### Answers for Lesson 10-3, pp. 548–550 Exercises

1. \( m \angle 1 = 120; m \angle 2 = 60; m \angle 3 = 30 \)
2. \( m \angle 4 = 90; m \angle 5 = 45; m \angle 6 = 45 \)
3. \( m \angle 7 = 60; m \angle 8 = 30; m \angle 9 = 60 \)
4. \( 2144.475 \text{ cm}^2 \)
5. \( 2851.8 \text{ ft}^2 \)
6. \( 12,080 \text{ in.}^2 \)
7. \( 2475 \text{ in.}^2 \)
8. \( 1168.5 \text{ m}^2 \)
9. \( 2192.4 \text{ cm}^2 \)
10. \( 841.8 \text{ ft}^2 \)
11. \( 27.7 \text{ in.}^2 \)
12. \( 93.5 \text{ m}^2 \)
13. \( 210 \text{ in.}^2 \)
14. \( 72 \text{ cm}^2 \)
15. \( 384\sqrt{3} \text{ in.}^2 \)
16. \( 162\sqrt{3} \text{ m}^2 \)
17. \( 75\sqrt{3} \text{ m}^2 \)
18. \( 12\sqrt{3} \text{ in.}^2 \)
19. a. 72  
   b. 54  
20. a. 45  
   b. 67.5  
21. a. 40  
   b. 70  
22. a. 30  
   b. 75  
23. \( 73 \text{ cm}^2 \)
24. D
25. a. 9.1 in.  
   b. 6 in.  
   c. 3.7 in.  
   d. Answers may vary. Sample: About 4.6 in.; the length of a side of a pentagon should be between 3.7 in. and 6 in.
26. \( m \angle 1 = 36; m \angle 2 = 18; m \angle 3 = 72 \)
27. The apothem is one leg of a rt. \( \triangle \) and the radius is the hypotenuse.
Answers for Lesson 10-3, pp. 548–550 Exercises (cont.)

28. a–c.

regular octagon

d. Construct a 60° angle with vertex at circle’s center.

29. \(600\sqrt{3} \text{ m}^2\)

30. Check students’ work.

31. 128 cm²

32. \(24\sqrt{3} \text{ cm}^2, 41.6 \text{ cm}^2\)

33. \(900\sqrt{3} \text{ m}^2, 1558.8 \text{ m}^2\)

34. a. \(b = s; h = \frac{\sqrt{3}}{2}s\)

\[
A = \frac{1}{2}bh
\]

\[
A = \frac{1}{2}s \cdot \frac{\sqrt{3}}{2}s
\]

\[
A = \frac{1}{4}s^2\sqrt{3}
\]

b. apothem = \(\frac{s\sqrt{3}}{6}\)

\[
A = \frac{1}{2}ap = \frac{1}{2}\left(\frac{s\sqrt{3}}{6}\right)(3s)
\]

\[
= \frac{1}{4}s^2\sqrt{3}
\]

35. The apothem is \(\perp\) to a side of the pentagon. Two right \(\triangle\) are formed with the radii of the pentagon. So the \(\triangle\) are \(\cong\) by HL. Therefore, the \(\triangle\) formed by the apothem and radii are \(\cong\) by CPCTC, and the apothem bisects the vertex \(\angle\).
Answers for Lesson 10-3, pp. 548–550 Exercises (cont.)

36. For regular \( n \)-gon \( ABCDE \ldots \), let \( P \) be the intersection of the bisectors of \( \angle ABC \) and \( \angle BCD \). \( BC \cong DC \), \( \angle BCP \cong \angle DCP \), and \( CP \cong CP \), so \( \triangle BCP \cong \triangle DCP \), and \( \angle CBP \cong \angle CDP \) by CPCTC. Since \( \angle BCP \) is half the size of \( \angle ABC \) and \( \angle ABC \cong \angle CDE \), \( \angle CDP \) is half the size of \( \angle CDE \). By a similar argument, \( P \) is on the bisector of each \( \angle \) around the polygon.

The smaller angles formed by the bisectors are all \( \cong \). By the Conv. of the Isosc. \( \triangle \) Thm., each of \( \triangle APB \), \( BPC \), \( CPD \), and so on are isosceles with \( AP = BP = CP = DP \) and so on. Thus, \( P \) is equidistant from the polygon’s vertices, so \( P \) is the center of the polygon and the \( \angle \) bisectors are radii.

37. a. \((2.8, 2.8)\)

b. 5.6 units\(^2\)

c. 45 units\(^2\)

38. a. \( A = \frac{1}{2}bh \) and \( h = a \sin C \)

b. two sides; included

c. Form \( n \) \( \triangle \) with the radii. \( A(\text{each } \triangle) = \frac{1}{2}r^2 \sin\left(\frac{360}{n}\right) \), so \( A = \frac{nr^2}{2} \sin \left(\frac{360}{n}\right) \).