


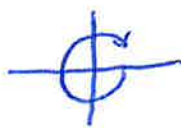



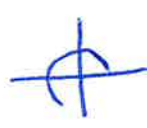




**Section 6.1 – Practice Problems**

1. Determine the Quadrant the standard position angle is in, or if it is not in a specific quadrant, say so.

<p>a) <math>150^\circ</math></p> <p>Q2</p> 	<p>b) <math>-150^\circ</math></p> <p>Q3</p> 
<p>c) <math>314^\circ</math></p> <p>Q4</p> 	<p>d) <math>-314^\circ</math></p> <p>Q1</p> 
<p>e) <math>612^\circ</math></p> <p>Q3</p> 	<p>f) <math>-537^\circ</math></p> <p>Q3</p> 
<p>g) <math>1100^\circ</math></p> <p>Q1</p> 	<p>h) <math>6325^\circ</math></p> <p>Q3</p>  <p><math>6325 \div 360 = 17.57</math>  <math>0.57 \cdot 360 = 205</math></p>
<p>i) <math>810^\circ</math></p> <p>not in a quadrant</p> <p><math>810 \div 360 = 2.25</math>  <math>0.25 \cdot 360 = 90^\circ</math></p> 	<p>j) <math>-900^\circ</math></p> <p>NOT IN A QUADRANT</p> <p><math>-900 \div 360 = -2.5</math>  <math>-0.5 \cdot 360 = -180</math></p> 

2. Find the degree measure of the given rotation (One full rotation is  $360^\circ$ )

<p>a) <math>\frac{1}{8}</math> rotation</p> <p><math>\frac{1}{8} \cdot 360 = 45^\circ</math></p>	<p>b) <math>\frac{1}{5}</math> rotation</p> <p><math>\frac{1}{5} \cdot 360 = 72^\circ</math></p>
<p>c) <math>\frac{5}{6}</math> rotation</p> <p><math>\frac{5}{6} \cdot 360 = 300^\circ</math></p>	<p>d) <math>\frac{9}{8}</math> rotation</p> <p><math>\frac{9}{8} \cdot 360 = 405^\circ</math></p>
<p>e) <math>\frac{7}{5}</math> rotation</p> <p><math>\frac{7}{5} \cdot 360 = 504^\circ</math></p>	<p>f) <math>\frac{7}{6}</math> rotation</p> <p><math>\frac{7}{6} \cdot 360 = 420^\circ</math></p>

3. Find the radian measure of the given rotation (One full rotation is  $2\pi$ )

a)  $\frac{1}{6}$  rotation  $\frac{1}{6} \cdot 2\pi = \frac{2\pi}{6} = \frac{\pi}{3}$

b)  $\frac{3}{4}$  rotation  $\frac{3}{4} \cdot 2\pi = \frac{3\pi}{2}$

c)  $\frac{2}{3}$  rotation  $\frac{2}{3} \cdot 2\pi = \frac{4\pi}{3}$

d)  $2\frac{1}{4}$  rotation  $2\frac{1}{4} = \frac{9}{4}$   
 $\frac{9}{4} \cdot 2\pi = \frac{9\pi}{2}$

e)  $\frac{13}{12}$  rotation  $\frac{13}{12} \cdot 2\pi = \frac{13\pi}{6}$

f)  $\frac{11}{8}$  rotation  $\frac{11}{8} \cdot 2\pi = \frac{11\pi}{4}$

4. Determine one positive and one negative coterminal angle (Answers Vary Here)

a)  $150^\circ$

$$150 + 360 = 510^\circ$$

$$150 - 360 = -210^\circ$$

b)  $-150^\circ$

$$-150 + 360 = 210^\circ$$

$$-150 - 360 = -510^\circ$$

c)  $314^\circ$

$$314 + 360 = 674^\circ$$

$$314 - 360 = -46^\circ$$

d)  $-314^\circ$

$$-314 + 360 = 46^\circ$$

$$-314 - 360 = -674^\circ$$

e)  $612^\circ$

$$612 + 360 = 972^\circ$$

$$612 - 2(360) = -108^\circ$$

f)  $-537^\circ$

$$-537 + 2(360) = 183^\circ$$

$$-537 - 360 = -897^\circ$$

g)  $1100^\circ$

$$1100 - 360 = 740^\circ$$

$$(1100 - 4(360)) = -340^\circ$$

h)  $6325^\circ$

$$6325 - 360 = 5965$$

$$6325 - 18(360) = -155^\circ$$

i)  $810^\circ$

$$810 - 360 = 450^\circ$$

$$810 - 3(360) = -270^\circ$$

j)  $-900^\circ$

$$-900 + 360 = -540$$

$$-900 + 3(360) = 180^\circ$$

5. Convert from degrees to radians. Express answer in terms of  $\pi$ .Ratio is  $\pi : 180$ 

a)  $45^\circ$

$$45^\circ \cdot \frac{\pi}{180^\circ} = \frac{\pi}{4}$$

b)  $90^\circ$

$$90 \cdot \frac{\pi}{180} = \frac{\pi}{2}$$

c)  $150^\circ$

$$150 \cdot \frac{\pi}{180} = \frac{5\pi}{6}$$

d)  $240^\circ$

$$240 \cdot \frac{\pi}{180} = \frac{4\pi}{3}$$

e)  $300^\circ$

$$300 \cdot \frac{\pi}{180} = \frac{5\pi}{3}$$

f)  $360^\circ$

$$360 \cdot \frac{\pi}{180} = 2\pi$$

g)  $405^\circ$

$$405 \cdot \frac{\pi}{180} = \frac{9\pi}{4}$$

h)  $420^\circ$

$$420 \cdot \frac{\pi}{180} = \frac{7\pi}{3}$$

i)  $450^\circ$

$$450 \cdot \frac{\pi}{180} = \frac{5\pi}{2}$$

j)  $630^\circ$

$$630 \cdot \frac{\pi}{180} = \frac{7\pi}{2}$$

6. Convert from degrees to radians. Express answer in to three decimals.

a)  $70^\circ$

$$70^\circ \cdot \frac{\pi}{180} = 1.222$$

b)  $37.5^\circ$

$$37.5 \cdot \frac{\pi}{180} = 0.654$$

c)  $130^\circ$

$$130 \cdot \frac{\pi}{180} = 2.269$$

d)  $\frac{90^\circ}{\pi}$

$$\frac{90^\circ}{\pi} \cdot \frac{\pi}{180} = 0.5$$

e)  $400^\circ$

$$400 \cdot \frac{\pi}{180} = 6.981$$

f)  $527^\circ$

$$527 \cdot \frac{\pi}{180} = 9.198$$

g)  $-248^\circ$

$$-248 \cdot \frac{\pi}{180} = -4.328$$

h)  $718^\circ$

$$718 \cdot \frac{\pi}{180} = 12.531$$

i)  $1025^\circ$

$$1025 \cdot \frac{\pi}{180} = 17.890$$

j)  $-1349^\circ$

$$-1349 \cdot \frac{\pi}{180} = -23.544$$

7. Convert from radians to degrees.

a)  $\frac{\pi}{3}$

$$\frac{\pi}{3} \cdot \frac{180}{\pi} = 60^\circ$$

b)  $\frac{5\pi}{6}$

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

c)  $\frac{3\pi}{4}$

$$\frac{3\pi}{4} \cdot \frac{180}{\pi} = 135^\circ$$

d)  $\frac{11\pi}{6}$

$$\frac{11\pi}{6} \cdot \frac{180}{\pi} = 330^\circ$$

e)  $\frac{17\pi}{6}$

$$\frac{17\pi}{6} \cdot \frac{180}{\pi} = 510^\circ$$

f)  $\frac{21\pi}{4}$

$$\frac{21\pi}{4} \cdot \frac{180}{\pi} = 945^\circ$$

g)  $\frac{11\pi}{3} \quad \frac{11\pi}{3} \cdot \frac{180}{\pi} = 660^\circ$

h)  $\frac{20\pi}{3} \quad \frac{20\pi}{3} \cdot \frac{180}{\pi} = 1200^\circ$

i)  $\frac{31\pi}{6} \quad \frac{31\pi}{6} \cdot \frac{180}{\pi} = 930^\circ$

j)  $\frac{23\pi}{4} \quad \frac{23\pi}{4} \cdot \frac{180}{\pi} = 1035^\circ$

8. Convert from radians to degrees. Provide answers to 1 decimal place.

a) 3

$$3 \cdot \frac{180}{\pi} = 171.9^\circ$$

b) -4

$$-4 \cdot \frac{180}{\pi} = -229.2^\circ$$

c) 2.7

$$2.7 \cdot \frac{180}{\pi} = 154.7^\circ$$

d) -1.2

$$-1.2 \cdot \frac{180}{\pi} = -68.8^\circ$$

e) 8.2

$$8.2 \cdot \frac{180}{\pi} = 469.8^\circ$$

f) -12.8

$$-12.8 \cdot \frac{180}{\pi} = -733.4^\circ$$

Arc length:  $s = r\theta$  ← in radians9. Find the radius of a circle if an arc of 3 subtends angle of  $30^\circ$  on the circle.

$$3 = r(30^\circ)$$

$$3 = r\left(\frac{\pi}{6}\right)$$

$$18 = \pi r \quad r = \frac{18}{\pi} = \boxed{5.73 \text{ cm}}$$

10. Find the arc length of a sector of a circle radius 15cm if the sector angle is  $130^\circ$ .

$$s = 15(130)$$

$$s = 15\left(\frac{13\pi}{18}\right)$$

$$130^\circ \cdot \frac{\pi}{180^\circ} = \frac{13\pi}{18}$$

$$s = \boxed{34.03 \text{ cm}}$$

11. Find the angle in degrees if an arc length of 5cm has a radius of 6cm.

$$S = r\theta$$

$$5 = 6\theta$$

$$\theta = \frac{5}{6} \text{ radians}$$

$$\frac{5}{6} \cdot \frac{180}{\pi} = \boxed{47.75^\circ}$$

12. As the time changes from 2:00pm to 2:30pm on an analog clock.

- a) Determine the change in radian measure of the minute hand.

Minute moves 30 of 60 minutes

$$\text{covers } \frac{1}{2} \cdot 360 = 180^\circ$$

$$180^\circ = \boxed{\pi}$$

- b) Determine the change in radian measure of the hour hand.

Hour hand moves rotation of 12 times

Half an hour is  $\frac{1}{24}$  of clock

$$\frac{1}{24} \cdot 360 = 15^\circ$$

$$15 \cdot \frac{\pi}{180} = \boxed{\frac{\pi}{12}}$$

13. A horse on a merry-go-round is 4m from the center. How many meters does Kate travel if the horse if the merry-go-round makes 15 revolutions before stopping?

$$r = 4m$$

$$15 \text{ revs} = 2\pi \cdot 15$$

$$= 30\pi \leftarrow \text{angle in radians}$$

$$S = 4 \cdot 30\pi$$

$$120\pi$$

$$\boxed{377m}$$

14. A flywheel makes 12 revolutions per minute (rpm). How many seconds does it take for the flywheel to turn through 216°?

$$\frac{12 \text{ rev}}{1 \text{ min}} \cdot \frac{1 \text{ min}}{60 \text{ secs}} = \frac{12 \text{ rev}}{60 \text{ secs}} = \boxed{\frac{4320^\circ}{60 \text{ secs}}}$$

$$1 \text{ rev} = 2\pi$$

$$12 \text{ rev} = 12 \cdot 2\pi = 24\pi$$

$$24\pi \cdot \frac{180}{\pi} = 4320^\circ$$

$$216^\circ \cdot \frac{60 \text{ sec}}{4320^\circ} = \boxed{3 \text{ sec}}$$

this is the radian

or ↓

$$\frac{60 \text{ secs}}{4320^\circ}$$

15. The earth rotates about an axis through its poles, making one revolution per day. The radius of Earth is approximately 6400km. What distance is traversed by a point on Earth's surface at the equator during an 8 - hour interval as a result of Earth's rotation about its axis?

$$\frac{1 \text{ rev}}{\text{day}} = \frac{360^\circ}{24 \text{ hr}}$$

our rotation

$$8 \text{ hr} \cdot \frac{360^\circ}{24 \text{ hr}} = 120^\circ$$

$$120^\circ \cdot \frac{\pi}{180} = \boxed{\frac{2\pi}{3}}$$

$$S = 6400 \left( \frac{2\pi}{3} \right)$$

$$\boxed{S = 13\,404 \text{ km}}$$

16. What distance does a bird fly when flying due South from 40° north latitude to 20° north latitude?

20° of travel

$$20^\circ \cdot \frac{\pi}{180^\circ} = \frac{\pi}{9} \text{ rotation in radians}$$

on Earth so radius is still 6400km

$$S = 6400 \left( \frac{\pi}{9} \right)$$

$$\boxed{S = 2234 \text{ km}}$$

See Website for Detailed Answer Key

**Extra Work Space**