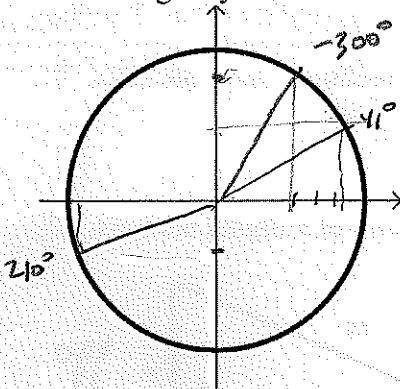
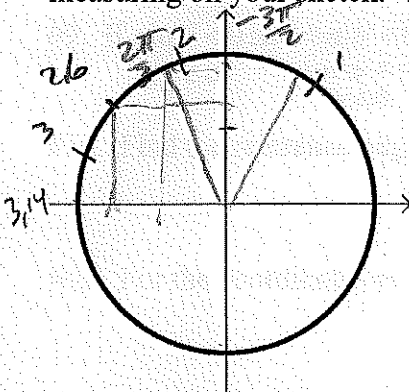


#1. For each of the following angles in degrees, sketch on the circle and estimate  $\sin \theta$  and  $\cos \theta$  by measuring on your sketch. Then check your estimates by find the values using your calculator:



Angle	$\sin \theta$ (measured)	$\cos \theta$ (measured)	$\sin \theta$ (calculator)	$\cos \theta$ (calculator)
$41^\circ$	0.5	0.72	0.656	0.75
$210^\circ$	-0.4	-0.9	-0.5	-0.866
$-300^\circ$	0.85	0.45	0.866	0.5

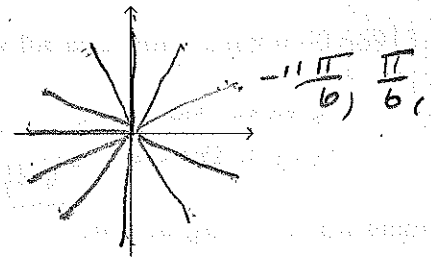
#2. For each of the following angles in radians, sketch on the circle and estimate  $\sin \theta$  and  $\cos \theta$  by measuring on your sketch. Then check your estimates by find the values using your calculator:



Angle (radians)	$\sin \theta$ (measured)	$\cos \theta$ (measured)	$\sin \theta$ (calculator)	$\cos \theta$ (calculator)
$\frac{2\pi}{3}$	0.8	-0.5	0.866	-0.5
$\frac{3\pi}{2}$	1	0	1	0
2.6	0.65	-0.8	0.5155	-0.857

#3. Given  $\theta = \frac{-11\pi}{6}$ , make a sketch and list (a) one positive, and (b) one negative coterminal angle.

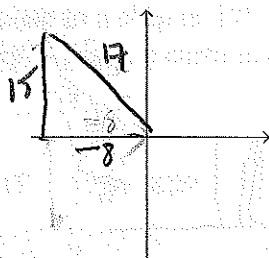
$\frac{\pi}{6}, \frac{-23\pi}{6}$



#4. (a) Convert to radians:  $210^\circ \frac{\pi}{180} = \frac{7\pi}{6}$

(b) Convert to degrees:  $\frac{5\pi}{4} \frac{180}{\pi} = 225^\circ$

#5. Given  $\cos \theta = \frac{-8}{17}$  and  $\sin \theta > 0$ , find the exact values (using a sketch) of the other 5 trig functions.



$\frac{-8}{17} = \frac{x}{r}$   
 $\sin \theta = \frac{y}{r} = \frac{15}{17}$   
 $\tan \theta = \frac{\sin \theta}{\cos \theta} = \frac{15/17}{-8/17} = -\frac{15}{8}$

$\sec \theta = \frac{1}{\cos \theta} = \frac{17}{-8}$   
 $\csc \theta = \frac{1}{\sin \theta} = \frac{17}{15}$   
 $\cot \theta = \frac{1}{\tan \theta} = \frac{8}{-15}$

#6. Find the exact value (no calculator) of the following trig functions:

(a)  $\cos\left(\frac{11\pi}{6}\right) = \frac{\sqrt{3}}{2}$

(b)  $\csc\left(-\frac{\pi}{3}\right) = \frac{1}{\sin\left(-\frac{\pi}{3}\right)}$

(c)  $\tan\left(\frac{\pi}{2}\right) = \frac{\sin\frac{\pi}{2}}{\cos\frac{\pi}{2}} = \frac{1}{0}$

$\frac{11\pi}{6} \left(\frac{\sqrt{3}}{2}, -\frac{1}{2}\right)$

$= \frac{1}{-\frac{\sqrt{3}}{2}} = -\frac{2}{\sqrt{3}} = \frac{-2\sqrt{3}}{3}$

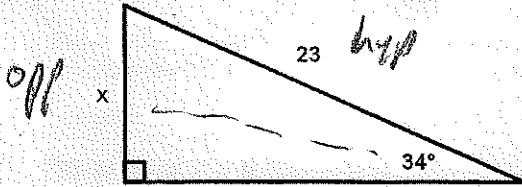
undefined

#7. Find the exact length of the arc intercepted by the central angle  $200^\circ$  on a circle with radius = 10 cm.

$\theta = 200^\circ \frac{\pi}{180} = \frac{10\pi}{9}$

$s = r\theta$   
 $s = 10\left(\frac{10\pi}{9}\right) = \frac{100}{9}\pi \text{ cm} \approx 34.9 \text{ cm}$

#8. Find the length x to three decimal places.



$\sin\theta = \frac{\text{opp}}{\text{hyp}}$   
 $\sin 34^\circ = \frac{x}{23}$

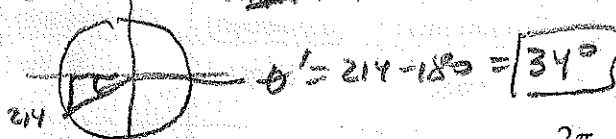
$x = 23 \sin 34^\circ = 12.861$

#9. If  $\sin\theta < 0$  and  $\sec\theta < 0$  in what quadrant does  $\theta$  lie?

$y < 0$     $\cos\theta < 0$   
 $x < 0$

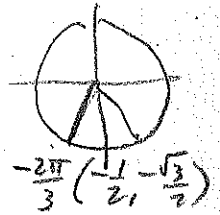
III

#10. Find the reference angle for  $214^\circ$ .



#11. For the coordinates of the point (x,y) on the unit circle that corresponds to  $\theta = \frac{2\pi}{3}$

$\left(-\frac{1}{2}, \frac{\sqrt{3}}{2}\right)$



#12. Use a calculator to evaluate  $\sec(24^\circ 15')$

$\frac{1}{\cos(24^\circ 15')} = 1.0968$

#13. Find two values of  $\theta$  ( $0^\circ < \theta < 360^\circ$ , to nearest degree) that satisfy the equation:  $\sin\theta = -0.66913$

$\theta = \sin^{-1}(-0.66913) = -42^\circ$

$0 < \theta < 360$

So add 360:  $-42 + 360 = 318$



same side, same y

$180 + 42 = 222^\circ$

#14. A skateboard ramp requires a rise of one foot for each three feet of horizontal length. Find the angle of elevation of the ramp to the nearest degree.

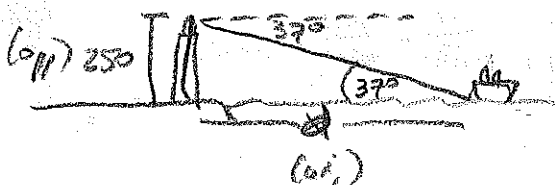


$\tan\theta = \frac{1}{3}$

$\theta = \tan^{-1}\left(\frac{1}{3}\right) = 18.4$

$18^\circ$

#15. A 250 foot tall lighthouse sits at the edge of the ocean. If the angle of depression from the top of the lighthouse to a ship is  $37^\circ$ , what is the distance along the surface of the earth between the lighthouse and the ship? (assume earth is approximately flat over this distance)

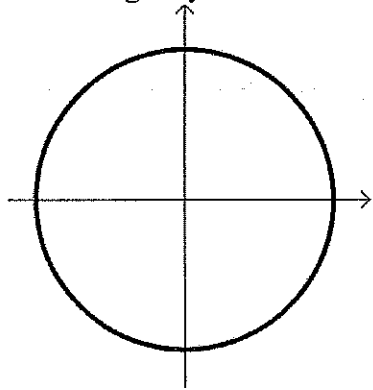


$\tan\theta = \frac{\text{opp}}{\text{adj}}$

$\tan 37^\circ = \frac{250}{d}$

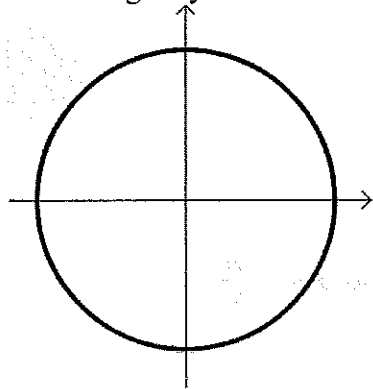
$d = \frac{250}{\tan 37^\circ} = 331.76 \text{ ft}$

#1. For each of the following angles in degrees, sketch on the circle and estimate  $\sin \theta$  and  $\cos \theta$  by measuring on your sketch. Then check your estimates by find the values using your calculator:



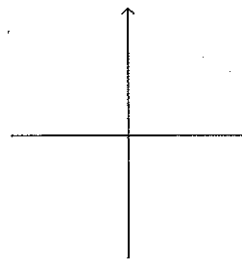
Angle	$\sin \theta$ (measured)	$\cos \theta$ (measured)	$\sin \theta$ (calculator)	$\cos \theta$ (calculator)
$41^\circ$				
$210^\circ$				
$-300^\circ$				

#2. For each of the following angles in radians, sketch on the circle and estimate  $\sin \theta$  and  $\cos \theta$  by measuring on your sketch. Then check your estimates by find the values using your calculator:



Angle (radians)	$\sin \theta$ (measured)	$\cos \theta$ (measured)	$\sin \theta$ (calculator)	$\cos \theta$ (calculator)
$\frac{2\pi}{3}$				
$-\frac{3\pi}{2}$				
2.6				

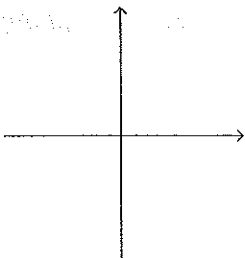
#3. Given  $\theta = \frac{-11\pi}{6}$ , make a sketch and list (a) one positive, and (b) one negative coterminal angle.



#4. (a) Convert to radians:  $210^\circ$

(b) Convert to degrees:  $\frac{5\pi}{4}$

#5. Given  $\cos \theta = \frac{-8}{17}$  and  $\sin \theta > 0$ , find the exact values (using a sketch) of the other 5 trig functions.



#6. Find the exact value (no calculator) of the following trig functions:

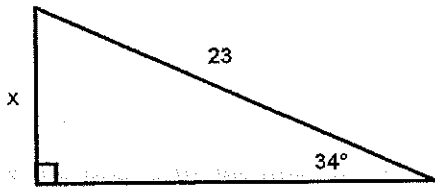
(a)  $\cos\left(\frac{11\pi}{6}\right)$

(b)  $\csc\left(-\frac{\pi}{3}\right)$

(c)  $\tan\left(\frac{\pi}{2}\right)$

#7. Find the exact length of the arc intercepted by the central angle  $200^\circ$  on a circle with radius = 10 cm.

#8. Find the length  $x$  to three decimal places.



#9. If  $\sin \theta < 0$  and  $\sec \theta < 0$  in what quadrant does  $\theta$  lie?

#10. Find the reference angle for  $214^\circ$ .

#11. For the coordinates of the point  $(x,y)$  on the unit circle that corresponds to  $\theta = -\frac{2\pi}{3}$

#12. Use a calculator to evaluate  $\sec(24^\circ 15')$

#13. Find two values of  $\theta$  ( $0^\circ < \theta < 360^\circ$ , to nearest degree) that satisfy the equation:  $\sin \theta = -0.66913$

#14. A skateboard ramp requires a rise of one foot for each three feet of horizontal length. Find the angle of elevation of the ramp to the nearest degree.

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