*AAT (IC/HW)-Day 1
Chapter 6: 6-1 Angles

Name Key
Date: ____________ Period: ____________

If the given angle is in standard position, find two positive coterminal angles and two negative coterminal angles.

1. (a) 120°

$120° + 1(360°) = 480°$
$120° + 2(360°) = 840°$
$120° - 1(360°) = -240°$
$120° - 2(360°) = -600°$

(b) 135°

$135° + 1(360°) = 495°$
$135° + 2(360°) = 855°$
$135° - 1(360°) = -225°$
$135° - 2(360°) = -585°$

(c) -30°

$-30° + 1(360°) = 330°$
$-30° + 2(360°) = 690°$
$-30° - 1(360°) = -390°$
$-30° - 2(360°) = -750°$

(d) 620°

$620° + 1(360°) = 980°$
$620° - 1(360°) = 260°$
$620° - 2(360°) = -100°$
$620° - 3(360°) = -460°$

(e) $\frac{5\pi}{6}$

$\frac{5\pi}{6} + 1(2\pi) = \frac{17\pi}{6}$
$\frac{5\pi}{6} + 2(2\pi) = \frac{29\pi}{6}$
$\frac{5\pi}{6} - 1(2\pi) = -\frac{7\pi}{6}$
$\frac{5\pi}{6} - 2(2\pi) = -\frac{19\pi}{6}$

(f) $-\frac{\pi}{4}$

$-\frac{\pi}{4} + 1(2\pi) = \frac{7\pi}{4}$
$-\frac{\pi}{4} + 2(2\pi) = \frac{15\pi}{4}$
$-\frac{\pi}{4} - 1(2\pi) = -\frac{9\pi}{4}$
$-\frac{\pi}{4} - 2(2\pi) = -\frac{17\pi}{4}$

(g) $\frac{2\pi}{3}$

$\frac{2\pi}{3} + 1(2\pi) = \frac{8\pi}{3}$
$\frac{2\pi}{3} + 2(2\pi) = \frac{14\pi}{3}$
$\frac{2\pi}{3} - 1(2\pi) = -\frac{4\pi}{3}$
$\frac{2\pi}{3} - 2(2\pi) = -\frac{10\pi}{3}$

(h) $\frac{-5\pi}{4}$

$-\frac{5\pi}{4} + 1(2\pi) = \frac{3\pi}{4}$
$-\frac{5\pi}{4} + 2(2\pi) = \frac{11\pi}{4}$
$-\frac{5\pi}{4} - 1(2\pi) = -\frac{13\pi}{4}$
$-\frac{5\pi}{4} - 2(2\pi) = -\frac{21\pi}{4}$

Find the angle that is complementary to θ.

2. (a) θ = 5°17'34"

$90° - 5°17'34'' = 84°42'26''$

DMS → 2nd ∠

2nd Angle
°
'
" → above + key

(b) θ = 32.5°

$90° - 32.5° = 57.5°$

Find the angle that is supplementary to θ.

3. (a) θ = 48°51'37"

$180° - 48°51'37'' = 131°8'23''$

(b) θ = 136.42°

$180° - 136.42° = 43.58°$

Find the exact radian measure of the angle.

4. (a) 150° (b) -60° (c) 225°

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

$-60° \cdot \frac{\pi}{180°} = \frac{-\pi}{3}$

$225° \cdot \frac{\pi}{180°} = \frac{5\pi}{4}$

(d) 450° (e) 72° (f) 100°

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

$72° \cdot \frac{\pi}{180°} = \frac{2\pi}{5}$

$100° \cdot \frac{\pi}{180°} = \frac{5\pi}{9}$

Find the exact degree measure of the angle.

5. (a) $\frac{2\pi}{3}$ (b) $\frac{11\pi}{6}$ (c) $\frac{3\pi}{4}$

$\frac{2\cancel{\pi}}{3} \cdot \frac{180}{\cancel{\pi}} = 120°$

$\frac{11\cancel{\pi}}{6} \cdot \frac{180}{\cancel{\pi}} = 330°$

$\frac{3\cancel{\pi}}{4} \cdot \frac{180}{\cancel{\pi}} = 135°$

(d) $-\frac{7\pi}{2}$ (e) $\frac{\pi}{9}$ (f) 7π

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

$\frac{\cancel{\pi}}{9} \cdot \frac{180}{\cancel{\pi}} = 20°$

$7\cancel{\pi} \cdot \frac{180}{\cancel{\pi}} = 1260°$

Express θ in terms of degrees, minutes, and seconds, to the nearest second.

6. θ = 2 7. θ = 5

$2 \cdot \frac{180}{\pi} \approx 114.59156°$ ▸DMS

$\approx 114°35'30''$

$5 \cdot \frac{180}{\pi} \approx 286.4787°$

$\approx 286°28'44''$

Express the angle as a decimal, to the nearest ten-thousandth of a degree.

8. 37°41' $\approx 37.6833°$

9. 115°26'27" $\approx 115.4408°$

Express the angle in terms of degrees, minutes, and seconds, to the nearest second.

10. 63.169° ▸DMS

$\approx 63°10'8''$

11. 310.6215° ▸DMS

$\approx 310°37'17''$

If a circular arc of the given length *s* subtends the central angle θ on a circle, find the radius of the circle.

12. s = 10 cm, θ = 4

$s = r\theta$

$\frac{10}{4} = \frac{r \cdot 4}{4}$

$r = 2.5$ cm

13. s = 3 km, θ = 20°

$s = r\theta$

$3 = r \cdot \left(20 \cdot \frac{\pi}{180}\right)$

$3 = \frac{\pi}{9} r$

$r = \frac{27}{\pi} \approx 8.59$ km

Find (a) the length of the arc and (b) the area of the circle sector.

14. central angle θ = 45°, r = 8 cm.

(a) $s = r \cdot \theta$

$= 8\left(45 \cdot \frac{\pi}{180}\right)$

$s = 8\left(\frac{\pi}{4}\right) = 2\pi \approx 6.28$

(b) $A = \frac{1}{2} r^2 \theta$ —or— $A = \frac{x}{360} \cdot \pi r^2$

$= \frac{1}{2}(8)^2\left(\frac{\pi}{4}\right)$

$A = 8\pi \approx 25.13 \text{ cm}^2$

$= \frac{45}{360} \cdot \pi (8)^2$

$= 8\pi \approx 25.13 \text{ cm}^2$

Find (a) the radian and degree measures of the central angle θ subtended by the given arc of length s on a circle of radius r and (b) find the area of the sector determined by θ.

15. s = 7 cm, r = 4 cm

(a) $s = r \cdot \theta$

$\frac{7}{4} = \frac{4 \cdot \theta}{4}$

$\theta = \frac{7}{4} = 1.75$ radians

$\frac{7}{4} \cdot \frac{180°}{\pi} = 100.27°$

(b) $A = \frac{1}{2} r^2 \theta$ —or— $A = \frac{x}{360} \cdot \pi r^2$

$= \frac{1}{2}(4^2)\left(\frac{7}{4}\right)$

$= 14 \text{ cm}^2$

$A = \frac{100.27}{360} \cdot \pi (4)^2$

$\approx 14 \text{ cm}^2$

16. A wheel of the given radius 5 in. is rotating at the rate of 40 rpm. Find the angular speed (in radians per minute).

$\left(40 \frac{rev}{min}\right)\left(2\pi \frac{rad}{rev}\right) = 80\pi \frac{rad}{min}$

~~$A = (RPM) \times 2\pi$~~

17. A typical tire for a compact car is 22 inches in diameter. If the car is traveling at a speed of 60 mi/hr, find the number of revolutions the tire makes per minute.

$\frac{60 \text{ m}}{hr} = \frac{60 \text{ mil}}{hr} \cdot \frac{1 \text{ hr}}{60 \text{ min}} \cdot \frac{5280 \text{ ft}}{mi} \cdot \frac{12 \text{ in}}{ft} = \frac{63{,}360 \text{ in.}}{min}$

Dimensional Analysis

18. A vender sells two sizes of pizza by the slice. The small slice is $\frac{1}{6}$ of a circular 18-inch-diameter pizza, and it sells for \$2.00. The large slice is $\frac{1}{8}$ of a circular 26-inch-diameter pizza, and it sells for \$3.00. Which slice provides more pizza per dollar?

provides slightly more pizza per \$

$A_{small} = \frac{1}{2} r^2 \theta$

$= \frac{1}{2}\left(\frac{1}{2}(18)\right)^2\left(\frac{2\pi}{6}\right)$

$= \frac{27\pi}{2} \therefore Cost_{small} = \frac{27\pi}{2} \div 2 \approx 21.21 \text{ in}^2/\$$

$A_{large} = \frac{1}{2}\left(\frac{1}{2} \cdot 26\right)^2 \cdot \left(\frac{2\pi}{8}\right) = \frac{169\pi}{8} \therefore Cost_{large} =$

$\frac{169\pi}{8} \div 3 \approx 22.12 \text{ in}^2/\$$