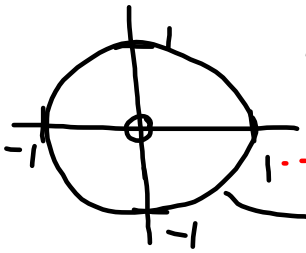
MARCH 28

The Unit Circle" is a circle with radius 1 and centre at the origin (0,0)



Equation of a circle (centre (0,0))

$x^2 + y^2 = r^2$

$x^2 + y^2 = 1$

Not 'unit circle'

- radius of 2 → $x^2 + y^2 = 4$
- radius of 6 → $x^2 + y^2 = 36$

Apr 4-9:50 AM

- Determine the coordinates for all points on the unit circle that satisfy the given conditions

a) the x-coordinate is $\frac{2}{3}$

$x^2 + y^2 = r^2$

$\left(\frac{2}{3}\right)^2 + y^2 = 1$

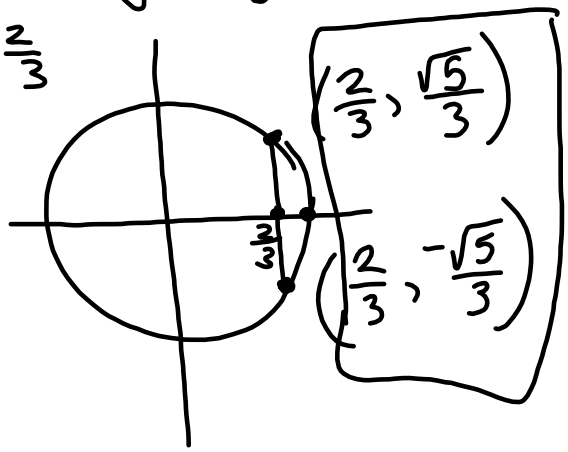
$\frac{4}{9} + y^2 = 1$

$y^2 = 1 - \frac{4}{9}$

$y^2 = \frac{9}{9} - \frac{4}{9}$

$y^2 = \frac{5}{9}$

$y = \pm\sqrt{\frac{5}{9}}$ $\pm\frac{\sqrt{5}}{3}$



Apr 4-10:06 AM

b) the y coordinate is $\frac{-1}{\sqrt{2}}$ and the point is in quadrant III

$x^2+y^2=1$

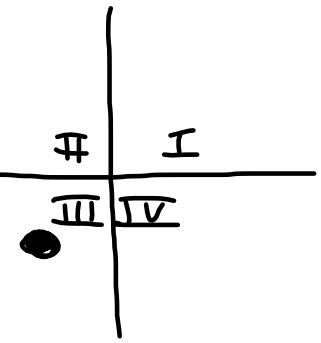
$x^2+\left(\frac{-1}{\sqrt{2}}\right)^2=1$

$x^2+\frac{1}{2}=1$

$x^2=1-\frac{1}{2}$

$x^2=\frac{1}{2}$

$x=\pm\sqrt{\frac{1}{2}}$ → $\pm\frac{1}{\sqrt{2}}$



$-$ ← it can only be $-\frac{1}{\sqrt{2}}$ so the coordinate is $\left(\frac{-1}{\sqrt{2}}, \frac{-1}{\sqrt{2}}\right)$

Apr 4-10:16 AM

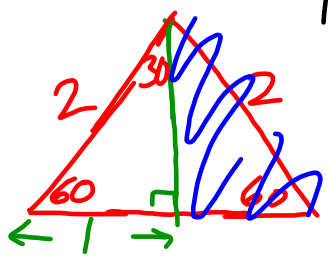
P. 183 Your Turn

a) $\left(-\frac{5}{8}, y\right)$

b) $\left(x, \frac{5}{13}\right)$ quad II

Apr 4-10:35 AM

Recall 'Special Angles' (30°, 45°, 60°)



$\sin 30° = \frac{1}{2}$

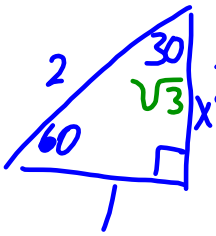
$\cos 30° = \frac{\sqrt{3}}{2}$

$\tan 30° = \frac{1}{\sqrt{3}}$

$\sin 60° = \frac{\sqrt{3}}{2}$

$\cos 60° = \frac{1}{2}$

$\tan 60° = \frac{\sqrt{3}}{1}$

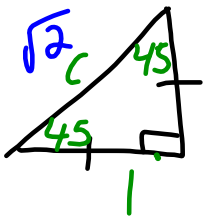


$2^2 = 1^2 + x^2$

$4 = 1 + x^2$

$3 = x^2$

$x = \sqrt{3}$



$c^2 = 1^2 + 1^2$

$c = 1 + 1$

$c = 2$

$c = \sqrt{2}$

$\sin 45° = \frac{1}{\sqrt{2}}$

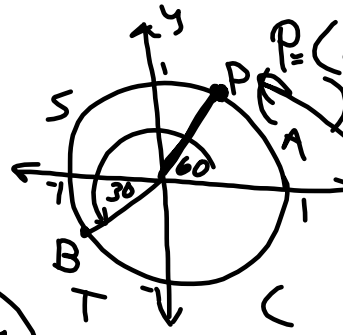
$\cos 45° = \frac{1}{\sqrt{2}}$

$\tan 45° = 1$

Apr 5-9:50 AM

* Any point on the unit circle is equal to $(\cos\theta, \sin\theta)$ *

S	A
T	C



$P = (\cos 60, \sin 60°)$

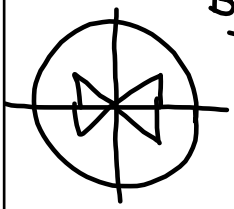
$(0.5, 0.866)$

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

$B = (\cos 210°, \sin 210°)$

$(-0.866, -0.5)$

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

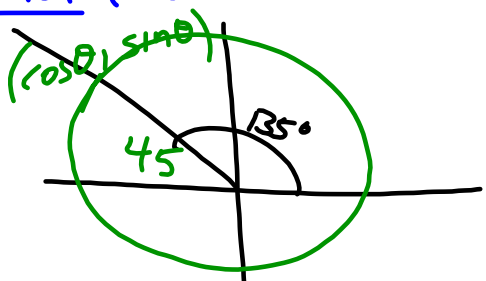


Mar 31-2:06 PM

ex If P(θ) is a point on the unit circle determine the exact coordinates of:

a) $P\left(\frac{3\pi}{4}\right)$ $\frac{3(180)}{4}$

$P(135°)$



$(\cos\theta, \sin\theta)$

$\cos 135, \sin 135$

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

Apr 5-10:03 AM

3a) $P\left(\frac{5\pi}{6}\right)$

b) $P\left(-\frac{7\pi}{4}\right)$

Apr 25-9:57 AM

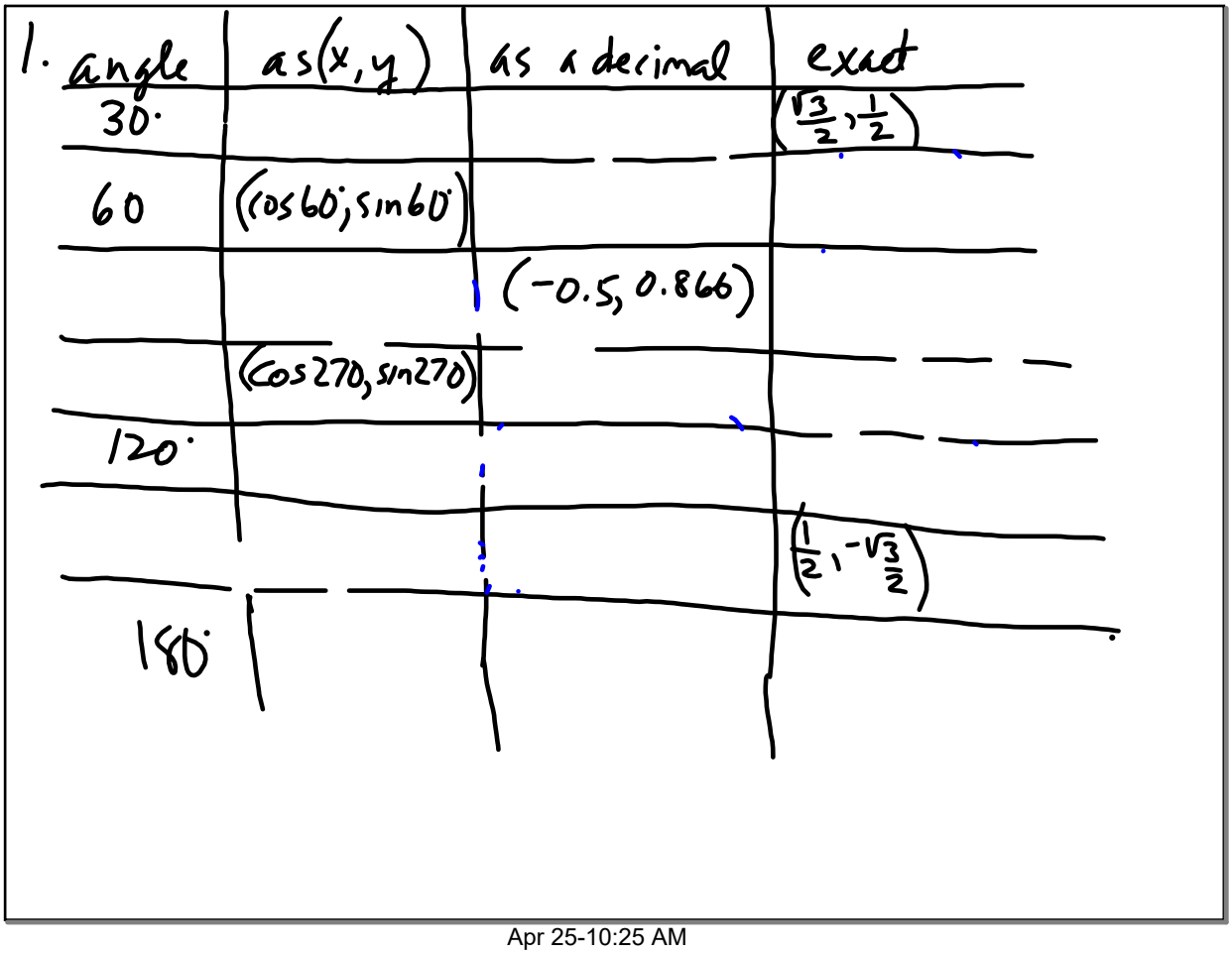
b) $P\left(\frac{5\pi}{3}\right)$

d) $P\left(\frac{7\pi}{6}\right)$

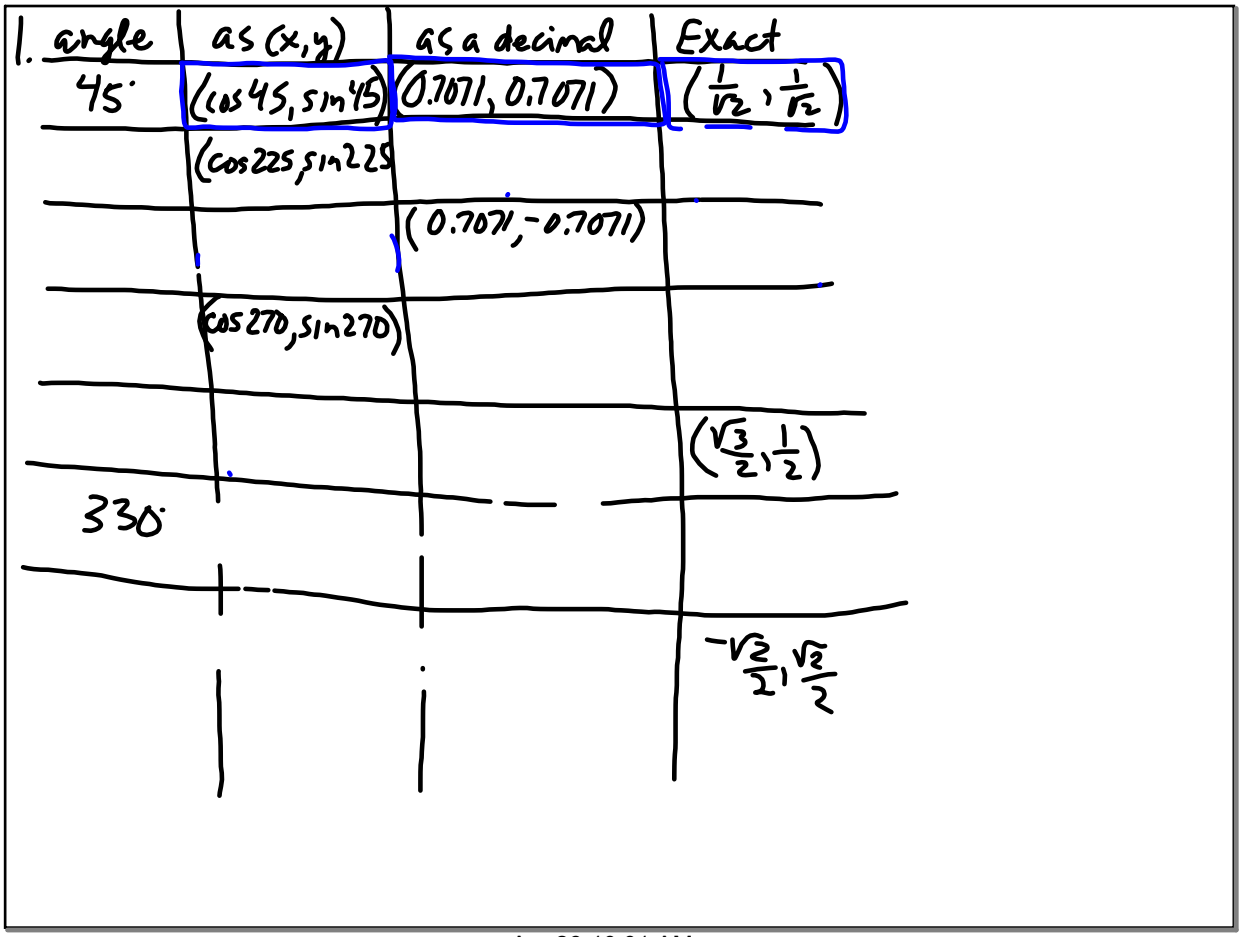
Apr 5-10:12 AM

c) $P\left(\frac{7\pi}{6}\right)$

Apr 5-10:26 AM



Apr 25-10:25 AM



Apr 26-10:01 AM

Sheet 3

Angle of Rotation

degrees	radians	coordinates of P(1,0)	coordinates of P'	radius	arc length
	$\frac{\pi}{6}$			3	
	$\frac{3\pi}{4}$			2	
210°				1	
315°					$7\pi/4$
	$\frac{2\pi}{3}$			3	
150				2	
	$\frac{\pi}{4}$		$\frac{\sqrt{2}}{2}, \frac{-\sqrt{2}}{2}$		

$\cos\theta, \sin\theta$

$\sqrt{2} \cdot \sqrt{2}$

Apr 7-2:12 PM

Apr 11

REMEMBER

* The coordinate for the point(P) on the unit circle for any given θ is always $(\cos\theta, \sin\theta)$. [r=1, centre=(0,0)]

* The arc length of any given $\theta = \theta r$, where θ is in radians

Apr 11-10:12 AM

e) $\sin\frac{\pi}{4}^{45^\circ} + \cos\frac{\pi}{4}^{45^\circ}$

$\frac{1}{\sqrt{2}} + \frac{1}{\sqrt{2}} = \frac{2}{\sqrt{2}}$

f) $\sin^2\frac{\pi}{6}^{30^\circ} + \cos^2\frac{\pi}{6}^{30^\circ}$

g) $\sin\frac{\pi}{6} \cdot \cos\frac{\pi}{3} - \cos\frac{\pi}{6} \cdot \sin\frac{\pi}{3}$

h) $\cos\frac{2\pi}{2} - \sin\left(-\frac{\pi}{3}\right)$

-1

$< \frac{\sqrt{3}}{2}$

$\frac{-2+\sqrt{3}}{2}$

Apr 20-9:46 AM

i) $\dfrac{\cos\frac{7\pi}{6}}{\sin\frac{\pi}{6}} + \cos\frac{5\pi}{4}$

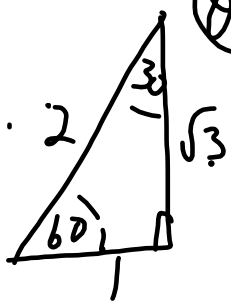
$\sqrt{3} - \frac{1}{\sqrt{2}}$

Apr 20-9:56 AM

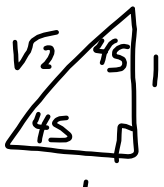
Apr 11

1. $0 \le \theta \le 90$

a) $\cos\theta = \frac{\sqrt{3}}{2}$ $\theta = 30°$



b) $\sin\theta = \frac{1}{\sqrt{2}} = (45°)$



c) $\cos\theta = 1$ $\theta = 0°$

d) $\sin\theta = 0$ $\theta = 0°$

e) $\cos\theta = 0$ $\theta = 90°$

f) $\sin\theta = 1$ $\theta = 90°$

Apr 20-10:12 AM

Reciprocal Ratios

$\sin\theta = \frac{1}{\csc\theta}$ or $\csc\theta = \frac{1}{\sin\theta}$ → cosecant

$\cos\theta = \frac{1}{\sec\theta}$ or $\sec\theta = \frac{1}{\cos\theta}$ → secant

$\tan\theta = \frac{1}{\cot\theta}$ or $\cot\theta = \frac{1}{\tan\theta}$ → cotangent

S	A
T	C

$\sec\theta = \frac{2}{\sqrt{3}} \Rightarrow \cos\theta = \frac{\sqrt{3}}{2} = 30°$

2a) $\sec\theta = 2$

$\cos\theta = \frac{1}{2}$ $\theta = 60$

Apr 20-10:25 AM

Apr 21 Claire's Birthday

2b) $\csc\theta = \frac{2}{\sqrt{3}}$ c) $\sec\theta = 1$ d) $\tan\theta = 1$

$\sin\theta = \frac{\sqrt{3}}{2}$ $\cos\theta = 1$ $\theta = 45°$

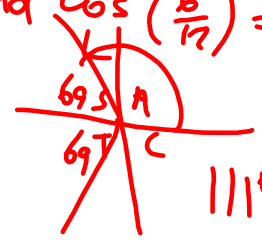
$\theta = 60°$ $\theta = 0°$

e) $\tan\theta = \sqrt{3}$ f) $\cot\theta = \sqrt{3}$

$\theta = 60°$ $\tan\theta = \frac{1}{\sqrt{3}} = 30°$

$\cos\theta = -\frac{6}{17}$

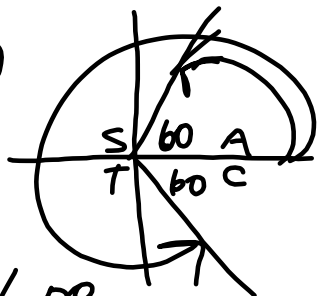
2nd $\cos\left(\frac{6}{17}\right) = 69$



111°, 249°

Apr 21-9:27 AM

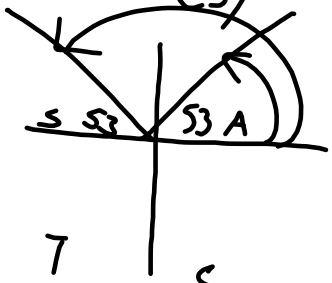
3a) $\cos\theta = \frac{1}{2}$ b)



60°, 300°

5a) $\sin\theta = \frac{4}{5}$

2nd $\sin\left(\frac{4}{5}\right) = 53°$



4a) $\sin\theta = \frac{\sqrt{3}}{2}$

b) $\csc\theta = \frac{2}{\sqrt{3}}$

$\sin\theta = \frac{\sqrt{3}}{2} = 60°$

T C

$\theta = 53°, 127°$

Apr 21-10:05 AM

5.

b) $\cos\theta = \frac{-6}{17}$ c) $\tan\theta = \frac{7}{3}$ d) $\cot\theta = -\frac{4}{9}$

Apr 21-10:13 AM

e) $\sec\theta = \frac{5}{3}$ f) $\csc\theta = \frac{5}{4}$

C

Apr 21-10:28 AM

10.6 Apr

11 a) $\cos^2\theta = -\cos\theta$

$\cos^2\theta + \cos\theta = 0$

$\cos\theta(\cos\theta + 1) = 0$

$\cos\theta = 0, \quad \cos\theta + 1 = 0$

$\cos\theta = -1$

$90°, 180°$

b) $2\sin^2\theta - \sin\theta = 0 \quad 0° \le \theta \le 90°$

Apr 22-9:32 AM

c) $\sin^2\theta - 6\sin\theta + 5 = 0$

$x^2 - 6x + 5$

$(x-5)(x-1)$

$(\sin\theta - 5)(\sin\theta - 1) = 0$

$\sin\theta - 5 = 0, \quad \sin\theta - 1 = 0$

$\sin\theta = 5, \quad \sin\theta = 1$

$\theta = 90°$

d) $4\cos^2\theta + \cos\theta - 3 = 0$

Apr 22-9:50 AM