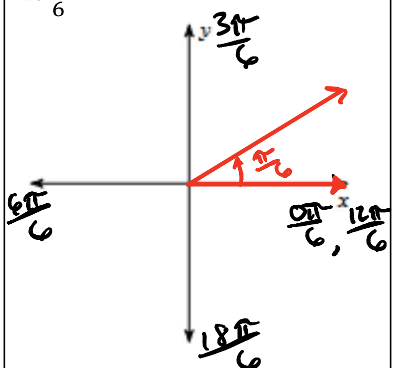
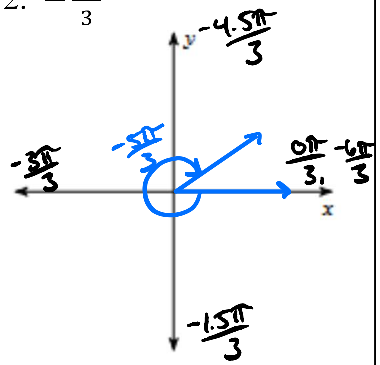
Draw an angle with the given measure in standard position.

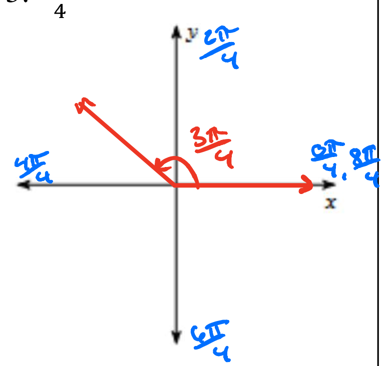
1. $\frac{\pi}{6}$



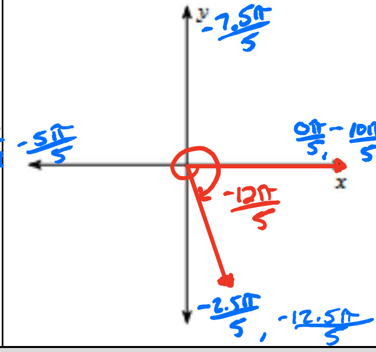
2. $-\frac{5\pi}{3}$



3. $\frac{3\pi}{4}$

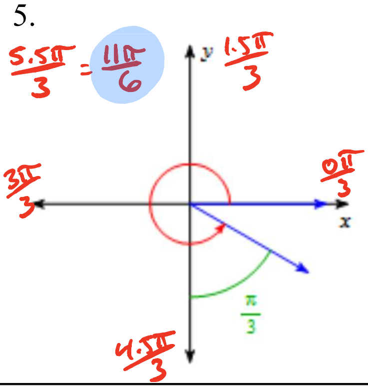


4. $-\frac{12\pi}{5}$

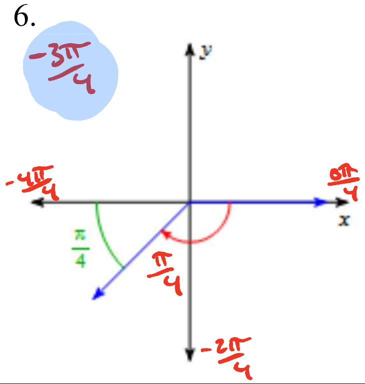


Find the measure of each angle. (IN RADIANS!)

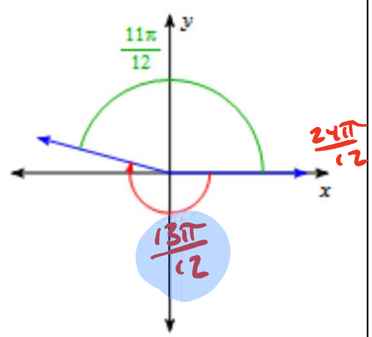
5.



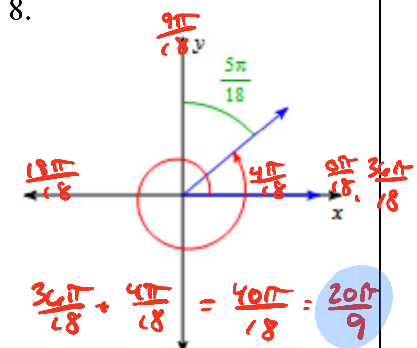
6.



7.

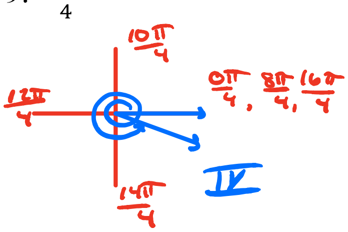


8.

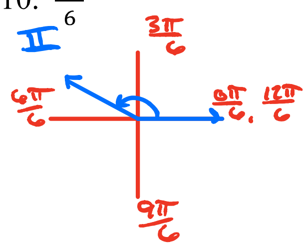


State the quadrant in which the terminal side of each angle lies.

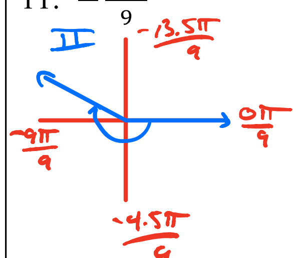
9. $\frac{15\pi}{4}$



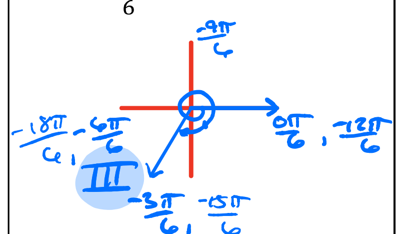
10. $\frac{5\pi}{6}$



11. $-\frac{10\pi}{9}$



12. $-\frac{17\pi}{6}$



Find one positive and one negative coterminal angle the angle given. (IN RADIANS!)

13. $\frac{\pi}{3}$

+ coterminal $= \frac{\pi}{3} + \frac{6\pi}{3} = \frac{7\pi}{3}$

− coterminal $= \frac{\pi}{3} - \frac{6\pi}{3} = \frac{-5\pi}{3}$

14. $\frac{5\pi}{4}$

+ coterminal $= \frac{5\pi}{4} + \frac{8\pi}{4} = \frac{13\pi}{4}$

− coterminal $= \frac{5\pi}{4} - \frac{8\pi}{4} = \frac{-3\pi}{4}$

Find a coterminal angle between 0 and 2π.

15. $\frac{9\pi}{4}$

(1 Rev)

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

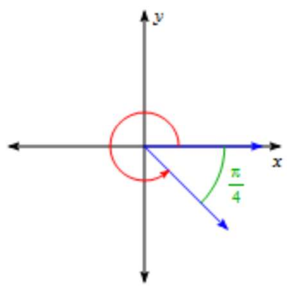
16. $\frac{13\pi}{2}$

(3 Rev)

coterminal $= \frac{13\pi}{2} - \frac{12\pi}{2} = \frac{\pi}{2}$

Find ALL coterminal angles in the world for each angle.

17.



$-\frac{\pi}{4} + 2\pi k$ where $k \in \mathbb{Z}$

18. $\frac{\pi}{2}$

$\frac{\pi}{2} + 2\pi k$ where $k \in \mathbb{Z}$

Convert each degree measure into radians.

19. 225°

$\frac{\overset{5}{\cancel{225^\circ}}}{1} \cdot \frac{\pi}{\underset{4}{\cancel{180^\circ}}} = \frac{5\pi}{4}$

20. 280°

$\frac{\overset{14}{\cancel{280^\circ}}}{1} \cdot \frac{\pi}{\underset{9}{\cancel{180^\circ}}} = \frac{14\pi}{9}$

21. $-210°$

$\frac{\overset{-7}{\cancel{-210^\circ}}}{1} \cdot \frac{\pi}{\underset{6}{\cancel{180^\circ}}} = \frac{-7\pi}{6}$

22. $-1020°$

$\frac{-1020^\circ}{1} \cdot \frac{\pi}{180^\circ} = \frac{\overset{-51}{\cancel{-102\pi}}}{\underset{9}{\cancel{18}}} = \frac{-51\pi}{9} = \frac{-17\pi}{3}$

Convert each radian measure into degrees.

23. $-\frac{5\pi}{9}$

$-\frac{5\cancel{\pi}}{\cancel{9}} \cdot \frac{\overset{20^\circ}{\cancel{180^\circ}}}{\cancel{\pi}} = -100^\circ$

24. $\frac{5\pi}{6}$

$\frac{5\cancel{\pi}}{\cancel{6}} \cdot \frac{\overset{30^\circ}{\cancel{180^\circ}}}{\cancel{\pi}} = 150^\circ$

25. $\frac{23\pi}{36}$

$\frac{23\cancel{\pi}}{\cancel{36}} \cdot \frac{\overset{5}{\cancel{180^\circ}}}{\cancel{\pi}} = 115^\circ$

26. $\frac{79\pi}{18}$

$\frac{79\cancel{\pi}}{\cancel{18}} \cdot \frac{\overset{10^\circ}{\cancel{180^\circ}}}{\cancel{\pi}} = 790^\circ$

Skillz Review **Simplify the following.**

1. $\frac{\frac{1}{2}}{\frac{3}{2}} \cdot \frac{2}{2} = \frac{1}{3}$

2. $\frac{\frac{1}{2}}{\frac{\sqrt{3}}{2}} \cdot \frac{2}{2} = \frac{1}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{\sqrt{3}}{3}$

3. $\frac{3}{\left(\frac{\sqrt{2}}{2}\right)} \cdot \frac{2}{2} = \frac{6}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}}$

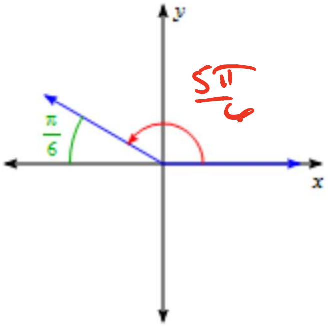
$= \frac{6\sqrt{2}}{2}$

$= 3\sqrt{2}$

4. $\frac{\left(\frac{\sqrt{3}}{2}\right)}{\sqrt{3}} \cdot \frac{2}{2} = \frac{\cancel{\sqrt{3}}}{2\cancel{\sqrt{3}}}$

$= \frac{1}{2}$

1. Name the angle.



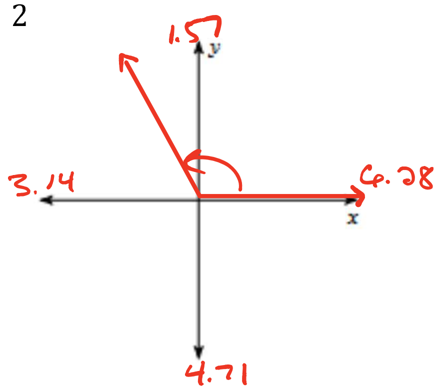
2. Convert 630° to radians.

$$\frac{63\cancel{0}^\circ}{1}\cdot\frac{\pi}{18\cancel{0}^\circ} = \frac{63\pi}{18} = \frac{7\pi}{2}$$

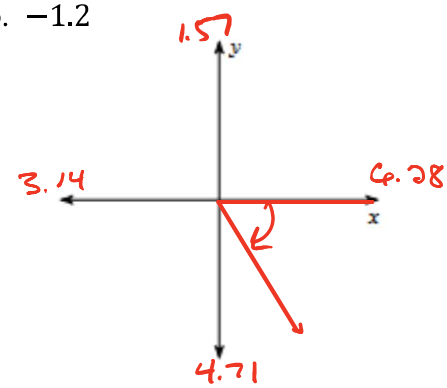
3. Some people really freak out when they see an angle measurement in radians without pi. Don't freak out! Remember pi is just a number, so think of π as 3.14, $\frac{\pi}{2}$ as 1.57, etc…

Draw the angle with the given radian measure in standard position.

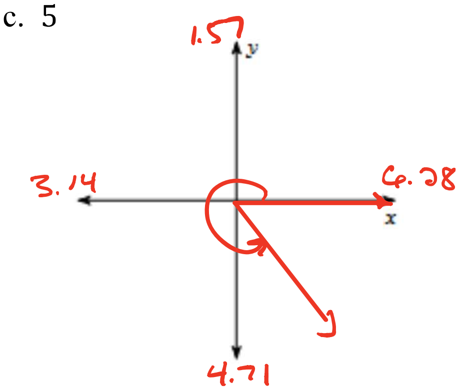
a. 2



b. -1.2



c. 5



4. To avoid confusion with degrees, we can use the abbrev "rad" (for radians). Convert the following to degrees.

a. 2.5 rad

$$\frac{2.5\ \cancel{RAD}}{1}\cdot\frac{180^\circ}{\pi\ \cancel{RAD}} = \frac{450^\circ}{\pi}$$

$\approx 143.239^\circ$

b. -0.7 rad

$$\frac{-0.7\ \cancel{RAD}}{1}\cdot\frac{180^\circ}{\pi\ \cancel{RAD}} =$$

$$\frac{-126^\circ}{\pi} = -40.107^\circ$$

c. 8 rad

$$\frac{8\ \cancel{RAD}}{1}\cdot\frac{180^\circ}{\pi\ \cancel{RAD}} = \frac{1440^\circ}{\pi}$$

$\approx 458.366^\circ$

5. One complete revolution or one complete rotation is 360° or 2π. How many radians would an angle go through given the following…

a. 4 revolutions

$$4\ \cancel{Rev}\cdot\frac{2\pi\ RAD}{1\ \cancel{Rev}} = 8\pi\ RAD$$

b. 7.5 rotations

$$7.5\ \cancel{Rev}\ \frac{2\pi\ RAD}{1\ \cancel{Rev}} = 15\pi\ RAD$$

c. $\frac{3}{4}$ revolution

$$\frac{3\ Rev}{\cancel{4}\ 2}\cdot\frac{\cancel{2}\pi}{1\ Rev} = \frac{3\pi}{2}\ RAD$$

6. Mr. Kelly decides to play Pink Floyd's Dark Side of Moon backwards on his record player to determine the meaning of life. Rumor has it that you need to revolve the record 45 times backwards to hear the message. Mr. Kelly has already revolved the record $\frac{27\pi}{5}$ times. In radians, what measure does he still need to revolve the record?

(Hint: Think about how many radians 45 revolutions is!)

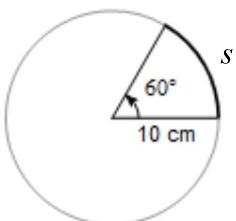
Needs $= \frac{45 \text{ Rev}}{1} \cdot \frac{2\pi \text{ RAD}}{1 \text{ Rev}} = 90\pi \text{ RAD} = \frac{450\pi}{5}$

Already $= \frac{27\pi}{5}$

Still $= \frac{450\pi}{5} - \frac{27\pi}{5} = \frac{423\pi}{5}$

7-9 are all related

7. Finding the arc length in degrees is a bit tedious. Use the tedious formula $s = \frac{\theta}{360°} 2\pi r$ where s = arc length, θ = measure of the central angle, and r = radius to find the arc length of…

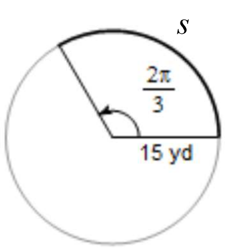


$S = \frac{60°}{360°} 2\pi (10 \text{ cm})$

$S = \frac{120}{360} \pi (10)$

$S = \frac{10}{3} \pi \text{ cm}$

8. Finding the arc length in radians is awesome. A radian is $\theta = \frac{s}{r}$, so multiply both sides by r to get $s = \theta r$. Use that awesome formula to find the arc length of…



$S = \theta r$

$S = \left(\frac{2\pi}{3}\right)(15 \text{ yd})$

$S = 10\pi \text{ yd}$

9. Wait a minute, not a degree minute, but a time minute. What if you converted $s = \frac{\theta}{360°} 2\pi r$, tedious degree formula, to radians? Aka replace 360° with 2π and simplify! Why is that the most awesome thing you have done with radians today?

$S = \frac{\theta}{360°} 2\pi r$

$S = \frac{\theta}{2\pi} 2\pi r$

$S = \theta r$