Unit 8.1, Lesson 4: Moving Day

Answer Key

Warm-Up

Things students may notice:

- There are three sets of parallel grid lines in the triangle grid.
- The individual angles in the equilateral triangles are $60°$.
- One grid is made out of squares, and the other is composed of equilateral triangles.

Things students may wonder:

- Are we going to use this kind of grid?
- Why would we use the triangle grid instead of the square grid?
- Why are there no vertical lines on the triangle grid?

Responses vary.

The prime symbol ($'$) indicates the same point on the transformed image.

Activity 1: Move It

- Solutions are on Screens 3–6 of the Teacher Presentation Screens.

Activity 2: Make My Transformation

- The correct transformations are shown on the cards.

Lesson Synthesis

Responses vary.

Sample Response

A. A grid is helpful to describe a rotation because I can identify the angle of the rotation using the grid lines.
B. A grid is helpful to describe a translation because I can more precisely determine the vertical and horizontal distances of the translation.
C. A grid is helpful to describe a reflection because I can see the distance from the line of reflection to each vertex and then measure the same distance in the opposite direction.

Cool-Down

Responses vary.

Answer Key

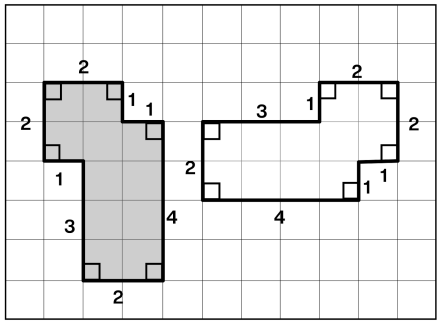
Warm-Up

Responses vary.

- **Upper left:** The only pair where the image gets smaller.
- **Upper right:** The only pair where the image gets larger.
- **Bottom left:** The only pair that does not have shapes with four sides.
- **Bottom right:** The only pair where the image is not rotated.

Activity 2: Sides and Angles

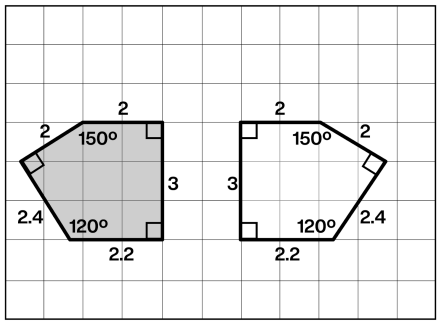
Pair A

1. 

2. *Responses vary.* All the corresponding angle measures and side lengths are the same.

3. *Responses vary.* The image is in a different location than the pre-image.

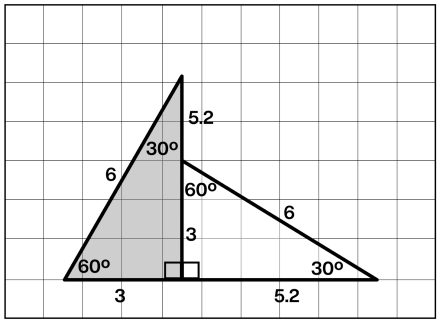
Pair B

1. 

2. *Responses vary.* All the corresponding angle measures and side lengths are the same.

3. *Responses vary.* The image is in a different position and is a reflection of the pre-image.

Pair C

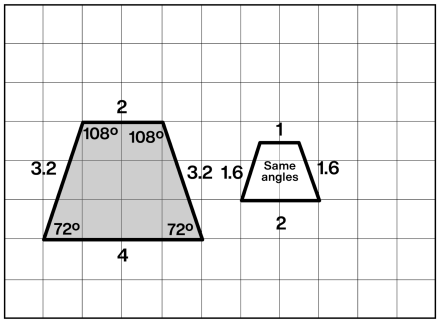
1. 

2. *Responses vary*. All the corresponding angle measures and side lengths are the same.

3. *Responses vary*. The image has been rotated to the right and is in a different position than the pre-image

Pair D

1.



2. *Responses vary.* All the corresponding angle measures are the same.

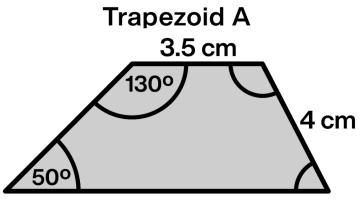
3. *Responses vary.* The corresponding side lengths are different sizes.

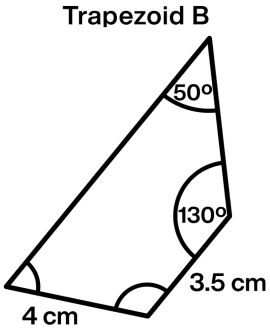
Lesson Synthesis

Pair J

Responses vary. In Pair H, the corresponding angles M and M' do not have the same measure. In order to be the result of a rigid transformation, all the corresponding angles must have the same measure.

Cool-Down





Unit 8.1, Lesson 11: Tearing It Up

Answer Key

Activity 1: Find All Three

4. *Responses vary.*

Student Names	Angle 1	Angle 2	Angle 3	Angle Sum
Elena, Nasir, Tyler	90°	50°	40°	180°

5. *Responses vary*. I knew I found the correct partners when I traced my triangle on patty paper, and it also fit exactly on their triangles.

6. *Responses vary*. The three angles always add up to $180°$.

Activity 2: Tear It Up

4. *Responses vary*. The angles in each triangle always make a line when they are arranged with the angles all meeting at the same point. Since there are $180°$ in a line, there must also be $180°$ in a triangle.

Lesson Synthesis

Triangle 1: 67°

Triangle 2: *Responses vary.* Any measurement less than $120°$.

Triangle 3: 30°

Cool-Down

A, E, and F

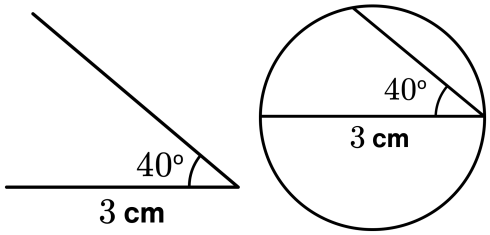
Responses vary. I know these could be the angles in a triangle because 42°, 18°, and 120° sum to 180°.

Unit 7.7, Lesson 8: Can You Draw It?

Answer Key

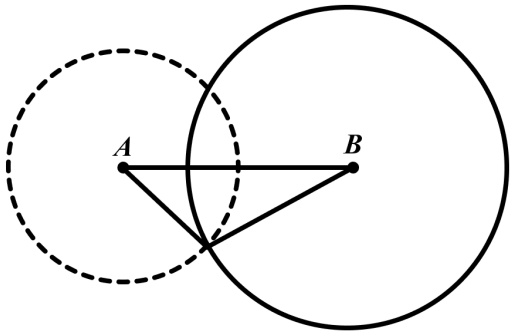
Warm-Up

Responses vary.

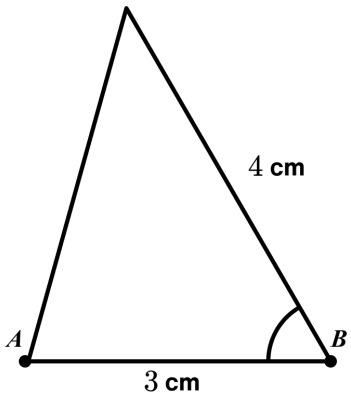


Activity 1: Complete the Triangles

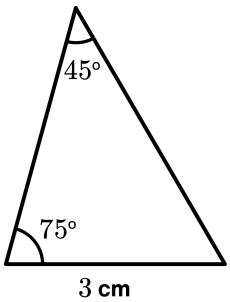
1. *Responses vary.* Sadia could draw a circle with a radius of 3 cm around point B. The circles will intersect twice. Then from one intersection point, she can draw a line to point A and a line to point B.



2. *Responses vary.* Nekeisha can draw a 4 cm line starting at point B along the $60°$ angle. Then draw another line that connects the end of the 4 cm to point A.

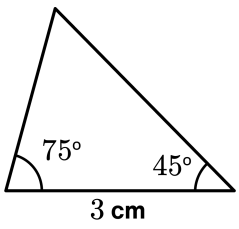


3.1 *Responses vary.* Ahmed can draw a $45°$ angle at point B.



3.2 Yes.

Responses vary. Changing the position of the $45°$ angle creates different triangles.



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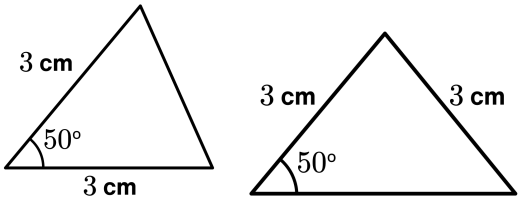
Unit 7.7, Lesson 8: Can You Draw It?

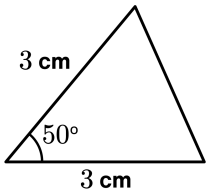
Answer Key

Activity 2: Drawing Challenges

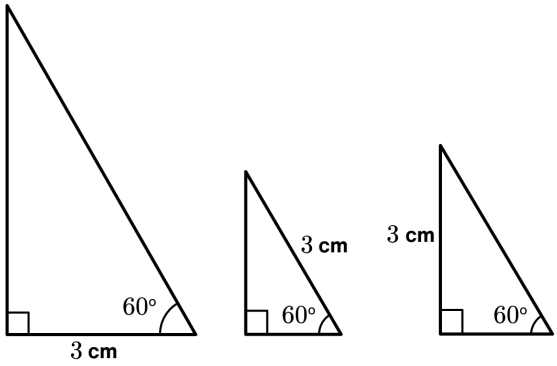
1. Two 3 cm sides and one $50°$ angle.



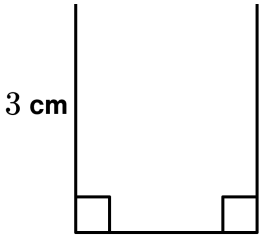
2. Two 3 cm sides with a $50°$ angle in between.



3. One $60°$ angle, one $90°$ angle, and one 3 cm side.



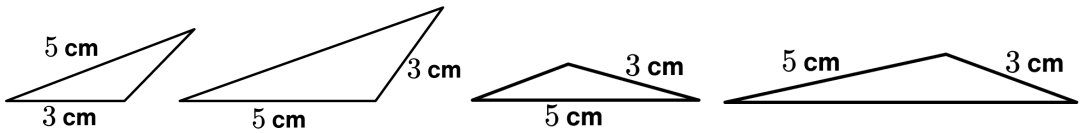
4. It is not possible to draw a triangle with two $90°$ angles.



Are You Ready for More?

1.1 Four triangles

1.2 *Responses vary.* 3 cm and 5 cm.



Lesson Synthesis

Responses vary. First create a triangle with the given measurements. Then keep the two angles in the same place but change the position of the side that you know. Changing the position of a measurement will create a different triangle.

Cool-Down

Yes.

Explanations vary. Alejandro could make it so that the 8 cm segment is on one of the smaller sides rather than on the largest side. This arrangement would create a different triangle.

Unit 7.1, Lesson 2: Scaling Robots

Answer Key

Warm-Up

Responses vary.

- The large robot is the same shape as the small robot.
- The eyes of both robots are touching the edges.

Activity 1: Scaling a Robot

1.

	Original	Copy
Height (in.)	2	4
Width (in.)	4	8
Eye distance (in.)	3	6
Antenna (in.)	1.5	3

2. *Responses vary.* If the scale factor is 2, the height of the scaled copy is twice the original height, so in this case, the width would be 3 times the original height, or 6.

Activity 2: Analyzing Robots

1. Imani's copy is not a scaled copy.

   Explanations vary. Imani's copy robot is 4 times as tall as the original but only 2 times as wide, so the robot's body won't look right.

2.1

	Original	Scaled Copy
Height (in.)	2	*Responses vary.*
Width (in.)	6	
Eye distance (in.)	4	
Antenna (in.)	3	

2.2 *Responses vary.* There should be a constant scale factor between each measurement in Imani's robot and each corresponding measurement in the copy robot. Common scale factors may be 4, 2, 2.5, and 3.

3.1 *Responses vary.* Anushka's strategy was multiplying each length by itself. $3 \cdot 3 = 9$.

3.2 *Responses vary.* I would give the advice to multiply each length on the small robot by the same scale factor. It does not matter what scale factor you choose so long as you multiply each length by the same scale factor.

4.1 *Responses vary.*

- Change the height from 15 to 12.5.
- Change the width to 24 and the antenna length to 6.

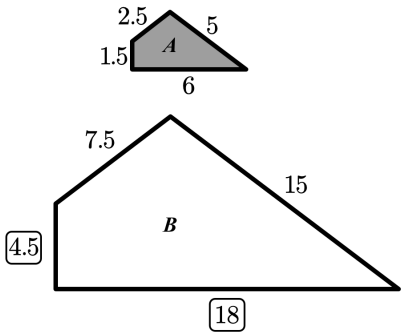
4.2 *Scale factors vary depending on the changes made.*

Lesson Synthesis

Responses vary.

If there is the same scale factor between each length in the original figure and its matching length in the copy, then it is a scaled copy. For example, if you multiply each length in figure L by 1.5 or $\frac{3}{2}$, you get all of the lengths in figure S.

Cool-Down



Responses vary.

To find the missing lengths, I multiplied each length in figure A by 3 because the scale factor from A to B is 3.

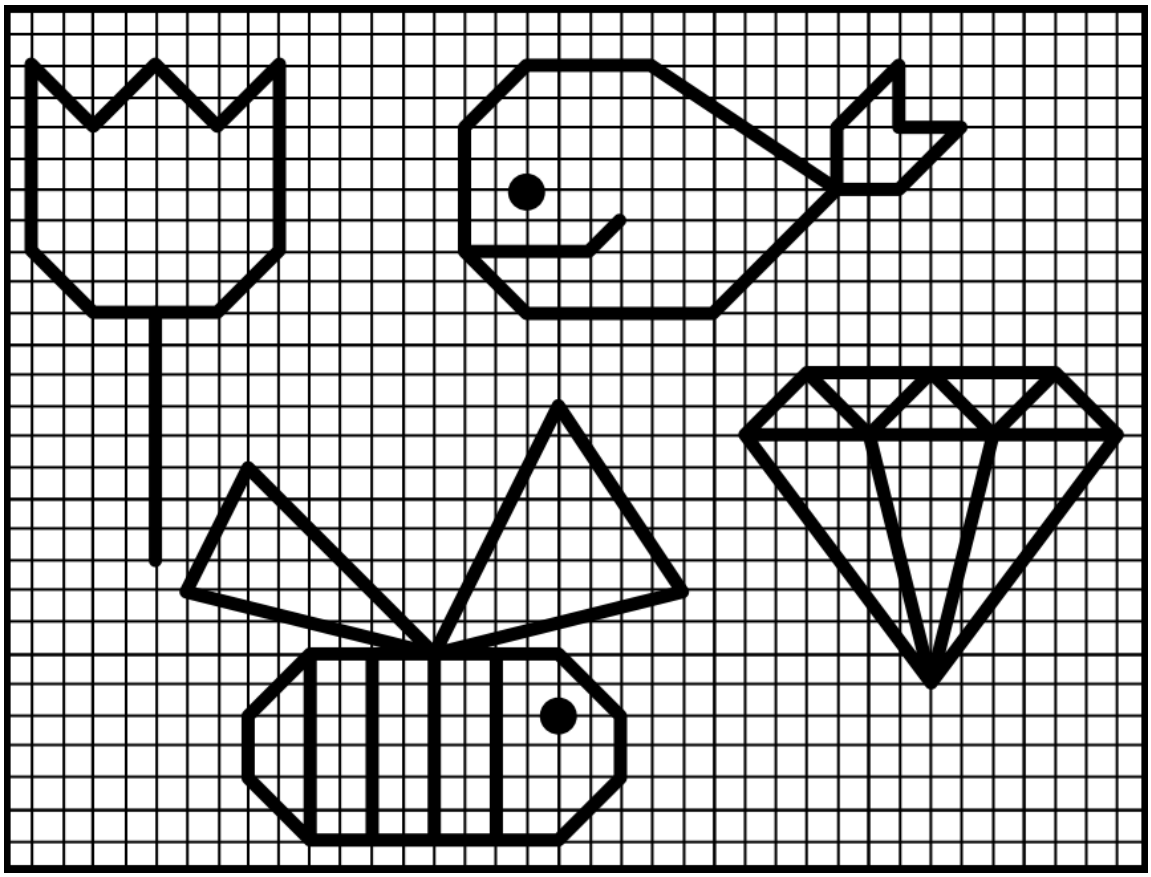
All measurements are in grid units.

Unit 7.1, Lesson 3: Make It Scale

Answer Key

Activity 1: Drawing Scaled Copies on a Grid

1.



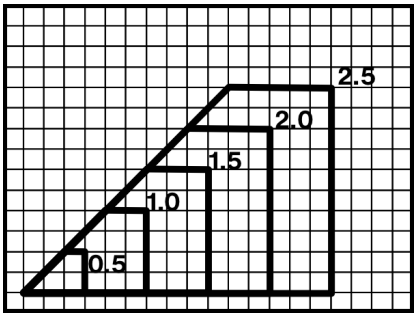
2. Students should trade their drawings with other students.

3. *Responses vary.* First, I figured out the length of one side in the original figure. Next, I multiplied that length by 2 to get the length of that side in the scaled copy. Then, I drew that side in my scaled copy. For diagonal lines, I had to pay extra attention to get the angle just right. I repeated these steps for each line in the figure.

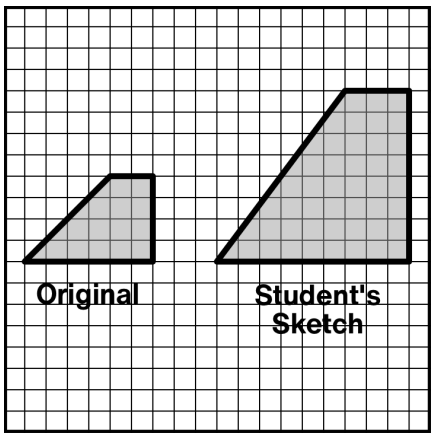
Activity 2: Did It Scale?

1. Scale factor: *Responses vary.*

2. *Responses vary based on scale factor. The drawing shows several possible scale factors.*



3. *Responses and explanations vary.*
   - Sasha is correct because the height of the sketch is multiplied by 2.
   - Randy is correct. The width is multiplied by 1.5.
   - Both Sasha and Randy are correct. The scale factors 2 and 1.5 are both used in this sketch.
   - Neither student is correct. A single scale factor is not used, and the sketch is not a scaled copy.



Are You Ready for More?

Drawings vary.

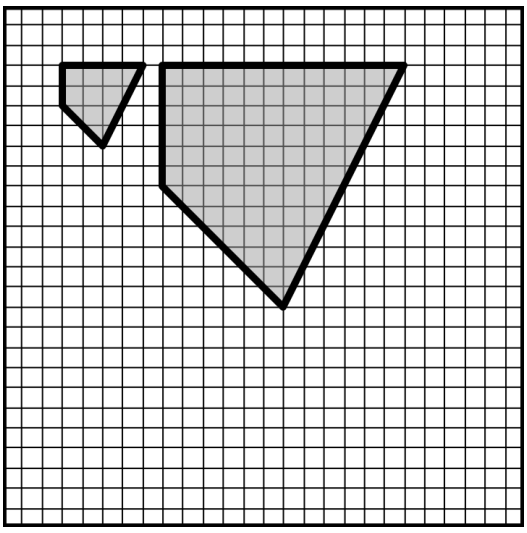
Lesson Synthesis

Responses vary.

- When making a scaled copy, you need to make sure all the side lengths are multiplied by the same scale factor.
- When you are drawing the new figure, you need to keep in mind how you draw the angles so that the angles remain the same in both figures.

Cool-Down

This is a scale drawing of the original figure using a scale factor of 3.



Unit 7.1, Lesson 7: Will It Fit?

Answer Key

Warm-Up

Responses vary.

- A scale drawing is a drawing that shows the object accurately and all parts in the drawing match the parts in the actual object.
- A scale drawing is like a scaled copy of a real object, but it is a drawing that shows one flat surface of the object.

Activity 1: Will It Fit?

1. *Responses vary.*
   It means that 2 centimeters on the scale drawing represents 5 meters on the actual court.

2. *Measurements may differ slightly.*

	Length of Court (L)	Width of Court (W)	Hoop to 3-pt. Line (H)	3-pt. Line to Side Line (S)
Scale drawing	11.2 cm	6 cm	2.8 cm	0.4 cm
Actual court	28 m	15 m	7 m	1 m

   Explanations vary.
   The actual dimensions of Karima's court are 28 meters by 15 meters and will not fit in the designated 20-by-20 meter park area because 28 meters is longer than 20 meters.

Are You Ready for More?

The bench should be about 3.6 centimeters long.
Yes, the bench area in Karima's scale drawing is about 3.6 centimeters long.

Activity 2: Fix It

1.1 *Responses vary.*

- Karima could scale down all of the lengths in her court by the same scale factor so that the length of the court fits in the designated area.
- I recommend that Karima propose building a half court since the dimensions of a half court would fit in the designated area.

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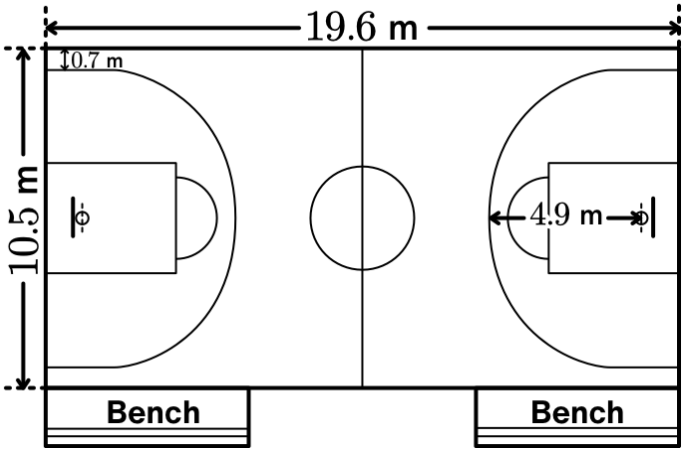
Unit 7.1, Lesson 7: Will It Fit?

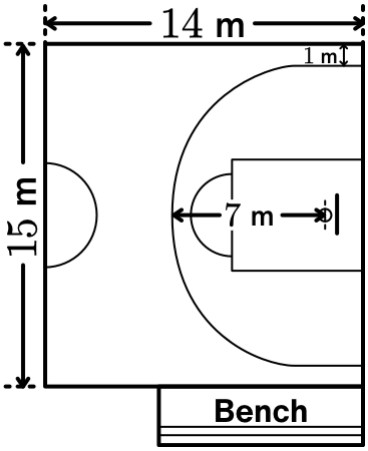
Answer Key

1.2 *Proposals vary.*

Scaled Court (Scale factor = 0.7)



Half Court



2. *Responses vary.*

Scaled full court: The scaled full court will have an area of 205.8 square meters because $19.6 \cdot 10.5 = 205.8$. Since the original full area is 400 square meters, there will be 194.2 square meters remaining for outdoor seating.

Half court: The half court will have an area of 210 square meters because $14 \cdot 15 = 210$. Since the original full area is 400 square meters, there will be 190 square meters remaining for outdoor seating.

Lesson Synthesis

Responses vary.

- Each centimeter represents 2.5 meters, so $2.5 \cdot 1.8 = 4.5$ meters.
- The scale is 2 cm to 5 m. $2 \cdot 0.9 = 1.8$ cm, so the court is actually $5 \cdot 0.9 = 4.5$ meters.

Cool-Down

40 feet is the actual length of the bus.

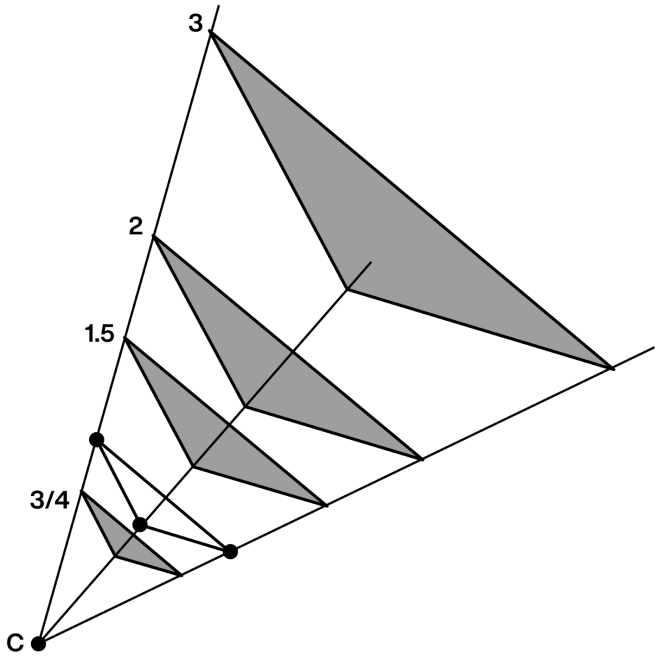
Explanations vary. The scale drawing is 4 inches, so there are $4 \div \frac{1}{2} = 8$ half inches in the drawing.

Since each half inch represents 5 feet , $8 \cdot 5 = 40$ feet.

Unit 8.2, Lesson 2: Supplement

Answer Key

1.



2. *Responses vary.*

3. *Responses vary.*

4. *Responses vary.*

   The line segments in JAM look parallel to the line segments in $J'A'M'$.
   The angles in JAM look congruent to the angles in $J'A'M'$.

Unit 8.2, Lesson 4: Dilations on a Plane

Answer Key

Warm-Up

- Point F, $(-3, -1)$

Activity 1: Dilate It!

- Solutions are on Screens 3–6 of the Teacher Presentation Screens.

Activity 2: Make My Dilation

- The correct transformations are shown on the cards.

Are You Ready for More?

A. $A' = (0, 0)$; $B' = (9, 3)$; $C' = (3, 9)$

B. $A'' = (9, 3)$; $B'' = (12, 4)$; $C'' = (10, 6)$

C. A'' and B' must be at the same coordinates because the sum of the dilation scale factors ($\frac{3}{4}$ and $\frac{1}{4}$) is 1.

Lesson Synthesis

Responses vary. Coordinates are useful when describing dilations because they communicate the location of points in the plane. When we perform a dilation, we also need to know the center of dilation (another point) and the scale factor (a number). On the coordinate plane, all of the information we need to dilate a polygon can be communicated with accuracy.

Cool-Down

Responses vary.

Information that must be included:

- The center of dilation is $(3, 0)$.
- The scale factor is 3.
- The triangle being dilated has vertices at $(2, 0)$, $(4, -2)$, and $(5, 1)$.

Unit 8.2, Lesson 6: Social Scavenger Hunt

Answer Key

Warm-Up

Responses vary.

- **Upper left:** The only pair of congruent figures.
- **Upper right:** The only pair of non-congruent figures that are similar.
- **Lower left:** The only pair of non-congruent figures that have congruent corresponding sides.
- **Lower right:** The only pair of non-similar figures that have congruent corresponding angles.

Social Scavenger Hunt

Rounds 1–4 (Screens 2–3 and 5–6)

Responses vary.

Intermission (Screen 4)

1. True. All four side lengths on each figure are 4 units.
2. False. The figure on the left appears to have four right angles. The figure on the right does not appear to have any right angles.
3. False. Corresponding angles are not congruent.
4. False. Corresponding angles are not congruent.

Lesson Synthesis

Statements	Always	Sometimes	Never
1. If two figures are congruent, then they are similar.	✓		
2. If two figures are similar, then they are congruent.		✓	
3. If two figures have congruent corresponding angles, then the figures are similar.		✓	
4. If two figures have congruent corresponding angles and a common scale factor between corresponding sides, then the figures are similar.	✓		

Cool-Down

Yes, $ABCD$ is similar to $EFGH$.

Responses vary.

- Corresponding angles are congruent, and there is a common scale factor ($\frac{3}{4}$) between corresponding sides.
- Dilating quadrilateral $ABCD$ with center A and a scale factor of $\frac{3}{4}$ gives a quadrilateral that is congruent to $EFGH$. This can be shown with a translation of A to E and then a rotation with center E.

Unit 7.6, Lesson 4: Seeing Structure

Answer Key

Warm-Up

1. *Responses vary*.
   - $100 = 8(x + 9)$ and $9(x + 7) = 100$ are alike because they are both equations that have an expression equal to 100, and the expression is some number times a quantity in parentheses.
   - $100 = 72 + 8x$ and $100 = 8x + 72$ are alike because the equations use all of the same numbers, and they have the same solution ($x = 3.5$).

2. *Responses vary*.
   - **Group 1 equations:** A, B, F. All the equations in this group have an expression that looks like __$(x +$ __$)$.
   - **Group 2 equations:** C, D, E. All the equations in this group have an expression that looks like __$x +$ __.

Activity 1: Which Diagram?

1. **Diagram:** A — **Equation:** $5x + 3 = 45$

   Solution: $x = 8.4$ — **Meaning:** Each cardboard package weighs 8.4 pounds.

2. **Diagram:** B — **Equation:** $5(x + 3) = 45$

   Solution: $x = 6$ — **Meaning:** Each bag starts with 6 pencils.

3. **Diagram:** A — **Equation:** $5x + 3 = 45$

   Solution: $x = 8.4$ — **Meaning:** The fee per person is $\$8.40$.

Activity 2: Write Your Own

1.1 *Responses vary*. How many balloons will each family member inflate?

1.2 *Responses vary*. Each family member will inflate 9 balloons.

1.3 $60 = 24 + 4x$. **Check:** $24 + 4(9) = 24 + 36 = 60$.

2.1 *Responses vary*. How much should the instructor charge per person for supplies in order to make $\$240$?

2.2 *Responses vary*. The instructor should charge $\$5$ per person for supplies.

2.3 $240 = 12(x + 15)$. Check: $12(5 + 15) = 12(20) = 240$.

Are You Ready for More?

Responses vary.

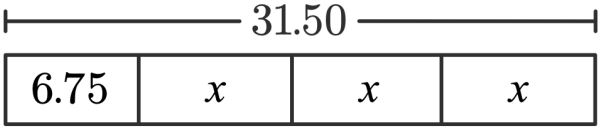
Lesson Synthesis

1.

2. *Responses vary*. Both diagrams have the same length (90). The first tape diagram has one unknown value three times, plus 15 more. The second diagram has three identical pieces of tape, with each piece representing an unknown plus 15.

Cool-Down

Tape Diagram:



Equation: $6.75 + 3x = 31.50$

Solution: $x = 8.25$

Meaning of solution: The shirts cost $\$8.25$ each.

Unit 7.6, Lesson 7: Keeping It True

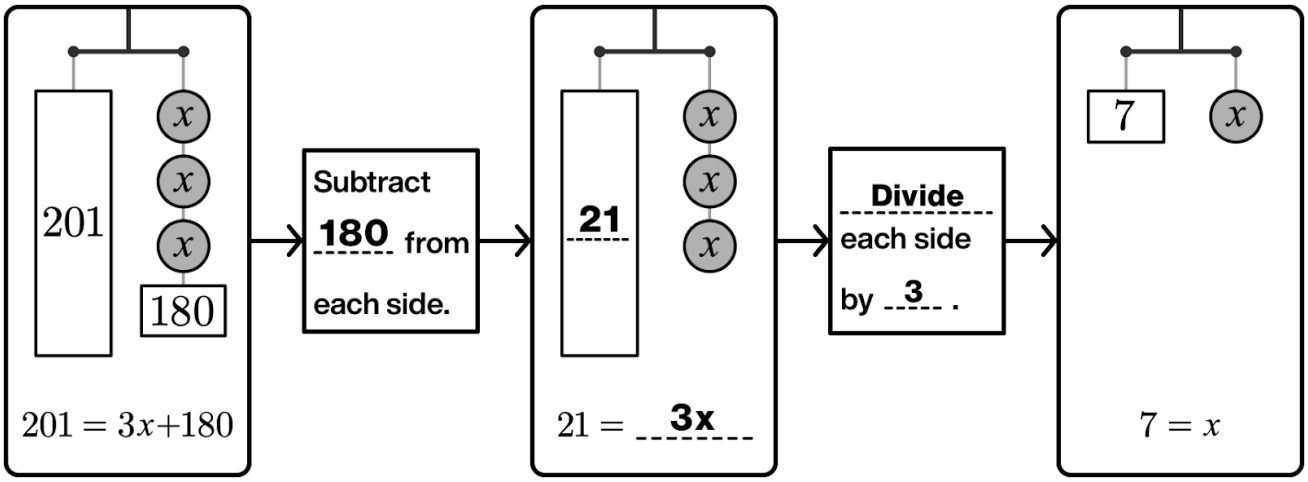
Answer Key

Warm-Up

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

Activity 1: Keep It True

1.



2. *Responses vary.*

$5 = 2x+8$

Subtract 8 from each side.

$-3 = 2x$

Divide each side by 2.

$-1.5 = x$

3. *Responses vary.*

$2(x-5) = -6$

Divide each side by 2.

$x-5 = -3$

Add 5 to each side.

$x = 2$

4. *Responses vary.* I could check if the solutions are correct by replacing x with my solution and checking to see that both sides are equivalent.

Activity 2: Less and More Difficult

Responses vary. Equation D would be hard to solve because it has two fractions and negative numbers.

Activity 3: Solve 'em

A. $x = -10$

B. $x = -99$

C. $x = -6$

D. $x = -\frac{1}{3}$

E. $x = 5$

F. $x = 30$

G. $x = 4$

H. $x = 7.5$

Lesson Synthesis

Responses vary.

1. $-9999(1.2x - .001) = \frac{7}{9}$
2. This equation is difficult to solve because it has parentheses, fractions, decimals, and a negative number.
3. To solve an equation like this, be sure to keep both sides of the equation balanced.

Cool-Down

1. $x = -7$
2. $x = -1$

Unit 7.6, Lesson 8: Factoring and Expanding

Answer Key

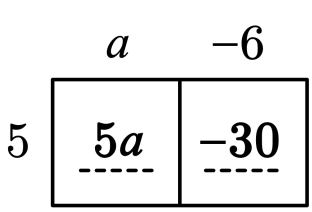
Warm-Up

Responses vary.

- The tape diagram does not belong because it is the only one with three 5s.
- The hanger diagram doesn't belong because it is the only one with circles.
- The equation $3(x+5)=18$ doesn't belong because it is the only one with parentheses.
- The equation $3x+5=6$ doesn't belong because it represents a different relationship than the other three.

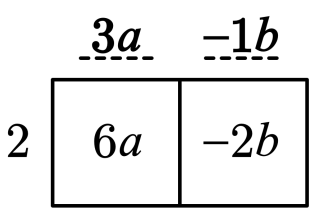
Activity 1: Factoring Puzzles

Puzzle 1



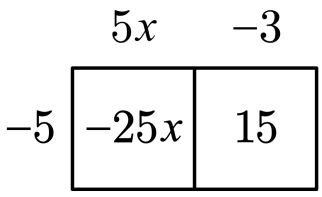
Factored	Expanded
$5(a-6)$	$5a-30$

Puzzle 2



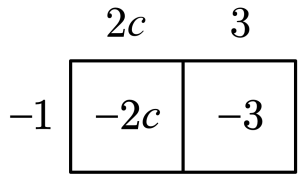
Factored	Expanded
$2(3a-1b)$	$6a-2b$

Puzzle 3



Factored	Expanded
$-5(5x-3)$	$-25x+15$

Puzzle 4



Factored	Expanded
$-(2c+3)$	$-2c-3$

Activity 2: Step by Step by Step by Step

1. Yes, each of their first steps are correct.

   Explanations vary. Sadia divided each side first and Amir expanded the left side of the equation first, but they both kept the equation balanced.

2.

Sadia	Amir
$2(x-9)=10$	$2(x-9)=10$
$x-9=5$	$2x-18=10$
$x=14$	$2x=28$
	$x=14$

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Unit 7.6, Lesson 8: Factoring and Expanding

Answer Key

Activity 3: Different First Steps

1. $3(x + 2) = 21$

Expand First	Divide First
$3x + 6 = 21$	
$3x = 15$	$x + 2 = 7$
$x = 5$	$x = 5$

2. $200(x - 0.3) = 600$

Expand First	Divide First
$200x - 60 = 600$	
$200x = 660$	$x - 0.3 = 3$
$x = 3.3$	$x = 3.3$

3. $-10(x - 1.7) = -3$

Expand First	Divide First
$-10x + 17 = -3$	
$-10x = -20$	$x - 1.7 = 0.3$
$x = 2$	$x = 2$

Lesson Synthesis

Responses vary.

1. When solving an equation like $6(x + 4) = 30$, you could divide both sides by 6 first, or you could expand $6(x + 4)$ and replace the left side with $6x + 24$.
2. Having different ways to solve an equation can be helpful because then you can decide which way is easier.

Cool-Down

$8.88 = 4.44(x - 7)$

$2 = x - 7$

$9 = x$

Unit 7.6, Lesson 11: Equation Roundtable

Answer Key

Warm-Up

Responses vary.

- Add 6 to each side of the equation.
- Combine $12x$ and $4x$ on the left to make the equation $16x - 6 = 30$.

Activity 1: Equation Roundtable

1. $x = 14$
2. $x = 7$
3. $x = 10$
4. $x = 4$

Reflection

Responses vary.

- When solving equations, you have to keep each side of the equation balanced.
- When solving equations, you can expand first if there are parentheses.

5. $x = 4$
6. $x = 2.25$ (or equivalent)
7. $x = –2.2$ (or equivalent)
8. $x = 3$

Lesson Synthesis

1. *Responses vary.*
   - Add 6 to each side of the equation.
   - Expand $2(8x - 3x)$ to get $16x - 6x$.
   - Rewrite $(8x - 3x)$ as $5x$.
2. *Responses and explanations vary.*
   - I prefer to add 6 to each side of the equation first so that I can then divide each side by 2.
   - I prefer to expand first so I don't have parentheses anymore.

Cool-Down

Ichiro

Responses vary. The error was that Ichiro didn't expand correctly. He only multiplied 5 to the first term in the parentheses.

Unit 7.6, Lesson 12: Community Day

Answer Key

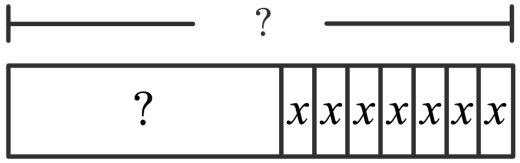
Warm-Up

1. A
2. $3(a + 2) = 24$

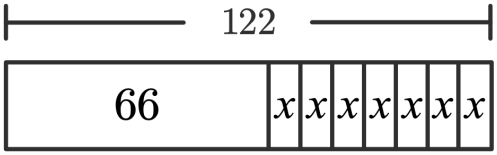
Activity 1: Three Reads

1. *Discussions vary*. Kyrie is making invitations for their school's community day, and they are trying to plan how many they will need to make each day of the week.

2. *Diagrams vary*.



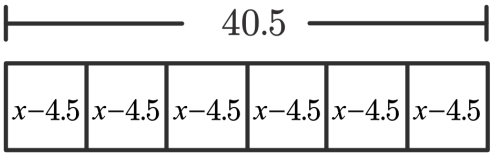
3. *Responses vary*. Kyrie should make 8 invitations each day.



Activity 2: Similar Problems

Set 1A

Visuals vary.



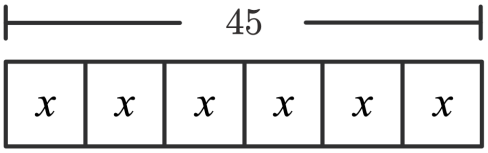
$6(x - 4.5) = 40.5$

$x = 11.25$

Each ticket costs $\$11.25$ without the coupon.

Set 1B

Visuals vary.



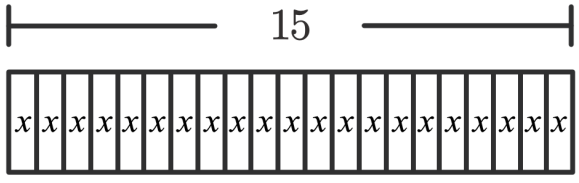
$40.50 = 6x - 4.50$ or $6x = 40.50 + 4.50$

$x = 7.5$

Each ticket costs $\$7.50$ without the coupon.

Set 2A

Visuals vary.



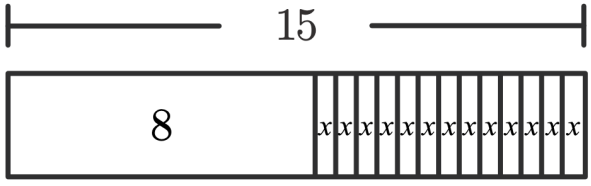
$13x + 8x = 15$

$x = \frac{5}{7}$

Each bean bag weighs $\frac{5}{7}$ of a pound.

Set 2B

Visuals vary.



$8 + 13x = 15$

$x = \frac{7}{13}$

Each small bean bag weighs $\frac{7}{13}$ of a pound.

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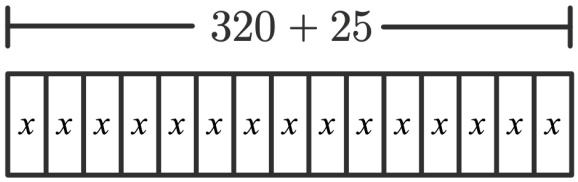
Unit 7.6, Lesson 12: Community Day

Answer Key

Set 3A	Set 3B
Visuals vary. $25(x - 15) = 320$ $x = 27.8$ They have to sell each T-shirt for $\$27.80$ to make a profit of $\$320$ for 25 shirts.	*Visuals vary.*  $15x - 25 = 320, x = 23$ They have to sell each T-shirt for $\$23$ to make a profit of $\$320$ for 15 shirts.

Activity 2 Synthesis

Responses vary.

Set 1: For Problem A, each person gets a discount. For Problem B, the whole family gets a single discount. Both families pay $\$40.50$ for all 6 tickets.

Set 2: For Problem A, there was a total of 21 beans bags of the same size. For Problem B, there was a total of 14 bean bags that were different sizes. Both problems include the same giant 15 lb. stuffed animal on one side of the scale.

Set 3: Both groups of people want to make $\$320$ in profit. Problem A includes a cost to make each shirt, while Problem B includes a single cost for supplies.

Responses vary.

- I found the equation useful because once I had the equation, I could just solve to find the answer.
- A tape diagram was helpful because it shows every part of the situation visually.

Activity 3 Warm-Up

Responses vary. I am most proud of how well I worked with my group.

Responses vary. I think if I labeled each part of my hanger diagram, it would be more clear.

Activity 3: Gallery Tour

Responses vary.

Activity 4: Revisions and Reflection

Responses vary.

Lesson Synthesis

Responses vary.

- Check to make sure that your tape diagram and equation give you the same answer when you solve.
- It's helpful to remember that sometimes there are single costs (like supplies) and sometimes the cost applies every time (like the cost to make a shirt). These look different when you write the equation.

Cool-Down

6. 14 minutes

Unit 8.4, Lesson 4: More Balanced Moves

Answer Key

Warm-Up

1. Does not maintain equality.
2. Maintains equality if $x = 2$.
3. Maintains equality.
4. Maintains equality.
5. Does not maintain equality.

Activity 1: Step by Step by Step by Step

1. *Responses vary.* Yes, -8 will make the equation true, and since $-8 = x$ and $x = -8$ have the same meaning, both solutions are correct.
2. *Responses vary.* Both students tried to get the variable to one side of the equation. Sadia used the distributive property to rewrite the left side as $3\,(4x + 1)$, moving from line two to line three, while Amir used the same property to distribute the 3 on the left side, moving from line two to line three.
3. *Responses vary.* Caleb made an error moving from line one to line two by subtracting $5x$ from each side of the equation before multiplying by 3 on the right side of the equation. Roberto made an error moving from line two to line three by adding $15x$ to each side of the equation instead of adding $-15x$ to each side of the equation.

Activity 2: Make Your Own Steps

Solution paths vary.

1. $\frac{12+6x}{3} = -2$

$$12 + 6x = -6$$
$$6x = -18$$
$$x = -3$$

2. $x - 4 = \frac{1}{3}\,(6x - 54)$

$$x - 4 = 2x - 18$$
$$-4 = x - 18$$
$$14 = x$$

3. $-3x + 12 = 9x - 4$

$$12 = 12x - 4$$
$$16 = 12x$$
$$\frac{16}{12} = x$$
$$\frac{4}{3} = x$$

Are You Ready for More?

$x + (x + 1) + (x + 2) = 24$, so $x = 7$. Therefore, the cups have 7, 8, and 9 pencils in them.

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Unit 8.4, Lesson 4: More Balanced Moves

Answer Key

Lesson Synthesis

Responses vary. As long as you maintain the equality of the equation there are lots of different ways you can begin solving. Subtracting $2x$ from both sides, adding 6 to both sides, or dividing both sides by 2 are all different first steps you can take to solve this equation.

Cool-Down

1. *Responses vary.* Nyanna made an error moving from line one to line two: $4 - 17 = -13$, not 13. She also made an error going from steps four to five. She should have subtracted $8x$ from both sides.

2. $x = \frac{1}{2}$

Unit 8.4, Lesson 6: Strategic Solving

Answer Key

Warm-Up

Responses vary. Following Katie's instructions for a number x results in the expression $\frac{1}{6}((3x-7)\cdot 2-22)$. Simplified, this expression is $x-6$. Katie knows that to figure out Emmanuel's original number, 3, she needs to solve the equation.

Activity 1: Predicting Solutions

A. Positive. A positive amount of x's equals a positive value.

B. Positive. A positive amount of x's equals a positive value.

C. Zero. There are only x terms, so there is no constant term for the variable to equal, or the constant term is 0.

D. Negative. If you add 8 to each side, you will be left with a positive amount of x's equal to a negative number.

E. Positive. If you subtract 9 from each side, you will be left with a negative amount of x's equal to a negative number.

F. Zero. Since the constant terms on each side are equal, the final constant term is 0.

G. Positive. After distributing, we will have a negative amount of x's equal to a negative number.

Activity 2: Least and Most Difficult

Responses vary. Equation D would be difficult to solve because there are fractions on each side of the equation. Equation A would be easy to solve because there are no fractions in the equation.

Activity 3: Solve 'em

A. $q = 3$

B. $v = -14$

C. $n = -3.5$

D. $m = 2$

E. $t = -10$

F. $r = \frac{3}{2}$

G. $c = 0$

H. $p = -2$

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Unit 8.4, Lesson 6: Strategic Solving

Answer Key

Lesson Synthesis

Responses vary.

1. $\frac{\frac{2x-5}{7}}{3} = -3\,(3x - 10)$
2. There are fractions inside of fractions.
3. Multiply both sides by the denominator of the fraction.

Cool-Down

1. Positive. If you add 5 to each side, you will be left with positive $3x$ equal to a positive number.
2. $x = \frac{2}{3}$

Unit 7.6, Lesson 15: Budgeting

Answer Key

Warm-Up

1. *Responses vary*. The situation is about a person named Maia. She has a job where she sells magazine subscriptions. She likes to play soccer and wants to buy equipment. Currently she wants to buy a ball.

2. *Responses vary*. Maia has a job where she earns $\$30$ per week, plus $\$5$ for every magazine subscription that she sells. She wants to use the money she earns to buy soccer equipment. This week, Maia wants to buy a new ball. The cheapest ball she wants costs $\$35$.

3. *Responses vary*. With the values I chose, Maia only needs to sell 1 magazine to afford the ball, but she could also sell more, like 10 magazines.

Activity 1: Maia's Magazines

1. $19 + 3x = 43$. $x = 8$. Maia needs to sell 8 magazine subscriptions.

2. *Responses vary*. Maia could also sell 10 magazines, or 15, or 40.

3. $x \geq 8$

4. $37 = 22.05 + 5x$. $x = 2.99$. Each pair of socks would cost $\$2.99$.

5. $x \leq 2.99$

Activity 2: Bao's Budgeting

1. C. $(175 - 12x \geq 25)$

2. 12 represents how many months Bao will be withdrawing money.

3. x represents the amount of money Bao will withdraw each month.

4. $x \leq$ makes sense for this situation.

   Explanations vary. There will be an amount Bao can withdraw that will get him to *exactly* $\$25$ a year from now. Withdrawing *less than* that amount would also enable him to reach his goal.

5. $x \leq 12.50$. Bao can withdraw no more than $\$12.50$ each month and reach his goal.

6. $175 + 12x \geq 1000$

7. $x \geq 68.75$. Bao must put at least $\$68.75$ in his account each month to reach his goal.

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Unit 7.6, Lesson 15: Budgeting

Answer Key

Lesson Synthesis

Responses vary. The amount Tay spends on beverages is 2.5 times the number of beverages (x), or $2.5x$. This quantity should be subtracted from 30, the total on the gift card, because the gift card *decreases* with each purchase. Tay can use the gift card as long as the balance doesn't go below $\$0$, which explains the inequality $30 - 2.50x \geq 0$.

Cool-Down

1. $h \leq 6$

2. *Responses vary*. Zahra will stay outside only for the next 6 hours.

Unit 7.6, Lesson 17: Write Them and Solve Them

Answer Key

Warm-Up

Responses vary.

C, D

Activity 1: Orange Juice and Donuts

1. $2.15x + 0.75x \geq 10$ or equivalent
2. $x \geq 3.44$
3. *Responses vary*. The solution means that Kiandra would have to buy a donut and an orange juice for at least four people.

Activity 2: Solve It!

1. $15x + 300 \leq 750$

   $x \leq 30$

   The marching band can spend up to $\$30$ for each new uniform.
2. $5 - 0.6x \leq 0$

   $x \geq 8\ \frac{1}{3}$

   The plants will need to be covered after $8\ \frac{1}{3}$ hours, or after 8:20 p.m.
3. $4(x - 5) \leq 65$

   $x \leq 21.25$

   Each person can order a meal that is $\$21.25$ or less.
4. $50 - 1.65x \geq 15$

   $x \leq 21.21$

   Adriana's family can do up to 21 loads of laundry before the card automatically reloads.

Lesson Synthesis

Responses vary. Since Sahana gets paid $\$9.50$ every hour, I would write $9.50x$, where x represents the hours she works. Sahana needs to make $\$235$ or more, so $9.50x$ needs to be greater than or equal to $\$235$.

Cool-Down

1. *Responses vary.* Wey Wey should have used the less-than-or-equal-to symbol.
2. $8x + 58 \leq 500$
3. Wey Wey can download 55 movies or fewer.