

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: $\approx 30^\circ$, $\approx 40^\circ$, $\approx 110^\circ$
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.** $x = 10^\circ$, $y = 61^\circ$
- 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:** $180^\circ - 38^\circ - 63^\circ = 79^\circ$ and $180^\circ - 38^\circ - 79^\circ = 63^\circ$, 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 \rightarrow 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: $\Delta TAC \sim \Delta GDO$

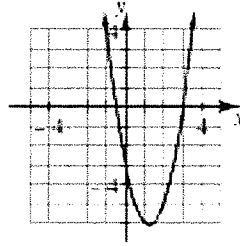
3.2.2:

- 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: $x = 51^\circ$ b: $x = 43^\circ$ 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: $3(4x - 12) = 180^\circ$, $x = 18$
b: $4.9^2 - 3.1^2 = x^2$, $x \approx 3.79$
c: $x + (180^\circ - 51^\circ - 103^\circ) + 82^\circ = 180^\circ$, $x = 72^\circ$
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 \sim and SAS \sim (if students show that the triangles are right triangles)
b: AA \sim and SAS \sim
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.** $x = 137^\circ$, $y = 76^\circ$
- 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.