Answer Key

Hands On Lab 1-4
Activity

$3 + (-5) = -2$

1a. 2; b. −1; c. 0; d. 3; e. −6; f. −5

$-3 + 2 + (-4) + 1 = -4$

2a. 1; b. −5; c. −9; d. −4

Think and Discuss

1. Carmen did not remove all of the zero pairs. She should remove one more gray/black pair so that only tiles of one color are left in the answer box.
2. When there are two addends, the sum has the same sign as the addend with the larger value when you ignore the signs. You can use this fact to check that your model has the correct color tiles in the answer box.
3. You would conclude that the sum is zero.
4. Yes; Possible answer: 1, 1, and −2.

Try This

1. 2
2. −3
3. −3
4. 0
5. −8
6. 2

Hands On Lab Recording Sheet 1-7
Think and Discuss

1. Possible answer: Determine how many tiles you need to remove from each side. Add pairs of positive and negative tiles until you have enough tiles to remove the correct number.
2. subtraction; addition
3. To check, replace the *x*-tile with the number of unit tiles from the answer and see if the equation balances.
4. $x + 2 = -5$
5. $x + (-2) = 4$

Try This

1. $x = 20$
2. $x = -12$
3. $x = 2$
4. $x = -3$
5. $x = 14$
6. $x = 8$
7. $x = -6$
8. $x = 3$
9. $c - 6 = 14$; $c = \$20$
10. $6 + m = 15$; $m = 9$ *mi*

Hands On Lab 1-7A

$x = 2$

1. a. $x = 2$
   b. $x = 2$
   c. $x = 4$
   d. $x = 1$

$x = -3$

2. a. $x = -1$
   b. $x = -3$
   c. $x = -2$
   d. $x = 0$

Think and Discuss

1. The number on the same side of the equation as the variable tells you how many black tiles to place on each side.
2. Placing the same number of black tiles on each side of the model maintains equality between the two sides.
3. On each side of the model, a black/gray pair equals zero.
4. The steps in modeling the equations are the same. In the first equation, you place 1 black tile on each side and in the second you place 3 black tiles. The solution to the first equation is a positive integer, but the second solution is a negative number.

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Answer Key

Try This

1. $x = 1$
2. $x = 2$
3. $x = 5$
4. $x = -1$
5. $x = -2$
6. $x = -1$
7. $x = -2$
8. $x = -1$
9. $x = -3$

Hands On Lab 1-8

$x = 2$

1. a. $x = 4$
   b. $x = 3$
   c. $x = 2$
   d. $x = 3$
2. a. $x = -2$
   b. $x = -1$
   c. $x = -2$
   d. $x = -3$

Think and Discuss

1. The coefficient in front of the variable tells you how many groups to make.
2. You use negative tiles to represent -4 rather than the positive tiles that represent $+ 4$; the other steps of the solution are the same.
3. $3x = 6$
4. Put 2 positive "x" tiles on the left side of the model and six positive "1" tiles on the right. Make 2 equal groups on each side. Look at one group for the answer.

Try This

1. $x = 3$
2. $x = 2$
3. $x = 3$
4. $x = -4$
5. $x = -1$
6. $x = -3$
7. $x = -2$
8. $x = 4$
9. $x = -2$

Hands On Lab 2-3

Think and Discuss

$-3\frac{3}{4} + (-50) = -\frac{15}{4} - \frac{200}{4}$

$= -\frac{215}{4} = -53\frac{3}{4}$

Susi is $53\frac{3}{4}$ feet under water so the ocean is $53\frac{3}{4}$ ft deep.

Try This

$d = 30 + (-40\frac{1}{3}) = \frac{90}{3} - \frac{121}{3}$

$= -\frac{31}{3} = -10\frac{1}{3}$

The fish is $10\frac{1}{3}$ feet under water.

Hands On Lab 2-5

Activity

Yes, it should come out even, with 6 segments.
7 segments

Think and Discuss

1. If the original number is divided by a rational number between 1 and 0, the result is a larger number. If it is divided by a rational number greater than 1, the result is a smaller number.
2. Yes, by converting it to a fraction. Since $0.3 = \frac{3}{10}$, you could divide by 0.3 by multiplying by $\frac{10}{3}$.

Try This

$12 \div 0.8 = 15$

$12 \div 1.2 = 10$

$12 \div 1.5 = 8$

$12 \div 2.0 = 6$

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Answer Key

Hands On Lab Recording Sheet 2-8
Think and Discuss

1. The Zero Property of Addition states that adding zero to a quantity leaves that quantity unchanged. You do not need to add anything to the other side of the equation because you have not changed the value of the first side of the equation.
2. First, set up the model for the original equation as in the beginning. Replace each s tile with 2 yellow tiles, since $s = 2$. Now you have 10 yellow tiles on each side, which proves that the solution is correct.
   Second, set up the model for the original equation as in the beginning. Replace each r tile with 5 negative tiles, since $r = -5$. Remove 4 zero pairs. Now you have 6 negative tiles on each side, which proves that the solution is correct.

Try This

1. $x = 1$
2. $p = 3$
3. $r = -1$
4. $n = -3$
5. $b = -1$
6. $a = \frac{3}{2}$ or $1\frac{1}{2}$
7. $m = 0$
8. $h = 7$
9. Gerry's daily salary was $15 per day.

Hands On Lab 2-8A
Think and Discuss

1. For all real numbers, a, b, and c, if $a = b$, then $a - c = b - c$. Subtracting equal amounts from each side of an equation results in an equivalent equation.

Try This

$m = 6$

Hands On Lab Lesson 3-5
Activity

$d = 50(h)$

Think and Discuss

1. There is an additional 50 miles for each hour the cheetah runs.
2. The line on the graph would be steeper. The numbers in the table would rise by 60 for each hour instead of 50, so those numbers would be greater. The equation could read $d = 60h$ instead of $d = 50h$.

Try This

1. $b = 25$ (m)
2. 150

Hands On Lab Lesson 3-6
Activity

Check students' answers.

Think and Discuss

1. The same number is added to the total of each previous number to get the next.
2. To find the common difference, find the difference between one term and the previous term.

Try This

1. 20; 29; 35; 38; the terms increase by 3.
2. $f(n) = 4n$

Hands On Lab 4-3
Activity

2		8	
	8	16	
2			32
	2		16
		3	2
	16	2	6
3			64

Think and Discuss

1. They are all the same number 2.
2. They are added together.

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3. They are equal.
4. $x^a \times x^b = x^{(a+b)}$

Try This

1.

16		4	
	8	2	
	1		4
8			2
		1	2

$x^a \div x^b = x^{(a-b)}$

2. $(x^a)^b = x^{(a \times b)}$

Hands On Lab 4-7
Think and Discuss

1. The first square has side length s, so its area is s^2. The second square has side length $s\sqrt{2}$, so its area is $2s^2$. The third square has side length $s\sqrt{3}$, so its area is $3s^2$.
2. You could perform them, but probably not as accurately as with the compass.

Try This

1. For a square four times as large, take the length BF, double the side of the original square. For a square five times as large, take the length BE, the hypotenuse of a right triangle with sides of 1, 2, and $\sqrt{5}$.

Hands On Lab Recording Sheet 4-8
Think and Discuss

1. No; for example, an equilateral triangle with side lengths of 1 does not satisfy the Pythagorean Theorem: $1^2 + 1^2 \neq 1^2$.

Try This

1. Yes: $8^2 + 15^2 = 64 + 225 = 289 = c^2$; $c = \sqrt{289} = 17$
2. $8.5\sqrt{2} \approx 12.0$ in.

Hands On Lab 4-8A
Activity

Check student work.

Think and Discuss

1. I could use the same equation and fill in the numbers I had to find the unknown.
2. The hypotenuse will always be the longest side in a right triangle.

Try This

Check student work.

Hands On Lab 5-1
Activity

6 little sections; The ratios make the same comparison.

Think and Discuss

1. I could divide the squares into a different number of sections.
2. I could simplity a ratio to see if it becomes the original ratio, and I could make a grid to see if I could create both ratios in the same number of squares on the grid.

Try This

Check student work.

Hands On Lab 5-3
Think and Discuss

No; the measurement system used has no effect on the precision. The measuring tool used determines the precision of a measurement, and one tool can be more precise than another.

Try This

Answers will vary. The important thing is that the students understand how to multiply the number of shoe-lengths their classroom turns out to be by the length of their shoe. Then, they have to know how to convert from centimeters to inches. The best unit for measuring the length of a classroom would be the foot or the meter because inches and centimeters are so small that the measurements will turn out to be very high.

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Answer Key

Hands On Lab Recording Sheet 5-5
Think and Discuss

1. They are equal.
2. They are proportional.
3. The angles will be the same.

Try This

1. Check students' work. The corresponding angles should be the same, and corresponding side lengths should be proportional.
2. Check students' work. The corresponding angles should be the same, and corresponding side lengths should be proportional.

Hands On Lab 5-5A
Activity

Check student work.

Think and Discuss

1. If the corresponding angles in the figures are the same, and the corresponding sides have lengths that form equivalent ratios, the two figures are similar.
2. Divide the original height, 24 inches, by the corresponding height of the reduction, 9 inches, to get the scale factor. Then multiply the width of the original poster by the scale factor to find how wide the reduction will be.

Try This

1. 10

Hands On Lab 5-5B
Activity

Check student work.

Think and Discuss

1. The two pictures are not similar because the corresponding sides must have lengths that form equivalent ratios, and these photos would not.

Try This

1. The figure is similar, because the corresponding angles are congruent and the corresponding sides have lengths that form the equivalent ratios. The orientation (vertical or horizontal) does not have to be the same.

Hands On Lab 5-5C
Activity

Check student work.

Think and Discuss

1. If you needed to know the height of something tall and could not measure it, you could use this technique on a sunny day to find the height.
2. You could use the light bulb to cast a shadow, making sure that the objects were in the same place when they were measured.

Try This

Check student work.
The closer the length of the shadow is the actual size, the closer the ratio is to 1.

Hands On Lab Recording Sheet 5-6
Activity 1
Think and Discuss

1. The ratios are all equal to 2. The ratios are in proportion.
2. The ratio is 2. This is the same as the ratios in the table.
3. The corresponding sides of the figures are in proportional, and the corresponding angles are congruent.

Try This

1–3. Check students' work.

Hands On Lab 5-6A
Activity

Check student work.

Think and Discuss

1. If the figures are not necessarily the same size, but are the same shape, it is a dilation.
2. A scale factor of 1 would show 2 figures of the same size.

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Answer Key

Try This

1. The transformation is not a dilation, because the figures are not the same shape.

Hands On Lab Recording Sheet 5-8
Activity 1
Think and Discuss

1. 6.25 in. tall
2. Possible answer: The building is made of concrete and has a solid base.
3. 1:80

Try This

1. Check students' work. Possible scale is 1 in. = 5 ft. Then you will need the following:

Three 8 in. × 4 in. rectangles
One 4 in. × 4 in. square
One 4 in. × 2.8 in. rectangle

Activity 2
Think and Discuss

1. Possible answer: A good scale would be $\frac{1}{16}$ in. = 4 in.

Try This

1. Check students' work.

Hands On Lab 6-1
Think and Discuss

A circle has 360°, $\frac{1}{4}$ of 360° is 90°.

Try This

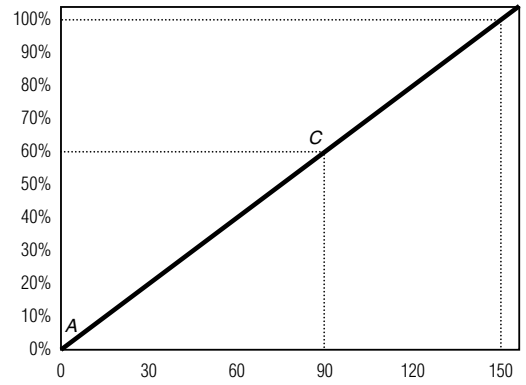
1. $\frac{1}{3}$ or $\approx$ 33.33% of the squares are gray; $\frac{2}{3}$ or $\approx$ 66.67% of the squares are white.
2. 20%

Hands On Lab 6-3
Think and Discuss

1. The slope decreases when the whole increases. When the slope decreases, the line comes closer to the *x*-axis.

Try This

1. Slope = $\frac{100}{150} = \frac{2}{3}$. The *y*-coordinate is 60.

2. 

Hands On Lab Recording Sheet 7-1
Think and Discuss

1. Possible answer: Begin by constructing a segment. Use the procedure to bisect the segment. Then bisect each half. The four segments are congruent because each one represents an equal part of the length of the original segment.

Try This

1–6. Check students' work.

Hands On Lab 7-1A
Think and Discuss

1. It is better to measure a classroom in feet rather than millimeters because of the size of the room. Feet are reasonable units to use to measure a room whereas millimeters are reasonable units to measure something very small.

Try This

1. Check students' work.

Hands On Lab Recording Sheet 7-2
Think and Discuss

1. Possible answers: There is an infinite number of lines that can be drawn perpendicular to a given line. Since a line contains an infinite number of points, there are an infinite number of points at which a perpendicular line can intersect the line.
2. Possible answers: 1) Construct a line perpendicular to one of the lines. If it's perpendicular to the other line, the two lines are parallel. 2) Look for markings

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on the drawing. Double arrows indicate that lines are parallel. 3) Draw a third line that intersects both lines, and measure interior angles to see if they have the same measure.

Try This

1–6. Check students' constructions.

Hands On Lab 7-2A
Activity

1. I measured the angles in the same position where the lines intersected. The angles were the same, so the lines are parallel.
2. If the measure of the angle is 90°, then they are perpendicular, and the angle measures 90°, so these are perpendicular lines.

Think and Discuss

1. Three other angles would be 38°.
2. You know every other angle because every angle is either congruent to the first angle, 72°, or else supplementary to the first angle, 108°.

Try This

Check student work.

Hands On Lab 7-3

1. Check students' answers.
2. I know it is an equilateral triangle because the lengths of the sides are all equal.

Think and Discuss

1. The three angles will always add up to 180°.
2. The triangle cannot be an acute triangle, because in an acute triangle, all angles are less than 90°.

Try This

1. Check students' work.

Hands on Lab 7-4

Try This

1. Check students' work.

Hands On Lab 7-4A
Think and Discuss

1. The quadrilateral cannot be completed. The angles are already more than 360°.
2. The remaining angle will be 10° larger than player 2 is expecting it to be.

Try This

Check students' work.

Hands On Lab 7-6
Activity

Check student work.

Think and Discuss

1. If the corresponding angles and sides of the polygons are congruent, the two polygons are congruent.
2. No, because in a dilation the size is different.

Try This

1. Check students' answers.

Hands On Lab Recording Sheet 7-7
Activity 1
Think and Discuss

1. Yes; the result of doing multiple transformations will not be the same if the order is switched. For example, in the Activity, the vertex at (2, 5) would end up at (7, −8) instead of (7, −2).

Try This

1. Check students' work.

Activity 2
Think and Discuss

1. The images resulting from the transformations in parts **b.** and **c.** are the same. The images resulting in the transformation in part **d.** has two sides parallel with the *y*-axis instead of the *x*-axis.

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Answer Key

Try This

1. Check student answers.

Hands On Lab Recording Sheet 8-1
Think and Discuss

1. The length and width of rectangle *C* are twice the length and width of rectangle *B*. The perimeter of rectangle *C* is twice the perimeter of rectangle *B*. The area rectangle *C* is four times the area of rectangle *B*.
2. Possible answer: If the ratio that compares the perimeter of a larger rectangle to that of a smaller rectangle is *x*, the ratio that compares the areas of the two rectangles will be x^2.

Try This

1–3. Check students' work.

Hands On Lab 8-1A
Think and Discuss

1. A square is a rectangle, so you can use the same formula: $P = 2\ell + 2w$. In a square, the length and the width are the same. This means you can develop the formula $P = 4s$, where P = perimeter and s = one side; $P = 4$ (15.5); or 62 inches.

Try This

1. 361 feet
2. Check students' work.

Hands On Lab 8-1B
Think and Discuss

1. Betty's average will be precise to the hundredths place since that is the number of significant digits found in her least precise measurement of 4.25 inches.

Try This

1. Check students' work. Be sure students use the correct number of significant digits in their answers.

Hands On Lab 8-1C
Activity

1. 22 cm
2. $P = 2(12.7) + 2(7.6)$, so $P = 40.6$ cm

Think and Discuss

1. A square is a rectangle, so you can use the same formula $P = 2\ell + 2w$. In a square, the length and the width are the same. This means you can develop the formula $P = 4s$, where P = perimeter and s = one side. $P = 4$ (15.5), or 62 inches.
2. The formula works for parallelograms because the lengths of opposite sides are the same.

Try This

Check student answers.

Hands On Lab 8-1D
Activity

1. $A = 20 \times 12$, so $A = 240$ cm^2
2. $A = 5.5 \times 8$, so $A = 44$ square units.

Think and Discuss

1. It is alike because with both you multiply vertical by horizontal measures and different because in rectangles you measure the outside lines and in a parallelogram you measure a vertical line that cuts through the figure.

Try This

1. The area is 387.3002 feet.
2. Check student answers.

Hands On Lab 8-2
Think and Discuss

1. There may have been an error in measurement: perhaps the string was not stretched entirely tight. One person could stretch the string while another did the tracing.
2. Triangle #1 had both the greater area and sides that were closer in length.

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Answer Key

Try This

1. 6.7; 6.7; 19.4
2. The closer the sides are in length, the larger the area of the triangle.

Hands On Lab 8-2A
Activity

2.5; 4; 6; 12.5

5 cm; 2.5 cm

12.5 square cm

Think and Discuss

1. Yes, the areas are the same. The base of the rectangle is equal to the mean of the two bases of the trapezoid and the height of the rectangle is equal to the height of the trapezoid, so it follows the formula exactly and has the same area.
2. No, it contains the same area inside a more compact perimeter.

Try This

1. 2.5; 4.5; 3.5; 10

Hands On Lab 8-3
Think and Discuss

1. Yes, the two chords could be used to find the center point of the circle. The secant line would then be drawn through the center point of the circle. The resulting line segment in the circle would be the diameter.

Try This

1–2. Check student's drawings.

Hands On Lab Recording Sheet 8-3A
Think and Discuss

1. The ratio is approximately equal to 3.14.
2. Multiply the distance across the circular object by 3.14.

Try This

1. Check students' work.

Hands On Lab 8-3B
Activity

Check students' work.

Think and Discuss

1. It becomes closer to a rectangle.
2. The figure would be a rectangle. The height would be r, and the base would be equal to half the circumference of the circle, or πr. Therefore the ratio of the base to the height would be π.

Try This

Check students' work.

Hands On Lab Recording Sheet 8-4
Activity 1
Think and Discuss

1. 6
2. rectangles
3. Yes, the four larger rectangles were congruent and the two smaller rectangles were congruent.

Try This

1. Yes. Yes.
2. Possible answer: A box is a three-dimensional figure make of six connecting rectangles. The four rectangles are congruent and form lateral faces. The two smaller rectangles are congruent and form the two parallel bases. If the box is a cube, then it is made of six congruent squares.
3. Check students' work.

Activity 2

1. 3
2. one rectangle and two circles
3. Yes, the two circles are congruent.

Try This

1. Possible answer: A can is a three-dimensional figure made of two parallel, congruent circular bases and a rectangle that forms the lateral surface.

Activity 3
Think and Discuss

1. a cone
2. There is no bottom. It should be a circle.

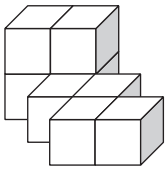
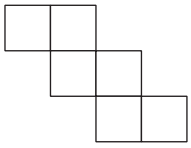
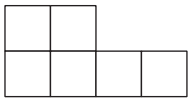
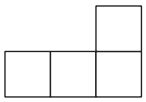
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Answer Key

Try This

1. Check student work.
2. A pyramid is a three-dimensional figure with a polygon for a base and lateral faces that are triangles.

Hands On Lab 8-4A
Activity

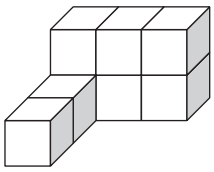
1. 
2. 
   Top
3. 
   Front
4. 
   Side

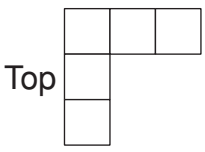
Think and Discuss

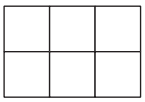
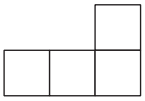
1. No, because sometimes a cube is hidden behind another cube.
2. Sample answer: No: the top view shows that fewer cubes are used to build the original figure than one might think based upon the front and side views.

Try This

1. Check student work.



2. 
   Top

3. 
   Front
4. 
   Side

Hands On Lab Recording Sheet 8-5
Think and Discuss

1. The volume of each rectangular prism is the product of the area of the base and the height. The volume of each cylinder is the product of the area of the base and the height.
2. You can find the volume of any rectangular prism or cylinder by multiplying the area of the base times the height of the figure.

Try This

1. Check students' work.
2. Check students' work.

Hands On Lab 8-5A
Think and Discuss

1. 144 cm^3

Try This

1. Volume equals pi times radius squared times height.
2. Volume equals length times width times height.

Hands On Lab 8-5B
Activity

1. about 4.5 cups
2. about 6 cups
3. The short, wide cylinder holds more than the tall one.

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Answer Key

Think and Discuss

1. The first cylinder has a height of 11 in. and a circumference of 8.5 in.; the second cylinder has a height of 8.5 in. and a circumference of 11 in. They are reversed.
2. The height and circumference are reversed, so the volume of the first cylinder is $11 \times \left(\frac{8.5}{2\pi}\right)^2 \times \pi \approx 63.2$ cubic inches while the volume of the second cylinder is $8.5 \times \left(\frac{11}{2\pi}\right)^2 \times \pi \approx 81.8$ cubic inches. π is a factor in both calculations, but $11 \times \left(\frac{8.5}{2\pi}\right)^2$ does not equal $8.5 \times \left(\frac{11}{2\pi}\right)^2$ so the volumes are not the same.

Hands On Lab 8-5C
Think and Discuss

1. The first box has a greater surface area, because you cut only 1-inch squares away from the sheet in making it, while 2 inch squares were subtracted from the surface area of the other box.
2. No, its volume would be less than either of the others.

Try This

Check students' answers.

Hands On Lab Recording Sheet 8-6
Activity 1
Think and Discuss

1. Check students' work.
2. $\frac{1}{3}$
3. $\frac{1}{3}Bh$

Try This

1. Check students' answers.
2. 93 in^3; The volume of a prism is three times the volume of a pyramid with a congruent base and height.
3. 9 cm^3; The volume of a pyramid is $\frac{1}{3}$ the volume of a prism with a congruent base and height.
4. ≈ 91.7 cm^3

Activity 2
Think and Discuss

1. Check students' work.
2. $\frac{1}{3}$
3. $\frac{1}{3}Bh$ or $\frac{1}{3}\pi r^2 h$

Try This

1. Check students' work.
2. 11.1 m^3; The volume of a cylinder is three times the volume of a cone with a congruent base and height.
3. 96 ft^3; The volume of a cone is $\frac{1}{3}$ the volume of a cylinder with a congruent base and height.
4. ≈ 471 in^3
5. Possible answer: Yes; Aneesha is correct. The volume of the first cone is $\frac{1}{3}\pi(2)^2(3)$, or 4π in^3. The volume of the second cone is $\frac{1}{3}\pi(2)^2(6)$, or $2 \cdot 4\pi$ in^3. It has twice the volume of the first cone.

Hands On Lab 8-6A
Think and Discuss

1. Your measurement of the length of the cone was probably not completely accurate, nor was the measurement of the number of cups of rice.
2. Not at all.

Try This

1. one-third the product of the area of the base times the height, where the area of the base is pi times the square of the radius.
2. ≈ 376.8 cm^3
3. ≈ 34.4 in^3

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Answer Key

Hands On Lab 8-6B
Activity
1. Check students' work.
2. 16, 16 cm^3; 9, 9 cm^3; 4, 4 cm^3; 1, 1 cm^3
3. 4 cm
4. 16 cm^2
5. $V \approx 21.3$ cm^3
6. The actual volume is about 8.7 cm^3 less than the volume of the pyramid I built.

Think and Discuss
1. Volume of rectangular prism = 480 in^3, volume of pyramid = 160 in^3.
2. You can calculate the volume of the pyramid by dividing the volume of the rectangular prism by 3.

Try This
1. $B = \frac{1}{2}(5 \times 8) = 20$; $V = \frac{1}{3}(20)(17)$; $V = 113.3$ ft^3
2. V of box $= 22 \times 20 \times 18 = 7{,}920$ in^3
   V of pyramid $= \frac{1}{3}Bh$ or $\frac{1}{3}$ the volume of the box
   $V = \frac{1}{3}(22 \times 20)(18)$ or $\frac{1}{3}(7920)$
   $V = 2{,}640$ in^3
   $7{,}920$ $in^3 - 2{,}640$ $in^3 = 5{,}280$ in^3

Hands On Lab Recording Sheet 8-7
Activity 1
Think and Discuss
1. Check students' work.
2. $2B + Ph$.

Try This
1. Check students' work.

Activity 2
Check students' work.

Think and Discuss
1. Check students' work.

Try This
1. Check students' work.

Hands On Lab 8-7A
Think and Discuss
1. $T = 2B + Ph$

Try This
2. 100.48 cm^2

Hands On Lab 8-7B
Think and Discuss
1. $2\pi r$
2. $S = 2\pi r^2 + 2\pi rh$ — Students should circle $2\pi r$.
3. They are the same. $A = L$, $l = 2\pi r$, and $w = h$.
4. ≈ 12.56 cm

Try This
1. $L = 2\pi rh$
   $L \approx (3.14)(1)(4)$
   $L \approx 25.12$ in^2
2. Answers will vary depending on measurements of cylinder.

Hands On Lab 8-7C
Activity 1
Answers will vary.

Activity 2
236 cm^2

Think and Discuss
1. Formula
   $S = 2\left(\frac{1}{2} \cdot 20 \cdot 7.5\right) + (12 + 13 + 20)(7)$
   $S = 150 + 315$
   $S = 465$ cm^2

Try This
1. To find the surface area of a prism, find the area of its base. Multiply the area of one base by two. Then find the surface area of its lateral surface. Multiply the perimeter of the base by the height of the prism. Then add the area of the lateral surface to the area of the base times two; 1,344 in^2.

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2. 1,008 in^2
3. 152 cm^2

Hands On Lab Recording Sheet 8-8
Think and Discuss

1. They are the same.
2. 56; The product is twice the total area of the triangular faces.
3. area of the base + $\frac{1}{2}$(perimeter)(slant height)

Try This

1. Check students' work.

Hands On Lab 8-8A
Think and Discuss

1. 36 cm^2
2. $A = \frac{1}{2}bh$
   $A = \frac{1}{2}(6)(5)$
   $A = 15\ cm^2$
3. 60 cm^2
4. P, perimeter is equal to $4b$, so $\frac{1}{2}P$ is equal to $4\left(\frac{1}{2}b\right)$. The slant height ℓ is equal to the height h, of the triangle. This means $\frac{1}{2}P\ell = 4\left(\frac{1}{2}bh\right)$.

Try This

1. 495 in^2
2. 429 cm^2

Hands On Lab 8-8B
Think and Discuss

1. The arc length of the lateral surface is the part of the surface that touches the base. It fits around the base exactly one time, which makes it the same as the circumference of the base.

Try This

1. First, find the area of the base of the cone. Square the radius and multiply it by π. This is the area of the base. Then find the area of the lateral surface. Multiply π by the radius of the base by the slant height. Then add the area of the lateral surface to the area of the base; 2,996 cm^2.
2. Answers will vary.

Hands On Lab 8-9
Activity

Answers will vary.

Think and Discuss

1. The volume of the hemisphere will be the difference between the volume of the cylinder and the volume of the cone. Find the difference between the two volumes.
   $392.5 - 130.8 = 261.7\ in^3$
2. **Formula**:
   $S = 4\pi r^2$
   $S = 4\pi(24)^2$
   $S = 4\pi 576$
   $S = 2304\pi\ cm^2$

Try This

$V = \frac{4}{3}\pi r^3$

$V = \frac{4}{3}\pi(6378.1)^3$

$V \approx \frac{4}{3}\pi 259{,}462{,}126{,}000$

$V \approx 345{,}949{,}501{,}300\pi$

$V = 1{,}086{,}281{,}434{,}000\ km^3$

$S = 4\pi r^2$

$S = 4\pi(6378.1)^2$

$S = 4\pi 40{,}680{,}159.61$

$S = 162{,}720{,}638.4\pi$

$S \approx 510{,}942{,}804.7\ km^2$

Hands On Lab Recording Sheet 9-1

1.a. Possible answer: every student in the school

b. Possible answer: A random sample takes the least planning but could be unintentionally biased. A systematic

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sample is a little more difficult to execute but could give more reliable results. A stratified sample requires a great deal of planning but will ensure that all groups (e.g. grade levels) are represented fairly in the sample.

c. Possible answer: school colors (maroon and gray) and navy blue; and pants, skirts, and vests

Think and Discuss

1. Possible answer: The teachers will not be wearing the uniforms and their clothing preference may be different from the students'.
2. Possible answer: by selecting colors that seem the most popular when students choose their own clothes.

Try This

1. Check students' forms and tables.

Hands On Lab Recording Sheet 9-5

Think and Discuss

1. 25

Try This



Hands On Lab 9-5A

Activity

Frisbee; Hal Hertz; 12, 23, 44, 97

Acme; Marge Dubois; 12, 15, 19, 23, 44

Benson; Tony Romero; 13, 52

Holloway; Carmen Chang; 15, 25

Think and Discuss

1. oral presentations, emergency situations, situations with time constraints, overheard conversations.
2. A table is much less visual. It is harder to see at a glance.
3. Yes. A Venn diagram with 15 circles would be too confusing.

Try This

1. There is a core of ingredients common to all of the recipes. For example, beef, water, and salt. Other ingredients are common to some for the recipes, and some recipes use ingredients that do not appear in any other recipes.

Hands On Lab 9-5B

Activity

Check students' work.

Think and Discuss

1. I would use a bar graph. On a bar graph, I can use different color bars to represent the elementary students and high school students. The bars would be next to each other so they can be compared.
2. I would use the double-line graph to show how the time we spent getting ready changed over time. One line would be for me and the other for my friend.

Try This

1. Answers will vary.
2. Students should construct a bar graph and a line graph of the data they collect. They should explain that the bar graph shows how often each temperature occurred in a week and the line graph shows how the temperature changed over the week.

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Answer Key

Hands On Lab 9-7
Think and Discuss

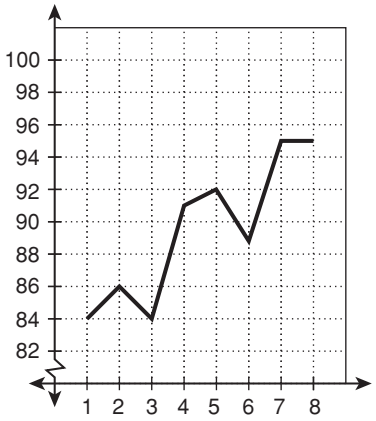
1. There is a positive correlation, which means that the longer a student studies, the better the grade will be on the exam.

Try This

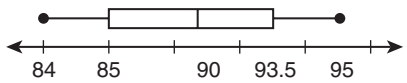
1. There is no correlation.

Hands On Lab 9-8
Activity

2. A line graph; Students should have drawn a line graph displaying the data in the table in #1.



3. A box and whisker plot displaying the data from the table above.



Think and Discuss

1. Students should respond that the question asked helps to determine how the data is displayed. For example, if the question asked was "How many students got A's on an exam? A histogram would be the best type of graph.

Try This

1. A circle graph would be the best type of graph. A circle graph compares parts to a whole.
2. A line graph will show how the number of miles he rode each day changed over the week.

Hands On Lab 10-1
Think and Discuss

1. You would expect to pull out a light-colored marble 21 times, which is very close to the probability $P_{(G)} = 21.05\%$.

Try This

1. Possible answer: $P_{(R)} = \frac{7}{13} = 53.85\%$.

   You probably pulled a dark colored marble out 10 or 11 times.

Hands On Lab Recording Sheet 10-3
Activity 1
Think and Discuss

1. Check students' work.

Try This

1. Check students' work.

Activity 2
Think and Discuss

1. Possible answer: There are two possible outcomes for the situation and two possible outcomes for tossing a coin.
2. Check students work.

Try This

1. Check students' work.

Activity 3
Think and Discuss

1. Check students' work.
2. The 80 squares that are filled in represent the number of free throws that Belinda makes and the 20 blank squares represent the number of free throws that she misses; check students' work.

Try This

1. 52.5%
2. 20%

Hands On Lab 10-3A
Activity

1. Check students' answers.

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Answer Key

Think and Discuss

1. Students will likely get a probability close to 25%. They should state that this supports the usefulness of random-number simulations, because it shows that the random-number simulation will find a probability close to the actual probability.
2. Possible answer: Random means in not any order.

Try This

1. Answer will depend on random number table used. It should be close to 0.1.
2. Answers will depend on the random number table used. It should be close to 16%.

Hands On Lab 10-5
Activity 1

1. No; independent; $\frac{1}{6}$, $\frac{1}{6}$, $\frac{1}{6} \bullet \frac{1}{6} = \frac{1}{36}$

Activity 2

1. $\frac{3}{10}$; 2; 9 socks; $\frac{2}{9}$; $\frac{3}{10} \bullet \frac{2}{9} = \frac{6}{90} = \frac{1}{15}$

Think and Discuss

1. Check students' work.
2. Check students' work.

Try This

1. $\frac{1}{2} \bullet \frac{1}{2} \bullet \frac{1}{2} \bullet \frac{1}{2} \bullet \frac{1}{2} = \frac{1}{32}$
2. $\frac{3}{10} \bullet \frac{2}{9} \bullet \frac{1}{8} = \frac{6}{720} = \frac{1}{120}$

Hands On Lab 10-9
Think and Discuss

1. Probability is an expression of the possibility of something happening out of all the possibilities. Odd are always expressed as either for something or against something.

Try This

1. Answers will vary.
2. Probability = $P = \frac{2}{6} = \frac{1}{3} = 33.3\%$
3. The odds are $\frac{2}{4} = \frac{1}{2} = 50\%$. The odds in favor of rolling a number less than 3 are 1 to 2.
4. $P = \frac{3}{6} \times \frac{3}{6} \times \frac{3}{6} = \frac{1}{8} = 12.5\%$
5. The probability is 1 in 27, which is only about 3.7%. This is much lower than the chance of rolling 3 numbers less than 4. This is because the question said greater than 4, not 4 and greater. If you do not include the number 4, your probability decreases dramatically.

Hands On Lab 11-1
Activity

$6x^2 + 4x + 3$

1. a. $3x^2 + 3x + 4$
   b. $6x^2 + 6x + 3$
   c. $5x^2 + 4x + 3$
   d. $8x^2 + 6x + 4$

$x^2 + x + 3$

2. a. $x^2 + 2x$
   b. $-2x + 1$
   c. $x^2 - 3x + 2$
   d. $2x^2 + x - 2$

Think and Discuss

1. Choose an algebra title with a different size to stand for the x^3 terms and model the expression the same way.
2. Possible answers: use different color tiles for each variable; model each variable separately then combine the expressions.
3. The sum of those two tiles is zero.

Try This

1. $2x^2 + x - 2$
2. $2x^2 - x$
3. $x^2 + 3y^2 - x + y + 2$

Hands On Lab Recording Sheet 11-3
Think and Discuss

1. Replace each yellow x bar with 2 yellow unit squares. Replace each red x bar

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with 2 red unit squares. See whether the equation balances.

2. To be able to see what number of unit tiles one variable is equal to

Try This

1. $x = -3$
2. $x = 3$
3. $x = 2$
4. $x = 3$

Hands On Lab 11-5

Think and Discuss

1. The solution set would have been different because you would have had $-10a$ instead of $8a$. The main change would have been that the inequality would have had the opposite sign because you divide or multiply by a negative number, you need to reverse the inequality sign.

Try This

1. $a \geq -2$

Hands On Lab 12-1 Activity

1. 13; 16; 19; 22; 25; 31; 37
2. it would be a straight line.
4. 1; 4; 9; 16; 25; The graphs of linear equations are straight lines.

Think and Discuss

1. a. linear
   b. linear
   c. not linear
   d. not linear
2. No, because x is not raised to the first power.

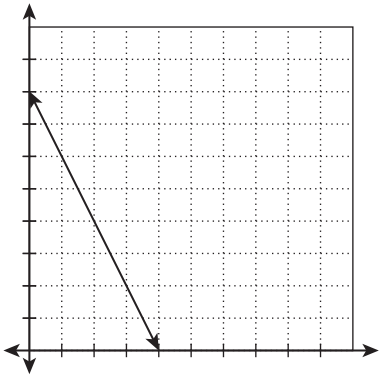
Try This

1. a. linear
   b. linear
   c. not linear
   d. not linear

Hands On Lab 12-3 Activity 1

4

8



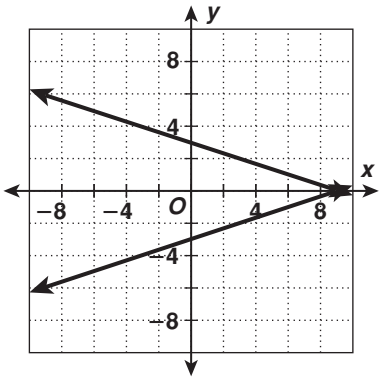
The correct graph is a line that has an x-intercept of 4 and a y-intercept of 8.

Think and Discuss

1. Students should respond that you can solve for the x-intercept and y-intercept in the same way you do when the equation is in standard form. Substitute 0 for y to find the x-intercept and 0 for the x to find the y-intercept; 2; 5.
2. $3x + y = 4$

Try This

1. One line has a positive slope and the other line has a negative slope.

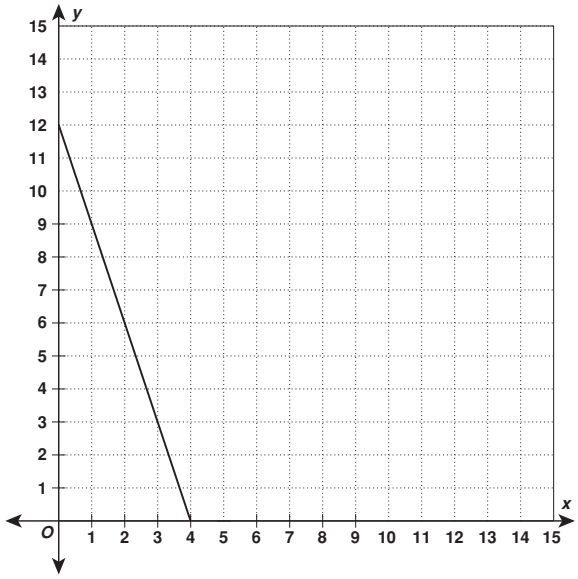


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Answer Key

Hands On Lab 12-3A

12; −4



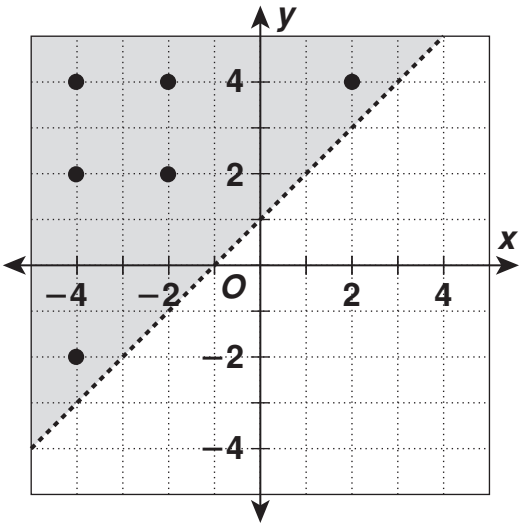
Think and Discuss

1. You can divide the difference in the *y*-values by the difference in the *x*-values to find the slope of the line. Then write the slope-intercept equation using that slope. Then take one of the points and plug it into the equation. Simplify the equation.
2. $y = 7x + 0$

Try This

1. $y = 5x + 50$; 5; 50; Check students' work.

Hands On Lab 12-6 Activity

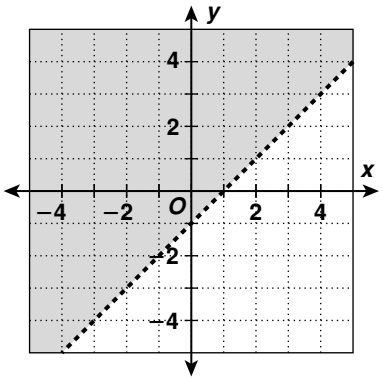


Think and Discuss

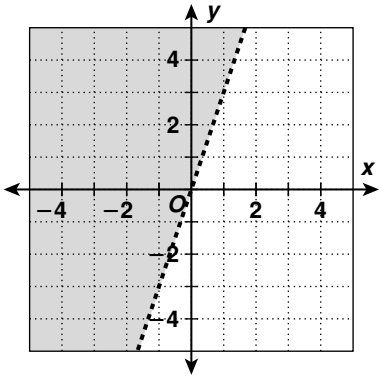
1. The points are all above and to the left of the graph of $y = x + 1$
2. The shaded area represents the solution to $y > x + 1$
3. No, because points on the graph of $y = x + 1$ do not satisfy the inequality.
4. Graph the related equation. Test a point from each of the two areas created by the graph to see if it is a solution. Shade the solution.

Try This

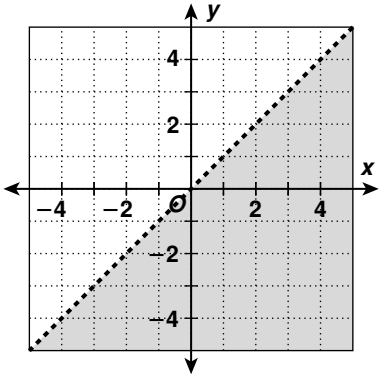
1.



2.

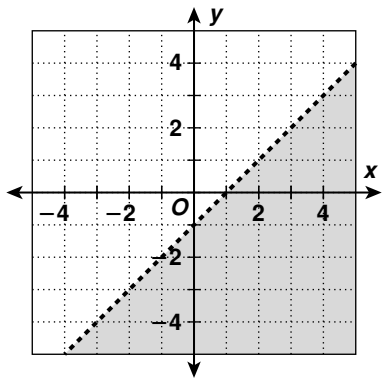


3.



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4.



Hands On Lab 12-7
Activity
Step 1: 3
Step 2: 79.5
Step 4: possible answer m = 10
Step 5: possible answer $y = 10x + 49.5$

Think and Discuss
1. No, there can be more than one line of best fit, because it is up to the person drawing the line to choose the line they think best fits the data. There is no correct answer.
2. Some students may need to study more than other students to get the same score on a test.

Try This
1. The line of best fit should go through the point (3.5, 3.6). Answers will vary depending on the line of best fit the students drew. The equation should be written in slope-intercept form.

Hands On Lab 13-2
Activity 1
Step 1: 4
Step 2: 4
Step 3: 4, 4

Activity 2
Step 1: 3
Step 2: $a_{12} = 1 \times 3^{11}$
Step 3: $a_{12} = 177{,}147$

Think and Discuss
1. It is a geometric sequence. I know it is because each term divided by the term before it equals $\frac{1}{4}$.

Try This
1. No it is not geometric.
2. $\frac{1}{128}, \frac{1}{512}, \frac{1}{2048}, \frac{1}{8192}$

$a_n = a_1 \times r^{n-1}$, $a_{18} = 160 \times \left(\frac{1}{2}\right)^{17}$,
$a_{18} \approx 160 \times 0.000007629$, $a_{18} \approx 0.001221$

Hands On Lab Recording Sheet 13-3
Think and Discuss
1. 0; 0 + 1 = 1, so it would be the only way for the pattern to work.
2. Yes, because 144 + 233 = 377.

Try This
1. 34, 55
2. 6765

Hands On Lab 13-6
Activity
4. 4; 9; 16; 25
   19.6; 44.1; 78.4; 122.5

Think and Discuss
1. No, small dense objects fall faster.
2. no
3. approximately yes
4. yes

Try This
1. 0.5 J
2. 7 J
3. 28 J

Hands On Lab 13-6A
Activity
18, 8, 2, 0, 2, 8, 18
11, 6, 3, 2, 3, 6, 11
It stretches vertically.
It shifts up 2.

Think and Discuss
1. It will be wider.
2. It will be shifted down 2 units.

Try This
4.5, 2, 0.5, 0, 0.5, 2, 4.5
The boat is 2 m deep.

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Answer Key

Hands On Lab Recording Sheet 14-1
Activity 1
Think and Discuss

1. Possible answer: Red tiles represent terms with a negative coefficient.

Try This

1–3. Check students' work.

Activity 2
Think and Discuss

1. Possible answer: There are two large, square, yellow tiles, so the coefficient is 2.

Try This

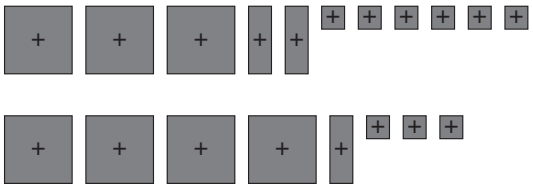
1. $2x^2 - 2x$
2. $x^2 - 2x + 1$
3. $-2x^2 + 3x - 2$

Hands On Lab Recording Sheet 14-4
Think and Discuss

1. They cancel each other out.
   $-2x + 2x = 0$

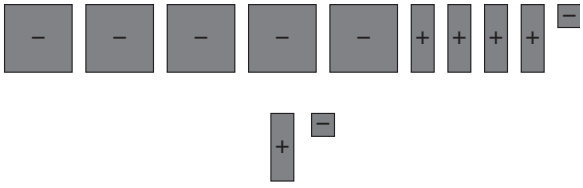
Try This

1.



$7m^2 + 3m + 9$

2.



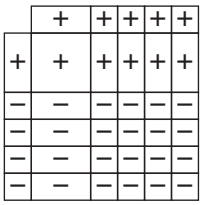
$-5b^2 + 5b - 2$

Hands On Lab Recording Sheet 14-6
Activity 1
Think and Discuss

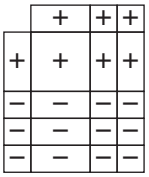
1. The product of two negatives or two positives is positive, so the first and last terms are positive. The product of a positive and a number is a negative, so the inner and outer terms are negative.
2. Make a rectangle with base $x + 3$ and height $x - 3$. The product has one yellow x^2-tile, 3 red x-tiles, 3 yellow x tiles and 9 red unit tiles. The 3 red and 3 yellow x-tiles combine for 3 zero pairs. The product is $x^2 - 9$.

Try This

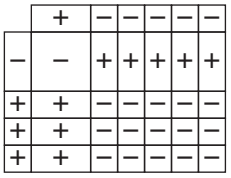
1. $x^2 - 16$



2. $x^2 - x - 6$



3. $-x^2 + 8x - 15$



Activity 2
Think and Discuss

1. $x^2 + x - 2$: one zero pair is modeled: there is one pair of a yellow x tile and a red x tile.

Try This

1. $(x + 2)(x + 2) : x^2 + 4x + 4$
2. $(x - 3)(x + 2) : x^2 - x - 6$
3. $(-2x + 4)(x - 2) : -2x^2 + 8x - 8$

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