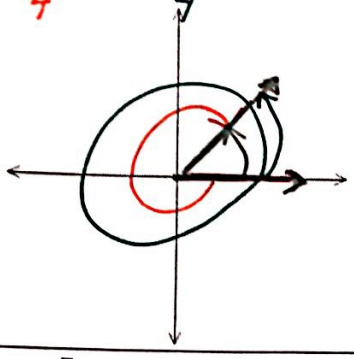
2016

PreCalculus
WS: 4.1 Extra Practice

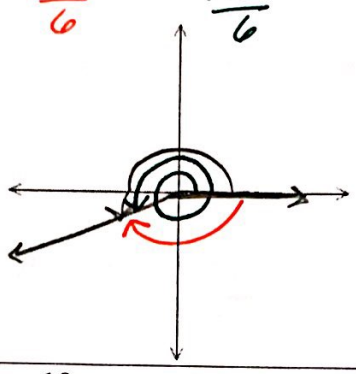
Name Key
Date 9/14 9/15 **Block** 1A 2B

Determine the quadrant in which each angle lies. Then, find one positive and one negative angle coterminal with the given angle. Sketch all three angles.

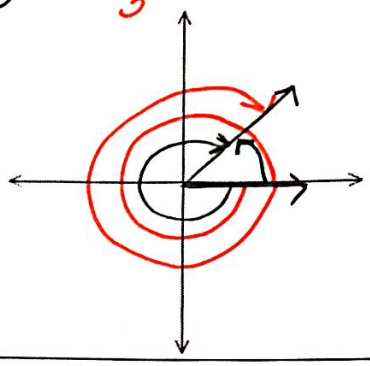
1. $\frac{\pi}{4}$ I
$-\frac{7\pi}{4}$ $\frac{9\pi}{4}$



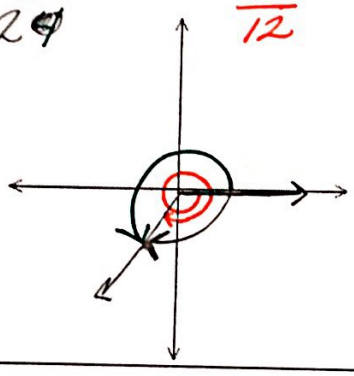
2. $\frac{7\pi}{6}$ III
$-\frac{5\pi}{6}$ $\frac{19\pi}{6}$



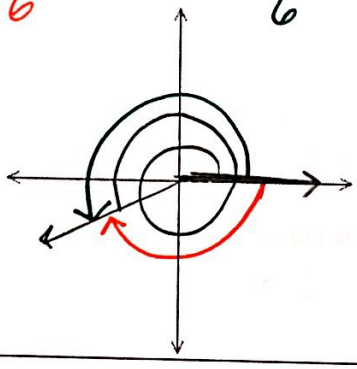
3. $-\frac{5\pi}{3}$ I
$\frac{\pi}{3}$ $-\frac{11\pi}{3}$



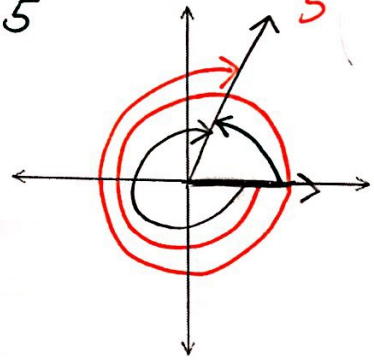
4. $-\frac{7\pi}{12}$ III
$\frac{17\pi}{12}$ $-\frac{31\pi}{12}$



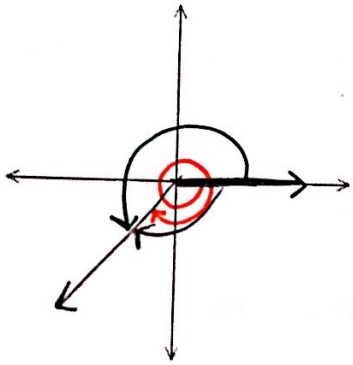
5. $\frac{19\pi}{6}$ III
$-\frac{5\pi}{6}$ $\frac{7\pi}{6}$



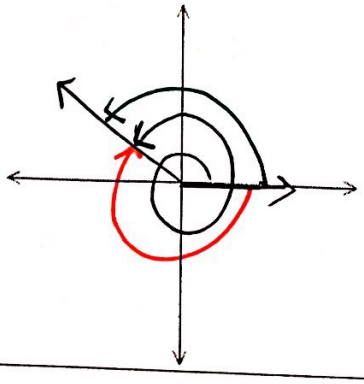
6. $-\frac{8\pi}{5}$ I
$\frac{2\pi}{5}$ $-\frac{18\pi}{5}$



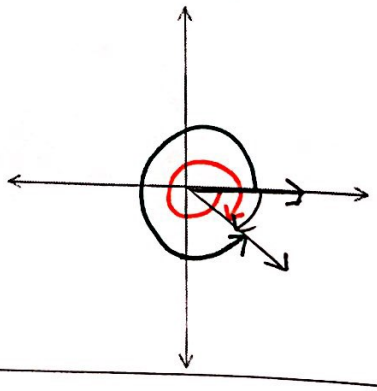
7. -2 III
4.28 -8.28



8. 500° II
-220° 140°



9. -30° IV
-390° 330°



State if the given angles are coterminal.

10. 185°, -545°

NO

11. $\frac{17\pi}{36}, \frac{161\pi}{36}$

YES

12. $-\frac{4\pi}{3}, \frac{28\pi}{3}$

NO

Find (if possible) the complement and supplement of each angle.

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

Comp: $\frac{\pi}{6}$ Supp: $\frac{2\pi}{3}$

14. $\frac{7\pi}{12}$ Supp

Comp: None

15. $\frac{4\pi}{9}$ Comp: $\frac{\pi}{18}$ Supp: $\frac{5\pi}{9}$

Express each of the following in radian measure. Leave your answer in terms of π.

16. 150° $\frac{5\pi}{6}$

17. 315° $\frac{7\pi}{4}$

18. -240° $-\frac{4\pi}{3}$

19. 115° $\frac{23\pi}{36}$

20. 345° $\frac{23\pi}{12}$

21. -216° $-\frac{6\pi}{5}$

Express each of the following in degree measure.

22. $\frac{5\pi}{9}$ 100°

23. $-\frac{7\pi}{12}$ -105°

24. $\frac{11\pi}{5}$ 396°

Answer the following. Show all work. Round all answers to two decimal places when necessary.

25. Find the length of the arc on a circle with a radius of 20 meters intercepted by a central angle of 138°.

$s = r\theta$

$r = 20m$

$\theta = 138^\circ = \frac{23\pi}{30}$ radians

$s = 20\left(\frac{23\pi}{30}\right) = \frac{46\pi}{3} \approx$ 48.171 meters

26. Assuming Earth is a sphere of radius 6378 kilometers, what is the difference in the latitudes of Syracuse, NY and Annapolis, MD, where is Syracuse is 450 kilometers due north of Annapolis?

$r = 6378km$

$s = 450km$

find θ

$450 = 6378\theta$

$\theta = 0.0706$ radians

$0.0706 \cdot \frac{180^\circ}{\pi} =$

4.043°

27. A car is moving at a rate of 45 miles per hour, and the diameter of its wheels is 3 feet.

a. Find the number of revolutions per minute the wheels are rotating.

$\frac{45 mi}{hr} \cdot \frac{1 hr}{60 min} \cdot \frac{5280 ft}{1 mi} \cdot \frac{1 rev}{3\pi ft} =$ 420.169 rev/min

b. Find the angular speed of the wheels in radians per minute.

$\frac{420.169 rev}{min} \cdot \frac{2\pi radians}{1 rev} =$ 2640 rad/min

$d = 7.5\text{ in}$ $r = 3.75\text{ in}$ 2400 rpm

28. The circular blade on a saw has a diameter of 7.5 inches and rotates at 2400 revolutions per minute.
    a. Find the angular speed in radians per second.

$$\frac{2400\text{ rev}}{\text{min}} \cdot \frac{2\pi\text{ rad}}{1\text{ rev}} \cdot \frac{1\text{ min}}{60\text{ sec}} = 251.327\text{ rad/sec}$$

    b. Find the linear speed of the saw teeth in feet per second as they contact the wood being cut.

$$\frac{2400\text{ rev}}{\text{min}} \cdot \frac{1\text{ min}}{60\text{ sec}} \cdot \frac{7.5\pi\text{ in}}{1\text{ rev}} \cdot \frac{1\text{ ft}}{12\text{ in}} = 78.54\text{ ft/sec}$$

29. A car is moving at a rate of 65 miles per hour, and the diameter of its wheels is 2.5 feet.
    a. Find the number of revolutions per minute the wheels are rotating.

$$\frac{65\text{ mi}}{\text{hr}} \cdot \frac{1\text{ hr}}{60\text{ min}} \cdot \frac{5280\text{ ft}}{1\text{ mi}} \cdot \frac{1\text{ rev}}{2.5\pi\text{ ft}} = \boxed{728.293\text{ rev/min}}$$

    b. Find the angular speed of the wheels in radians per minute.

$$\frac{728.293\text{ rev}}{\text{min}} \cdot \frac{2\pi\text{ rad}}{1\text{ rev}} = \boxed{4576\text{ rad/min}}$$

30. A carousel with a 50-foot diameter makes 4 revolutions per minute.
    a. Find the angular speed of the carousel in radians per minute.

$$\frac{4\text{ rev}}{\text{min}} \cdot \frac{2\pi\text{ rad}}{1\text{ rev}} = \boxed{25.133\text{ rad/min}}$$

    b. Find the linear speed of the platform rim of the carousel.

$$\frac{4\text{ rev}}{\text{min}} \cdot \frac{2\pi(25)\text{ ft}}{1\text{ rev}} = \boxed{628.25\text{ ft/min}}$$