Chapter 5

5.1.1:

5-7. $x \approx 7.50$ and $y \approx 8.04$ units; Sine or cosine could be used to get the first leg, then any one of the trig ratios or the Pythagorean Theorem to get the other.

5-8. **a:** False (a rhombus and square are counterexamples)
b: True
c: False (it does not mention that the lines must be parallel, so a counterexample with two non-parallel lines cut by a transversal can be drawn.)

5-9. **a:** $(0.8)(0.8) = 0.64 = 64\%$ **b:** $(0.8)(0.2) = 0.16 = 16\%$

5-10. area = 74 sq. un, perimeter = 47.66 units

5-11. **a:** $x = -3$ **b:** $m = 10$ **c:** $p = -4$ or $\frac{2}{3}$ **d:** $x = 23$

5.1.2:

5-16. **a:** $\sin 22° = \frac{x}{17}$, $x \approx 6.37$ **b:** $\tan 49° = \frac{7}{x}$, $x \approx 6.09$
c: $\cos 60° = \frac{x}{6}$, $x = 3$

5-17. ≈ 26.92 feet

5-18. **a:** a possible area model:

	parents $\frac{1}{3}$	niece $\frac{1}{6}$	boyfriend $\frac{1}{2}$
parents $\frac{1}{3}$	$\frac{1}{9}$	$\frac{1}{18}$	$\frac{1}{6}$
niece $\frac{1}{6}$	$\frac{1}{18}$	$\frac{1}{36}$	$\frac{1}{12}$
boyfriend $\frac{1}{2}$	$\frac{1}{6}$	$\frac{1}{12}$	$\frac{1}{4}$

b: $\frac{1}{4}$

c: $\frac{1}{9} + \frac{1}{6} + \frac{1}{6} + \frac{1}{4} = \frac{25}{36} \approx 69\%$

5-19: **a:** False (a 30°- 60°- 90° triangle is a counterexample)
b: False (this is only true for rectangles and parallelograms)
c: True

5-20. $\Delta ABC \sim \Delta EFD$ by $SAS \sim$

5.1.3:

5-26. **a:** $x = \pm 5$ **b:** all numbers **c:** $x = 2$ **d:** no solution

5-27. ≈ 11.5 seconds

5-28. **a:** $\frac{3}{8}$ **b:** $\frac{1}{8}$ **c:** $\frac{3}{8}$ **d:** $\frac{1}{8}$
The sum must be equal to one.

5-29. area ≈ 294.55 square units, perimeter ≈ 78.21 units

5-30. 9.38 minutes

5.1.4:

5-36. All of the triangles are similar. They are all equilateral triangles.

5-37. Since $\tan(33.7°) \approx \frac{2}{3}$, $y = \frac{2}{3}x + 7$.

5-38. **a:** $\sin\theta = \frac{b}{a}$ **b:** $\tan\theta = \frac{a}{b}$ **c:** $\cos\theta = \frac{a}{b}$

5-39. **a:** $\frac{4}{20} = \frac{1}{5}$
b: $\frac{4}{5}$, Since the sum of the probabilities of finding the ring and not finding the ring is 1, you can subtract $1 - \frac{1}{5} = \frac{4}{5}$.
c: No, his probability is still $\frac{4}{20} = \frac{1}{5}$ because the ratio of the shaded region to the whole sandbox is unchanged.

5-40. **a:** $\cos 23° = \frac{18}{x}$ or $0.921 = \frac{18}{x}$
b: Since 67° is complementary to 23°, then $\sin 67° = \cos 23°$. So $\sin 67° \approx 0.921$.

5.2.1:

5-46. **a:** $A = 1$ square units, $P = 2 + 2\sqrt{2}$ units

b: $A = \frac{25\sqrt{3}}{2} \approx 21.65$ square units, $P = 15 + 5\sqrt{3} \approx 23.66$ units

5-47. **a:** $y = 111°, x = 53°$ **b:** $y = 79°, x = 47°$

c: $y = 83°, x = 53°$ **d:** $y = 3°, x = 3\sqrt{2}$ units

5-48. **a:** $4\sqrt{2}$ units; students can use the Pythagorean Theorem or can use the fact that it is a 45°- 45°- 90° triangle.

b: It is a trapezoid; 24 square units

5-49. **a:** Answers vary. Sample responses: $x < 3$, x is even, etc.

b: the length of each leg is 6 units

5-50. **a;** not similar **b:** $SAS \sim$ **c:** $SSS \sim$ **d:** $SSS \sim$ or $SAS \sim$

5.2.2:

5-56. **a:** 16 units **b:** 4 units and $4\sqrt{2}$ units

c: 24 units **d:** 10 and $10\sqrt{3}$ units

5-57. **a:** $m\measuredangle A = 35°, m\measuredangle B = 35°, m\measuredangle ACB = 110°$, $m\measuredangle D = 35°$, $m\measuredangle E = 35°$, $m\measuredangle DCE = 110°$

b: Answers vary. Once all the angles are found, State which pairs of corresponding angles have equal measure, such as $m\measuredangle D = m\measuredangle A$, to reach the conclusion that $\Delta ABC \sim \Delta DEC$ by AA ~ or SAS ~.

c: They are both correct. Since both triangles are isosceles, we cannot tell if one is the reflection or the rotation of the other (after dilation).

5-58. $\cos 52° = \frac{b}{c}, \tan 52° = \frac{a}{b}, \cos 38° = \frac{a}{c}$

5-59. $\frac{14}{27} = \frac{x}{40}, x \approx 20.74$ inches

5-60. **a:** $\frac{1}{2}$ **b:** 0 **c:** $\frac{3}{4}$ **d:** 1

5.3.1:

5-67. $\approx 61°$

5-68. **a:** impossible because a leg is longer than the hypotenuse
b: impossible because the sum of the angles is more than 180°

5-69. William is correct.

5-70. **a:** $A'(-3,-6)$, $B'(-5,-4)$, $C'(0,-4)$ **b:** $A'(3,3)$, $B'(1,1)$, $C'(1,6)$

5-71. **a:** $x = \frac{16}{5}$ **b:** no solution **c:** $x = -11$ or 3 **d:** $x = 288$

5-72. b is correct; if two sides of a triangle are congruent, the angles opposite them must be equal.

5.3.2:

5-79. They must have equal length. Since a side opposite a larger angle must be longer than a side opposite a smaller angle, sides opposite equal angles must be the same length.

5-80. ≈ 10.6 units

5-81. 72 square units

5-82. 12.6

5-83. 36%

5-84. $(-2,4)$

5.3.3:

5-89. **a:** 29% **b:** $\cos 29° = \frac{y}{42}$, $y \approx 36.73$

5-90. **a:** $(-1,-2)$ **b:** $(4,-4)$ **c:** $(3,4)$

5-91. **a:** It uses circular logic.
b: The arrow between "Marcy likes chocolate" and "Marcy likes Whizzbangs" should be reversed. The arrow connecting "Marcy likes chocolate" and "Whizzbangs are 100% chocolate" should be removed.

5-92. $\tan^{-1}(\frac{3}{4}) \approx 36.87°$

5-93. **a:** $\frac{1}{12}$ **b:** $\frac{1}{3}$

5-94. C

5.3.4:

5-100. **a:** The diagram should be a triangle with sides marked 116 ft. and 224 ft. and the angle between them marked 58°.
b: ≈ 190 feet

5-101. **a:** Corresponding angles have equal measure.
b: The ratio of corresponding sides is constant, so corresponding sides are proportional.

5-102. $y = (\tan 25°)x + 4$ or $y \approx 0.466x + 4$

5-103. It must be longer than 5 and shorter than 23 units.

5-104. 7 years

5-105. B

5.3.5:

5-114. The third side is 12.2 units long. The angle opposite the side of length 10 is approximately 35.45°, while the angle opposite the side of length 17 is approximately 99.55°.

5-115. $x \approx 11.3$ units; Methods include using the Pythagorean Theorem to set up the equation $x^2 + x^2 = 16^2$, using the 45°- 45°- 90° triangle shortcut to divide 16 by $\sqrt{2}$, or to use sine or cosine to solve using a trigonometric ratio.

5-116. No, because to be a rectangle, the parallelogram needs to have 4 right angles. Possible counterexample: a parallelogram without 4 right angles.

5-117. a: $P \approx 40.32$ units, $A = 72$ sq. units **b:** $P = 30$ units, $A = 36$ sq. units

5-118. $A(2,4)$, $B(6,2)$, $C(4,5)$

5-119. $y = \frac{3}{4}x + 4$

5-120. a: $m\measuredangle ABE = 80°$, $m\measuredangle EBC = 60°$, $m\measuredangle BCE = 40°$, $m\measuredangle ECD = 80°$, $m\measuredangle DEC = 40°$, $m\measuredangle CEB = 80°$, $m\measuredangle BEA = 60°$
b: 360°

5-121. a: ≈ 8.64 cm **b:** $PS = SR = 5.27$ cm, so the perimeter is ≈ 25.5 cm

5-122. area ≈ 21.86 sq. units, perimeter ≈ 24.59 units

5-123. a: $(0.7)(0.7) = 0.49 = 49\%$ **b:** $(0.3)(0.7) = 0.21 = 21\%$

5-124. a: $5 + \sqrt{20} + \sqrt{37} \approx 15.55$ units **b:** ≈ 31.11 **c:** $(-2,0)$

5-125. a: $x = \frac{45}{4} = 11.25$ **b:** $x = -10$ or $x = 10$
c: $x = 1.3$ **d:** no solution