Chapter 3

3.1.1:

3-5. **a:** The enlarged rectangle will be 6 units by 8 units.
b: $A = 48$ sq. un., $P = 28$ un.
c: 5 units

3-6. **a:** $x = 18$ **b:** $x = 3$ **c:** $x = 6$ **d:** $x = 2$

3-7. **a:** $\approx 30°$, $\approx 40°$, $\approx 110°$
b: Obtuse scalene triangle

3-8. **a:** $\frac{4}{5}$ **b:** $MU = \sqrt{41} \approx 6.40$ units
c: Δx and Δy are used for both, but are used differently: one is a ratio (slope) while the other is a length (distance).

3-9. **a:** If a shape is an equilateral triangle, then it has 120° rotation symmetry.
b: If a shape is a rectangle, then the shape is a parallelogram.
c: If a shape is a trapezoid, then the shape's area is half the sum of its bases multiplied by its height.

3.1.2:

3-17. Result should be 12 units tall and 16 units wide.

3-18. **a:** The 15 corresponds to the 6, while the 20 corresponds to the 8. Multiple equivalent ratios are possible. One possibility: $\frac{15}{6} = \frac{20}{8} = 2.5$
b: 25 and 10; $\frac{25}{10} = 2.5$; yes

3-19. If h represents the number of hours and t represents the temperature, then $t = 77 + 3h$ and $t = 92 - 2h$; $h = 3$ hours and the temperature will be 86°F.

3-20. $x = 10°,\ y = 61°$

3-21. No, this is not convincing. While the facts are each correct, the conclusion is not based on the facts. As stated in Fact #2, a square is a rectangle because it has four right angles. However, a rhombus does not have to have four right angles, so therefore there is not enough evidence that a rhombus is a rectangle.

3.1.3:

3-27. **a:** Zoom factor: 0.5; The sides are only half as long, so the side corresponding to the 16 must become 8, and the side corresponding to the 11 must become 5.5.
b: It is 1:1 because it is congruent.

3-28. P(original) = 18 units and P(new) = 36 units; A(original) = 18 sq. units and A(new) = 72 sq. units. The enlarged perimeter is 2 times greater. The enlarged area is not 2 times greater. The enlarged area is 4 times greater.

3-29. **a:** $x = \frac{42}{5} = 8.4$ **b:** $m = 22$ **c:** $t = 12.5$ **d:** $x = \frac{3}{2} = 1.5$

3-30. **a:** $y = 3 - \frac{3}{5}x$ **b:** $A = 7.5$ sq. units, $P = 8 + \sqrt{34} \approx 13.8$
c: $y = 3 + \frac{5}{3}x$

3-31. **a:** alt. int. angles **b:** vertical angles
c: corresponding angles **d:** straight angle (or supplementary)

3.1.4:

3-38. **a:** $f = 9$ **b:** $g = 18$ **c:** $h = \frac{70}{3}$

3-39. **a:** $180° - 38° - 63° = 79°$ and $180° - 38° - 79° = 63°$, corresponding angles are equal.
b: All unmarked angles are the same since the difference with 180° will be the same.

3-40. **a:** Sandy's probability $= \frac{2}{4}$, while Robert's is $\frac{3}{5}$. Therefore, Robert has a greater chance.

3-41. They will be 3 years old.

3-42. **a:** The coordinates of the image are $A(-6,-4)$, $B(10,-4)$, $C(10,6)$, $D(2,12)$, and $E(-6,6)$.
b: perimeters = 28 and 56 un; areas = 52 and 208 sq. units

3.2.1:

3-48. **a:** Yes, since all trees are green and the oak is a tree.
b: No, only trees must be green according to the statement.
c: No, the second statement reverses the first.

3-49. **a:** yes, AA ~ **b:** yes, AA ~ or SSS ~ **c:** yes, zoom factor of 2.5 so SSS ~
d: no, since corresponding angles are not equal. Note that you can't apply zoom factor to angles.

3-50. **a:** If lines are parallel, then alternate interior angles are equal.
b: "If lines are parallel, then corresponding angles are equal" and "Lines are parallel → corresponding angles are equal."

3-51. Perimeter = 44.9 units; Area = 94 square units

3-52. **a:** $ABCD \sim EVOL$ **b:** $RIGHT \sim RONGW$
c: one possible answer: $\Delta TAC \sim \Delta GDO$

3.2.2:

3-59. **a:** $x = 20$ **b:** $w = 91$

3-60. Only (b) is possible. (a) can be rejected using Triangle Inequality or the Pythagorean Theorem, and (c) is rejected because the sum of the angles is 179°.

3-61. **a:** reflection, rotation, and translation (students may not include translation, since it can be avoided with a specially-chosen point of rotation)
b: rotation and translation
c: rotation, dilated by zoom factor of 2 and translation
d: rotation, reflection, and reduced by zoom factor of 0.5 (Students may also write translation, or multiple reflections instead of rotation and reflection.)

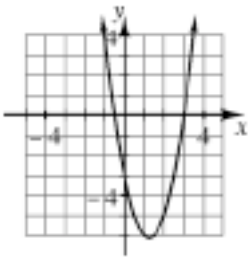
3-62. This reasoning is incorrect. The statement "it is raining" should be placed in the lower left oval, and "Andrea's flowers must be closed up" in the right oval.

3-63. **a:** possible
b: not possible because the sum of the measures of an obtuse and right angle is more than 180°
c: not possible because a triangle with sides of equal length obviously cannot have sides of different lengths
d: possible

3.2.3:

3-68. **a:** $(-\frac{1}{2},0)$ and $(3,0)$

b: $x=-\frac{1}{2}$ or $x=3$, yes



3-69. **a:** $(5,-2)$ **b:** $(-4,2)$ **c:** $(4,3)$

3-70. **a:** $x=51°$ **b:** $x=43°$ **c:** $x=1$

3-71. **a:** $n=32$ **b:** $m\approx 14.91$

3-72. Missing side length of first rectangle must be 4 un because the perimeter is 26 un. Missing side length of second rectangle must be 9 un because the area is 36 sq.un. Since angles are equal and ratios of corresponding side lengths are equal, therefore, the rectangles are similar. In fact, they are congruent because $r=1$.

3.2.4:

3-78. **a:** scalene triangle **b:** isosceles triangle
c: not possible **d:** equilateral triangle

3-79. **a:** The two equations should have the same slope but a different y-intercept. This forces the lines to be parallel and not intersect.
b: When solving a system of equations that has no solution, the equations combine to create an impossible equality, such as $3=0$.

3-80. **a:** not similar, interior angles are all different
b: must be similar, zoom factor 1.5
c: not similar, interior angles are all different

3-81. perimeter $=10+10+4+3+4+3+4=38$ units, height of triangle 8 units, area = 60 square units

3-82. **a:** $3(4x-12)=180°$, $x=18$
b: $4.9^2-3.1^2=x^2$, $x\approx 3.79$
c: $x+(180°-51°-103°)+82°=180°$, $x=72°$
d: $3x-2=2x+9$, $x=11$

3.2.5:

3-88. **a:** not possible because all three angles are 60° and therefore acute angles
b: possible
c: possible
d: not possible since a right triangle has a 90° angle and so not all of the angles are acute

3-89. **a:** SSS ~ and SAS ~ (if students show that the triangles are right triangles)
b: AA ~ and SAS ~
c: None since there is not enough information.

3-90. **a:** ≈ 2.344 **b:** ≈ 0.667 **c:** 1.5 or -5 **d:** no solution

3-91. Original: A = 135 sq. un., P = 48 un.; New: A = 15 sq. un., P = 16 un.

3-92. ≈ 13.2 miles

3.2.6:

3-96. $x = 137°,\ y = 76°$

3.97. $h = 5$ units, perimeter ≈ 24.2 units

3-98. **a:** $-\frac{1}{4}$ **b:** $-\frac{1}{4}$ **c:** $-\frac{1}{4}$

3-99. $x = 8.4,\ y = 7.5,\ z = 9.6$

3-100. $(x + 2)(x + 5) = 40,\ x^2 + 7x - 30 = 0$ so $x = -10$ or 3. Since x cannot be negative, $x = 3$. Therefore, the dimensions of the rectangle are 5 and 8 units.