Chapter 8

8.1.1:

8-6. **a:** 110° **b:** 70° **c:** 48° **d:** 108°

8-7. **a:** The measure of an exterior angle of a triangle equals the sum of the measures of its remote interior angles.
b: $a+b+c=180°$ (the sum of the interior angles of a triangle is 180°), $x+c=180°$ (straight angle); therefore, $a+b+c=x+c$ (substitution) and $a+b=x\,a+b=x$ (subtracting c from both sides).

8-8. $x=72°$ and $y=54°$

8-9. $360° \div 15° = 24$

8-10. **a:** $\cong$ (SAS $\cong$), $x=79°$ **b:** cannot be determined
c: $\cong$ (AAS $\cong$), $x \approx 5.9$ units **d:** $\cong$ (SAS $\cong$), $x \approx 60.9°$

8-11. **a:** True **b:** False (counterexample is a quadrilateral without parallel sides)
c: True **d:** True
e: False (counterexample is a parallelogram that is not a rhombus)

8.1.2:

8-16. **a:** isosceles right triangle, because $AC=BC$ and $\overline{AC} \perp \overline{BC}$
b: 45°, methods vary

8-17. $a=87°$, $b=83°$, $c=96°$, $d=94°$; 360°

8-18. $A=40.5\text{ un}^2$, $P \approx 27.7$ units

8-19. $(-5,1)$, $(-3,7)$, and $(-6,2)$

8-20.

Statements	Reasons
1. $\overline{BC} \parallel \overline{EF}$, $\overline{AB} \parallel \overline{DE}$, and $AF=DC$	1. **[Given]**
2. $m\measuredangle BCF = m\measuredangle EFC$ and $m\measuredangle EDF = m\measuredangle CAB$	2. **[If two lines cut by a transversal are parallel, then alternate interior angles are equal.]**
3. [$\boldsymbol{FC=FC}$]	3. Reflexive Property
4. $AF+FC=CD+FC$	4. Additive Property of Equality (adding the same amount to both sides of an equation keeps the equation true)
5. $AC=DF$	5. Segment addition
6. $\triangle ABC \cong \triangle DEF$	6. **[ASA ≅]**
7. [$\boldsymbol{\overline{BC} \cong \overline{EF}}$]	7. $\cong \triangle s \rightarrow \cong$ parts

8-21. B

8.1.3:

8-27. **a:** $A = 36$ sq. ft, $P = 28$ ft **b:** $A = 600$ sq. cm, $P \approx 108.3$ cm

8-28. $QP = RS$ and $PR = SQ$ (given), $QR = QR$ (Reflexive Property), so $\Delta PQR \cong \Delta SRQ$ (SSS $\cong$) and $\measuredangle P \cong \measuredangle S$ ($\cong \Delta s \rightarrow \cong$ parts).

8-29. **a:** isosceles triangle
b: The central vertex must be $360° \div 10 = 36°$. The other two angles must be equal since the triangle is isosceles. Therefore, $(180° - 36°) \div 2 = 72°$.
c: $10 \cdot 14.5 = 145$ square inches

8-30. $(6.5, 5)$

8-31. **a:** The region can be rearranged into a rectangle with dimensions 14 and 7 units.
b: $14(7) = 98$ square units

8-32. B

8.1.4:

8-37. The reflections are all congruent triangles with equal area. Therefore, the total area is $(6)(11.42) = 68.52$ square inches.

8-38. **a:** non-convex **b:** convex **c:** convex **d:** non-convex

8-39. **a:** 64un^2 **b:** $\approx 27.0\text{un}^2$ **c:** $8\sqrt{3} \approx 13.9\text{un}^2$

8-40. **a:** 3 **b:** 15 **c:** 4 **d:** 9

8-41. **a:** $A = 192\text{cm}^2$, $P = 70\text{cm}$
b: The length of each side is 9 times the corresponding side in the floor plan. $A = 15{,}552\ \text{cm}^2$ and $P = 630$ cm.
c: The ratio is $\frac{9}{1} = 9$; the ratio of the perimeters equals the zoom factor
d: The ratio of the areas is $\frac{81}{1} = 81$. The ratio of the areas equals the square of the zoom factor (9^2).

8-42. D

8.1.5:

8-49. **a:** The interior and exterior angles must be supplementary. Therefore, $180° - 20° = 160°$.

b: Possible ways: Use $360° \div 20° = 18$ sides or solve the equation $\frac{180(n-2)}{n} = 160°$ to find $n = 18$.

8-50. **a:** $x = 18$, $y = 9\sqrt{3}$ **b:** $x = 24\sqrt{2}$, $y = 24$

c: $x = \frac{8}{\sqrt{3}} = \frac{8\sqrt{3}}{3}$, $y = \frac{16}{\sqrt{3}} = \frac{16\sqrt{3}}{3}$

8-51. Since the diagonals of a parallelogram bisect each other, they must intersect at the midpoint of *BD*. Thus, they intersect at (6, 21).

8-52. $A = 100\sqrt{3} \approx 173.2\ \text{mm}^2$

8-53. **a:** $\pm\sqrt{\frac{17}{5}} \approx \pm 1.84$ **b:** $w \approx 2.17$ and -1.57

c: no solution possible

8-54. E

8-55. **a:** 60° **b:** 82° **c:** 14° **d:** 117°

8-56. **a:** equilateral triangle **b:** rectangle

c: nonagon **d:** rhombus or kite

8-57. The *x*-coordinate must be 6, but the *y*-coordinate could be $6\sqrt{3}$ or $-6\sqrt{3}$.

8-58. **a:** Yes; since $BC = BC$ (Reflexive Property), $\overline{AB} \cong \overline{DC}$ (given), and $\measuredangle ABC \cong DCB$ (given), then $\Delta ABC \cong \Delta DCB$ (SAS $\cong$). Therefore, $AC = DB$ ($\cong \Delta s \to \cong$ parts).

b: No; the relationships in the figure are true even if points *B* and *C* were "hinged," as long as the two angles remain congruent. See the diagram for problem 8-28 for a similar diagram.

8-59. **a:** $(-2.5, 0)$ and $(3, 0)$

b: The graph of $y = -(2x^2 - x - 15)$ would be the reflection of $y = 2x^2 - x - 15$ across the *x*-axis because each *y*-value would have its sign changed.

8-60. D

8.2.1:

8-65. **a:** $A = 34\text{un}^2$, $P \approx 25.7$ units **b:** $A = 306\ \text{un}^2$, $P \approx 77$ units
c: ratio of the perimeters $= 3$; ratio of the areas $= 9$

8-66. 80 inches or ≈ 6.67 feet

8-67. The area of the hexagon $\approx 23.4\ \text{ft}^2$. Adding the rectangles makes the total area $\approx 41.4\ \text{ft}^2$.

8-68. **a:** Reasoning will vary, but it is most likely that you will earn more extra credit if the class spins the spinner with the options of 5 and 10 points.
b: Reasoning will vary, but now the first spinner is definitely more attractive.

8-69. $4x^2 = 2x^2 + 17x - 30$, $x = 2.5$ or 6: yes, there are two possible answers.

8-70. B

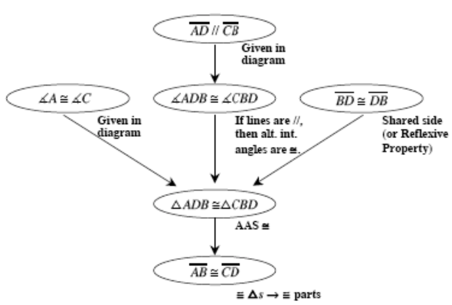
8.2.2:

8-76. **a:** $\frac{3}{4}$ **b:** rp **c:** ar^2

8-77. **a:** $\approx 403.1\ \text{cm}^2$ **b:** $\approx 100.8\ \text{cm}^2$

8-78. **a:** $5 + 1 = 6$, so two sides will collapse on the third side.
b: Answers vary. One solution is 2, 5, and 6.

8-79.



8-80. **a:** $AAS \cong, \Delta ABC \cong \Delta DCB$ **b:** $ASA \cong, \Delta ABC \cong \Delta EDC$

8-81. D

8.3.1:

8-85. Area of the entire pentagon ≈ 172.05 un^2, so the shaded area $\approx \frac{3}{5}(172.05) \approx 103.23$ un^2.

8-86. **a:** $x = 14\sqrt{3}$, 30°-60°-90° pattern **b:** $x \approx 5.78$, Law of Sines
c: No solution because the hypotenuse must be the longest side
d: 24 units, triangle angle formula

8-87. 168°

8-88. $\overline{BC} \cong \overline{DC}$ and $\measuredangle A \cong \measuredangle E$ (given) and $\measuredangle BCA \cong \measuredangle DCE$ (vertical angles are $\cong$). So $\Delta ABC \cong \Delta EDC$ (AAS $\cong$) and $\overline{AB} \cong \overline{ED}$ ($\cong \Delta s \to \cong$ parts).

8-89. **a:** (1.5,5) **b:** $y = \frac{4}{3}x + 3$ **c:** 15 units

8-90. B

8.3.2:

8-96. $(100 - 25\pi) \div 4 \approx 5.37$ square units

8-97. **a:** 8 **b:** 18

8-98. **a:** $x = 26$; if lines are parallel and cut by a transversal, then alternate interior angles are equal.
b: $x = 33$, $n = 59°$; if lines are parallel and cut by a transversal, then same-side exterior angles are supplementary.

8-99. **a:** 20 **b:** ≈ 126.3 un^2

8-100. The area of the hexagon is $24\sqrt{3}$ units, so the side length of the square is $\sqrt{24\sqrt{3}} \approx 6.45$ units.

8-101. D

8.3.3:

8-106. $360° - 40° = 320°$, so $\frac{320}{360} = \frac{8}{9} \approx 89\%$.

8-107. **a:** $C = 28\pi$ un, $A = 196\pi$ un^2 **b:** $C = 10\pi$ un, $A = 25\pi$ un^2
c: diameter $= 100$ un, radius $= 50$ un

8-108.

Statements	Reasons
1. $\overline{AB} \perp \overline{DE}$ and $\overline{DE}$ is a diameter of $\odot C$.	1. **[Given]**
2. $\measuredangle AFC$ and $\measuredangle BFC$ are right angles.	2. **[Definition of Perpendicular]**
3. $FC = FC$	3. **[Reflexive Property]**
4. $\overline{AC} = \overline{BC}$	4. Definition of a Circle (radii must be equal)
5. **[$\Delta AFC \cong \Delta BFC$]**	5. HL $\cong$
6. $\overline{AF} \cong \overline{FB}$	6. **[$\cong \Delta s \rightarrow \cong$ parts]**

8-109. $a \leftrightarrow 3$, $b \leftrightarrow 1$, $c \leftrightarrow 4$, $d \leftrightarrow 2$

8-110. **a:** -3 **b:** -4 **c:** 3 and -3 **d:** 2 and -2

8-111. D

8-112. **a:** $(55)(60) + 900\pi \approx 6127.4$ square feet
b: $110 + 60\pi \approx 298.5$ feet, $298.5 \cdot 8 = \$2387.96$ or approximately \$2,388
c: Area is four times as big $\approx 24{,}509.6$ square feet; perimeter is twice as big ≈ 597 units.

8-113. **a:** $x + x + 125° + 125° + 90° = 540°$, $x = 100°$
b: $6x + 18° = 2x + 12°$, $x = 3°$

8-114. **a:** $CD = 22$, $BC = 7$, and $ED = 6$; the perimeter is $22 + 14 + 12 = 48$ units
b: $54(4) = 216$ cm^2

8-115. **a:** $16\sqrt{3} \approx 27.71$ square units **b:** 36 square units, more
c: $24\sqrt{3} \approx 41.57$ square units; its area is greater than both the square and the equilateral triangle.
d: a circle

8-116. **a:** $2\pi r = 24$; $r = \frac{12}{\pi}$; $A = \frac{144}{\pi} \approx 45.84$ square units
b: $2\pi r = 18\pi$; $r = 9$; $A = 81\pi \approx 254.47$ square units

8-117. E