Chapter 6

6.1.1:

6-4. **a:** alternate interior angles   **b:** vertical angles
      c: $\angle u$ & $\angle z$, $\angle s$ & $\angle x$, $\angle v$ & $\angle w$, and $\angle t$ & $\angle y$

6-5. **a:** They are similar by SAS~.
      b: Yes, because they are similar and the corresponding sides have a ratio of 1.

6-6. $3x + 1° + 52° = 180°$, $x = \frac{127}{3} = 42.33°$

6-7. **a:** 8   **b:** ≈ 14.97 **c:** ≈ 15.2

6-8. **1a and 1b:** statements *ii* and *iv*
      2: The cupcakes are burned
      3: The fans will not buy the cupcakes because they are burned
      4: The team will not have enough money for uniforms

6-9. A

6.1.2:

6-13. $a = 97°$, $b = 15°$, $c = 68°$, $d = 68°$

6-14. **a:** ≈ 3.75, tangent
      b: $7\sqrt{2} \approx 9.9$, Pythagorean Theorem or $45° - 45° - 90°$ ratios
      c: ≈ 9.54, Law of Cosines

6-15. **a:** 25 units   **b:** 56 square units and 350 square units

6-16. **a:** $A'(-2,-7)$, $B'(-5,-8)$, $C'(-3,-1)$ **b:** $A''(2,7)$, $B''(5,8)$, $C''(3,1)$
      c: reflecting across the *y*-axis

6-17. Let *B* represent the measure of angle *B*. Then $(3B + 5°) + B + (B - 20°) = 180°$, so $m\angle A = 122°$, $m\angle B = 39°$, and $m\angle C = 19°$.

6-18. A

6.1.3:

6-24. Reasoning can vary. Sample responses:

    a: $a = 123°$, when lines are $/\!/$, corr. ∡s are =, $b = 123°$, when lines are $/\!/$, alt. int. ∡s are =, $c = 57°$, suppl. ∡s

    b: all $= 98°$, suppl. ∡s, then °, when lines are $/\!/$, alt. int. ∡s = and corres. or vert. ∡s =

    c: $g = h = 75°$, °, when lines are $/\!/$, alt. int. or corres. ∡s =, then vert. ∡s =

6-25. **a:** 40%

    b: To make only one freethrow, Vicki needs to make the first and miss the second. This probability is $0.6 \cdot 0.4 = 0.24$ or 24%. The probability of her scoring two free-throws is $0.6 \cdot 0.6 = 0.36$ or 36%. Therefore, she has a greater chance of scoring two points than one. This is a counter-intuitive result that could benefit from some discussion in class at a later point if time allows.

6-26. **a:** $x = -4$ and $y = 0$ **b:** No solution; the lines are parallel.

6-27. $\frac{4}{10} = \frac{5}{x+5}$, $x = 7.5$

6-28. **b:** The perimeter of both triangles is ≈ 48.25 units

    c: $\approx 32.9°$ and $\approx 57.1°$

6-29. C

6.1.4:

6-35. Justifications and order may vary: $a = 53°$, given; $b = 55°$, straight angle (with $\measuredangle g$); $c = 72°$, triangle angle sum; $d = 53°$, when lines are parallel, alternate interior angles are equal; $e = 55°$, when lines are parallel, alternate interior angles are equal; $f = 127°$, straight angle (with $\measuredangle a$), so they are supplementary.

6-36. x-intercept $(4,0)$, y-intercept $(0,6)$

6-37. **a:** For left-hand triangle: $c^2 = 9 + 36 - 2 \cdot 3 \cdot 6 \cos 60°$, $c = 3\sqrt{3} \approx 5.196$ units; For right-hand triangle: $c^2 = 36 + 27 - 2 \cdot 6 \cdot 3\sqrt{3} \cos 30°$, $c = 3$ units; They are congruent.
   b: Yes; by SSS $\cong$ or SAS $\cong$.

6-38. **a:** converse: If the ground is wet, then it is raining. Not always true.
   b: converse: If a polygon is a rectangle, then it is a square. Not always true.
   c: converse: If a polygon has four 90° angles, then it is a rectangle. Not always true.
   d: converse: If a polygon is a triangle, then it has three angles. Always true.
   e: converse: If vertical angles are congruent, then two lines intersect. Always true.

6-39. **b:** $\frac{14}{22} = \frac{10}{x}$, $x \approx 15.71$

6-40. $\sin 40° = \frac{h}{600}$, $h \approx 385.67$ feet

6.2.1:

6-43. **a:** $x \approx 45.56$ **b:** $x \approx 10.63$ **c:** $x \approx 266.49$ **d:** $x = 5$

6-44. 9 square units; One way: Find $AC = 5$ and then calculate $\frac{1}{2}(5)(3.6)$, or can use $\overline{BC}$ as the base and calculate $\frac{1}{2}(2 + 4)(3)$.

6-45. **a:** $m = 33$, $n = 36$
   b: area (small) = 378 square units, perimeter (small) = 80 units, area (big) = 850.5 square units, and perimeter (big) = 120 units

6-46. **a:** similar because of AA~
   b: neither because angles not equal
   c: congruent because of ASA $\cong$ or AAS $\cong$

6-47. **a:** $\approx 71.56°$ **b:** $y = x + 3$ **c:** $(1,4)$

6-48. D

6.2.2:

6-50. **a:** lines l and m are parallel because alternate interior angles are equal

b: line n is perpendicular to line m because $w + k = 180°$ and if $w = k$, then each is $90°$

c: no special statements can be made because vertical lines are always equal

d: lines l and m cannot be parallel because otherwise $z + k = 180°$.

6-51. **a:** $\triangle ABC \sim \triangle DEF$ (AA~)　　　　**b:** $\triangle MON \cong \triangle PQR$ (AAS$\cong$ or ASA$\cong$)

c: neither congruent nor similar because $m\angle J \neq 62°$. If $m\angle J = 62°$, then $m\angle L = 180° - 2 \cdot 62° = 56°$. Since $\frac{\sin 56°}{5} \neq \frac{\sin 72°}{8}$, this triangle cannot exist.

6-52. **a:** It is a trapezoid. The slope of $\overleftrightarrow{WZ}$ equals the slope of $\overleftrightarrow{XY}$.

b: ≈ 18.3 units　　　　**c:** $(-9,1)$　　　　**d:** 2

6-53. Because alternate interior angles are congruent, the angle of depression equals the angle formed by the line of sight and the ground. Then $\tan\theta = \frac{52}{38}$, $\theta \approx 53.85°$.

6-54. c^2 and $a^2 + b^2$

6-55. B

6.2.3:

6-61. **a:** Yes, because parallel lines assure us that the alternate interior angles are congruent. Since corresponding angles in the triangles have equal measure, the triangles are similar by AA ~.

b: $\frac{x}{20} = \frac{x+2}{24}$, $x = 10$

6-62. **a:** $x = 4$　　　　　　　　**b:** $x = 55°$

c: $x = 23°$ and $y = 43°$　　　**d:** $x = 5.5$ and $y = 45.2$

6-63. area ≈ 100.55 square units, perimeter ≈ 43.36 units

6-64. **a:** 288 feet by 256 feet

b: area of shape $= 59.5$ square units, area of island $= 60,928$ square units

6-65. **a:** Yes because of AAS$\cong$ or ASA$\cong$; $\triangle DEF \cong \triangle LJK$

b: reflection and rotation

c: $x \approx 4.3$

6-66. C

6.2.4:

6-71. **a:** congruent (HL$\cong$ or SAS$\cong$) **b:** congruent (AAS$\cong$)
c: not necessarily congruent **d:** congruent (SAS$\cong$)

6-72. **a:** $x + 4x - 2° = 90°$, $x = 18.4$ (complementary angles)
b: $2m + 3° + m - 1° + m + 9° = 180°$, $m = 42.25$ (Triangle Angle Sum Theorem)
c: $7k - 6° = 3k + 18°$, $k = 6$ (vertical angles are equal)
d: $\frac{x}{16} = \frac{8}{13}$, $x \approx 9.8$ (corresponding parts of similar figures have equivalent ratios)

6-73. $x = 11$; $m\angle ABC = 114°$

6-74. **a:** $\frac{3}{4}$ or 75% **b:** $\frac{3}{20}$ or 15% **c:** 1 or 100%

6-75. $c = 10$ because of substitution

6-76. D

6.2.5:

6-82. **a:** $5x + 3 = 4x + 9$ because if lines are parallel, then alternate interior angles are equal, $x = 6°$
b: $q = t$ because if lines are parallel, then corresponding angles are equal; $c + t = 180°$ because if lines are parallel, then same-side interior angles are supplementary; 66°
c: $180° - 88° = 92°$; $g + q = 180°$ because when lines are parallel, same-side interior angles are supplementary.

6-83. Methods vary.
a: $x \approx 10.73$ **b:** $x \approx 7.86$ **c:** $x \approx 15.3$

6-84. **a:** $x = 4$ **b:** $x \approx 8.1$
c: not enough information **d:** $x \approx 10.67$

6-85. **a:** $x = 15°$ **b:** $k = 5$
c: $t = 9°$ and $w = 131°$ **d:** $x \approx 49.94°$

6-86. B