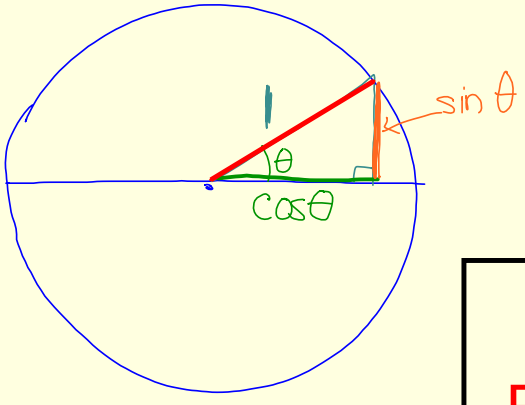
Write the following in your notes

tangent of θ is the slope of the radius



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

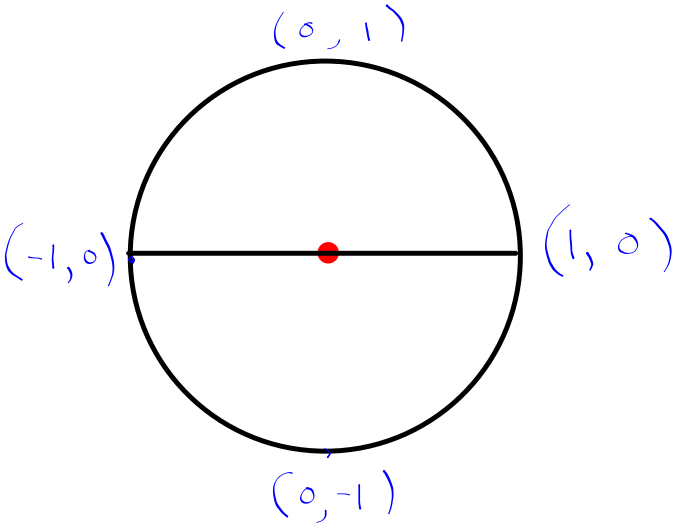
rise

run

Then
Pick Up the Warm Up

) Evaluate (without using a calculator) each of the following expressions:
(hint: you already know the coordinates of these points created by these rotation angles!)

$\sin(90°) =$ 1 $\quad \cos(270°) =$ 0 $\quad \tan 180° =$ 0

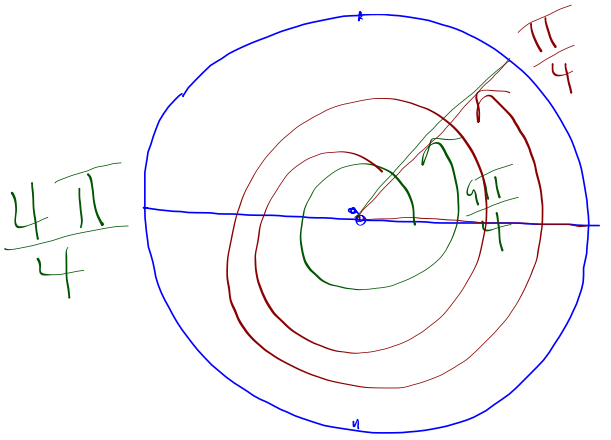


$\frac{\sin}{\cos}$ or $\frac{y}{x}$ $\frac{0}{-1}$

$\frac{-1}{0}$

2) There is a rotation angle around the unit circle of $\frac{9\pi}{4}$. What <u>other</u> rotation angle, also in radians, lands at the same position as the angle of $\frac{9\pi}{4}$? In other words, what other rotation angle will take you to the same point *(there are an infinite number of answers).*

Draw a unit circle to illustrate.



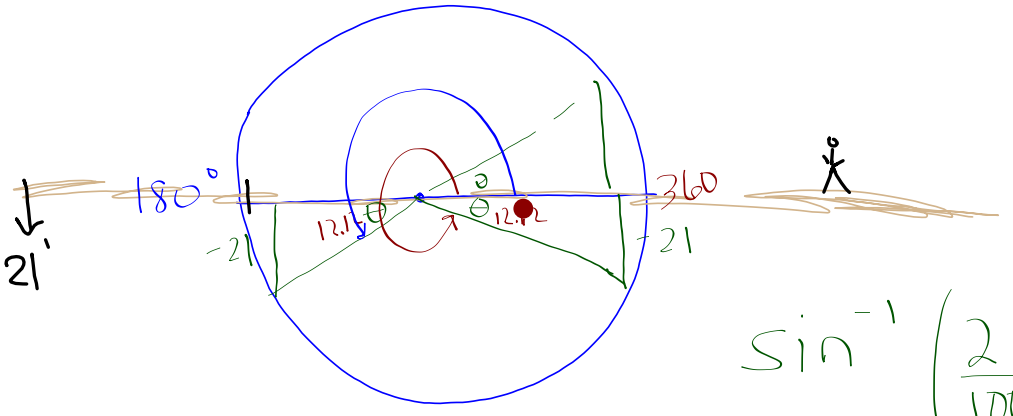
$\frac{9\pi}{4} + 2\pi n$

$\frac{9\pi}{4} + 2\pi \frac{8\pi}{4} = \frac{17\pi}{4}$

$\frac{9\pi}{4} - 2\pi \frac{8\pi}{4} = \frac{\pi}{4}$

3) You are riding the Ferris Wheel (100 foot radius) and it breaks down yet again. You are stuck 21 feet <u>below</u> the ground. What is the angle of rotation to your position?

What are all of the possibilities?



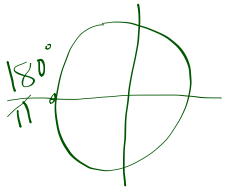
$\sin^{-1}\left(\frac{21}{100}\right) \approx 12.12°$

$180° + 12.12°$

$= 192.12°$

$360° - 12.12° = 347.88°$

4. Convert 171.31° to radians (round answer to 2 dp).



$180 = \pi$ $\quad \frac{\pi}{180} \cdot 1$

$171.31^\circ \cdot \frac{\pi}{180^\circ}$

≈ 2.99 radians

5. Convert $\frac{41\pi}{12}$ to degrees (round to 2 dp)

$\frac{41\pi}{12} \cdot \frac{180^\circ}{\pi}$

$\approx 615^\circ$

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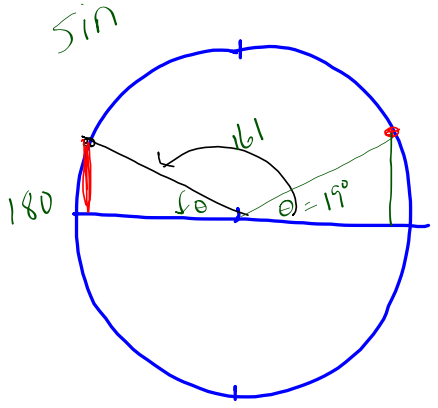
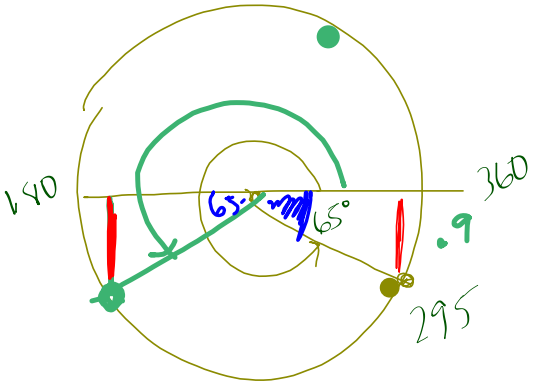
HW

(1) 161°



$$\begin{array}{r} 180 \\ -\,161 \\ \hline 19^\circ \end{array}$$



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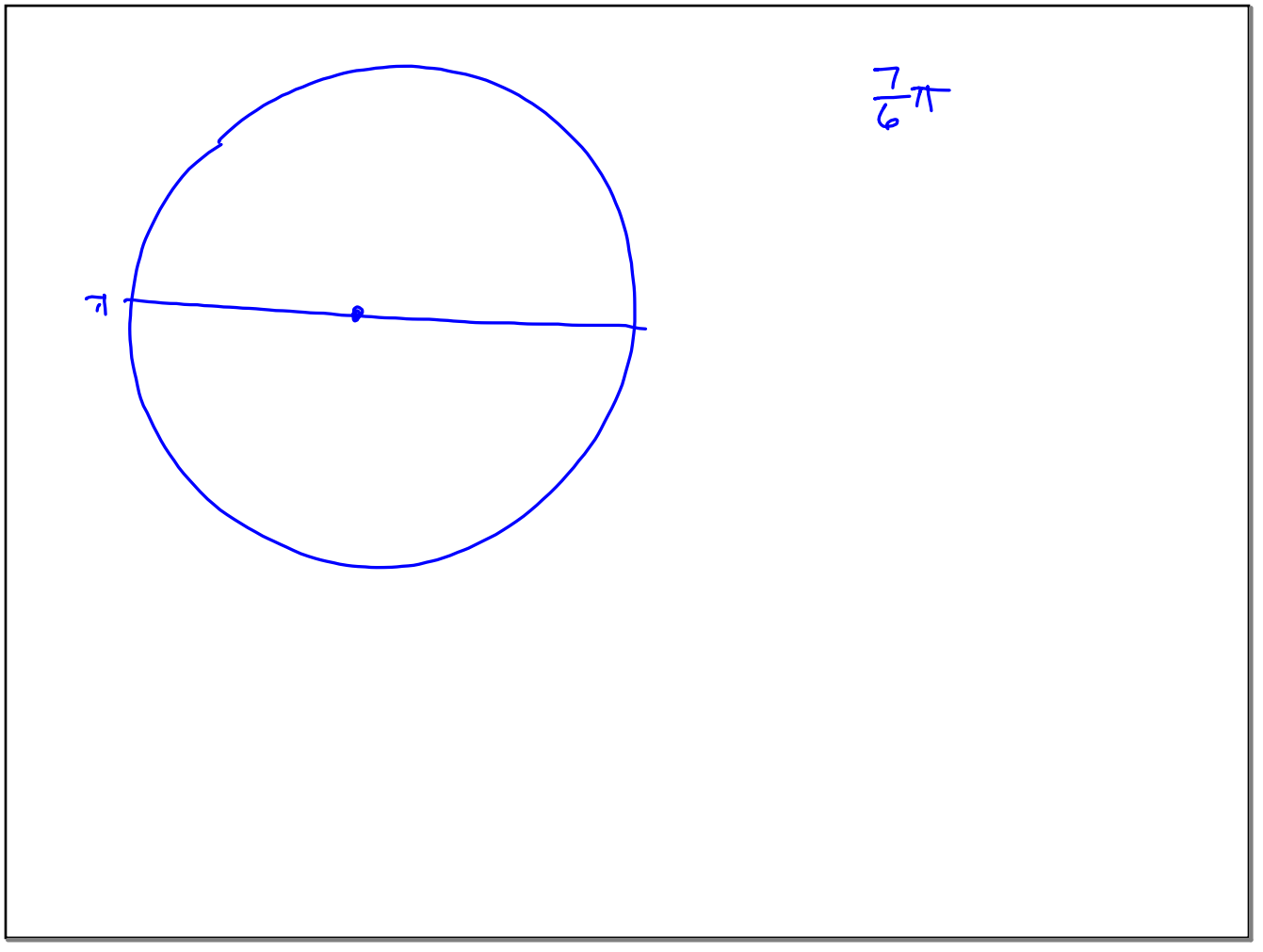
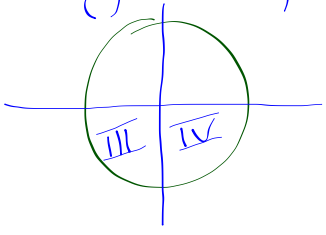


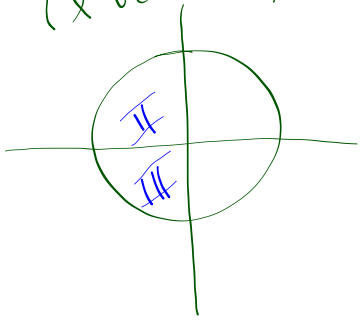
#5 $\sin\theta$ is negative

(y values)



$\cos\theta$ negative

(x values)



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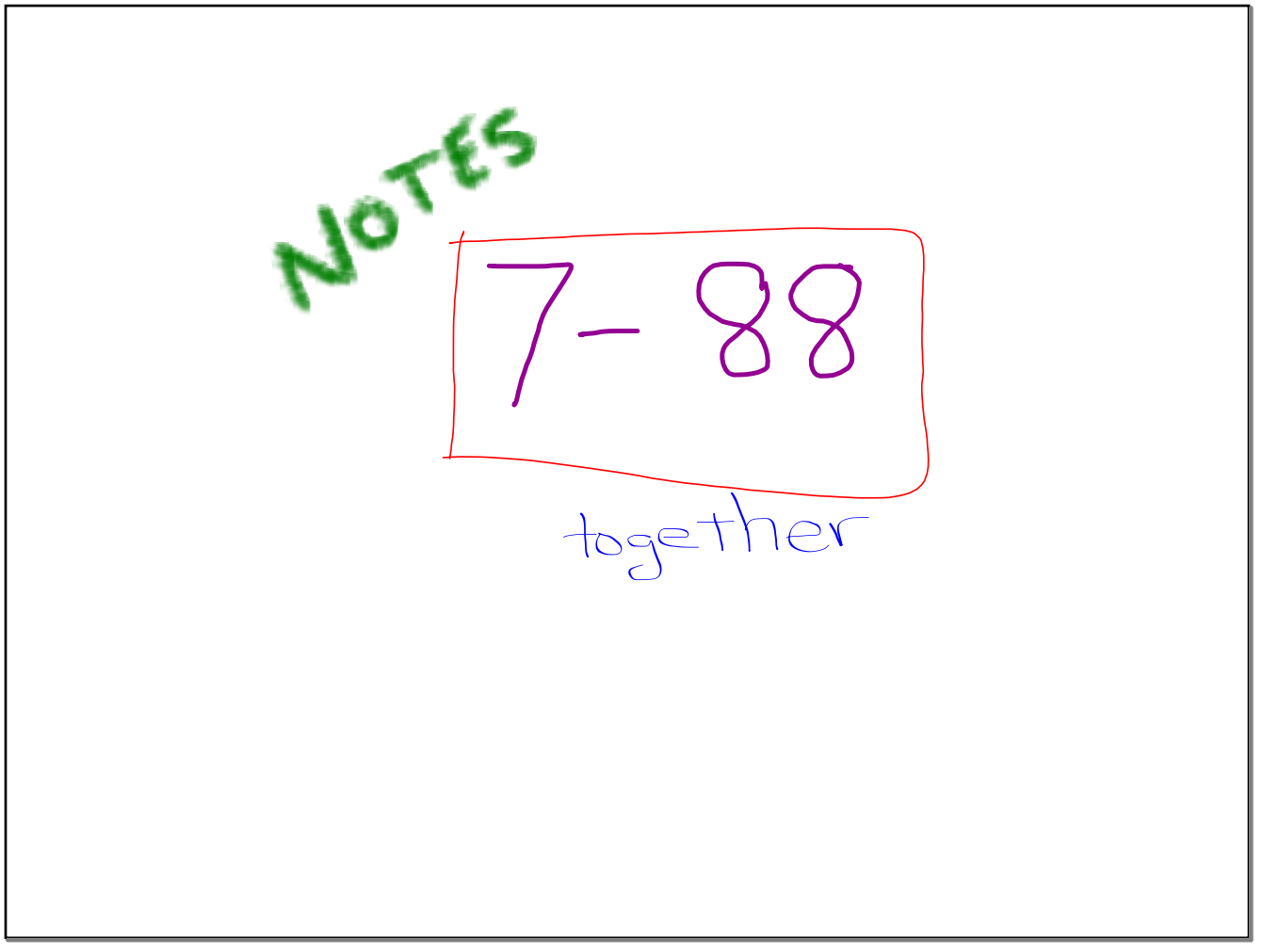
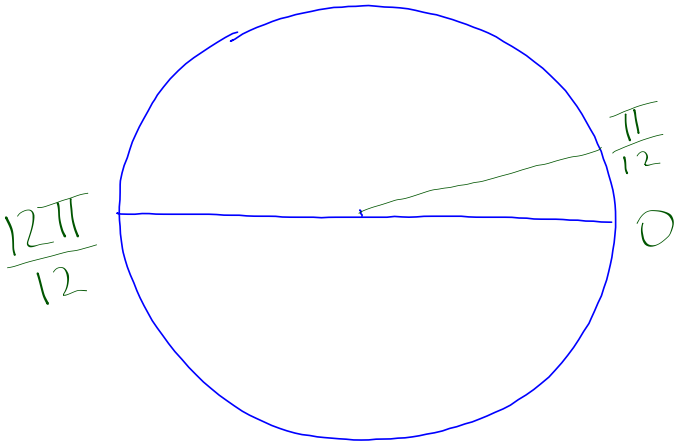


7-88. Draw a new unit circle, label a point that corresponds to a rotation of $\frac{\pi}{12}$, and put your calculator in radian mode.

a. What are the coordinates of this point, correct to two decimal places?



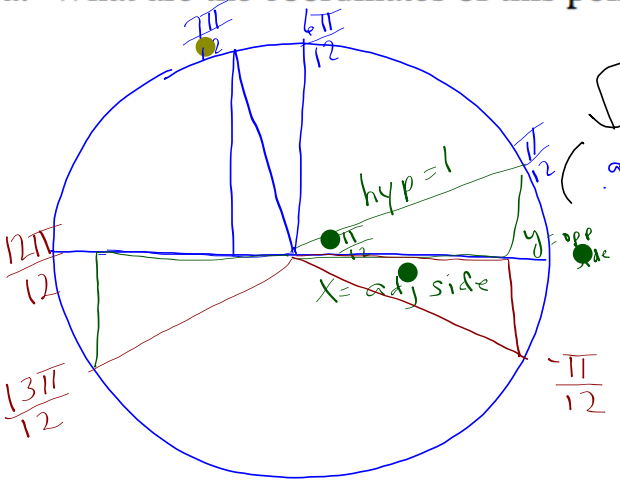
$(\quad)$

(x, y)

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

$(\cos\frac{\pi}{12}, \sin\frac{\pi}{12})$

a. What are the coordinates of this point, correct to two decimal places?



$\cos\left(\frac{\pi}{12}\right)$ $\sin\left(\frac{\pi}{12}\right)$

$(.97, .26)$

b (i) $\sin\left(-\frac{\pi}{12}\right) \approx (.97, -.26)$

(ii) $\cos\left(\frac{13\pi}{12}\right) \approx (-.97, -.26)$

(iii) $\cos\left(\frac{7\pi}{12}\right) \approx (-.27, .97)$

b. Use the information you found in part (a) to determine each of the following values: (Hint: Drawing each angle on the unit circle will be very helpful.)

i. $\sin(-\frac{\pi}{12}) \simeq$

ii. $\cos\frac{13\pi}{12} \simeq$

iii. Challenge: $\cos\frac{7\pi}{12}$

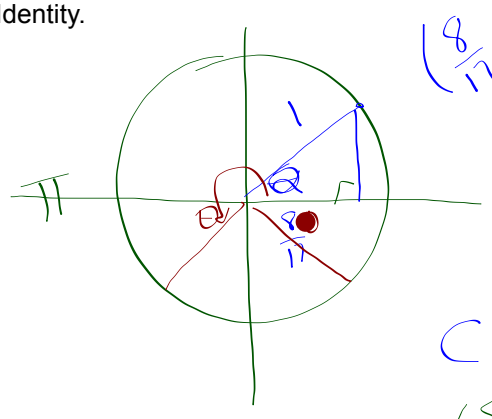
7-89

together

7-89. For angle α in the first quadrant, $\cos\alpha = \frac{8}{17}$. Use that information to find each of the following values without using a calculator. Be prepared to share your strategies with the class.

a. $\sin\alpha$

Use the Pythagorean Identity.



$\left(\frac{8}{17}, \frac{15}{17}\right)$

$\cos^2\theta + \sin^2\theta = 1$

$\left(\frac{8}{17}\right)^2 + \sin^2\theta = 1$

$\frac{64}{289} + \sin^2\theta = \frac{289}{289}$

$\sqrt{\sin^2\theta} = \sqrt{\frac{225}{289}}$

$\sin\theta = \pm\frac{15}{17}$

b. $\sin(\pi + \alpha)$

c. $\cos(2\pi - \alpha)$

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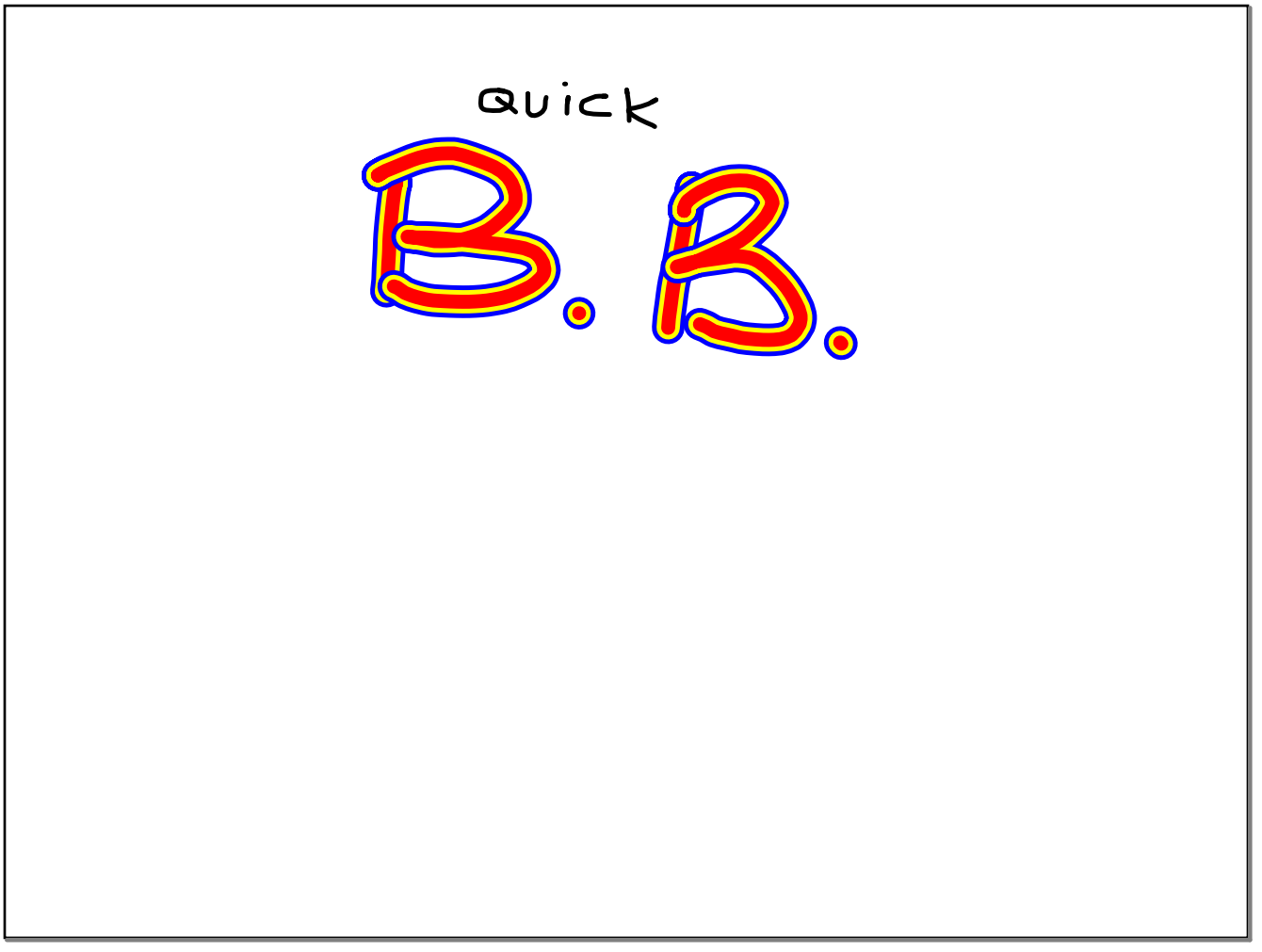

NOTES

Calculate exact values of sine and cosine for single (benchmark) angles.

Strategy

For each angle, draw a small unit circle with as little information as possible on it.

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$\sin(\theta) = \text{ratio}$

angle

vertical dist. on a unit circle

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$\cos\left(\frac{3\pi}{4}\right)$

$\sin\left(\frac{5\pi}{6}\right) =$

$\sin\left(\frac{4\pi}{3}\right) =$

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$\sin\left(-\frac{13\pi}{4}\right) =$

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

$\tan\left(\frac{2\pi}{3}\right) =$

Solve trig equations

(can have infinite answers)

Solve the equation over the interval $0 \le \theta \le 2\pi$

$\cos(\theta) = 0.5$

LCQ

Assignment

7....90, 91, 93, 94abc, 95-98

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