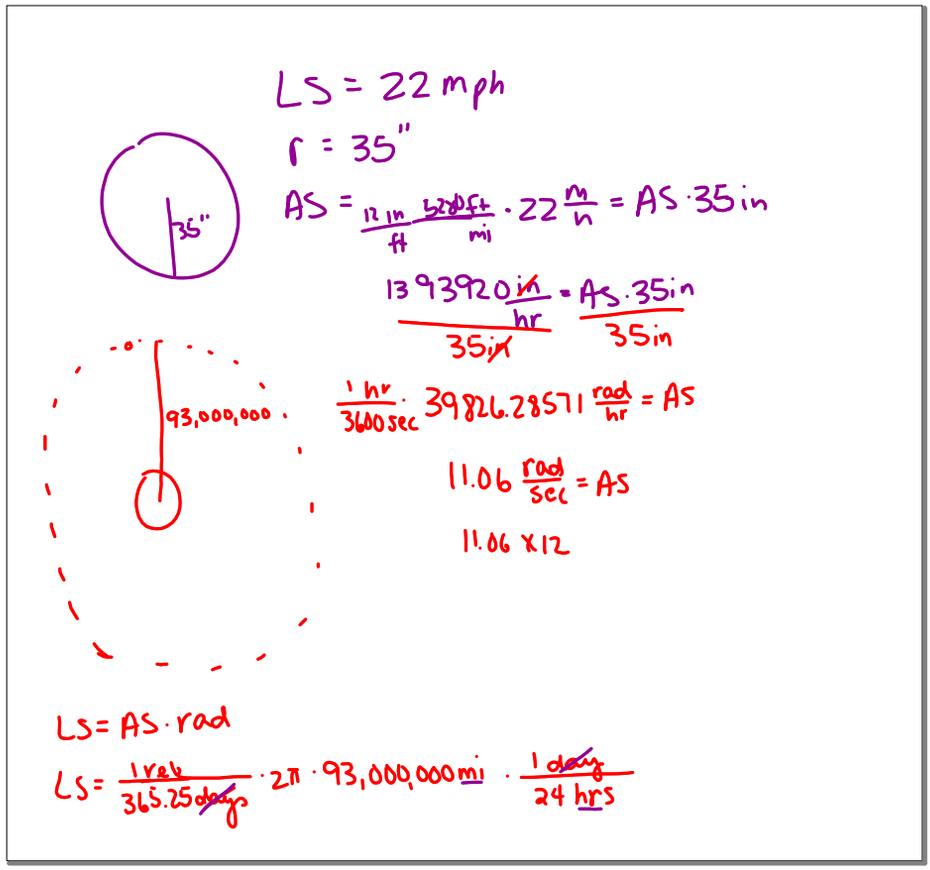
What quadrant am I in?

$\cot\theta = .4245$

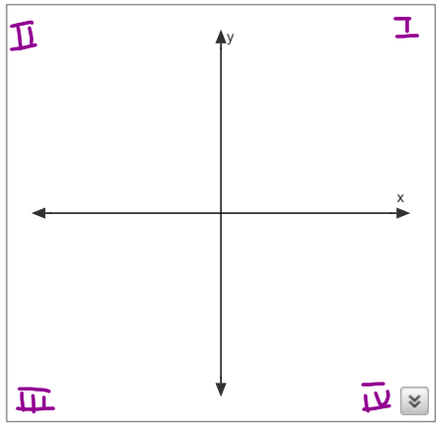
$\tan^{-1}\left(\frac{1}{.4245}\right)$

$\frac{1}{\tan 75}$

Jan 4-3:55 PM



So far we have talked only about trig ratios of acute angles. What if the angle I want to evaluate is obtuse?



Remember that on the unit circle

$(x, y) = (\cos\theta, \sin\theta)$

= (adj side, opp side)

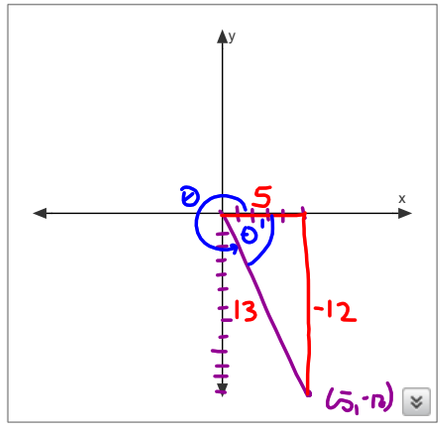
Jan 4-3:59 PM

Example: Let (5, -12) be a point on the terminal side of angle θ, find $\sin\theta$, $\cos\theta$, $\tan\theta$

Step 1: Draw a triangle with the x-axis

Step 2: Find the third side

Step 3: Find the ratios



$\sin\theta = \sin\theta' = -\frac{12}{13}$

$\cos\theta = \cos\theta' = \frac{5}{13}$

$\tan\theta = \tan\theta' = -\frac{12}{5}$

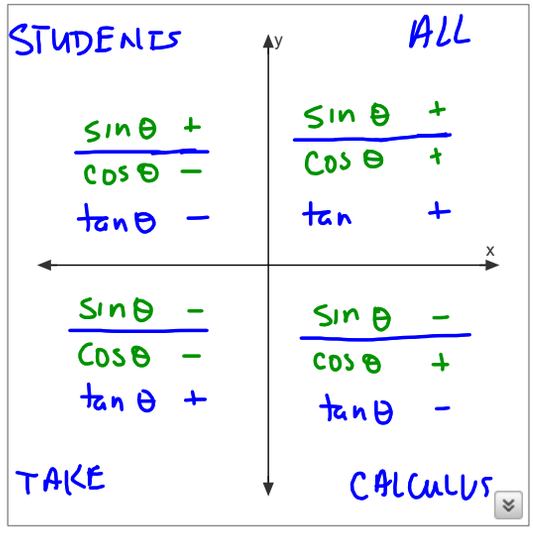
Jan 4-4:05 PM

ASTC

$(x, y) = (\cos\theta, \sin\theta)$

= (adj side, opp side)

$\frac{\sin\theta}{\cos\theta} = \tan\theta$



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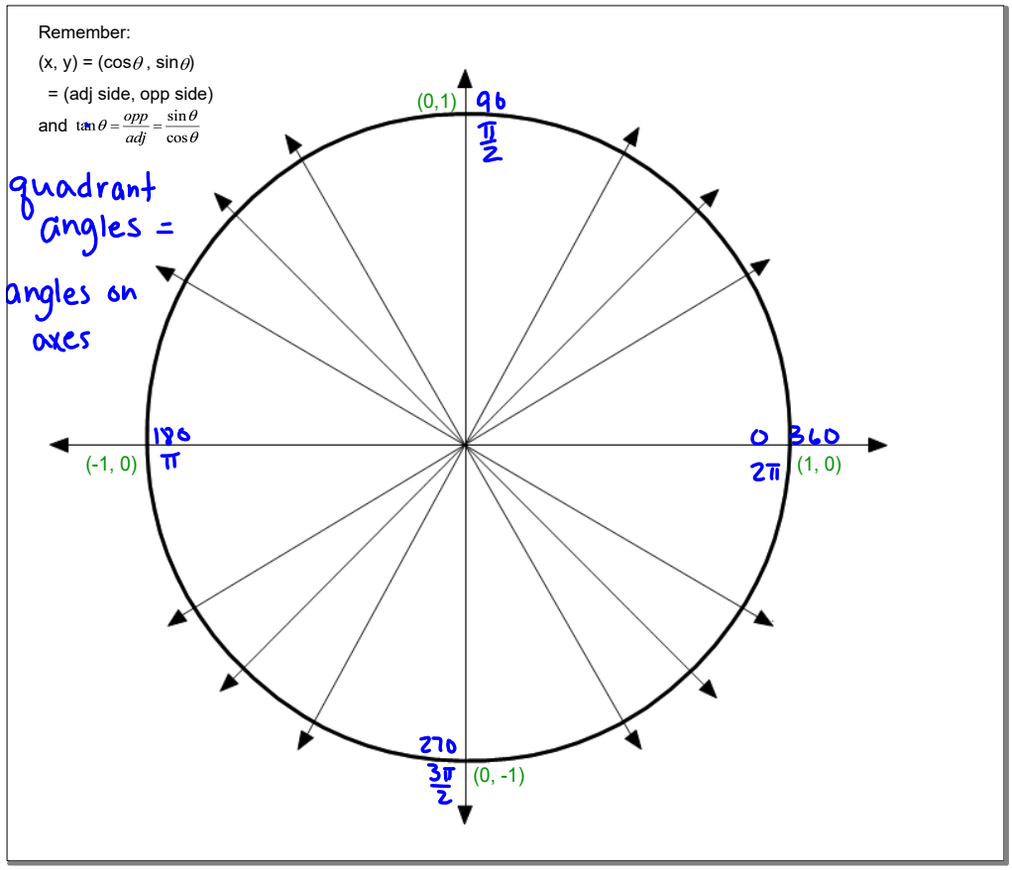


Jan 11-2:00 PM

$(x, y) = (\cos\theta, \sin\theta)$

(0,1) (-1,0) (1,0) (0,-1)

	0, 360 or 0, 2π	90 or π/2	180 or π	270 or 3π/2
sin θ	0	1	0	-1
cos θ	1	0	-1	0
tan θ	0	und	0	und
csc θ	und	1	und	-1
sec θ	1	und	-1	und
cot θ	und	0	und	0

$\frac{0}{1} = 0$

$\frac{1}{0} = \text{und}$

$\frac{1}{1} = \frac{1}{1}$

Jan 22-5:46 AM

What quadrant am I in??

$\sin\theta > 0 \quad \tan\theta > 0 \Rightarrow$ I

(I) II (I) III

$\cos\theta < 0 \quad \sin\theta < 0 \Rightarrow$ III

II IV III IV

$\sec\theta < 0 \quad \cot\theta < 0$

$\cos\theta < 0 \quad \tan\theta < 0 \Rightarrow$ II

(II) III (IV) IV

$\cot\pi$ 

$\tan\pi = \frac{\sin\pi}{\cos\pi}$

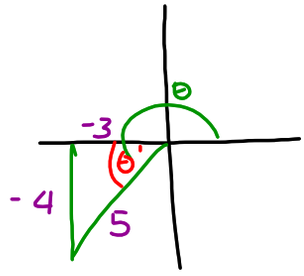
$\cot\pi = \frac{\cos\pi}{\sin\pi} = \frac{-1}{0} = \text{und}$

Jan 4-4:23 PM

find the remaining 5 trig ratios (values) given:

$\sin\theta = -\frac{4}{5}, \quad \cos\theta < 0$

III IV II III



$\sin\theta = \sin\theta' = -\frac{4}{5}$

$\cos\theta = \cos\theta' = -\frac{3}{5}$

$\tan\theta = \tan\theta' = \frac{4}{3}$

$\csc\theta' = -\frac{5}{4}$

$\sec\theta' = -\frac{5}{3}$

$\cot\theta' = \frac{3}{4}$

QIII only tanθ & its reciprocal cotθ are positive!

Jan 4-4:29 PM

HOMEWORK

p 294

1-21 odd, 29-36 all

Feb 2-9:51 PM

GO COUGARS!

Homework Questions

12. (a)  (b) 

13. (a) $-\frac{9\pi}{4}$ (b) $-\frac{7\pi}{15}$

14. (a) $\frac{7\pi}{4}$ (b) $\frac{8\pi}{15}$

In Exercises 15–20, find (if possible) the complement and supplement of the angle.

15. $\frac{\pi}{3}$ **16.** $\frac{3\pi}{4}$

17. $\frac{\pi}{6}$ **18.** $\frac{2\pi}{3}$

In Exercises 9–16, sketch a right triangle corresponding to the trigonometric function of the acute angle θ. Use the Pythagorean Theorem to determine the third side of the triangle and then find the other five trigonometric functions of θ.

9. $\sin\theta = \frac{3}{5}$ **10.** $\cot\theta = 5$

11. $\sec\theta = 4$ **12.** $\cos\theta = \frac{1}{3}$

13. $\tan\theta = 3$ **14.** $\csc\theta = \frac{12}{5}$

15. $\cot\theta = \frac{3}{4}$ **16.** $\sin\theta = \frac{1}{4}$

In Exercises 57–62, use a calculator to evaluate each function. Round your answers to four decimal places. (Be sure the calculator is in the correct angle mode.)

57. (a) sin 41° (b) cos 87°

58. (a) tan 18.5° (b) cot 71.5°

59. (a) sec 42° 12′ (b) csc 48° 7′

60. (a) cos 8° 50′ 25″ (b) sec 8° 50′ 25″

61. (a) $\cot\frac{\pi}{16}$ (b) $\tan\frac{\pi}{8}$

62. (a) sec 1.54 (b) cos 1.25

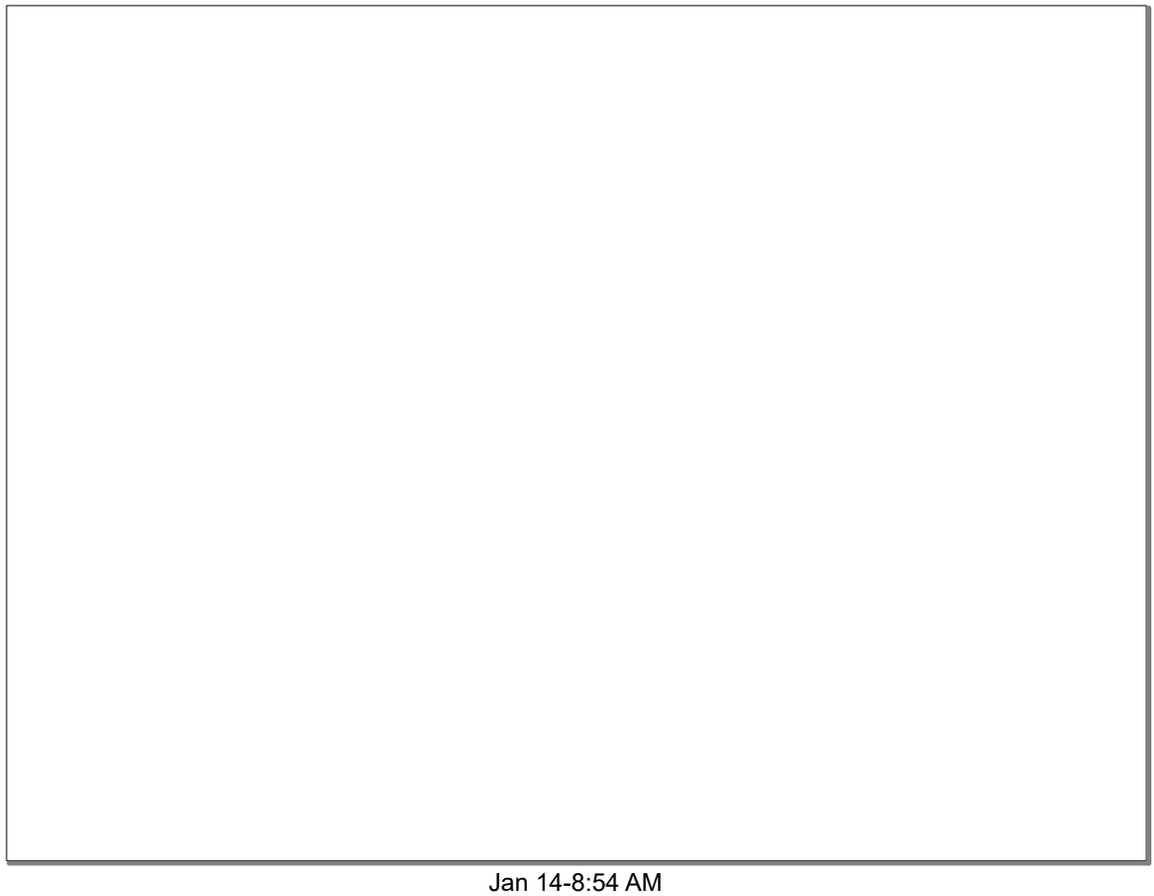
Workbook Answers

1. 7.73 rad/min 2. 12.99 rad/sec
3. 1441.94 rev/min 4a. 14.29 m/sec
4b. 211.6 cm/sec
5a. 5.28 cm/sec 6. 104.72 rad/sec
5b. 8.73 cm/sec
7. 17.45 ft/sec 8. fastest - outside
9. 17222.54 mph 10. 728.29 rev/min

4.1 - Linear & Angular Speeds WS #3

1. A wheel rotates 1.23 revolutions per minute. Find the angular speed in radians of a point of the wheel.
2. Determine the angular speed in radians per second of a wheel turning 124 revolutions per minute.
3. Determine the number of revolutions per minute of the wheel rotating 151rad/s.
4. Determine linear speed of a point rotating at the given angular speed at a distance (radius) from the axis of rotation
   A) r=1.3m AS=3.5π rad/s B) r=9.2cm AS=23 rad/s
5. Determine the linear speed of a point on a circle r units from the center that moves through an angle θ in 1 min. Express answer in cm/s.
   A) r= 72cm θ=1.4π rad B) r=1.2 m θ=250°
6. If an engine is making 1000rpm, what is the angular speed of the engine's crank shaft in radians/sec.
7. A Ferris wheel 250 ft in diameter makes one revolution every 45 seconds. Determine the linear speed of a car on the rim of the wheel.
8. A large merry-go-around is four horses deep. What seat should a child choose for the fastest ride? For the slowest?
9. Astronomy: A space telescope travels about the earth in a circular orbit at a distance of 380 mi from the earth's surface. It makes one orbit every 95 min. Find its linear speed in mph. (the radius of the earth is approximately 3960 mi).
10. A car is moving at a speed of 65 mph, the diameter of the wheels is 2.5 ft. Find the angular speed of the wheel in radians per minute and find the number of revolutions per minute the wheels are rotating.

Feb 2-9:51 PM



Jan 14-8:54 AM