θ = central angle

$$\theta = \frac{360}{n}$$

LESSON 11.6 Practice
For use with pages 762–769

Find the measure of a central angle **of a regular polygon with the given number of sides. Round answers to the nearest tenth of a degree, if necessary.**

1. 20 sides

$n = 20 \quad \theta = \frac{360}{20}$

$= 18°$

2. 36 sides

$n = 36 \quad \theta = \frac{360}{36}$

$= 10°$

3. 120 sides

$n = 120 \quad \theta = \frac{360}{120}$

$\theta = 3°$

4. 23 sides

$n = 23 \quad \theta = \frac{360}{23}$

$\theta = 15.7°$

Find the given angle measure for the regular dodecagon **shown.** n=12

$\theta = \frac{360}{12}$

$\theta = 30°$

5. $m\angle TWU = \theta$

$= 30°$

6. $m\angle TWX = \frac{1}{2}\theta$

$= \frac{30}{2}$

$= 15°$

7. $m\angle XUW$

$90 - 15$

$= 75°$

8. $m\angle TWK$

$30(4)$

$= 120°$

9. $m\angle UWK$

$3(30)$

$= 90°$

10. $m\angle XWK$

$15 + 3(30)$

$15 + 90$

$= 105°$
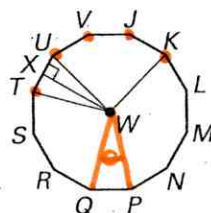
11. Multiple Choice Which expression gives the apothem for a regular nonagon with side length 10.5?

n=9

$\theta = \frac{360}{9} = 40$

$\frac{40}{2} = 20°$

$\frac{S}{2} = 5.25$

$\tan(20) = \frac{5.25}{a}$

A. $a = \dfrac{5.25}{\tan 40°}$

B. $a = \dfrac{10.5}{\tan 20°}$

C. $a = \dfrac{5.25}{\tan 20°}$

D. $a = 5.25 \cdot \tan 20°$
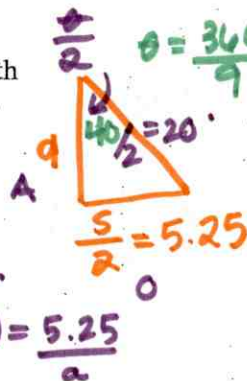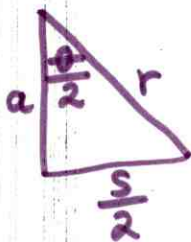
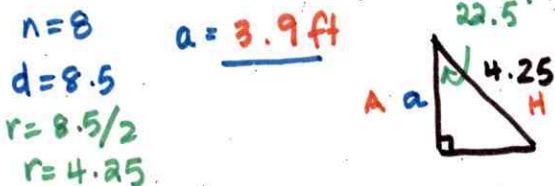**12.** A regular hexagon has diameter 22 inches. What is the length of its apothem? Round your answer to the nearest tenth.

$n = 6 \qquad a = \frac{11\sqrt{3}}{2} \text{ in}$

$d = 22$

$r = 22/2 = 11$
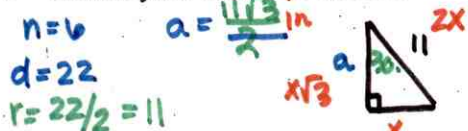
$\theta = \frac{360}{6} = 60°$

$\theta/2 = 30°$

$x = \frac{11}{2}$ or 5.5

$x\sqrt{3} = \frac{11\sqrt{3}}{2}$ or $5.5\sqrt{3}$

$2x = 11$

13. A regular octagon has diameter 8.5 feet. What is the length of its apothem? Round your answer to the nearest tenth.
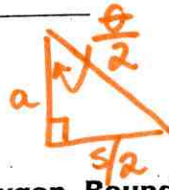
$n = 8$

$d = 8.5$

$r = 8.5/2$

$r = 4.25$

$a = 3.9 \text{ ft}$

$\theta = \frac{360}{8} = 45°$

$\frac{\theta}{2} = 22.5$

$\cos(22.5) = \frac{a}{4.25}$

$a = 4.25(\cos(22.5))$

LESSON 11.6 **Practice** continued
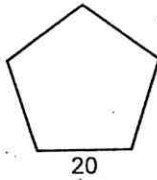For use with pages 762–769

$A = \dfrac{aP}{2}$

$P = ns$

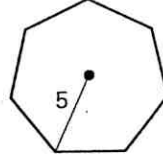Find the perimeter and area of the regular polygon. Round answers to the nearest tenth, if necessary.

14.
$n=6$
$r=8$
$S=2(4)=8$
$P = \boxed{48} \to 6(8)$
$a = 4\sqrt{3}$
$A = 96\sqrt{3}$

$x\sqrt{3}$ $2x$ 8
a $30.$
$\dfrac{S}{2} x$
$A = \dfrac{4\sqrt{3}(48)}{2}$ $\boxed{=146.3 u^2}$
$x = 4$
$x\sqrt{3} = 4\sqrt{3}$
$2x = 8$

15.
$n=5$
$S=20$
$P = \boxed{100}$ $5(20)$
$a = 13.8$
$A = \dfrac{13.8(100)}{2}$ $\boxed{=690 u^2}$

16.
$n=7$
$r=5$
$S = 4.4$
$P = \boxed{30.8}$ $7(4.4)$
$a = 4.5$
$A = \dfrac{4.5(30.8)}{2}$ $\boxed{49.3 u^2}$

17.
$n=8$
$a=4.5$
$S = 3.8$
$P = \boxed{30.4}$ $8(3.8)$
$A = \dfrac{4.5(30.4)}{2}$ $\boxed{A=68.4 u^2}$
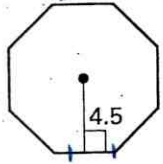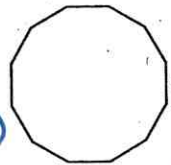
18.
look at #15 same process
$\boxed{P=60 units}$
$\boxed{A=279 u^2}$
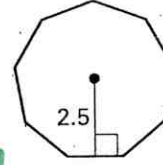
19.
look at #17 same process
$\boxed{P=16.2 units}$
$\boxed{A=20.3 u^2}$

20. What is the area of a regular 18-gon with a side length of 8 meters? Round your answer to the nearest tenth, if necessary.
Given
$n=18$ $a = 22.7$
$18(8)$ $S=8$
$P=144$
$\theta = \dfrac{360}{18} = 20$
$\tan(10) = \dfrac{4}{a}$ $a = \dfrac{4}{\tan(10)} = 22.7$
$A = \dfrac{22.7(144)}{2}$ $\boxed{=1634.4 m^2}$

21. What is the area of a regular 24-gon with a side length of 10 inches? Round your answer to the nearest tenth, if necessary.
Given
$n=24$ $P = 24(10)$ $a = 38$
$S=10$ $=240 in$
$\theta = \dfrac{360}{24} = 15$
$\tan(7.5) = \dfrac{5}{a}$ $a = 38$
$A = \dfrac{38(240)}{2}$ $\boxed{=4560 in^2}$

22. What is the area of a regular 30-gon with a radius of 20 feet? Round your answer to the nearest tenth, if necessary.
Given
$n=30$ $P = 126$
$r=20$ $a = 19.9$
$S = 4.2$ $2(2.1)$
$\theta = \dfrac{360}{30} = 12$
$\cos(6) = \dfrac{a}{20}$ $\sin(6) = \dfrac{x}{20}$
$a = 19.9$ $x = 2.1 \to 2(2.1) = side$
$P = 30(4.2)$
$A = \dfrac{19.9(126)}{2}$ $\boxed{A=1253.7 ft^2}$

23. Find the area of a regular pentagon inscribed in a circle whose equation is given by $(x - 4)^2 + (y - 6)^2 = 16$.
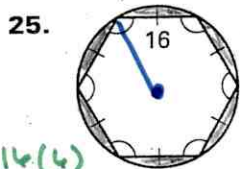omit

24. Find the area of a regular octagon inscribed in a circle whose equation is given by $(x - 2)^2 + (y + 3)^2 = 25$.
omit

Practice *continued*
For use with pages 762–769

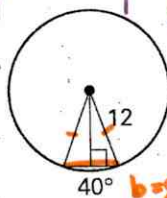**Find the area of the shaded region. Round answers to the nearest tenth, if necessary.**

Handwritten, upper right:
$$\frac{aP}{2} = \frac{5(30\sqrt{3})}{2}$$
$$= 75\sqrt{3}$$

25.

Handwritten:
A(circle) = πr^2
r = 16   = $\pi(16)^2$
A(Hexagon) = $\frac{aP}{2}$
a = $8\sqrt{3}$ = $\frac{8\sqrt{3}(96)}{2}$
P = 96

n=6
S=16
P=96   16(6)
a= $8\sqrt{3}$
A = 256π − 48($8\sqrt{3}$)
A = 139.1 u²

16

26.

r=10
2x
10   x=5
x a 60 $x\sqrt{3}=5\sqrt{3}$
5   2x = 10
10 5   S/2
10$\sqrt{3}$ $x\sqrt{3}$
S = $10\sqrt{3}$

A(O) − A(Δ)
= $\pi(10)^2$ $\frac{10\sqrt{3}(15)}{2}$
100π − 75$\sqrt{3}$
A = 183.7 units²

27.

A(sector) − A(Δ)
$\frac{x}{\pi(12)^2} = \frac{40}{360}$ $\frac{bh}{2}$
50.27 − $\frac{8.2(11.3)}{2}$
b=8.2
A = 4 units²

12
40°

sin(20)= $\frac{x}{12}$ A
x=4.1
cos(20)= $\frac{h}{12}$
11.3
height 20° 12 H
x
a S/2

28.

A(sector) − A(Δ)
$\frac{x}{\pi(13.6)^2} = \frac{72}{360}$ $\frac{16(11.1)}{2}$
116.21 − 88.8
A = 28.2 u²

72° 16

h 36 r
A   H
o 8

sin(36) = $\frac{8}{r}$
r=13.6
tan(36) = $\frac{8}{h}$
h = 11.0

A(Δ)

In Exercises 29 and 30, use the following information.

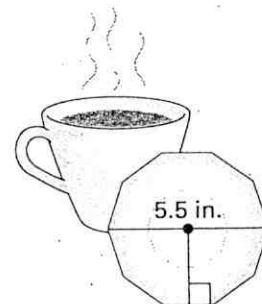**Tiles** You are tiling the floor of a hallway with tiles that are regular hexagons as shown.

29. What is the area of each tile?

6 in.

11.0
16

30. The hallway has a width of 5 feet and a length of 12 feet. At least how many tiles will you need?

31. A cup saucer is shaped like a regular decagon with a diameter of 5.5 inches as shown.

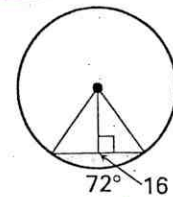   **a.** What is the length of the apothem of the saucer? Round your answer to the nearest tenth.

   5.5 in.

   b. What is the perimeter and area of the saucer? Round your answers to the nearest tenth.