Amplify Desmos Math

Grade 8

Additional Practice
Student Resources

About Amplify

Amplify is dedicated to collaborating with educators to create learning experiences that are rigorous and riveting for all students. Amplify creates K–12 core and supplemental curriculum, assessment, and intervention programs for today's students.

A pioneer in K–12 education since 2000, Amplify is leading the way in next-generation curriculum and assessment. All of our programs provide teachers with powerful tools that help them understand and respond to the needs of every student.

Amplify gratefully acknowledges the work of distinguished program advisors from the English Learners Success Forum (ELSF), who have been integral in the development of Amplify Desmos Math. ELSF is a 501(c)(3) nonprofit organization whose mission is to expand educational equity for multilingual learners by increasing the supply of high-quality instructional materials that center their cultural and linguistic assets.

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Practice Problems

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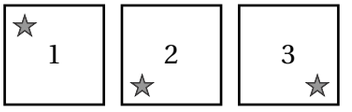
Additional Practice 1.01

Problems 1–2: These three frames show a figure's different positions. Describe how the figure moves to get from its position in each frame to the next.



1. Describe the move from Frame 1 to Frame 2.

2. Choose the correct move from Frame 2 to Frame 3.

A. The figure moved to the left and got smaller.

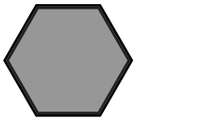
B. The figure moved to the right and got smaller.

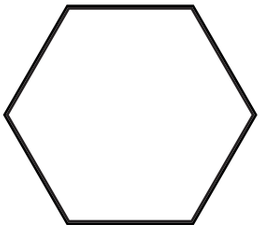
C. The figure moved to the left and got larger.

D. The figure moved to the right and got larger.

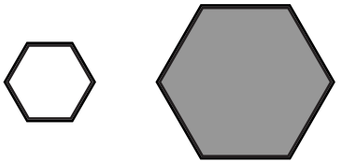
Problems 3–5: Clare saw a transformer and described the figure before (shaded) and after (unshaded). Rewrite each description to make it stronger and clearer.

3. The figure got larger.



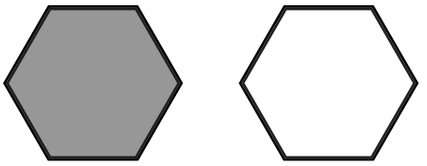


4. The figure got smaller.

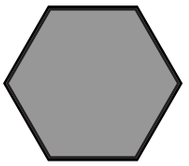


Name: ..... Date: ..... Period: .....

5. The figure moved.



6. Here is a figure before going through a transformer. Draw what the figure might look like after the transformer based on this description: *The figure got larger and moved to the right*.



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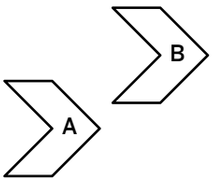
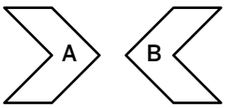
Additional Practice 1.02

1. For each movement from Figure A to Figure B, decide whether it shows a translation or a rotation.

a



b



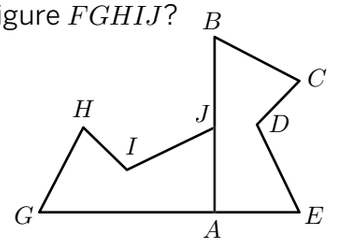
2. Which best describes the movement from Figure $ABCDE$ to Figure $FGHIJ$?

A. $90°$ clockwise rotation about point A.

B. $90°$ counterclockwise rotation about point A.

C. $180°$ clockwise rotation about point A.

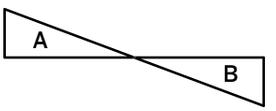
D. $270°$ counterclockwise rotation about point A.



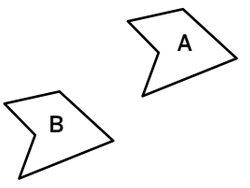
3. For each movement from Figure A to Figure B:

- Decide whether it shows a translation or rotation.

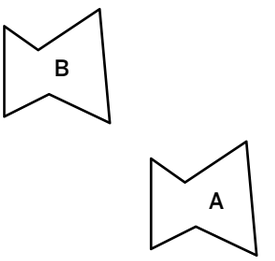
a



b

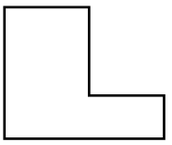


c



Name: ..... Date: ..... Period: .....

4. You will need a centimeter ruler. Translate the figure shown 4.5 cm right, and then rotate the newly translated figure $90°$ counterclockwise about point A.



5. Refer to Figure A and Figure B. Is the movement from Figure A to Figure B a *translation*, a *rotation*, or *both*? Explain your thinking.

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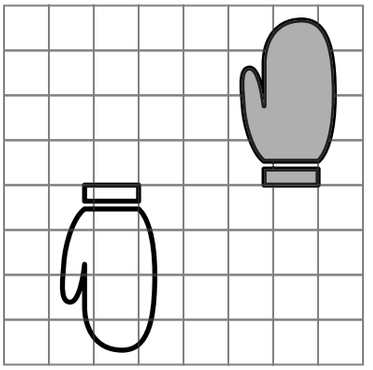
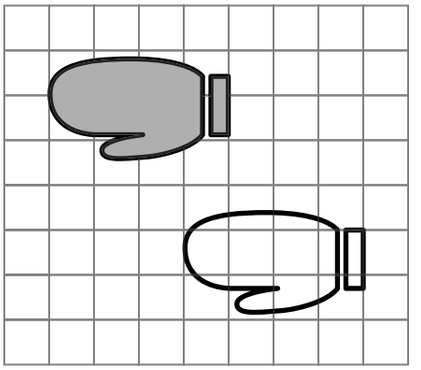
Additional Practice 1.03

Problems 1–4: Describe a sequence of transformations that moves the shaded figure onto the unshaded figure.

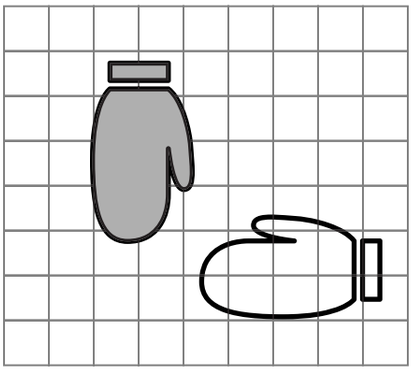
1.



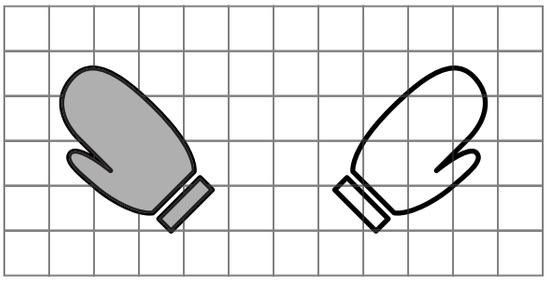
2.



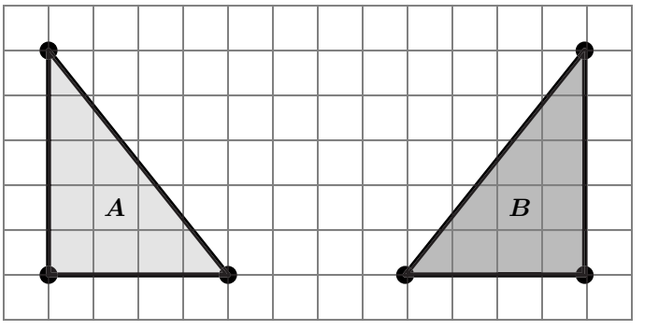
3.



4.



5. Refer to the figures shown. Identify the transformation that has occurred from Figure A to Figure B.



A. Translation 4 units to the left

B. Translation 8 units to the right

C. Reflection across a vertical line

D. Reflection across a horizontal line

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6. Select *all* the sequences of transformations that could return a figure to its original position.

- ☐ **A.** Rotate the figure around a point $90°$ clockwise and then rotate it another $90°$ clockwise
- ☐ **B.** Reflect the figure over one line and then reflect over a different line.
- ☐ **C.** Translate the figure 3 units down, then 5 units up, and then 2 units down.
- ☐ **D.** Reflect the figure over one line and then reflect over the same line.
- ☐ **E.** Rotate the figure $90°$ counterclockwise around a point and then $270°$ counterclockwise around the same point.
- ☐ **F.** Rotate a figure $180°$ counterclockwise, then reflect it over a vertical line.

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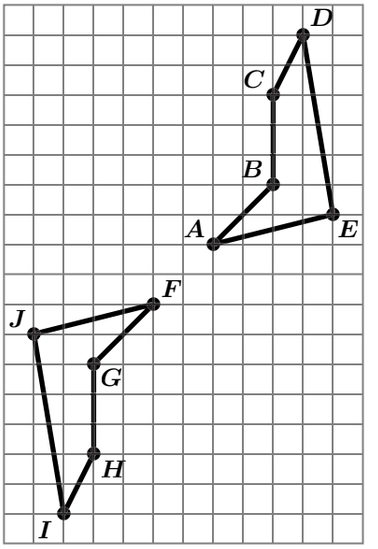
Additional Practice 1.04

1. A sequence of transformations maps Polygon $ABCDE$ onto Polygon $FGHIJ$. Select the correct sequence.

Sequence A: Reflect Polygon $ABCDE$ over a vertical line, and then reflect the resulting image across a horizontal line.

Sequence B: Translate Polygon $ABCDE$ down 9 units, and then reflect the resulting image across a vertical line.



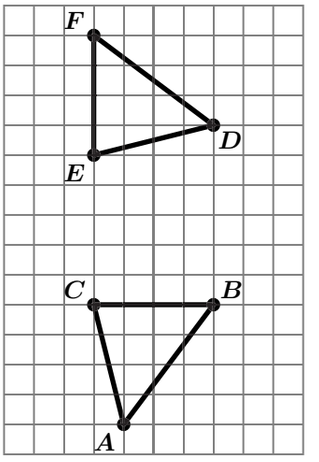
2. Select the series of transformations that maps Triangle ABC onto Triangle DFE.

A. Rotate Triangle ABC $90°$ counterclockwise about point C, and then translate the resulting image up 5 units.

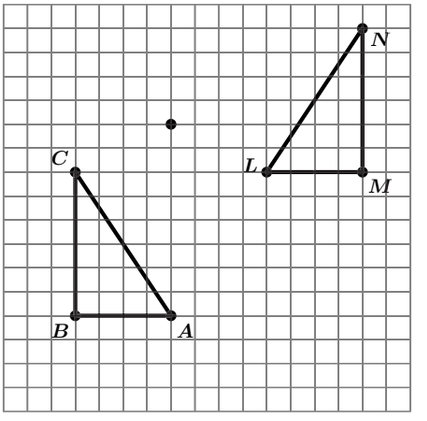
B. Rotate Triangle ABC $90°$ counterclockwise about point A, and then translate the resulting image up 5 units.

C. Reflect Triangle ABC across line AB, and then translate the resulting image up 5 units and 1 unit left.

D. Translate Triangle ABC up 9 units, and then rotate the resulting image $90°$ counterclockwise about point A.



3. Describe a sequence of transformations that maps Triangle ABC onto Triangle LMN.



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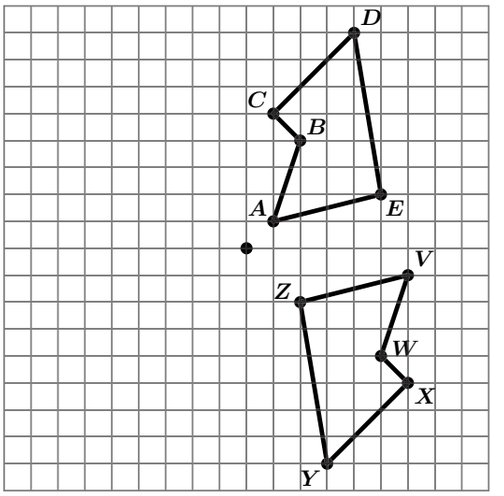
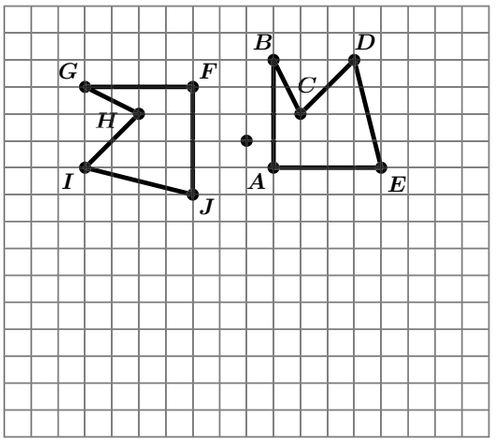
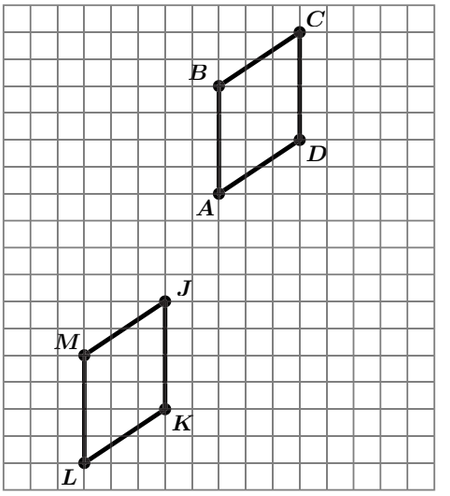
4. Describe a sequence of transformations that maps Polygon $ABCDE$ onto Polygon $VWXYZ$.



5. Describe a sequence of transformations that maps Polygon $ABCDE$ onto Polygon $FGHIJ$.



6. Kiran claims that there are at least two different transformations or sequences of transformations that map Polygon $ABCD$ onto Polygon $JKLM$. Is he correct? Explain your thinking.



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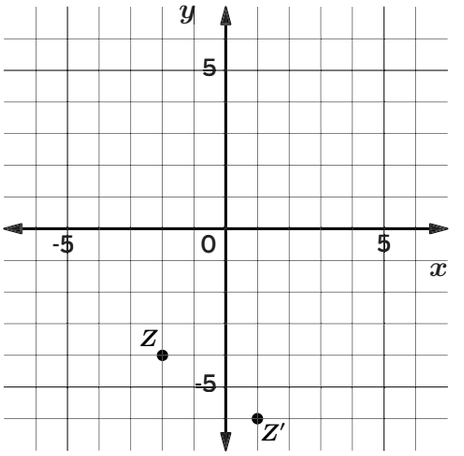
Additional Practice 1.05

1. Point $Z(-2, -4)$ is plotted on the coordinate plane. Point Z' is a translation of point Z. Which of the following describes the translation of point Z?



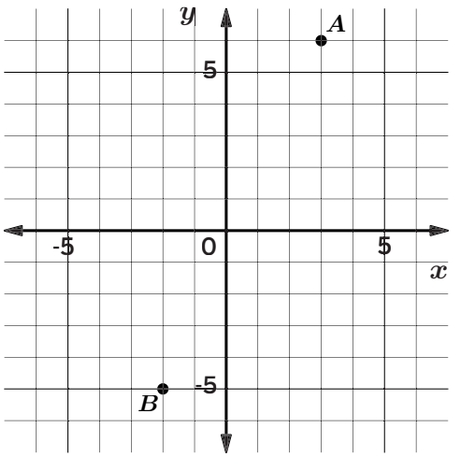
A. 2 units right, 3 units up

B. 3 units right, 2 units down

C. 3 units left, 2 units up

D. 2 units left, 3 units down

2. Points $A(3, 6)$ and $B(-2, -5)$ are plotted on the coordinate plane.



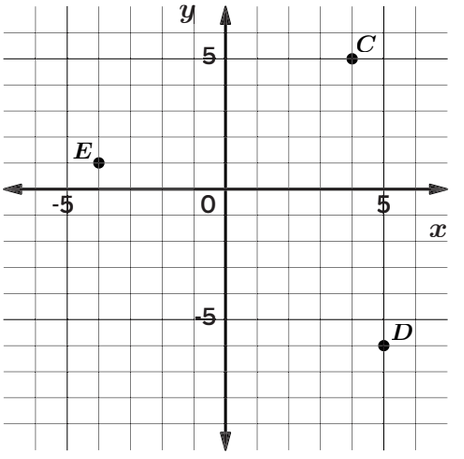
a Which are the coordinates of point A after a reflection across the x-axis? Circle the correct choice.

$(3, -6)$ $(-3, 6)$

b Which are the coordinates of point B after a reflection across the y-axis? Circle the correct choice.

$(-2, 5)$ $(2, -5)$

3. Points $C(4, 5)$, $D(5, -6)$, and $E(-4, 1)$ are plotted on the coordinate plane.



a What are the coordinates of points C, D, and E after each point is translated 2 units to the left and 3 units down?

b Plot these points on the grid, and label them C', D', and E'.

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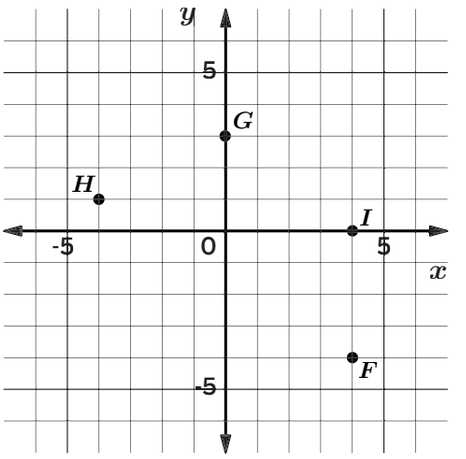
4. Points $F(4, -4)$, $G(0, 3)$, $H(-4, 1)$, and $I(4, 0)$ are plotted on the coordinate plane.

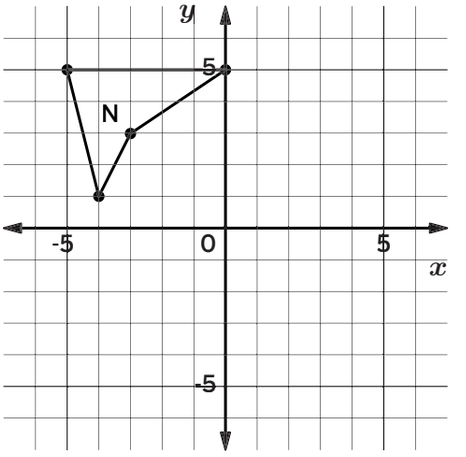


a What are the coordinates of points F and G after a reflection across the x-axis?

b What are the coordinates of points H and I after a reflection across the y-axis?

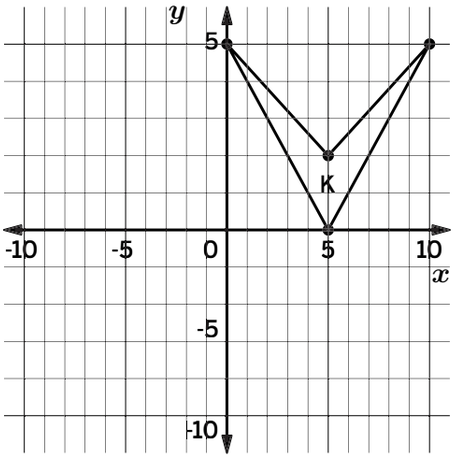
c Plot these points on the grid, and label them F', G', H', and I'.

5. Polygon N is reflected across the *y*-axis. Predict the coordinates of the image by completing the table. Check your predictions by graphing the image.



Preimage	Image
$(0, 5)$	
$(-3, 3)$	
$(-4, 1)$	
$(-5, 5)$	

6. K is reflected across the x-axis and then reflected across the y-axis. Complete the table with the coordinates of the final image. Check your coordinates by graphing the image.



Preimage	Image
$(5, 0)$	
$(5, 2)$	
$(0, 5)$	
$(10, 5)$	

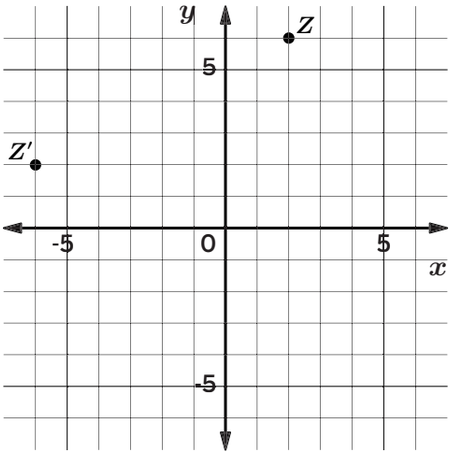
Name: ..... Date: ..... Period: .....

Additional Practice 1.06

1. Point $Z(2, 6)$ is plotted on the coordinate plane. Point Z' is a rotation of point Z about the origin. Circle the degree and direction of the rotation.

Degree: $90°$ **or** $180°$

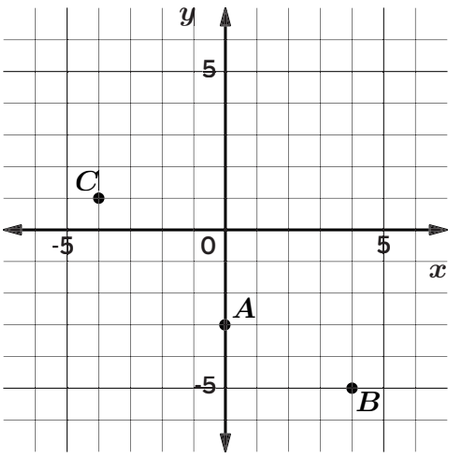
Direction: clockwise or counterclockwise



2. Point $N(0, 6)$ is rotated $180°$ counterclockwise about the origin, and the image is labeled N'. What are the coordinates of point N'?

3. Points $A(0, -3)$, $B(4, -5)$, and $C(-4, 1)$ are plotted on the coordinate plane.

What are the coordinates of A, B, and C after a rotation $270°$ counterclockwise about the origin? Plot these points on the grid, and label them A', B', and C'. Include the coordinates of the images in your labels.



4. Point $H(6, 4)$ is rotated $90°$ clockwise about the origin, and the image is labeled H'. Which of the following are the coordinates of point H'?

A. $(4, -6)$

B. $(-4, 6)$

C. $(6, -4)$

D. $(-6, -4)$

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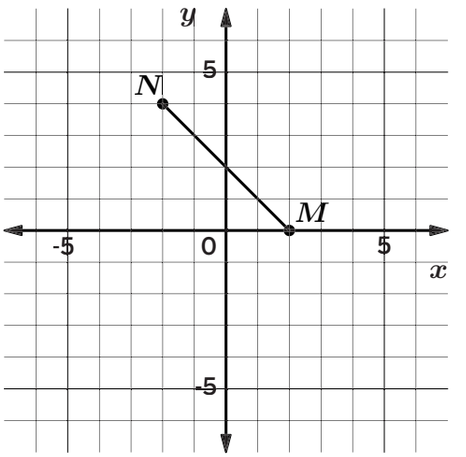
5. Rotate line segment MN 90° counterclockwise about the origin and label the image of the line segment $M'N'$. Record the coordinates of the image in the table.

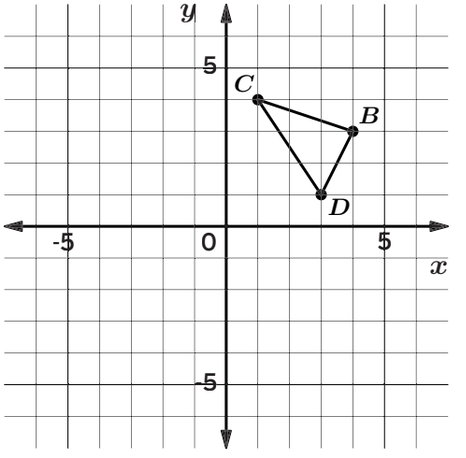


Preimage coordinates		Image coordinates	
M	$(2, 0)$	M'	
N	$(-2, 4)$	N'	

6. Triangle JKL has been rotated about the origin to create Triangle $J'K'L'$. The following table shows the coordinates of the vertices. Indicate the degree and direction of the rotation that maps Triangle JKL onto Triangle $J'K'L'$.

Preimage coordinates		Image coordinates	
J	$(-3, 6)$	J'	$(6, 3)$
K	$(-3, 2)$	K'	$(2, 3)$
L	$(2, 2)$	L'	$(2, -2)$

7. Elena wants to rotate Triangle BCD 180° about the origin. She says that it does not matter if she rotates the triangle clockwise or counterclockwise. Is she correct? Explain your thinking.



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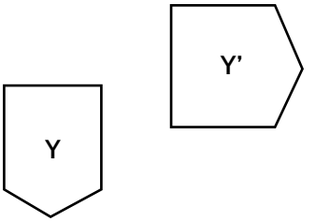
Additional Practice 1.07

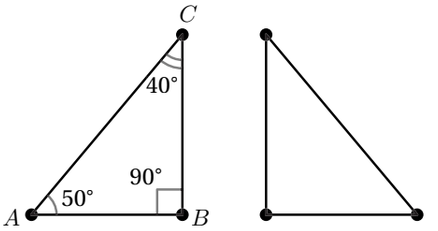
1. Is there a sequence of rigid transformations that maps Polygon Y onto Polygon Y'?



2. Triangle $A'B'C'$ is the image of Triangle ABC after a rigid transformation has been performed.

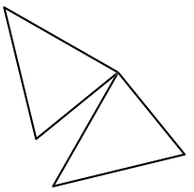
a Label all the vertices on Triangle $A'B'C'$.

b Label all known angle measures.

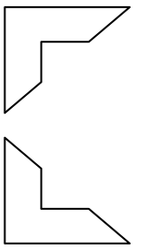


3. For each of the following, determine whether a rigid transformation can map one figure onto the other. If so, explain how the rigid transformation can be performed.

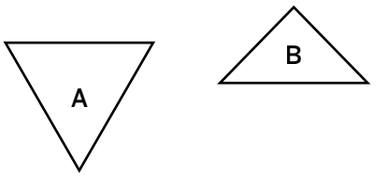
a



b

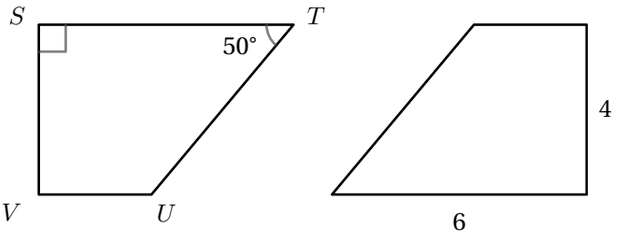


4. Is there a rigid transformation that maps Triangle A onto Triangle B? Explain your thinking.



Name: ..... Date: ..... Period: .....

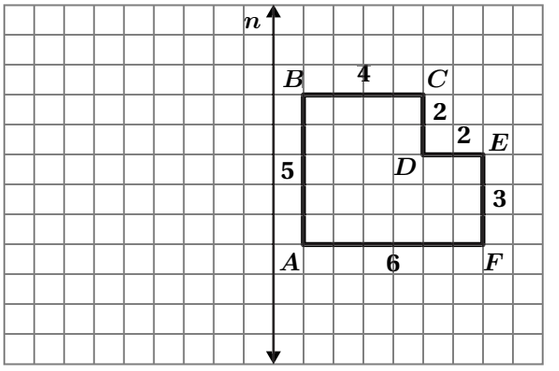
5. Trapezoid $S'T'U'V'$ is the image of Trapezoid $STUV$ after a rigid transformation has been performed.



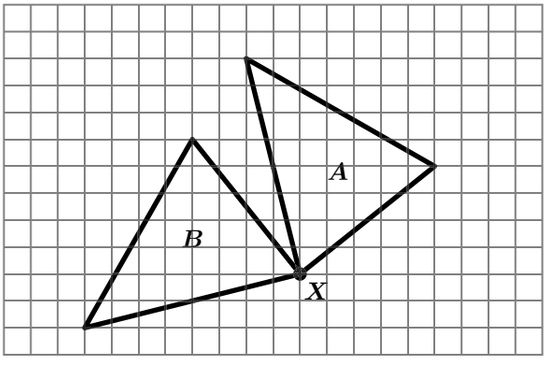
a Label all the vertices on Trapezoid $S'T'U'V'$.

b On both figures, label all known side lengths and angle measures.

6. Reflect Polygon $ABCDEF$ across line n. What conclusion can you make about the side lengths in the image and preimage?



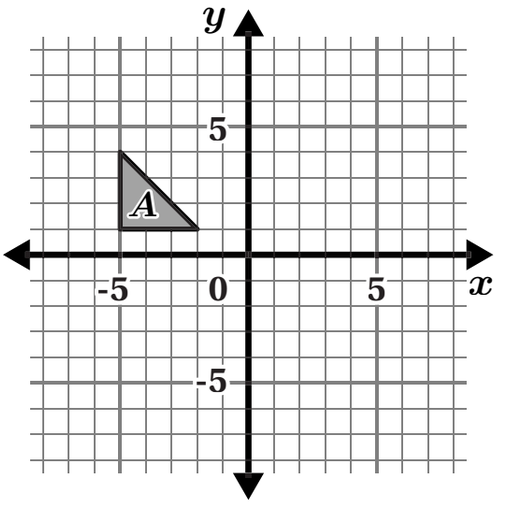
7. Explain whether a rigid transformation maps one triangle onto the other.



Name: ..... Date: ..... Period: .....

Additional Practice 1.08

Problems 1–3: This coordinate plane shows Figure *A*.



1. Translate Figure *A* 6 units to the right. Label the image *B*.
2. Reflect Figure *B* over the *x*-axis. Label the image *C*.
3. Are Figures *A* and *C* congruent? Explain your thinking.

4. Trapezoid $JKLM$ was graphed on a coordinate plane and then rotated 270° clockwise around the origin to form Trapezoid .

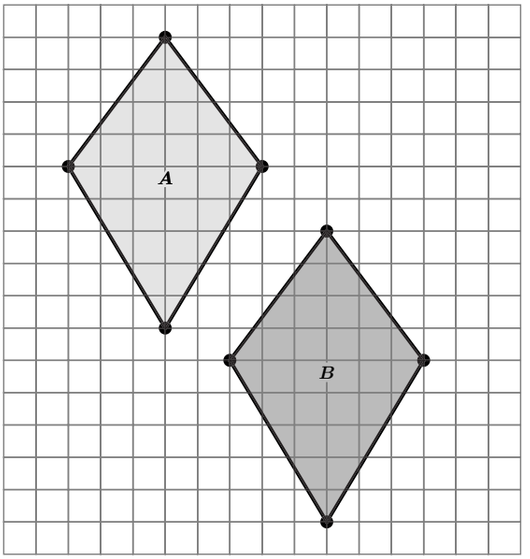
   Select *all* statements that are always true.

   - ☐ **A.** Trapezoid $J'K'L'M'$ is congruent to Trapezoid $JKLM$.
   - ☐ **B.** The length of side $J'K'$ is not the same as the length of side JK.
   - ☐ **C.** The measure of Angle $J'K'L'$ is the same as the measure of Angle JKL.
   - ☐ **D.** The area of Trapezoid $J'K'L'M'$ is equal to the area of Trapezoid $JKLM$.
   - ☐ **E.** Trapezoid $J'K'L'M'$ is facing the same direction as Trapezoid $JKLM$.

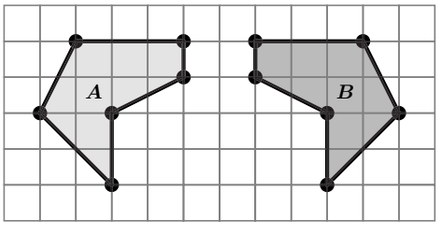
Name: ..... Date: ..... Period: .....

Problems 5–8: Determine whether Figure A is congruent to Figure B. Explain your thinking.

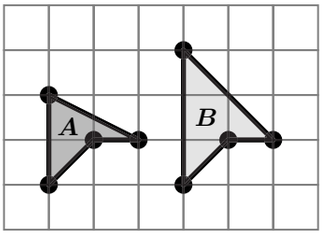
5.



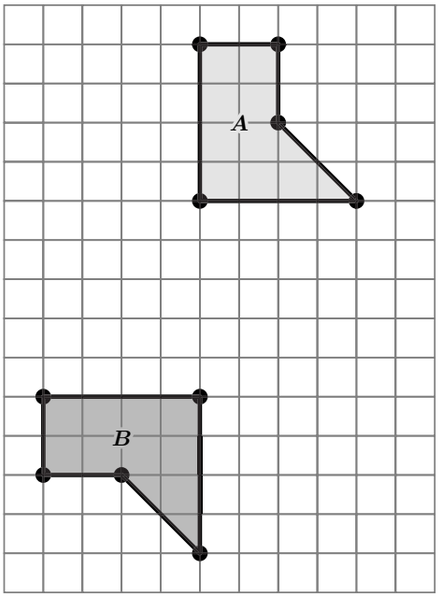
6.



7.



8.



Name: ..... Date: ..... Period: .....

Additional Practice 1.09

1. For each statement, choose the correct term or terms to complete the statement.

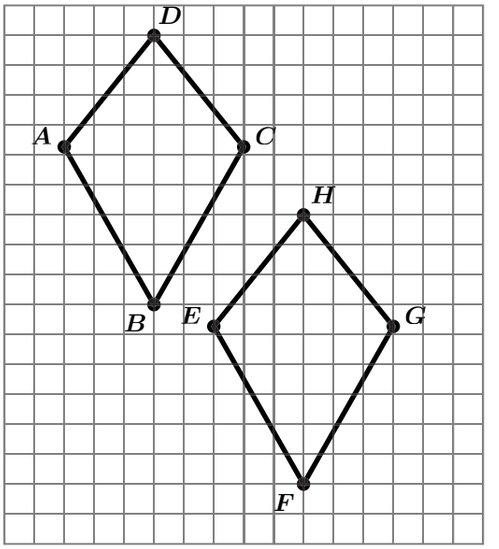
a If there is a sequence of translations, rotations, or reflections that map one polygon onto the other, then the two polygons are [congruent, not congruent].

b If two polygons have different side lengths, different angle measures, or different areas, then the polygons are [congruent, not congruent].

2. Which statement is better to explain why the polygons shown are congruent?

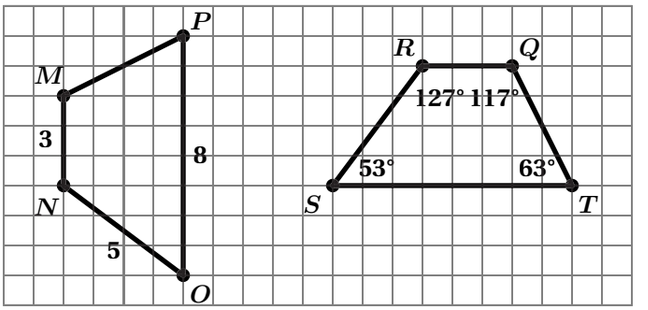
Statement A: Both figures have 4 sides and 4 angles.

Statement B: I can map one figure onto the other by translating Polygon $ABCD$ right 5 units and down 6 units.



3. Refer to Trapezoids $MNOP$ and $QRST$.

a Show that the two trapezoids are congruent by describing a sequence of rigid transformations that can map one figure onto the other.

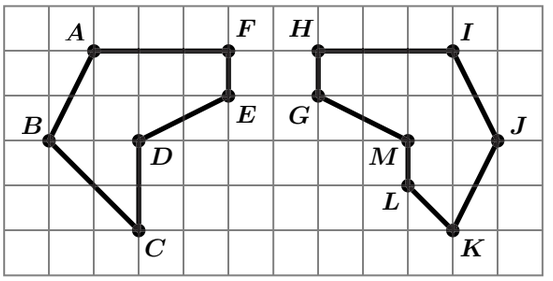


b Label the angle measures of Trapezoid $MNOP$ and the side lengths of Trapezoid $QRST$.

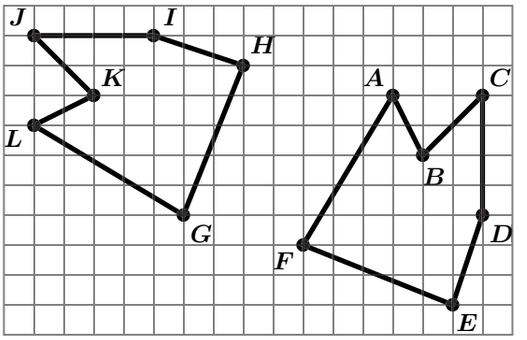
Name: ..... Date: ..... Period: .....

4. For each pair of figures, decide whether they are congruent. Explain your thinking.

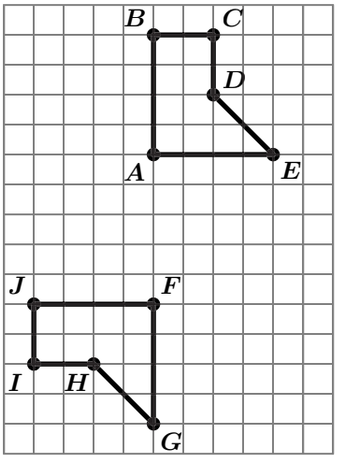
a



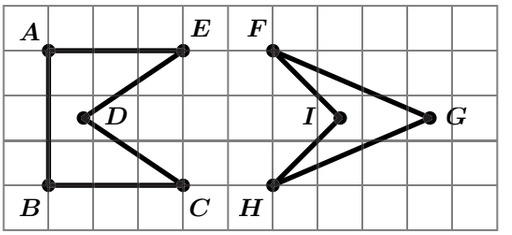
b



5. Describe a sequence of transformations that shows that Polygon $ABCDE$ is congruent to Polygon $FJIHG$.



6. Is the pair of figures congruent? Explain your thinking.

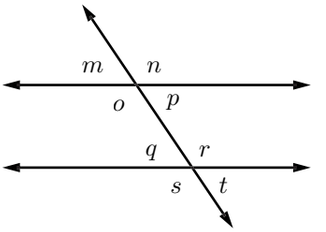


7. Rectangle A and Rectangle B have the same side lengths. Jada says that this is enough to prove that the figures are congruent. Do you agree? Explain your thinking.

Name: ..... Date: ..... Period: .....

Additional Practice 1.10

1. List *all* the pairs of vertical angles in the figure shown.

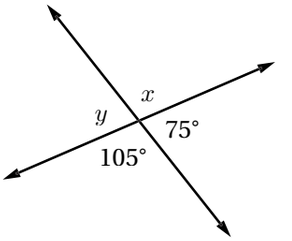


The figure may not be drawn to scale.

2. Use the figure to determine the missing values.

a x

b y



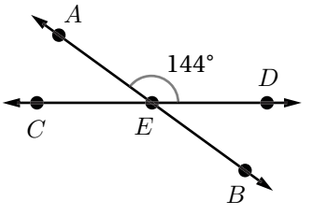
The figure may not be drawn to scale.

3. Use the figure to calculate the measure of each angle. Explain your thinking.

a $m\angle AEC$

b $m\angle DEB$

c $m\angle CEB$



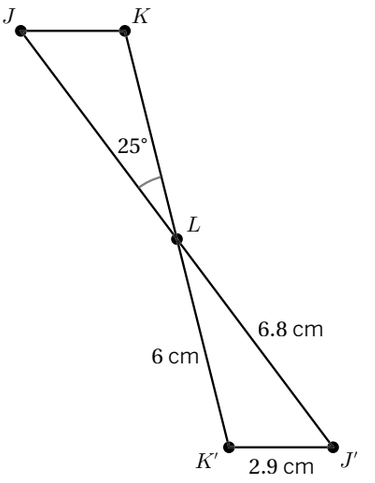
The figure may not be drawn to scale.

4. Triangle JKL is rotated $180°$ about point L to create Triangle $J'K'L$.

a What is the length of side JK? Explain your thinking.

b Name a pair of vertical angles. What are their angle measures?

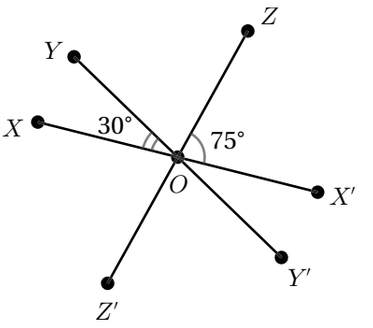
c Name two different angles that are also congruent.



The figure may not be drawn to scale.

Name: ..... Date: ..... Period: .....

5. Points X, Y, and Z are located at different distances from point O. The points X, Y, and Z are each rotated $180°$ about point O resulting in points X', Y', and Z'.

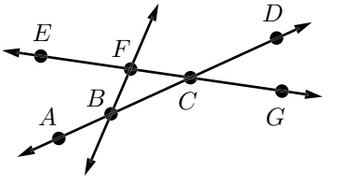


The figure may not be drawn to scale.

a Name a segment that has the same length as segment YO. Explain your thinking.

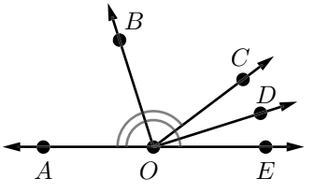
b List all the angles with a measure of $75°$. Explain your thinking.

6. Suppose $m\angle ECD$ is $150°$. Shawn says that $m\angle ACG$ is $150°$. Is Shawn correct? Explain your thinking.



The figure may not be drawn to scale.

7. Points A, O, and E lie on the same line. $m\angle AOB = m\angle BOC$ and $m\angle COD = m\angle DOE$. What is the measure of angle BOD? Explain your thinking.



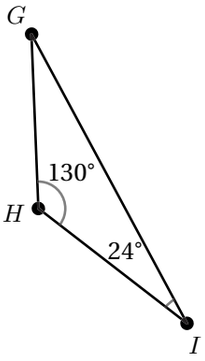
The figure may not be drawn to scale.

Name: ..... Date: ..... Period: .....

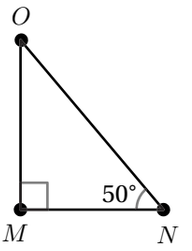
Additional Practice 1.11

1. For each triangle, write a possible measure for the third angle.
Note: The figures may not be drawn to scale.

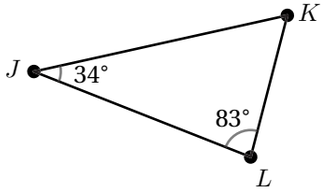
a



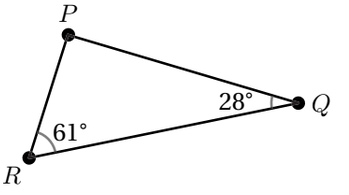
b



c



d



2. For each set of angles, determine whether a triangle with the given angle measures is possible. Write *yes* or *no*.

a 45°, 45°, 45°

b 90°, 50°, 40°

c 90°, 90°, 20°

d 100°, 60°, 30

e 110°, 40°, 30

Name: ..... Date: ..... Period: .....

3. Select three of the following measures that could be angles in the same triangle.

A. $20°$
B. $60°$
C. $35°$
D. $90°$
E. $100°$
F. $180°$

Explain your thinking.

4. Clare states that a triangle can have three acute angles. Do you agree with her? Explain your thinking.

5. Shawn says that it is possible to create a triangle with two right angles and one acute angle. Is Shawn correct? Explain your thinking.

6. Is there a relationship between the two acute angles in a right triangle? If so, what is it? Explain your thinking.

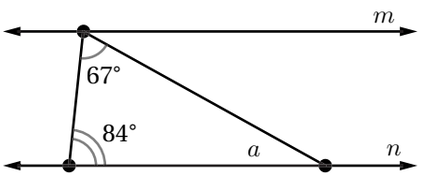
7. Write all of the possible combinations of three angle measures, from the following list, that can be the interior angle measures of a triangle. Use the number only once in your combination.

$120°$ $20°$ $100°$ $40°$ $60°$ $70°$ $10°$

Name: ..... Date: ..... Period: .....

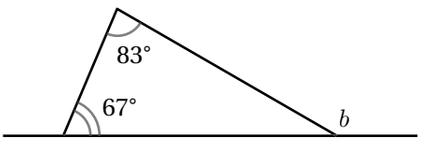
Additional Practice 1.12

1. Line m is parallel to line n. Determine the value of a.



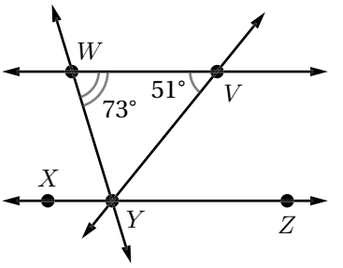
The figure may not be drawn to scale.

2. Determine the value of b.



The figure may not be drawn to scale.

3. The diagram shows parallel lines WV and XZ.



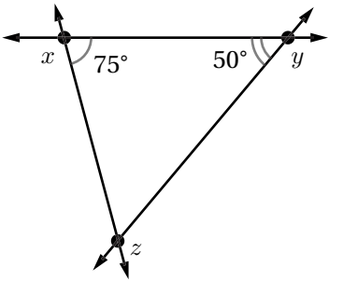
The figure may not be drawn to scale.

a What is $m\angle VYZ$?

b What is $m\angle WYX$?

c What is $m\angle WYV$?

4. Three intersecting lines are shown.



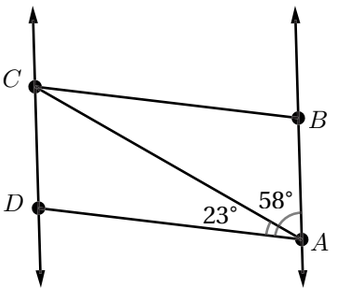
The figure may not be drawn to scale.

a Determine the three missing angle measures.

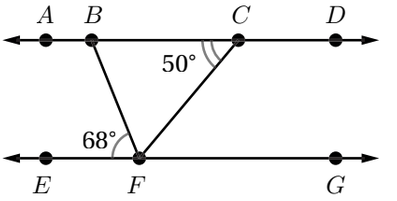
b What is the sum of these three angle measures?

Name: ..... Date: ..... Period: .....

5. Line AB is parallel to line CD. Angle BAC measures $58°$ and Angle DAC measures $23°$. What is the measure of $\angle ADC$? Show or explain your thinking.



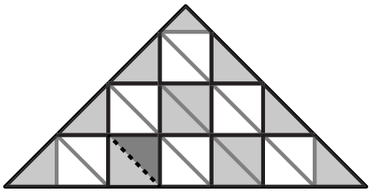
6. Line AD is parallel to line EG. Determine all five unknown angle measures. Show or explain your thinking.



Name: ..... Date: ..... Period: .....

Additional Practice 1.13

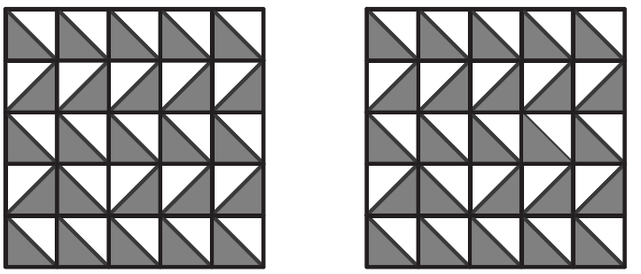
1. Here is the last triangle Misha needs to finish the tessellation.
Describe how Misha can transform the square so that it fits in the missing spot and completes the tessellation.



Problems 2–4: Misha created a new tessellation using the same triangles.

2. What transformation can Misha use on the triangle to complete the tesselation?

3. Complete the tesselation.



4. Describe or show how you see a translation, rotation, and/or reflection in the tesselation.

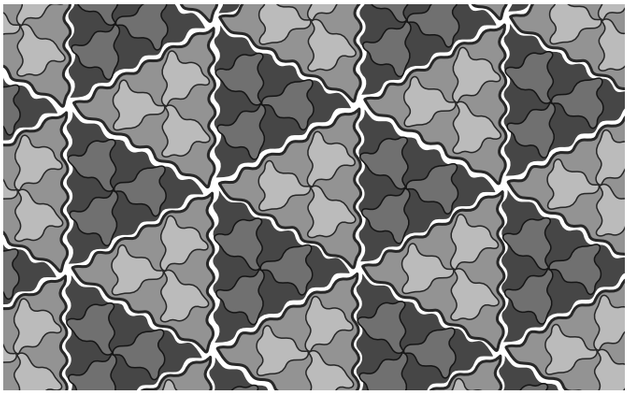
Translation:

Rotation:

Reflection:

Name: ..... Date: ..... Period: .....

5. Here is an example of a complex tesselation pattern.
Describe one transformation that you notice.



6. Your friend missed class today and needs your help catching up on the lesson. What are two things you can share with her about tesselations?

Grade 8 | Unit 2

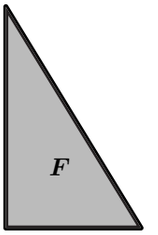
Additional Practice

Practice Problems

Name: ..... Date: ..... Period: .....

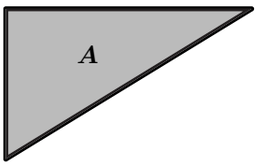
Additional Practice 2.01

Problems 1–2: Here is Triangle *F*.



1. Draw a dilation of Triangle *F* where the image has a larger area.

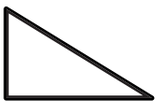
2. Draw a dilation of Triangle *F* where the image has a smaller area.



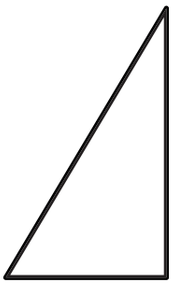
3. Select *all* the figures that could be a scaled copy of Triangle *A*.

☐ **A.**

☐ **B.**



☐ **C.**



☐ **D.**

4. Rectangle *X* measures 4 cm by 2 cm. Rectangle *Y* is a scaled copy of Rectangle *X*. Which measurement pair could be the dimensions of Rectangle *Y*?

A. 4 cm by 4 cm

B. 6 cm by 4 cm

C. 8 cm by 4 cm

D. 8 cm by 6 cm

Name: ..... Date: ..... Period: .....

5. Rectangle *K* measures 18 cm by 12 cm. Rectangle *L* measures 12 cm by 8 cm. Rectangle *M* measures 36 cm by 16 cm.

a Is Rectangle *K* a scaled copy of Rectangle *L*? Explain your thinking.

b Is Rectangle *L* a scaled copy of Rectangle *K*? Explain your thinking.

c Is Rectangle *M* a scaled copy of Rectangle *L*? Explain your thinking.

d Is Rectangle *K* a scaled copy of Rectangle *M*? Explain your thinking.

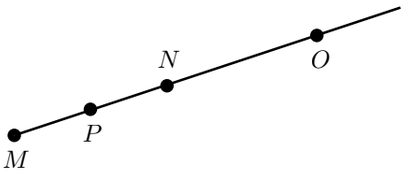
e Give a pair measurements for a rectangle that could be a scaled copy of Rectangle *M*. Explain your thinking.

6. The side measures of Triangle *XYZ* are *a* units, *b* units, and *c* units. Triangle *UVW* is a scaled copy of Triangle *XYZ*. Han says that a set of possible measurements for Triangle *UVW* is $3a$ units, $3b$ units, $3c$ units. Do you agree with Han? Explain your thinking.

Name: ..... Date: ..... Period: .....

Additional Practice 2.02

1. Point M is the center of dilation.



a Which point, point O or point P, is the dilation of point N with scale factor 2?

b Which point, point O or point P, is the dilation of point N with scale factor $\frac{1}{2}$?

2. Segment XY measures 5 cm. How long is the image of XY after a dilation with:

a A scale factor of 4?

b A scale factor of 2.8?

c A scale factor of $\frac{1}{4}$?

d A scale factor of a?

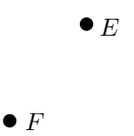
3. Refer to points E and F. Plot the points for each dilation described.

a Point G is the image of point F using point E as the center and a scale factor of $\frac{3}{12}$.

b Point H is the image of point E using point F as the center and a scale factor of $\frac{3}{2}$.

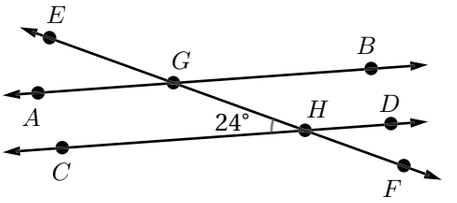
c Point I is the image of point F using point E as the center and a scale factor of $\frac{1}{2}$.

d Point J is the image of point E using point F as the center and a scale factor of $\frac{1}{2}$.



Name: ..... Date: ..... Period: .....

4. Consider parallel lines AB and CD and transversal EF. Calculate the measure of each of the indicated angles. Explain your thinking.



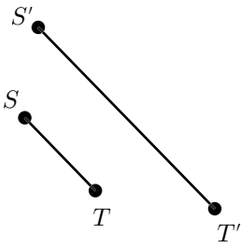
a $\text{m}\angle BGH$

b $\text{m}\angle AGE$

c $\text{m}\angle BGE$

5. Refer to line segment ST and its image $S'T'$ under a dilation.

a Use a ruler to draw the center of dilation. Label it point R.



b What is the scale factor of the dilation? Explain or show your thinking.

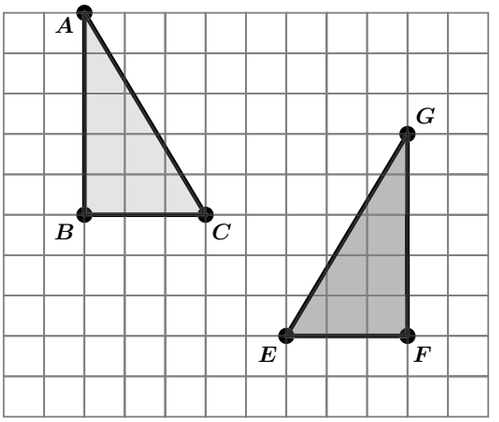
c Choose a point on segment ST and label it point U. Find the precise location of point U', the image of the dilation of point U. Explain or show your thinking.

Name: ..... Date: ..... Period: .....

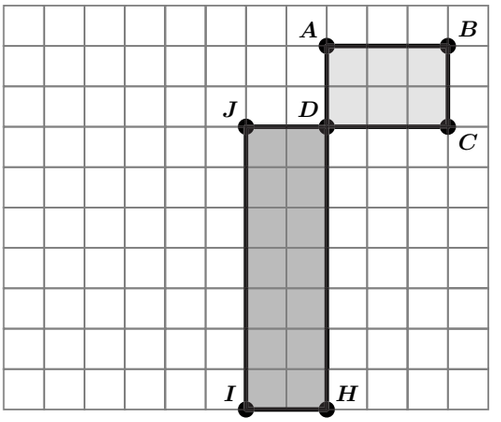
Additional Practice 2.03

Problems 1–4: Is there a transformation or sequence of translations, rotations, reflections, or dilations that moves one figure onto the other? (Write *yes* or *no*.) If you wrote *yes*, describe the sequence of transformations. If you wrote *no*, describe how you know it's not possible.

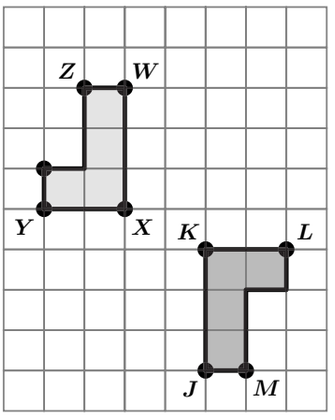
1.



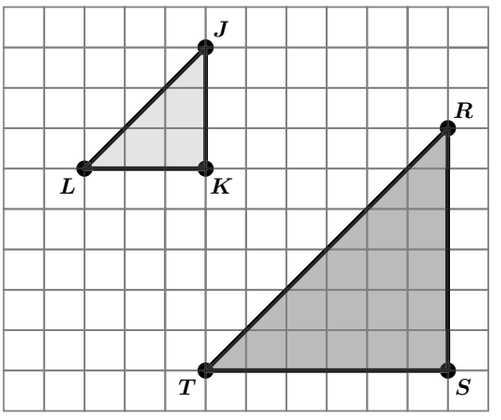
2.



3.



4.



Name: ..... Date: ..... Period: .....

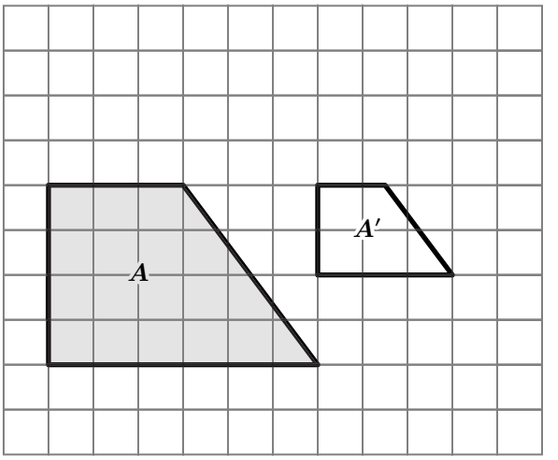
5. **a** Select *all* of the scale factors that will produce an image larger than the pre-image.

- ☐ **A.** $\frac{1}{4}$
- ☐ **B.** $\frac{3}{4}$
- ☐ **C.** $\frac{4}{3}$
- ☐ **D.** $\frac{3}{2}$
- ☐ **E.** $\frac{2}{5}$

b Explain your thinking.

6. Select *all* transformations that together will move the pre-image onto the image?

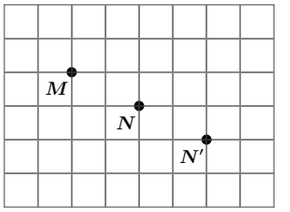
- ☐ **A.** Translating 6 units to the right.
- ☐ **B.** Dilating by a scale factor of 2.
- ☐ **C.** Translating 6 units to the left.
- ☐ **D.** Dilating by a scale factor of $\frac{1}{2}$.



Name: ..... Date: ..... Period: .....

Additional Practice 2.04

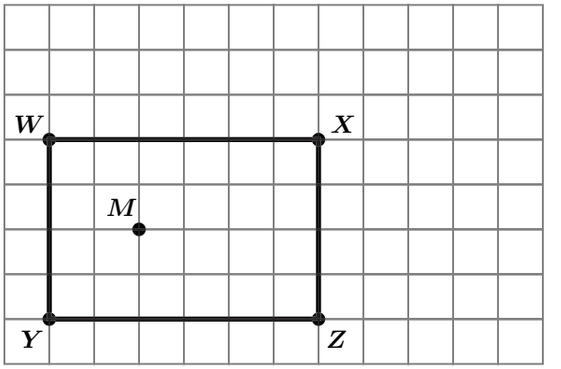
1. Point N' is an image of point N after a dilation. What is the scale factor if the center of dilation is point M?



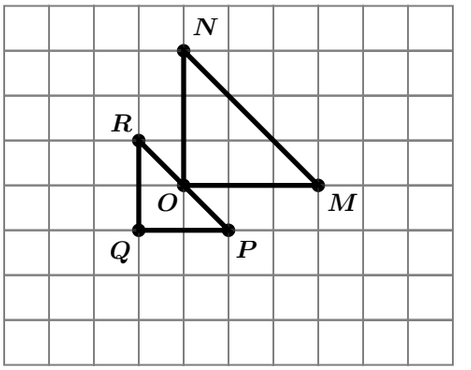
2. Consider Rectangle $WXZY$. Sketch the image of Rectangle $WXZY$ under the following dilations:

a The dilation centered at point Y with a scale factor of $\frac{3}{2}$.

b The dilation centered at point M with a scale factor of $\frac{1}{2}$.

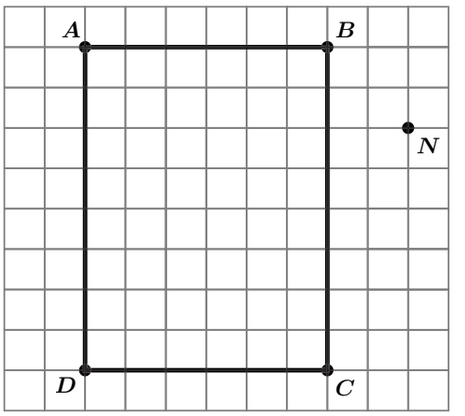


3. Triangle RQP can be mapped to Triangle NOM using a dilation. What are the center and the scale factor of the dilation? Label the center as point T.

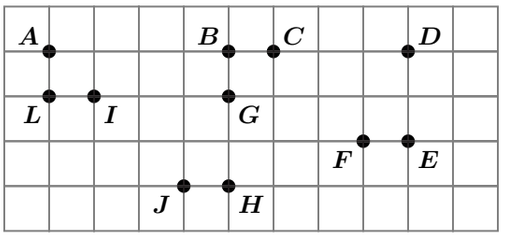


Name: ..... Date: ..... Period: .....

4. Dilate Rectangle $ABCD$ with point N as the center of dilation and a scale factor of $\frac{1}{2}$. Label the vertices of the image $A'B'C'D'$.



5. Refer to points A through L shown.

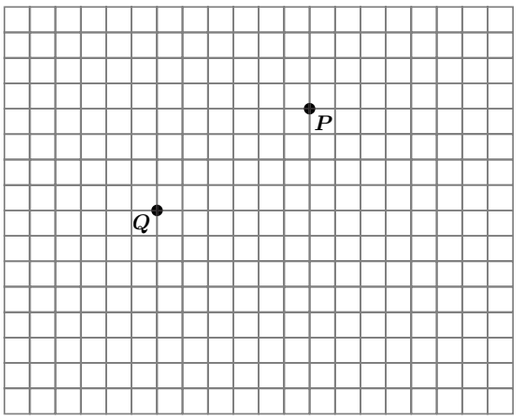


a Using point B as the center of dilation, point G is dilated so that its image is point H. What scale factor was used?

b Suppose point A is an image of point B after a dilation. Compare the scale factors with point C and point D as the centers of dilation.

c To dilate point I so that its image is point J, what point could be the center of dilation, and what would be the scale factor?

6. Elena was absent from today's lesson. Explain to her how to dilate point Q with a scale factor of $\frac{1}{2}$ and point P as the center of dilation using grid squares.



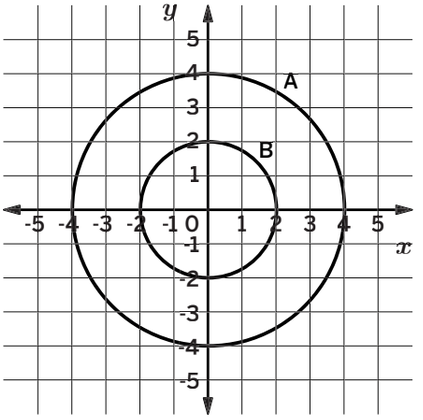
Name: ..... Date: ..... Period: .....

Additional Practice 2.05

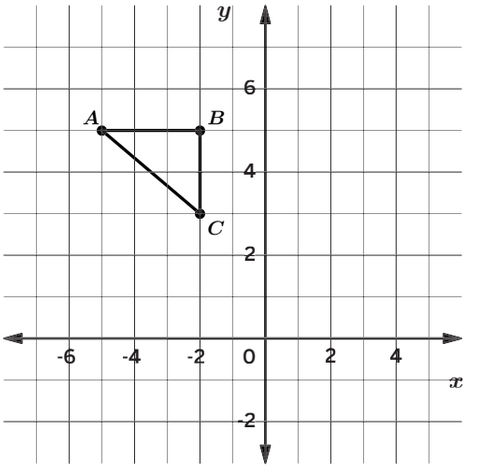
1. Triangle ABC has vertices located at $A(0, 2)$, $B(4, 2)$, and $C(4, 4)$. Triangle $A'B'C'$ is the result of dilating Triangle ABC using the origin as the center of dilation and a scale factor of 3. Predict the coordinates of Triangle $A'B'C'$ and record them in the table.

Preimage coordinates		Image coordinates	
Point A	$(0, 2)$	Point A'	
Point B	$(4, 2)$	Point B'	
Point C	$(4, 4)$	Point C'	

2. Circle B is the result of dilating Circle A using the origin as the center of dilation. What was the scale factor used?



3. Dilate Triangle ABC using point A as the center of dilation and a scale factor of 3. Label the image $A'B'C'$.

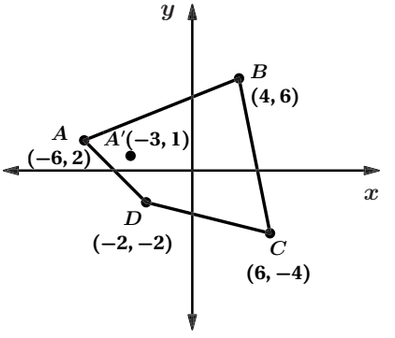


4. Quadrilateral $ABCD$ is dilated with the origin as the center of dilation, taking point A to point A'.

a What is the scale factor of the dilation?

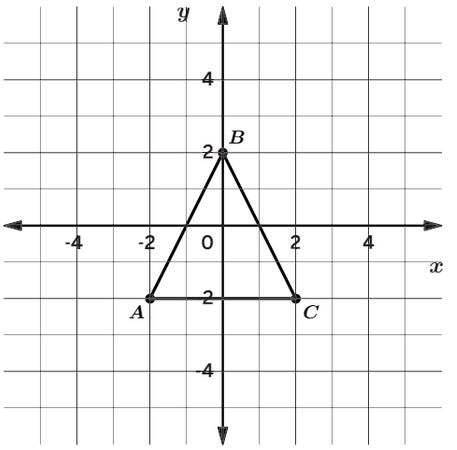
b Draw Quadrilateral $A'B'C'D'$.

c Label the coordinate of points for B', C', and D'.



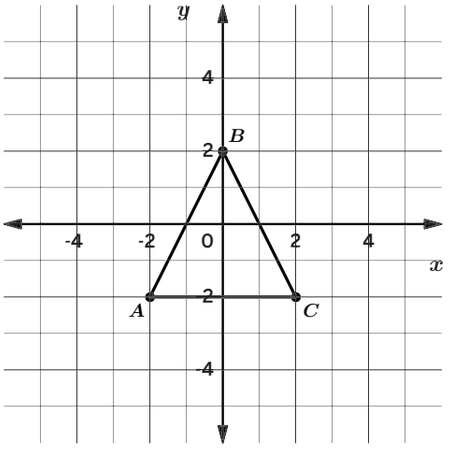
Name: ..... Date: ..... Period: .....

5. Consider Triangle ABC on the coordinate plane.



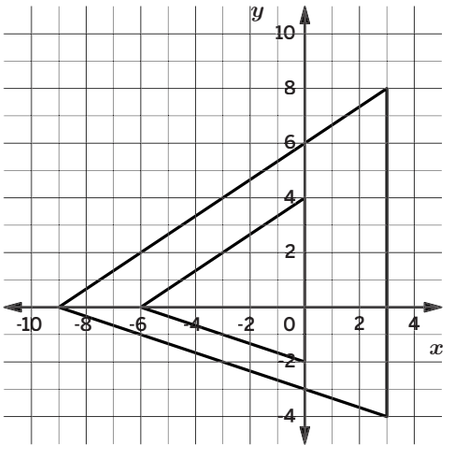
a Using the origin as the center and a scale factor of $\frac{1}{2}$, draw the dilation of Triangle ABC. Label the image Triangle DEF.

b Using the origin as the center and a scale factor of 2, draw the dilation of Triangle ABC. Label the image Triangle GHI.



c Is Triangle GHI a dilation of Triangle DEF? If yes, identify the center of dilation and scale factor.

6. Triangle ABC is dilated to create Triangle $A'B'C'$. The center of dilation is plotted, but not labeled. Describe this dilation. Be sure to include all the information needed to perform the dilation.

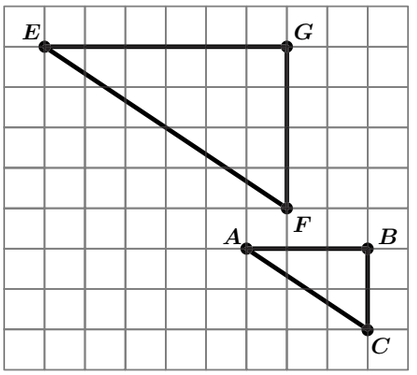


Name: ..... Date: ..... Period: .....

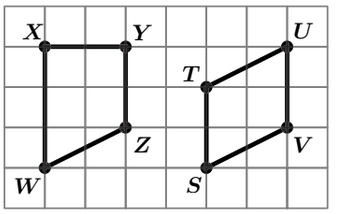
Additional Practice 2.06

1. Determine whether the figures in each pair of figures are similar. Write *similar* or *not similar*.

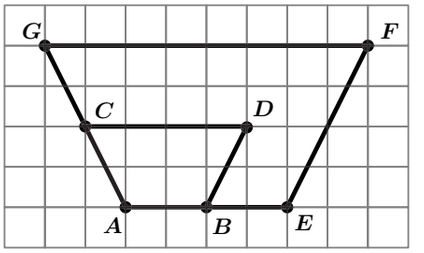
a



b



2. The two figures are similar. Which of the following sequences of transformations could be used to map Quadrilateral $ABDC$ onto Quadrilateral $AEFG$?



A. Dilate Quadrilateral $ABDC$ using point B as the center of dilation and a scale factor of 2.

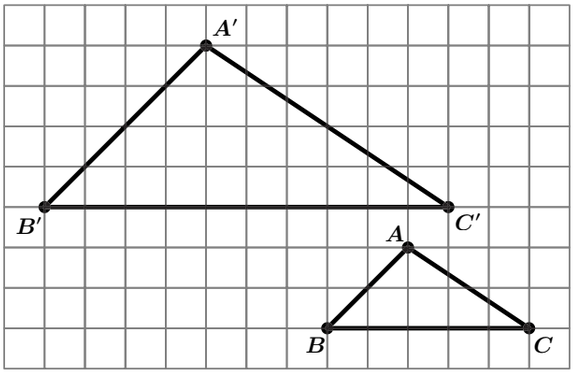
B. Dilate Quadrilateral $ABDC$ using point A as the center of dilation and a scale factor of 2.

C. Dilate Quadrilateral $ABDC$ using point A as the center of dilation and a scale factor of $\frac{1}{2}$.

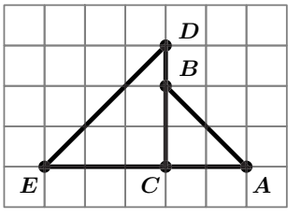
D. Dilate Quadrilateral $AEFG$ using point G as the center of dilation and a scale factor of $\frac{1}{2}$.

3. For each pair of figures, show that the two figures are similar by identifying a sequence of transformations that maps the smaller figure onto the larger one.

a

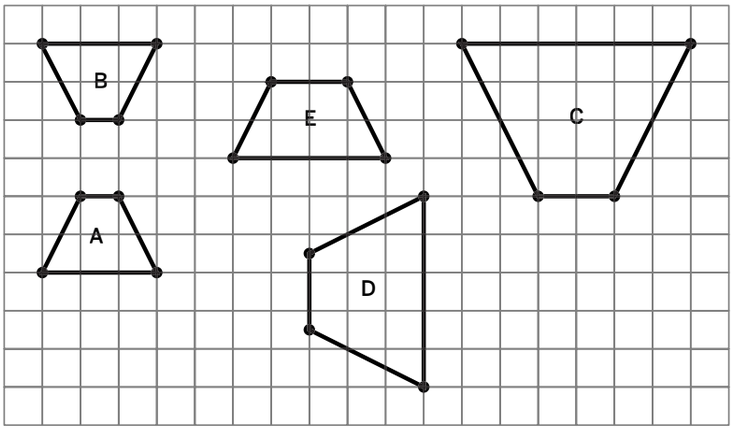


b



Name: Date: Period:

4. Select all the figures that are similar to Figure A. Explain your thinking.

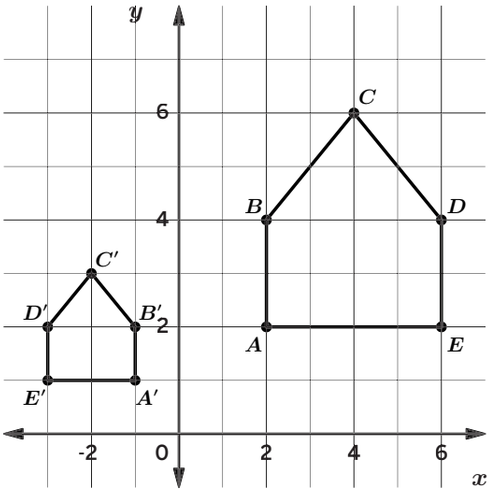


5. Tyler provides the following sequence of transformations to show that Polygon $ABCDE \sim A'B'C'D'E'$.

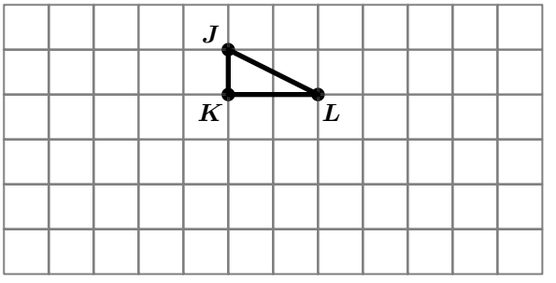
Step 1 Dilate Polygon $ABCDE$ using point A as the center of dilation and a scale factor of $\frac{1}{2}$.

Step 2 Reflect the result across the y-axis.

Is Tyler's method correct? If not, explain how it could be fixed.



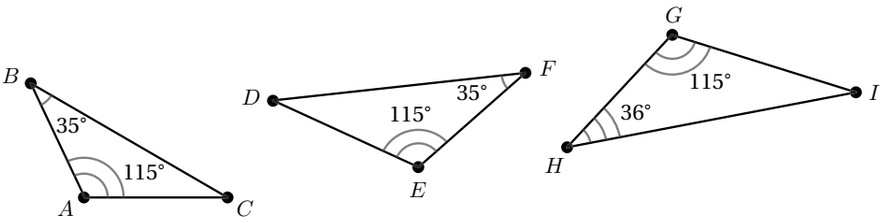
6. Given Triangle JKL, sketch the image, Triangle $J'K'L'$, using a reflection and a dilation with a scale factor greater than 1. Then explain why the triangles are similar.



Name: ..... Date: ..... Period: .....

Additional Practice 2.07

1. Which triangle is similar to Triangle ABC: Triangle EFD or Triangle GHI?



2. Diego wants to show that two triangles are similar. What does Diego need to be able to show to justify that the triangles are similar?

A. One pair of corresponding angles are congruent.

B. Two pairs of corresponding angles are congruent.

C. One pair of corresponding sides are congruent.

D. Two pairs of corresponding sides are congruent.

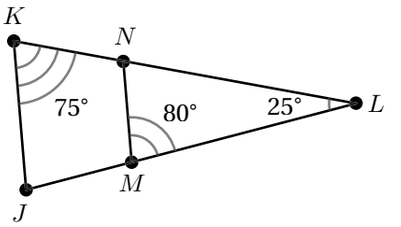
3. In each pair of triangles, some of the angle measures are given. Determine whether the triangles are similar, not similar, or if there is not enough information to determine whether they are similar. Place a check mark in the appropriate column.

Triangle pairs	Similar	Not Similar	Not enough information
Triangle M: 25°, 35° Triangle N: 25°, 45°			
Triangle O: 65°, 35° Triangle P: 35°, 65°			
Triangle Q: 100° Triangle R: 100°			
Triangle S: 30°, 60° Triangle T: 15°, 30°			

Name: ..... Date: ..... Period: .....

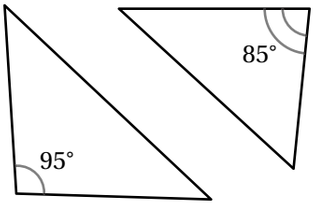
4. Two angle measures of Triangle ABC are $75°$ and $55°$. Two angle measures of Triangle DEF are $50°$ and $55°$. Tyler says that these triangles are not similar. Is he correct? Explain your thinking.

5. Is $\Delta JKL \sim \Delta MNL$? Explain your thinking.



6. Noah says two corresponding congruent angle pairs is sufficient to determine similarity with a quadrilateral. Noah is incorrect. Explain why.

7. Priya and Han wanted to determine in which category to place the following pair of triangles. Priya said there was not enough information to determine whether they are similar. Han says there is enough information and he knows the triangles are not similar. Do you agree with Priya or Han? Explain your thinking.



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Additional Practice 2.08

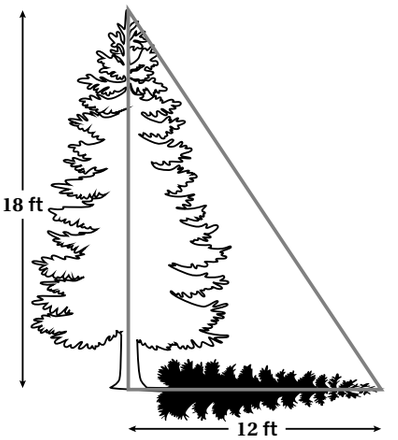
1. What is the ratio of the tree's height to its shadow?

A. 6

B. 3

C. $\frac{3}{2}$

D. $\frac{2}{3}$



The figures may not be drawn to scale.

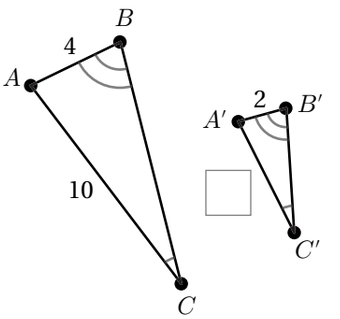
2. In the diagram, $\Delta ABC \sim \Delta A'B'C'$. Determine the length of side $A'C'$.

A. $\frac{1}{2}$

B. 2

C. 5

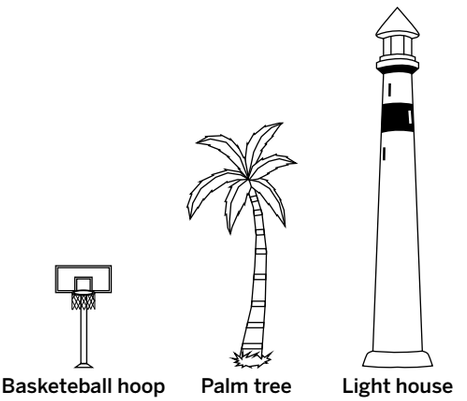
D. 8



The figures may not be drawn to scale.

3. The basketball hoop, palm tree, and lighthouse are all perpendicular to the ground and the sun's rays were cast on each figure at the same angle. Determine the height of the palm tree and lighthouse. Explain your thinking.

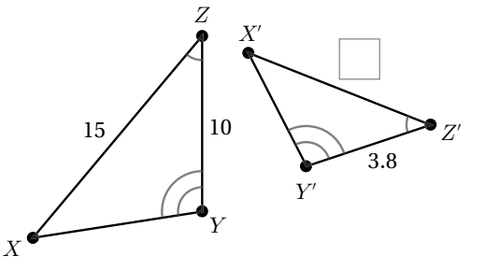
	Basketball hoop	Palm tree	Lighthouse
Height (ft)	12		
Shadow (ft)	8	30	90



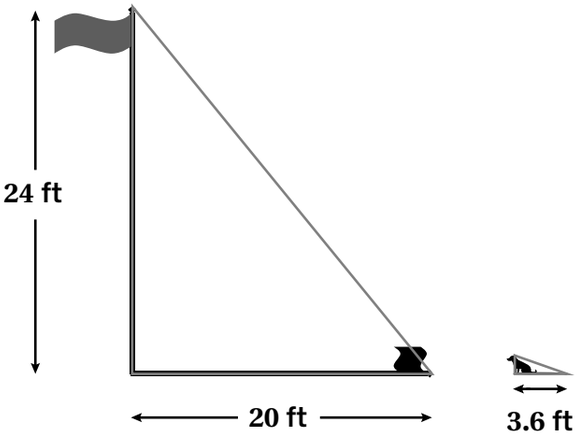
The figures may not be drawn to scale.

Name: ..... Date: ..... Period: .....

4. In the diagram, $\Delta XYZ \sim \Delta X'Y'Z'$. Determine the length of side $X'Z'$. Explain your thinking.

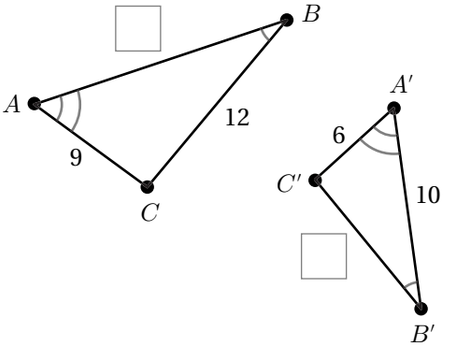


5. The position of the sun casts shadows of the flag pole and dog shown in the figure. Elena says the height of the dog is 3 ft. Is Elena correct? Explain your thinking.



The figures may not be drawn to scale.

6. $\Delta ABC \sim \Delta A'B'C'$. Determine the missing side lengths. Explain your thinking.



7. Write and solve a real-world situation in which you would use an object's shadow to determine the actual height of the object.

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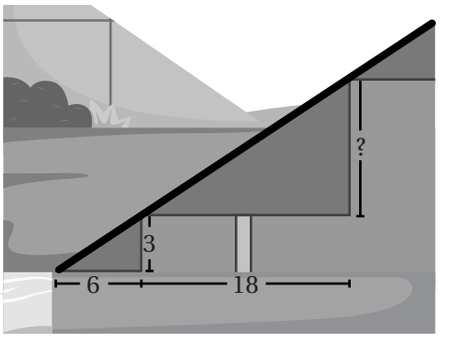
Additional Practice 2.09

1. Here are three ramps. One ramp has a slope of 4, one ramp has a slope of 1, and one ramp has a slope of $\frac{1}{4}$. Label each ramp with its slope.

2. Priya created a slide with a slope of $\frac{3}{2}$. Noah created a slide with a steeper slope than Priya's slide. Jada created a slide with a slope that is less steep than Priya's slide. Identify a possible slope for Noah's and Jada's slides. Explain your thinking.

Problems 3–5. Here are three ramps that make a smooth slide.



3. How long is the height of the second ramp?

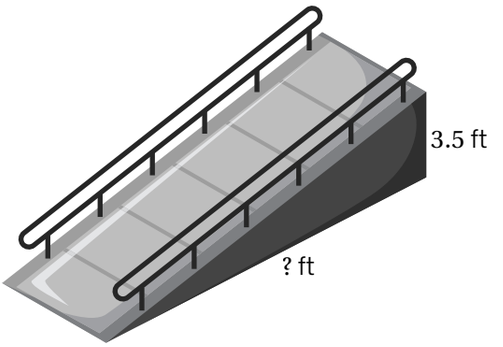
4. Explain how you know the triangles form ramps that are similar to each other.

5. Dion says that the height of the second ramp is 12 units longer than the height of the first ramp because $6 + 12 = 18$. Is Dion correct? Explain your thinking.

Name: ..... Date: ..... Period: .....

6. The Americans With Disabilities Act of 1990, or ADA, requires that public buildings make their entrances accessible to all people, which includes those who use a wheelchair. One requirement is that public wheelchair ramps must have a slope of $\frac{1}{12}$.

If the height of the entrance is 3.5 feet, how long does the base of the ramp need to be? Show or explain your thinking.

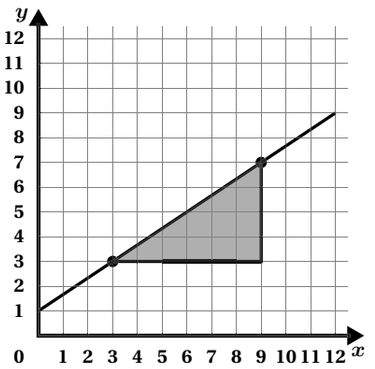


Name: ..... Date: ..... Period: .....

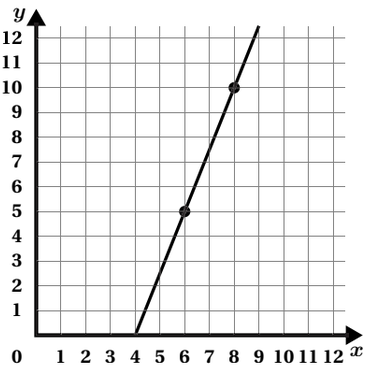
Additional Practice 2.10

Problems 1–4: Determine the slope of each line.

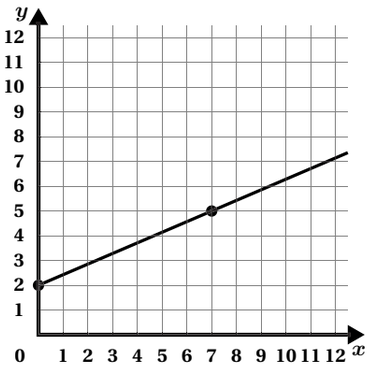
1. Slope = ...



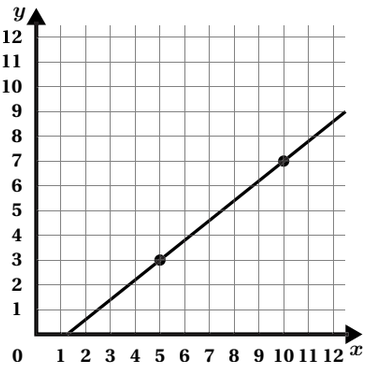
2. Slope = ...



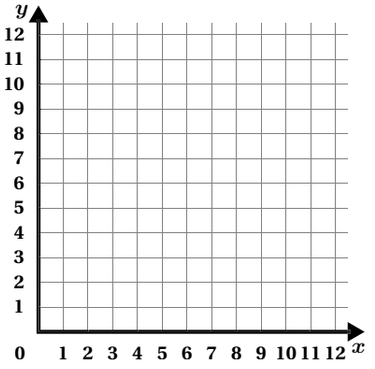
3. Slope = ...



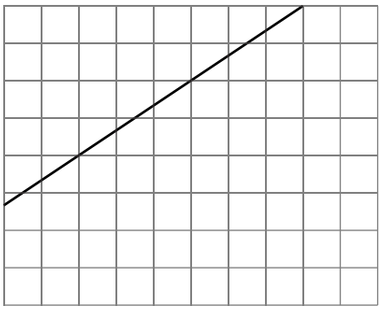
4. Slope = ...



5. Draw a line with a slope of $\frac{5}{3}$.

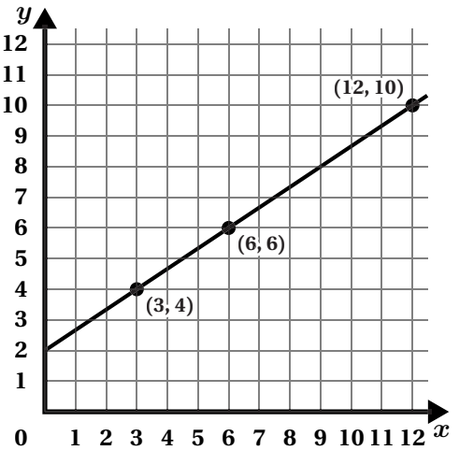


6. Here is a line. Draw a line that is parallel. What is the slope of each line? Show or explain your thinking.



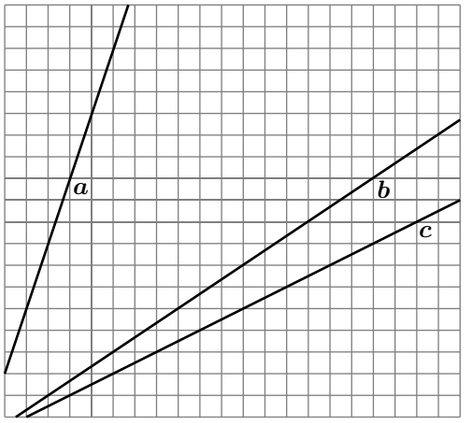
Name: ..... Date: ..... Period: .....

7. Select *all* the expressions that could represent the slope of this line.



- ☐ **A.** $\frac{3}{4}$
- ☐ **B.** $\frac{2}{3}$
- ☐ **C.** $\frac{4}{3}$
- ☐ **D.** $\frac{4}{6}$
- ☐ **E.** $\frac{6}{4}$

8. Identify the slope of each line on the graph.



Line *a* Slope = ...

Line *b* Slope = ...

Line *c* Slope = ...

Grade 8 | Unit 3

Additional Practice

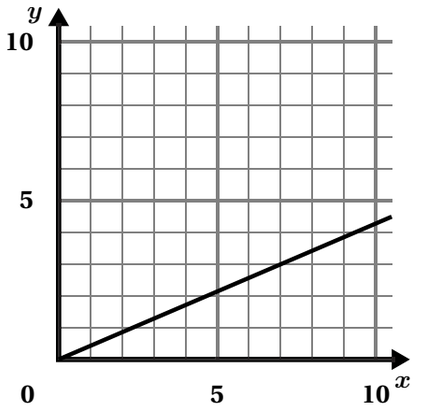
Practice Problems

Name: ..... Date: ..... Period: .....

Additional Practice 3.01

Problems 1–4: Determine whether each graph represents a proportional or non-proportional relationship (circle one). Then, determine the slope of each line.

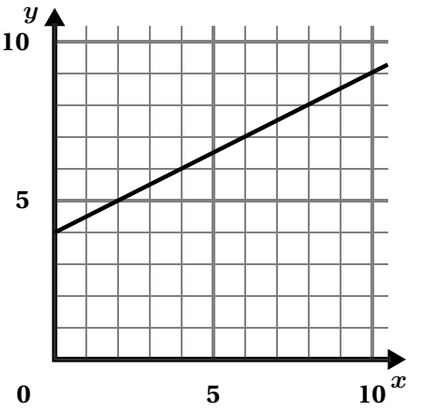
1.



Proportional Non-Proportional

Slope =

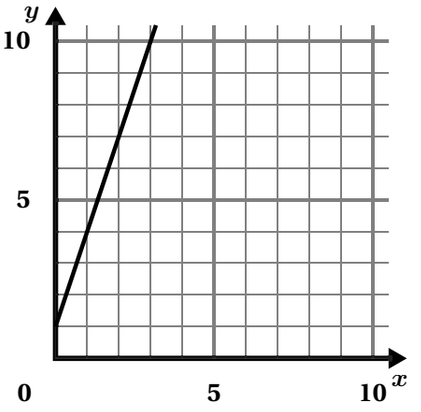
2.



Proportional Non-Proportional

Slope =

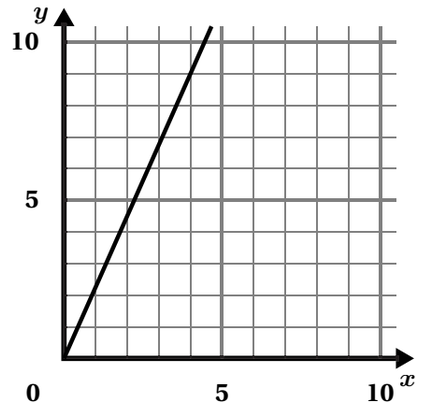
3.



Proportional Non-Proportional

Slope =

4.

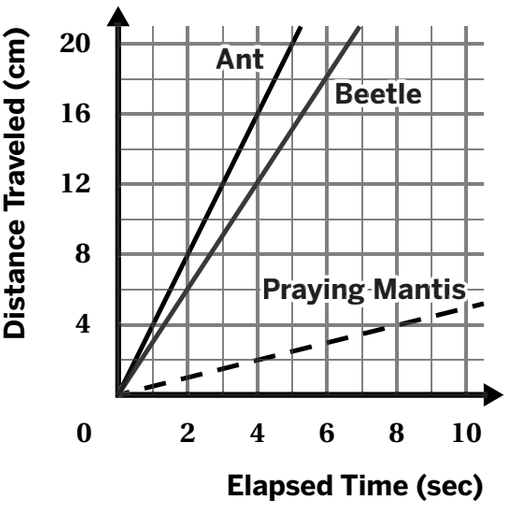


Proportional Non-Proportional

Slope =

Name: ..... Date: ..... Period: .....

5. An ant, a beetle, and a praying mantis compete in a 20-centimeter race. Write a story that represents the three lines on the graph.

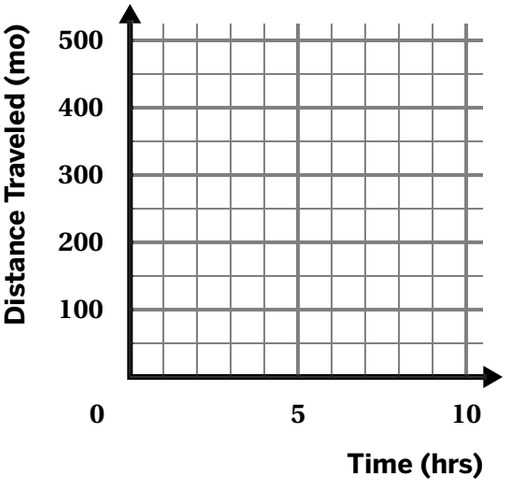


Problems 6–8: From rest, a bus travels at a constant rate. After 3 hours, the bus traveled 150 miles.

6. Graph the line showing the relationship between the car's distance traveled and time.

7. What is the slope of the line?

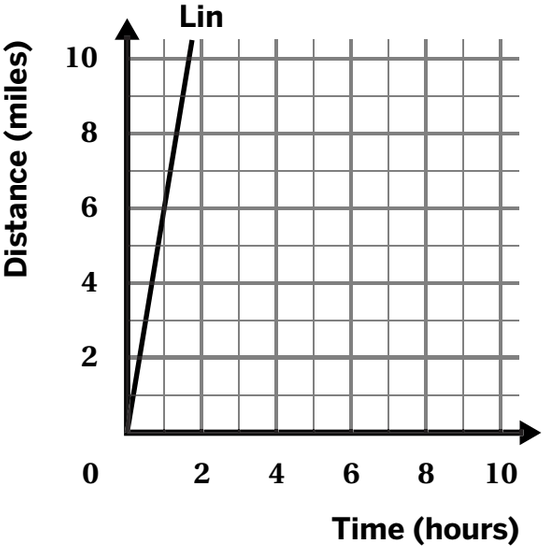
8. What does the slope represent in context?



Problems 9–10: Lin bikes at a constant speed. The relationship between her distance and time is shown on the graph. Jada jogs at a constant speed that is half as fast as Lin.

9. Graph the relationship between Lin's distance and time on the same coordinate plane.

10. Explain your reasoning.

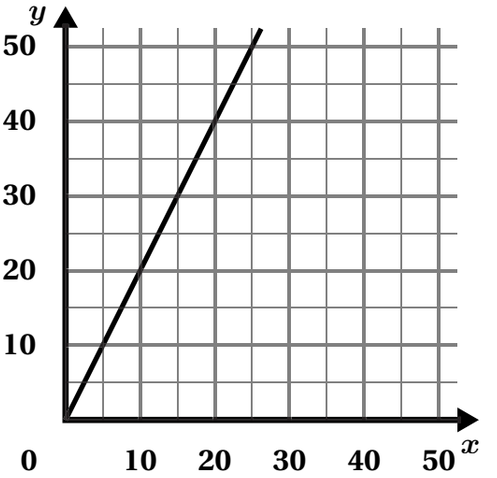


Name: Date: Period:

Additional Practice 3.02

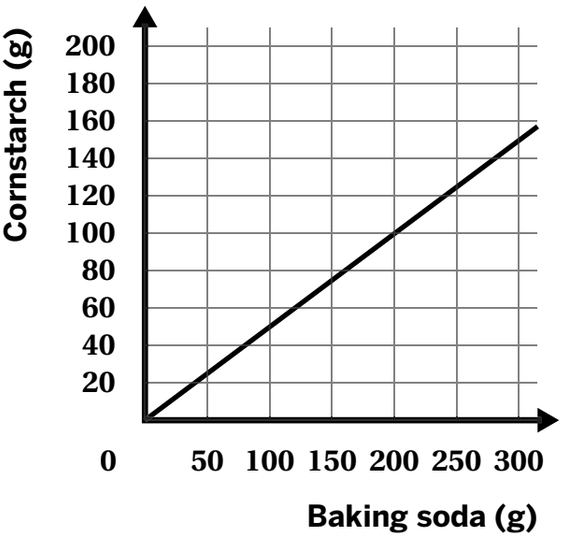
1. Write an equation for a graph of a proportional relationship that passes through the point $(16, 12)$. Explain your thinking.

2. Write an equation of the line graphed. Use $y = mx$ form where m represents the slope of the line.



Problems 3–4: The graph shown represents the proportional relationship between the number of grams of baking soda and the number of grams of cornstarch in a recipe to make your own bath fizzies.

3. Write an equation that represents this relationship. Let x represent the number of grams of baking soda and y represent the number of grams of cornstarch.

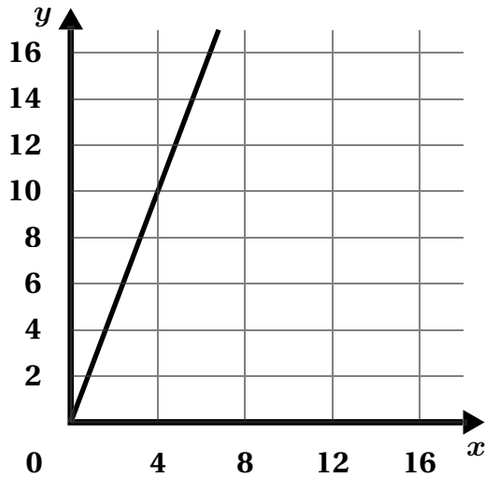


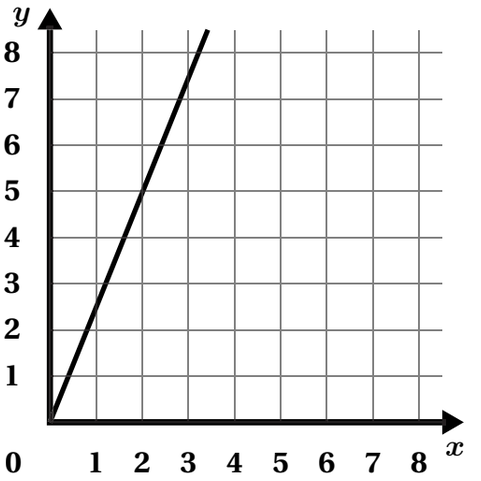
Name: Date: Period:

4. Use your equation to complete the table.

Baking Soda (g)	Cornstarch (g)
650	
	1,250
1	

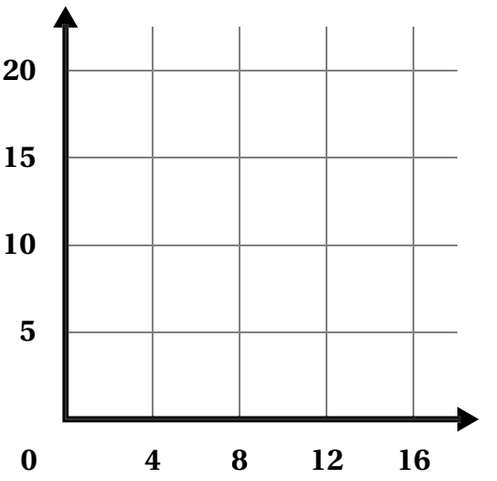
Problems 5–6: A swimmer is swimming at a constant rate. The two graphs shown represent the same proportional relationship between the distance swam in feet, y, and the amount of time, x, that has passed in seconds.





5. Write an equation that represents the relationship between distance y and time x.

6. Draw a graph to show the same proportional relationship as Problem 5. Explain your reasoning.



Name: Date: Period:

Additional Practice 3.03

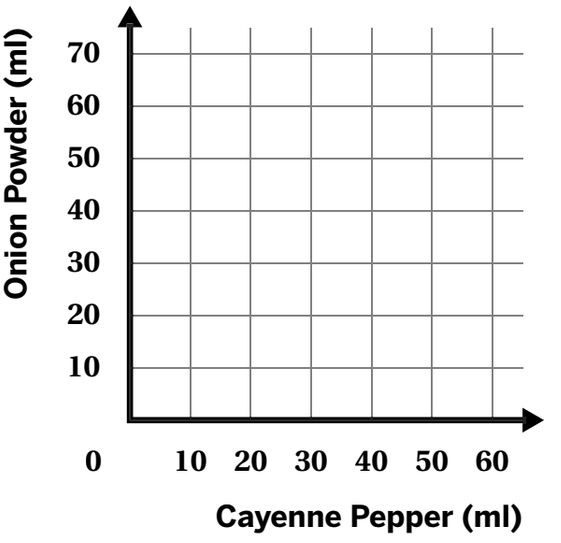
1. In 200 grams of beef soup, there are 80 calories. Let x represent the amount of grams of beef soup and y represent the number of calories in the beef soup. Which equations represent the relationship between y and y? Select *all* that apply.

- ☐ **A.** $y = \frac{2}{5}x$
- ☐ **B.** $y = \frac{5}{2}x$
- ☐ **C.** $x = \frac{2}{5}y$
- ☐ **D.** $x = \frac{5}{2}y$

Problems 2–4: The table shows the ratios of paprika, onion powder, and cayenne pepper in a rub recipe.

Paprika (ml)	Onion Powder (ml)	Cayenne Pepper (ml)
60	24	16
90	36	24

2. Write an equation that represents the relationship between x milliliters of cayenne pepper and y milliliters of onion powder. Show or explain your thinking.



3. Graph the relationship on the coordinate plane.

4. How much onion powder is needed for 64 ml of cayenne pepper? Show or explain your thinking.

Name: Date: Period:

Problems 5–7: Han and Priya are at swim practice. While both were swimming at a constant rate, they noticed they each took a different number of strokes to swim the same distance. For every 3 strokes Priya takes, Han takes 5 strokes. Suppose x represents the number of strokes Priya takes and y represents the number of strokes Han takes.

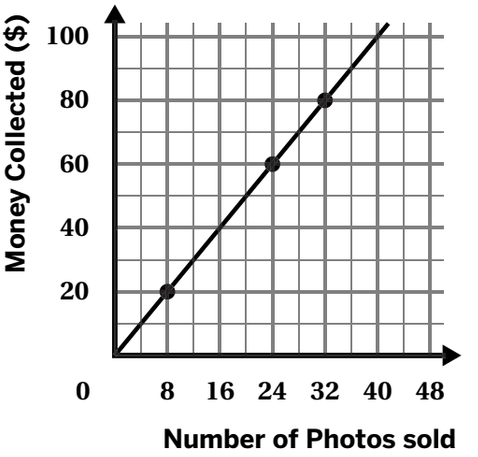
5. Complete the table.

Number of Priya's Strokes (x)	Number of Han's Strokes (y)
24	
36	
75	

6. Write an equation that reflects the relationship between x and y. Show or explain your thinking.

7. How many strokes has Han taken if Priya has taken 180 strokes? Show or explain your thinking.

8. At a middle school festival, they have a photo booth and are selling photos to raise money for the school. They collect \$40 for every 16 photos they sell.
Which statement correctly identifies both the slope and the representation of slope for the situation?



A. The slope is $\frac{2}{5}$, so the amount of money made for every photo is \$0.40.

B. The slope is $\frac{5}{2}$, so the amount of money made for every photo is \$2.50.

C. The slope is $\frac{2}{5}$, so to make \$1, they have to sell 0.40 photos.

D. The slope is $\frac{5}{2}$, so to make \$1, they have to sell 2.5 photos.

Name: ..... Date: ..... Period: .....

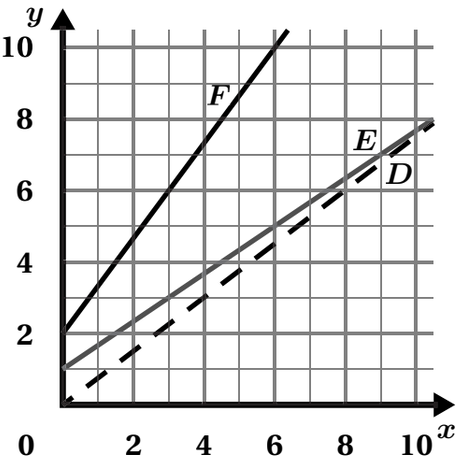
Additional Practice 3.04

1. Match each equation with the graph of its line.

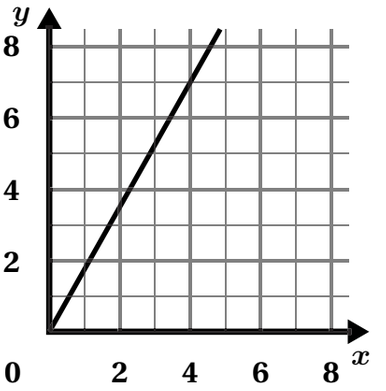
a. $y = \frac{2}{3}x + 1$ .....

b. $y = \frac{3}{4}x$ .....

c. $y = \frac{4}{3}x + 2$ .....



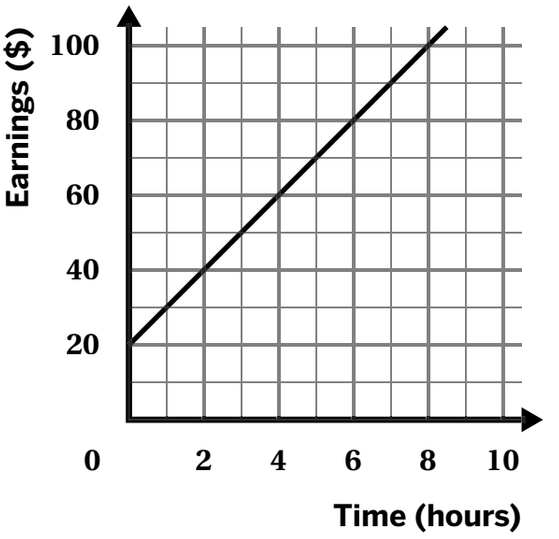
2. Select *all* statements that are true about the graph.



- ☐ **A.** The graph represents a linear relationship.
- ☐ **B.** The graph represents a proportional relationship.
- ☐ **C.** The constant of proportionality is $\frac{3}{2}$.
- ☐ **D.** The slope of the line is $\frac{2}{3}$.
- ☐ **E.** The slope of the line is $\frac{2}{3}$.

3. Jada charges a one-time supply fee plus an hourly rate to do yard work. The graph shows the money she earned, based on the number of hours worked for a recent all-day job.

Is the relationship a linear relationship? Is the relationship proportional? Explain your thinking.



Name: ..... Date: ..... Period: .....

Problems 4–9: Determine whether these linear relationships are proportional or non-proportional (Circle one).

4. From rest, Noah bikes at a constant speed of 12 miles per hour.

Proportional Non-Proportional

5.

x	y
3	7
4	9
6	13

Proportional Non-Proportional

6. $y = 4x$

Proportional Non-Proportional

7. At birth, a kitten weighs 3.5 ounces and doubles its weight in the first week.

Proportional Non-Proportional

8. $y = \frac{1}{2}x + 3$

Proportional Non-Proportional

9.

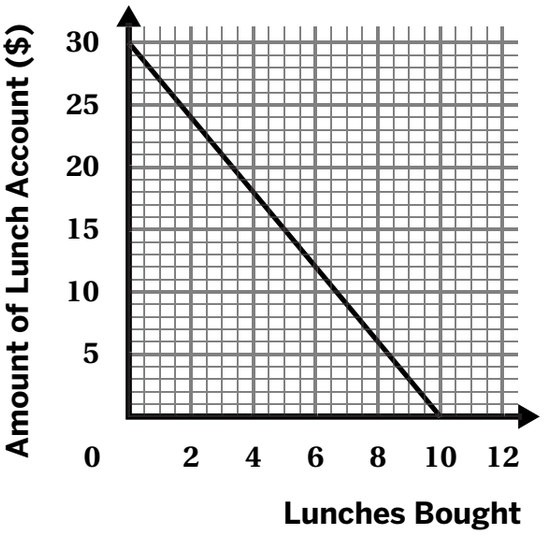
x	y
2	5
4	10
8	20

Proportional Non-Proportional

Name: Date: Period:

Additional Practice 3.05

Problems 1–4: Clara has an account to pay for her school lunches. Each time Clara buys lunch, $\$3.00$ is subtracted from the amount available in her account. This graph shows the amount of money available in her account, y, after buying x lunches.



1. How much money was initially in Clara's account? Explain how you know.

2. Complete the table.

Number of Lunches bought (x)	0	1	2	…	8
Amount of Money in Account	30	27		…	

3. Write an equation that represents the amount of money remaining in Clara's account, y, after buying x lunches.

4. After how many lunches will Clara's account run out of money? Show or explain your thinking.

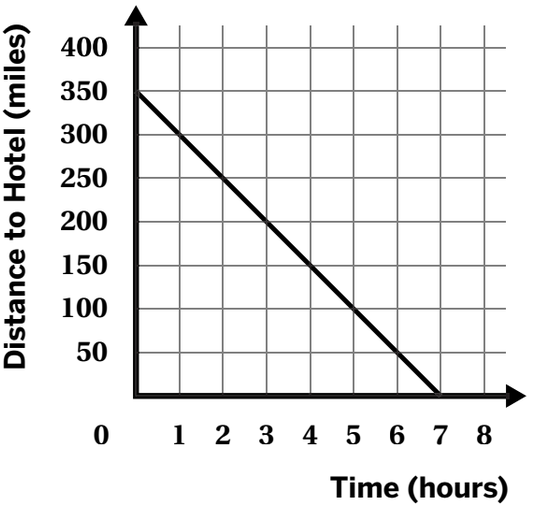
Name: ..... Date: ..... Period: .....

Problems 5–7: Mai's family is planning a trip and staying at a hotel. Mai estimates their average speed and graphed her expected progress on the trip. The graph shows the remaining distance d in miles to the hotel after driving h hours.

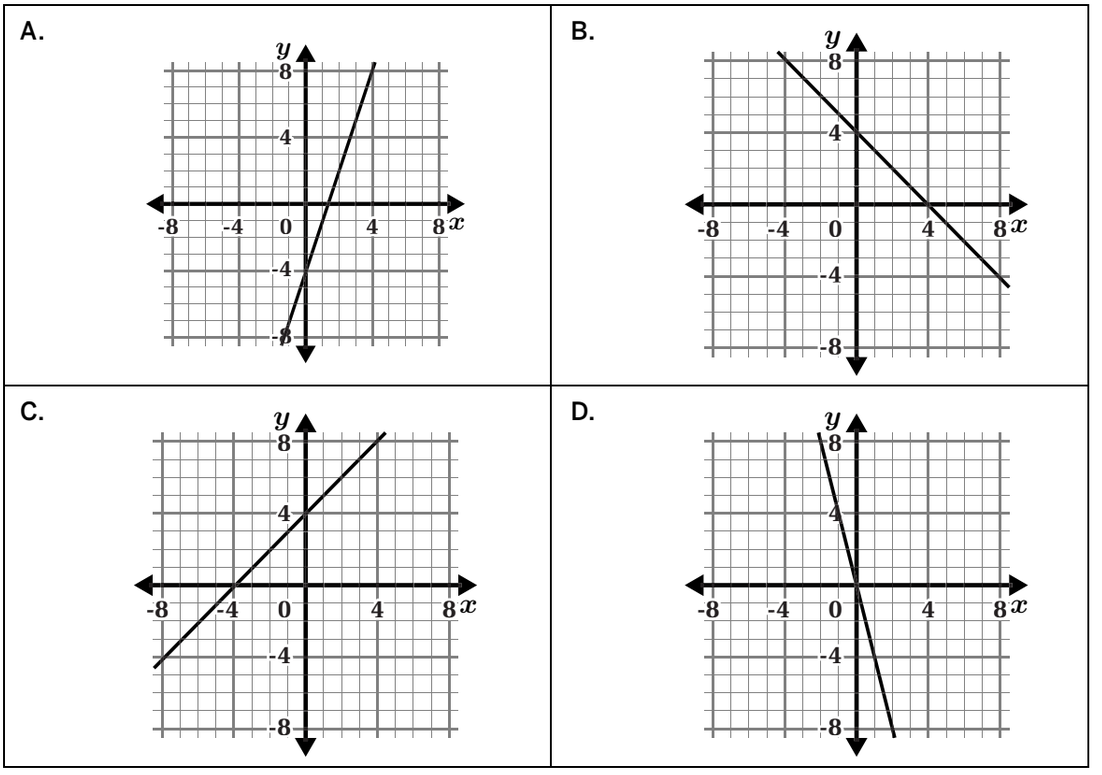
5. How far does Mai's family live from the hotel? Explain how you know.

6. Write an equation that describes the relationship between d and h. Show or explain your thinking.

7. Approximately how long will it take Mai's family to arrive at the hotel? Explain or show your thinking.



8. Which graph has a horizontal intercept of $(-4, 0)$?

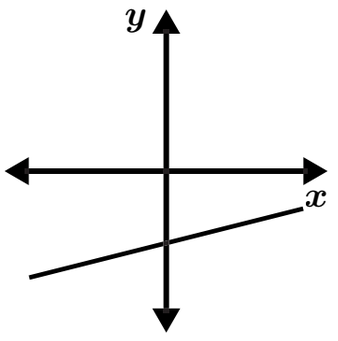


Name: ..... Date: ..... Period: .....

Additional Practice 3.06

Problems 1–3: Determine whether the slope of each line is *positive* or *negative* (Circle one).

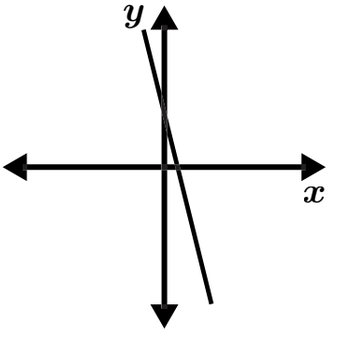
1.



Positive Slope

Negative Slope

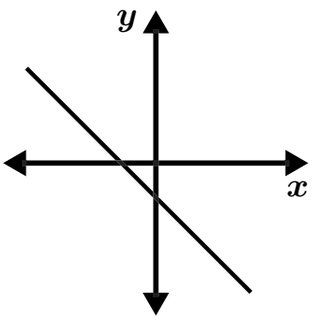
2.



Positive Slope

Negative Slope

3.



Positive Slope

Negative Slope

Problems 4–5: A hot air balloon trip can be represented with a linear equation. Consider the graph of such an equation, with time in minutes represented on the horizontal axis and elevation in feet on the vertical axis. For each situation, determine whether the slope is *positive* or *negative* (Circle one).

4. The hot air balloon climbs at a rate of 400 feet per minute.

Negative slope

5. The hot air balloon drops at a rate of 300 feet per minute.

Positive slope

Name: Date: Period:

Problems 6–7: Jada received a $\$15$ gift card to an online music store. Every time she buys a song, $\$1.50$ is subtracted from the amount available on her gift card.

6. Complete the table to show the amount of money remaining on the gift card after each song purchase.

Number of Songs, x	Amount on Gift Card, y
0	15
1	
2	
3	

7. Write an equation that represents the amount of money on the gift card, y, after x songs are purchased.

Problems 8–10: Kelly is starting out on a road trip with her friends. Her car has 15 gallons of gas in the tank and can travel 100 miles using 4 gallons of gas. Determine whether each statement is *true* or *false*. If *false*, explain why.

8. The initial amount of gas in the tank is 15 gallons.

9. The car can travel 50 miles with one gallon of gas.

10. After traveling for 150 miles, the car has 10 gallons of gas in the tank.

Name: Date: Period:

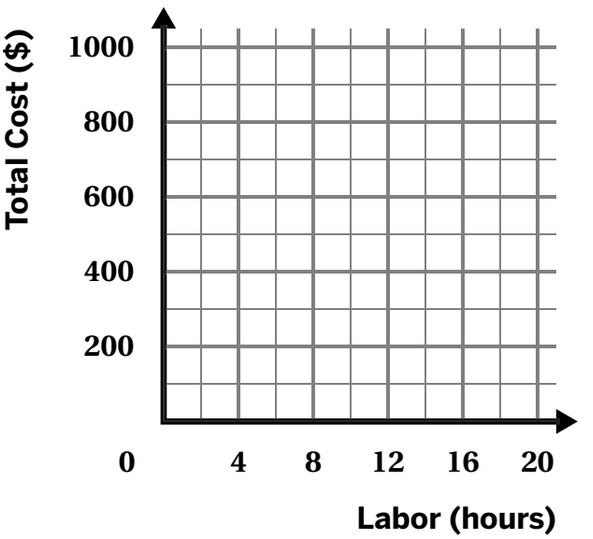
Additional Practice 3.07

Problems 1–4: For any service call, an electrician charges $\$60$, plus $\$40$ for each hour of labor.

1. How much would the electrician charge for a service call that needs 4 hours of labor? 20 hours of labor? Write your answers in the table.

Labor (hours)	Total cost ($)
4	
20	

2. Draw a line representing the relationship between the number of hours of labor for a service call and the total cost of the electrician's visit.



3. Plot and label two points on the graph from Problem 1.

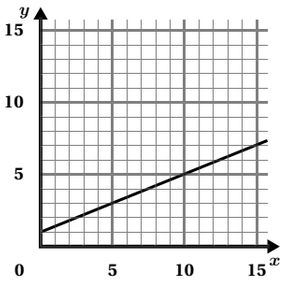
4. What is the slope of the line? What does it represent?

5. A flower shop allows you to purchase additional flowers, x, to add to the total cost of your arrangement, y. The line representing the relationship between x and y has a slope of 2.75 and a y-intercept of 25.25. Explain what the slope and y-intercept represent in this situation.

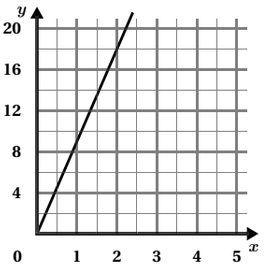
Name: ..... Date: ..... Period: .....

Problems 6–9: For each real-world situation, choose the graph that best represents it.

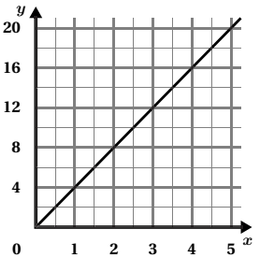
Graph A



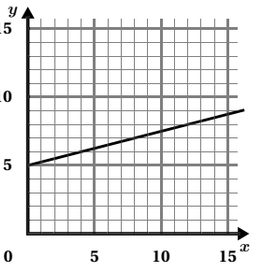
Graph B



Graph C



Graph D



6. y represents the total amount earned and x represents the number of hours worked. The slope of the line representing the relationship between x and y is 9.

7. y represents the cost of a scoop of ice cream and x represents the cost of each topping. The slope of the line representing the relationship between y and y is 4.

8. y represents the perimeter of a square and x represents its side length. The slope of the line representing the relationship between x and y is 0.25.

9. y represents the cost of a mailing a 1-ounce package and x represents the cost added for each additional ounce. The slope of the line representing the relationship between x and y is 0.40.

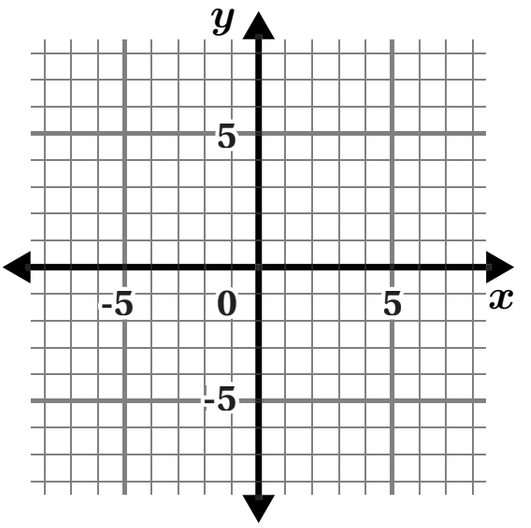
Name: Date: Period:

Additional Practice 3.08

1. Select all the equations whose graphs have the same y-intercept.

- ☐ **A.** $y = \frac{1}{2}x + 4$
- ☐ **B.** $y = \frac{1}{3}x - 2$
- ☐ **C.** $y = 4x - 2$
- ☐ **D.** $y = -2x + \frac{1}{2}$
- ☐ **E.** $y = \frac{1}{2}x - 2$

Problems 2–3: Here is a coordinate plane.



2. Graph the equations $y = -\frac{2}{3}x$ and $y = -\frac{2}{3}x + 4$.

3. How are the graphs alike? How are they different?

Problems 4–5: A streaming music service service changes $6 per month of service to existing customers. For new customers, there is an additional one-time sign-up fee of $10.

4. Write a linear equation representing the relationship between x, the number of months of service, and y, the total amount paid in dollars by a customer.

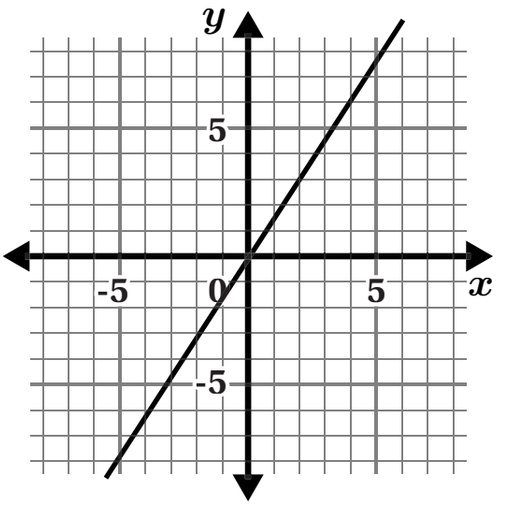
Existing customer: .....

New customer: .....

5. When the two equations are graphed on the coordinate plane, how are the graphs similar? How are they different?

Name: ..... Date: ..... Period: .....

6. Here is the graph of line n. Which equation represents a line that is a translation of line n?

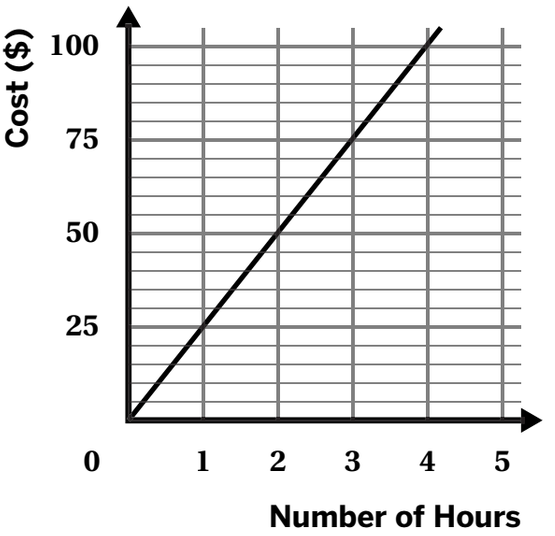


- ☐ **A.** $y = \frac{3}{2}x - 4$
- ☐ **B.** $y = 4x - \frac{2}{3}$
- ☐ **C.** $y = \frac{2}{3}x + 1$
- ☐ **D.** $y = -\frac{2}{3}x - 6$

Problems 7–8: A driving range charges $25 per hour for renting a space to hit golf balls. Here is a graph that represents the cost, y, of renting a space for x hours.

7. Write an equation that represents the cost, y, of bowling x games without renting any shoes.

8. Daniel went to the driving range and also rented a bucket of balls for $15. On the same coordinate plane, graph the relationship that represents the amount of money, y, that Daniel would spend after spending x hours at the driving range.



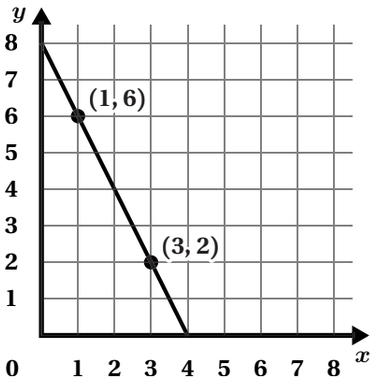
9. Write an equation for the relationship you graphed in Problem 8.

Name: ..... Date: ..... Period: .....

Additional Practice 3.09

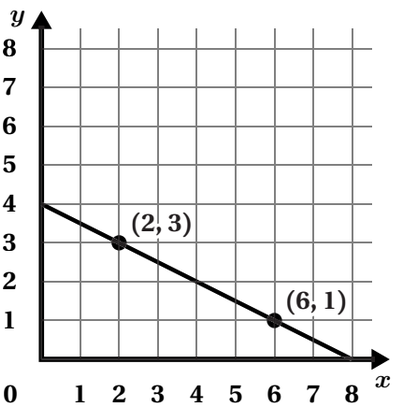
Problems 1–2: Determine the slope of each line. Show your thinking.

1.



Slope = ...

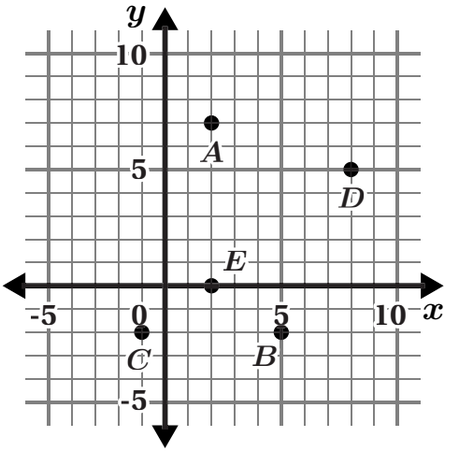
2.



Slope = ...

3. Draw a line with a slope of $-\frac{2}{3}$ that passes through point B.

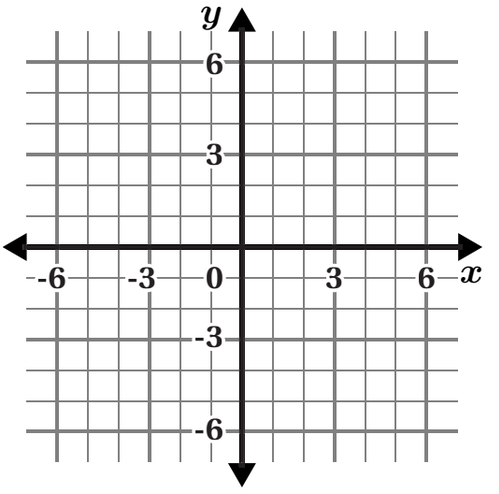
What other point lies on that line?



Problems 4–5: Here is a blank graph.

4. Draw a line with a slope of -3 and a positive y-intercept.

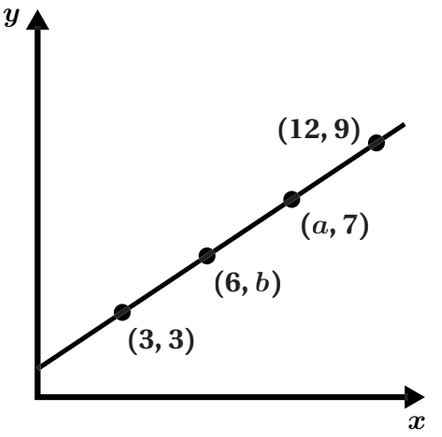
5. Explain how you know the slope of your line is -3.



Name: Date: Period:

Problems 6–8: All the points in this graph are on the same line.

6. What is the slope of the line? Explain your thinking.



7. What are the values for a and b?

8. What is the x-value when $y = 0$? Show or explain your thinking.

Name: ..... Date: ..... Period: .....

Additional Practice 3.10

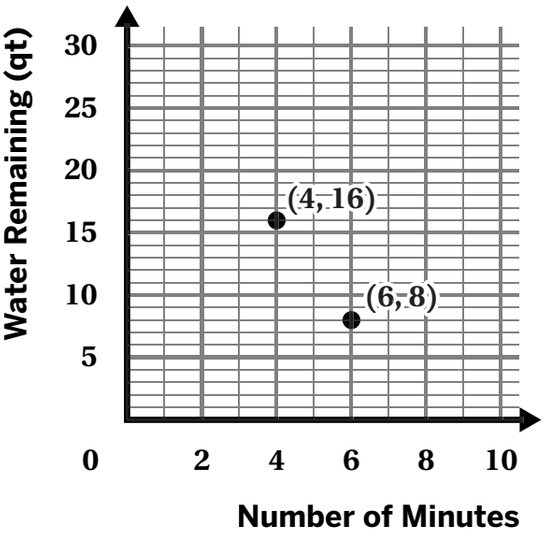
1. Diego is finding the slope of the line that passes through the points $(10, 8)$ and $(14, 10)$. His work is shown. Review his work. Find and fix any errors.

Diego's work:

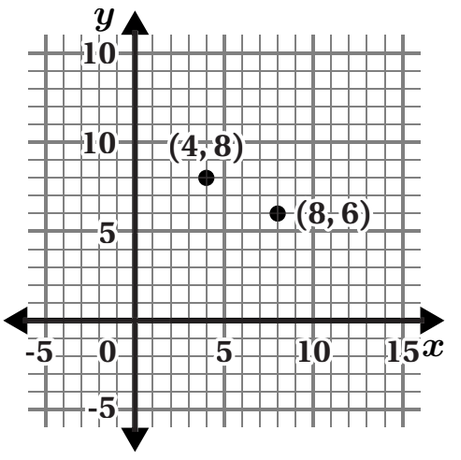
Slope $= \frac{10-8}{10-14} = \frac{2}{-4} = -\frac{1}{2}$

2. A cooler of water is draining. After 4 minutes, there are 16 quarts remaining. After 6 minutes, there are 8 quarts remaining.

Write an equation for the amount of water remaining, y, in the cooler after x minutes.



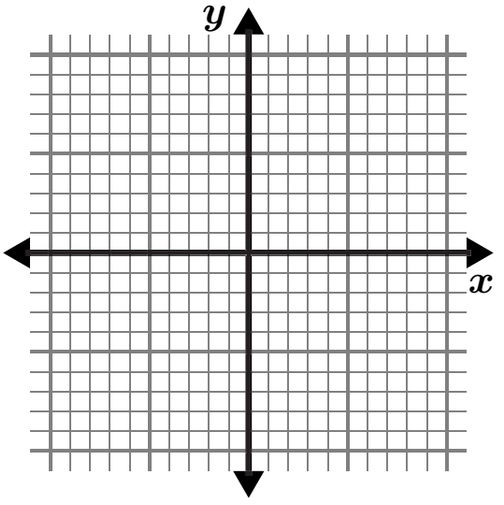
3. Here is a graph showing the points $(4, 8)$ and $(8, 6)$. What is the y-intercept of the line that passes through these points?



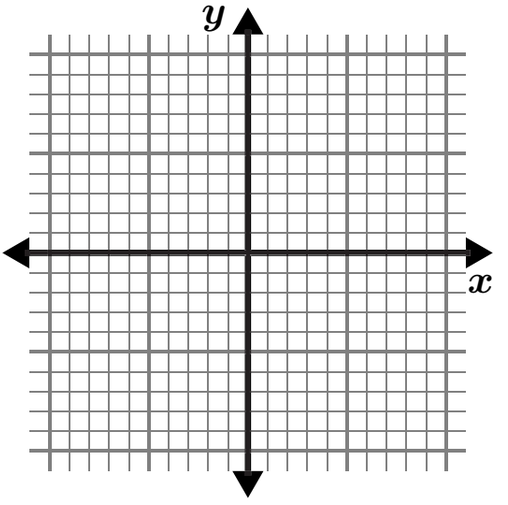
Name: ..... Date: ..... Period: .....

Problems 4–5: Write the equation of the line that passes through each pair of points. Show your work, and use the coordinate plane if it helps with your thinking.

4. $(3, 6)$ and $(4, 10)$



5. $(-5, 4)$ and $(-1, 2)$



6. Which equation represents the line that passes through points $(-8, 12)$ and $(4, 6)$?

A. $y = \frac{1}{2}x + 8$

B. $y = \frac{1}{2}x - 2$

C. $y = -\frac{1}{2}x + 8$

D. $y = -\frac{1}{2}x - 2$

Name: ..... Date: ..... Period: .....

Additional Practice 3.11

1. Which equation represents the line that passes through points $(-8, 12)$ and $(4, 6)$?

A. $y = \frac{1}{2}x + 8$

B. $y = -\frac{1}{2}x + 8$

C. $y = \frac{1}{2}x - 2$

D. $y = -\frac{1}{2}x - 2$

2. Lin is writing an equation of the line that passes the point $(4, 24)$ and has a slope of 3. Her unfinished work is shown:

Lin's work:

$y = 3x + b$ $\qquad m = 3$

$24 = 3(4) + b$

Finish Lin's work by solving the equation for b and writing the final equation for the line in the form $y = mx + b$. Show your thinking.

3. Write the equation of the line that passes through each pair of points. Show or explain your thinking.

a $(4, 18)$ and $(8, 34)$

b $(-4, 14)$ and $(2, 2)$

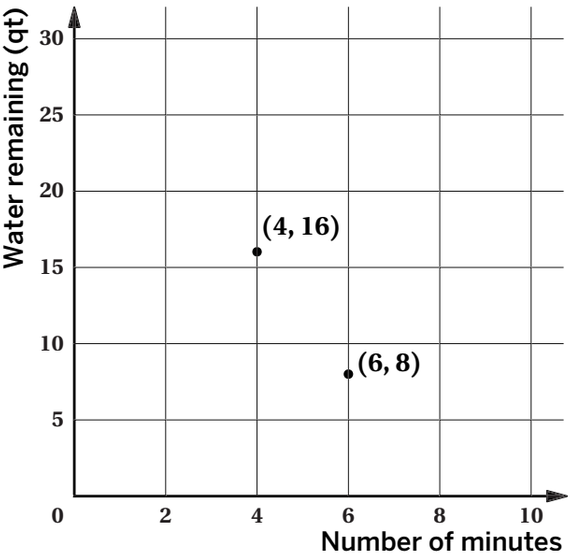
4. Diego is finding the slope of the line that passes through the points $(10, 8)$ and $(14, 10)$. His work is shown. Review his work. Find and fix any errors.

Diego's work:

Slope $= \frac{10 - 8}{10 - 14} = \frac{2}{-4} = -\frac{1}{2}$

Name: Date: Period:

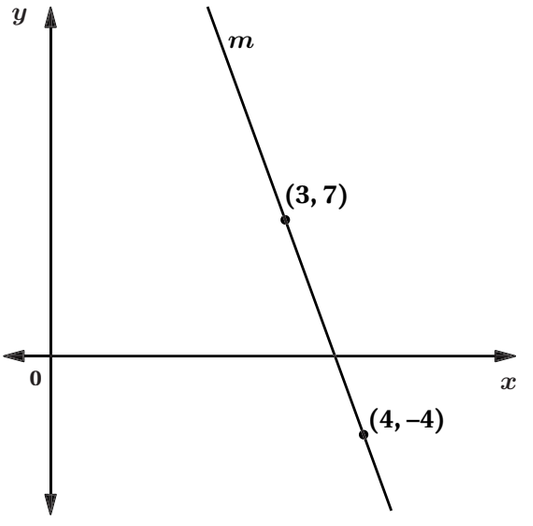
5. A cooler of water is draining. After 4 minutes, there are 16 qt remaining. After 6 minutes, there are 8 quarts remaining. Write an equation for the amount of water remaining y in the cooler after x minutes.



6. The table gives the x- and y-coordinates of points on a line. Without graphing, write an equation for the line that passes through the points. Show or explain your thinking.

x	-4	4	8
y	14	2	-4

7. Consider line m with the two labeled points as shown. Kiran missed today's lesson and does not understand how he can write the equation of the line without seeing the vertical intercept. Help Kiran understand how to write the equation for the line in the form $y = mx + b$.



Name: ..... Date: ..... Period: .....

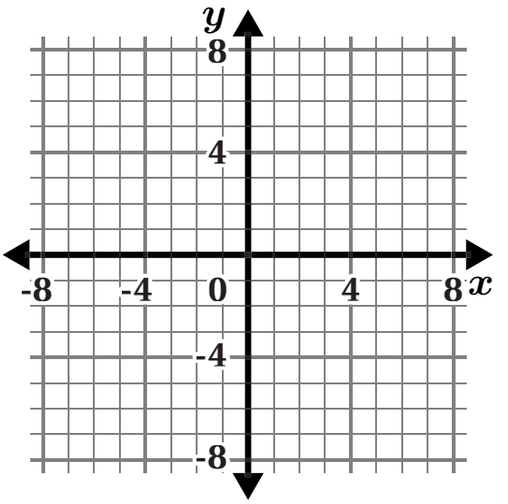
Additional Practice 3.12

1. Select *all* of the ordered pairs that are solutions to the linear equation $3x - 2y = 4$.

- ☐ **A.** $(0, -2)$
- ☐ **B.** $(2, -1)$
- ☐ **C.** $(-2, -5)$
- ☐ **D.** $(-4, 6)$
- ☐ **E.** $(4, 4)$

2. The graphs of a linear equation passes through the points $(-1, 2)$ and $(2, 8)$.

Select all the points that are also solutions to this equation. Use the graph if it helps with your thinking.



- ☐ **A.** $(0, -4)$
- ☐ **B.** $(1, 6)$
- ☐ **C.** $(-1, 2)$
- ☐ **D.** $(-2, 3)$
- ☐ **E.** $(-4, 4)$

3. Match each equation with its three solutions.

Equation	Solutions
a. $2x + y = 5$	..... $(9, 3), (5, -1), (8, 2)$
b. $y = \frac{1}{2}x - 1$	..... $(3, 2), (0, 0), (-6, -4)$
c. $x - y = 6$	..... $(1, 3), (-2, 9), (3, -1)$
d. $2x = 3y$	..... $(-4, -1), (4, 1), (16, 4)$
e. $y = \frac{1}{4}x$	..... $(2, 0), (4, 1), (-2, -3)$

Name: Date: Period:

4. Kiran is determining if the ordered pair $(2, -1)$ is a solution to the equation $3x + y = 5$. His work is shown. Is he correct? Explain your thinking.

Kiran's work:

$3x + y = 5$

$3(-1) + 2 = 5$

$-3 + 2 = 5$

$-1 \neq 5$

The point $(2, -1)$ is *not* a solution to the equation.

5. Determine whether the following statement is *true* or *false*. Explain your thinking. The ordered pairs $(10, 28)$, $(-12, -17)$, and $(14, 45)$ all lie on the line whose equation is $y = \frac{5}{2}x + 13$.

Problems 6–7: Complete each table.

6. $y = -\frac{4}{5}x$

x	y
-10	
	4

7. $x + 2y = 7$

x	y
-1	
	2

Name: Date: Period:

Additional Practice 3.13

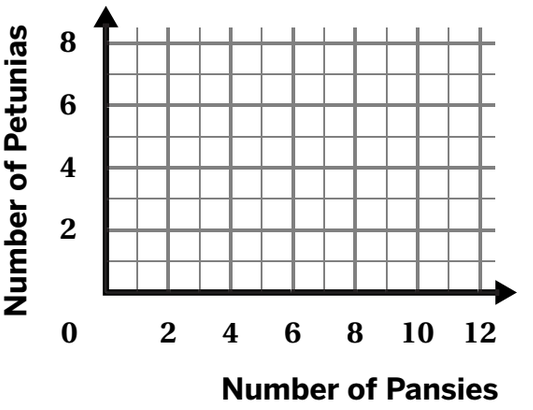
Problems 1–5: Maria has $\$48$ to spend on flowers for her garden. A pack of pansies costs $\$4$ each and a pack of petunias costs $\$6$ each.

1. Complete the table to show some possible combinations of packs of pansies and packs of petunias that will cost a total of $\$48$.

Number of Packs of Pansies	Number of Packs of Petunias

2. Write an equation that represents the relationship between the number of packs of pansies, x, and the number of packs of petunias, y, that Maria can buy.

3. Graph all possible combinations of packs of pansies and packs of petunias that will cost a total of $\$48$.



4. What is the slope of the line? What does it tell you about this situation?

5. What are the x- and y-intercepts of the line? What do they represent in this situation?

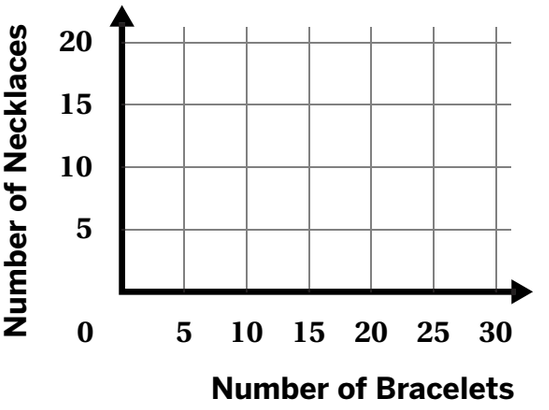
Name: ..... Date: ..... Period: .....

Problems 6–8: Jada made bracelets and necklaces to sell at the craft show. She sold her bracelets for $\$3$ each and her necklaces for $\$6$ each. She earned $\$96$ in sales at the craftshow.

6. Give two possible combinations of the number of bracelets and necklaces sold that earn a total of $\$96$ in sales.

7. Write an equation that represents the relationship between the number of bracelets, x, and the number of necklaces, y, that Jada sold.

8. Graph this relationship on the coordinate plane.



9. What are the x- and y-intercepts of the line? What do they represent in this situation?

Grade 8 | Unit 4

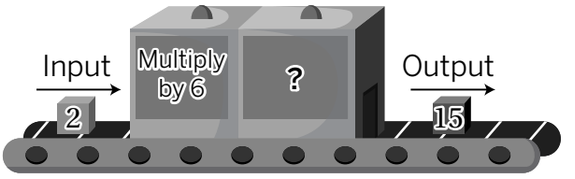
Additional Practice

Practice Problems

Name: ..... Date: ..... Period: .....

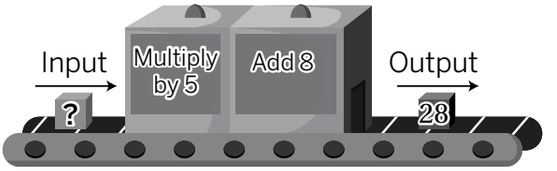
Additional Practice 4.01

1. The number machine shown has two steps. The input, 2, results in the output, 15. What is the missing second step?

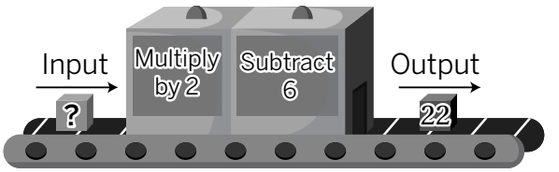


- ☐ **A.** Add 3
- ☐ **B.** Subtract 3

2. Kiran put a number into this number machine and 28 was the output. What was his input?



3. Jada wants to solve this puzzle represented by the number machine shown.



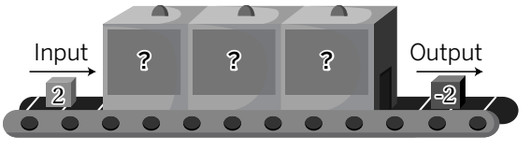
Her response is shown.

$$22 \div 2 = 11$$

$$11 + 6 = 17$$

Is Jada's work correct? Explain your thinking

4. The number machine shown has three steps. Create your own descriptions of these three steps so that an input of 2 gives an output of -2.



Step 1: .....

Step 2: .....

Step 3: .....

5. In a basketball game, Meghan scores twice as many points as Priya, Priya scores 6 points fewer than Anika, and Anika scores 4 times as many points as Sheryl. If Sheryl scores 4 points, how many points did Meghan score?

Explain your thinking.

Problems 6–7: Clare inputs n into a number machine. The expression $\frac{2(n-5)}{3+4}$ her output.

6. Describe the possible steps of the number machine.

7. What is the output if the input value is 17? Show your thinking.

8. Consider a number machine with the following steps:

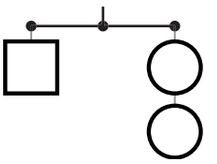
- Think of a number.
- Triple the number.
- Add 8.
- Subtract 2.
- Divide by 3.
- Subtract the original number.
- The final result should be 2.

Why does this always work? Explain your thinking.

Name: ..... Date: ..... Period: .....

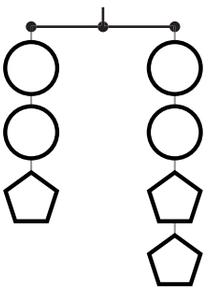
Additional Practice 4.02

1. If the diagram shown is balanced, what is the weight of 1 circle if a square weighs 10 pounds? Select the correct weight.



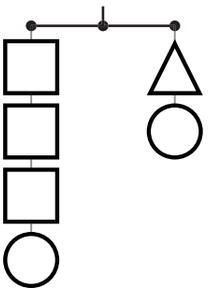
- ☐ **A.** 20 g
- ☐ **B.** 5 g

2. Which of these moves would keep the hanger diagram in balance? Select *all* that apply.



- ☐ **A.** Remove a circle from each side.
- ☐ **B.** Add pentagon to each side.
- ☐ **C.** Add a pentagon to the left side and remove a pentagon from the right side.
- ☐ **D.** Remove a circle and a pentagon from the left side and remove a circle and pentagon from the right side.

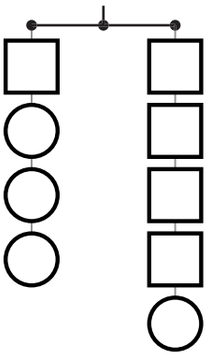
3. Which of these moves would keep the hanger diagram in balance? Select *all* that apply.



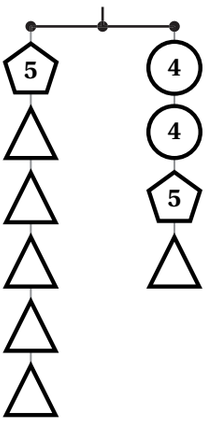
- ☐ **A.** Remove 3 squares from the left side and 1 triangle from the right side.
- ☐ **B.** Add 1 triangle to the left side and 1 square to the right side.
- ☐ **C.** Add 1 triangle to the left side and 3 squares to the right side.
- ☐ **D.** Add 1 circle to the left side and 1 circle to the right side.
- ☐ **E.** Remove 2 squares from the left side.

Name: ..... Date: ..... Period: .....

4. If the diagram shown is balanced, what is the weight of 1 square if a circle weighs 6 pounds? Explain your thinking.



5. A balanced hanger diagram is shown. Each pentagon weighs 5 pounds, each circle weighs 3 pounds, and x represents the weight of each triangle. Select all the equations that are equivalent to this hanger.

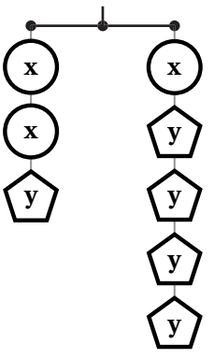


- ☐ **A.** $x + x + x + x + 5 = x + 5 + 4 + 4$
- ☐ **B.** $3x = 24$
- ☐ **C.** $4x + 11 = x + 13$
- ☐ **D.** $3x = 2$
- ☐ **E.** $3x + 5 = 5 + 4 + 4$

Name: ..... Date: ..... Period: .....

Additional Practice 4.03

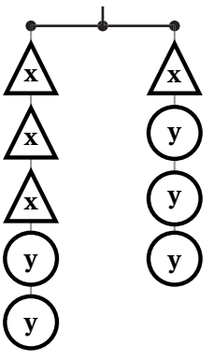
Problems 1–2: In this balanced hanger diagram, the weight of the circle is x and the weight of the pentagon is y.



1. Label the figures with x or y. Then, write an equation using x or y to represent the hanger diagram.

2. If $x = 9$, what is the value of y? Show or explain your thinking.

3. In this balanced hanger diagram, the weight of the triangle is x and the weight of the circle is y.



a Label the figures with x or y.

b Select *all* the equations that could represent a balanced hanger.

- ☐ **A.** $3y + 2x = y + 3x$
- ☐ **B.** $3x + 2y = x + 3y$
- ☐ **C.** $2x + 2y = 3y$
- ☐ **D.** $5xy = 4xy$
- ☐ **E.** $2x = y$

Name: ..... Date: ..... Period: .....

4. Match each set of equations with a possible step that turns the first equation into the second equation.

Equation	Possible steps
a. $9x + 3 = 3x + 18$ $3x + 1 = x + 6$	..... Multiply each side by -3
b. $-3(5x - 7) = -21$ $5x - 7 = 7$	..... Divide each side by -3
c. $-\frac{4}{3}x = 5$ $4x = -15$	..... Divide each side by 3
d. $7x + 5 = 3x - 6$ $4x + 5 = -6$	..... Subtract 3 from each side
e. $10 - 5x = 8 + 4x$ $7 - 5x = 5 + 4x$	..... Subtract $3x$ from each side

Problems 5–6: Jada and Tyler were each trying to solve $7x - 4 = 5x - 5$. Describe the first step they each made to the equation.

5. The result of Jada's first step was $7x = 5x - 1$.

6. The result of Tyler's first step was $7x + 1 = 5x$.

Name: ..... Date: ..... Period: .....

Additional Practice 4.04

1. Andre and Clare are each solving the equation $-4(x-5) = 10x - 8$. Andre's solution is $x = -2$, and Clare's solution is $x = -\frac{7}{9}$. Their responses are shown.

Andre's solution:

$$\begin{aligned} -4(x-5) &= 10x - 8 \\ 4x - 20 &= 10x - 8 \\ -20 &= 6x - 8 \\ -12 &= 6x \\ -2 &= x \end{aligned}$$

Clare's solution:

$$\begin{aligned} -4(x-5) &= 10x - 8 \\ x - 5 &= 10x + 2 \\ -5 &= 9x + 2 \\ -7 &= 9x \\ -\frac{7}{9} &= x \end{aligned}$$

Do you agree with either of their solutions? Show or explain your thinking.

2. Solve the equation $-5(2x-2) = 20x$ two different ways. Show your thinking.

Name: Date: Period:

3. Mia solved the equation $\frac{1}{2}(6x - 8) = 5x + 12$. Mia began with the original equation and her steps are shown. Complete the table by describing the steps Mai used to solve the equation.

Steps	Description
$\frac{1}{2}(6x - 8) = 5x + 12$	Original equation
$3x - 4 = 5x + 12$	
$-4 = 2x + 12$	
$-16 = 2x$	
$-8 = x$	

Problems 4–5: Determine whether $x = 2$ is a solution for each equation. Show your thinking.

4. $4(x - 5) = -12$

5. $-3(x + 2) = 2x + 16$

6. Solve each equation below. Show your thinking. Check your solution.

$2.4(x + 3) = 4.2x + 2(x - 4)$

Name: ..... Date: ..... Period: .....

Additional Practice 4.05

Problems 1–4: Solve each equation. Show or explain your thinking.

1. $7x - 3 = 4(x + 6)$

2. $9y - 5 = 13 + 3y$

3. $4(8 - n) = 6(n + 2)$

4. $14 - 6p = -12(p - 1)$

Problems 5–6: Shawn solved the equation shown, but when he checked his solution, he realized it was incorrect. He knows he made at least one mistake, but he cannot find it.

5. Identify Shawn' mistake.

6. Correct Shawn' work.

Shawn

$$\frac{2}{3}(3x - 9) = -2(x - 3)$$
$$x - 6 = -2x + 6$$
$$-6 = -3x + 6$$
$$-12 = -3x$$
$$-4 = x$$

Name: Date: Period:

Problems 7–8: Solve each equation. Show or explain your thinking.

7. $\frac{1}{8}(3b - 14) = \frac{1}{4}(4b + 3)$

8. $0.8w - (0.5 - 0.7w) = 1.25(2 + 0.4w)$

Name: Date: Period:

Additional Practice 4.06

1. For each equation, determine whether it has *one solution*, *no solution*, or *infinitely many solutions* by placing a check mark in the appropriate box.

Equation	One solution	No solution	Infinitely many solutions
$x + 2 = x + 4$			
$2x + 4 = 2x + 1 + 3$			
$3(x - 1) = 2x + 1$			
$-(4x - 5) = -x + 5 - 3x$			

2. If an equation is never true for any value of x, which is true about the equation?

A. It has no solution.

B. It has one solution.

C. It has infinitely many solutions.

D. Zero is its only solution.

Problems 3–4: For each equation, decide whether it has *one solution, no solution*, or *infinitely many solutions*. Show or explain your thinking.

3. $3x - 7x + 1 = -4x + 5$

4. $4(x + 3) = -2(2x + 6)$

5. Elena said $4x - 6 = 4(x - 6)$ has infinitely many solutions. Do you agree with Elena's answer? Explain your thinking.

Name: ..... Date: ..... Period: .....

6. Noah and Lin solved the equation $-(3x + 2) - 1 = -2x - (x + 3)$. Their responses are shown below.

Noah's work:

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

Lin's work:

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

Noah says that one of them is incorrect because you cannot get different results for the same equation. Is Noah correct? Explain your thinking.

7. Write the other side of this equation so that it is true for all values of x.

$-\frac{1}{2}(4x + 12) + 5x =$ .....

8. Write the other side of this equation so that it is true for no values of x.

$-\frac{1}{2}(4x + 12) + 5x =$ .....

9. Write the other side of this equation so that it is true when $x = 0$.

$-\frac{1}{2}(4x + 12) + 5x =$ .....

Name: Date: Period:

Additional Practice 4.07

1. Without solving them, identify whether each equation has a solution that is *positive*, *negative*, or *zero* by placing a check mark in the appropriate box.

Equation	Positive Solution	Negative Solution	Solution of zero
$12x = -36.24$			
$2x = 14.6$			
$6x - 10 = -10$			
$-\frac{2}{3}x = -64$			

Problems 2–5: Solve each equation. Show your thinking.

2. $5x + 7x - 12 = 6(2x - 2)$

3. $\frac{1}{2}(6y - 12) = 2(y - \frac{3}{2})$

4. $4(6 - 2m) = 3(m + 1) + 10$

5. $6b + 8 - 10b + 4 = -16 - 4b - 2$

6. Andre studied the equation $3(3x - 6) = -9(x - 2)$. He said, "I can tell right away there is no solution because, on the left side, you will have $9x$, and then, on the right side, you will have $-9x$. They will cancel each other out."

Do you agree with Andre's statement? Explain your thinking.

7. Jada wrote the equation $8x + 2 = 8x + 4$. She wants to change only one term so that the equation has exactly one solution.

a What is an example of a change that would result in exactly *one solution*?

b What is an example of a change that would result in an infinite number of *solutions*?

Name: ..... Date: ..... Period: .....

Additional Practice 4.08

1. For what value of x do the expressions $\frac{3}{4}x + 12$ and $\frac{1}{4}x - 8$ have the same value? Show or explain your thinking.

2. Which story could the equation $4x + 4 = 5x - 6$ represent?

A. Han and his brother get a weekly allowance of x dollars. At one point, Han had an allowance balance of $-\$6.00$ and his brother had an allowance balance of $\$4.00$. After 5 weeks of allowance for Han and 4 weeks of allowance for his brother, they have the same allowance balance.

B. The Huskies and the Cardinals are playing a trivia game. Each correct question is worth x points. At one point in the game, the Huskies have -6 points and the Cardinals have 4 points. After the Huskies answer 4 correct questions and the Cardinals answer 5 correct questions, they have the same number of points.

3. At Lin's fitness center, a membership costs $\$40$ a month and there is a one-time registration fee of $\$20$. At Kiran's fitness center, a membership costs $\$50$ a month and there is a one-time registration fee of $\$10$.

Which equation represents when the costs of the membership would be equal if m represents the number of months?

A. $40m + 10 = 50m + 20$

B. $40m = 50m + 10$

C. $40m + 20 = 50m$

D. $40m + 20 = 50m + 10$

Name: Date: Period:

Problems 4–7: Clare and Mai are running in the same direction on the same running trail.

4. Clare runs at a constant speed of 4 miles per hour. Write an expression that shows how many miles Clare has run after t hours.

5. Mai started running $\frac{1}{4}$ of an hour after Clare. If Clare has been running for t hours, how long has Mai been running?

6. Mai runs at a constant speed of 6 miles per hour. Write an expression that shows how many miles Mai has run after Clare has been running for t hours.

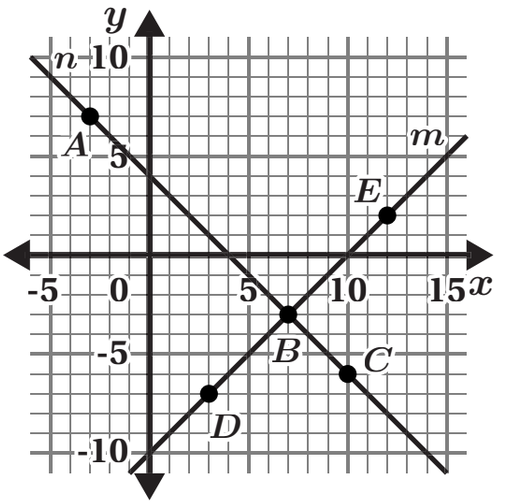
7. Use your expressions to determine when Clare and Mai will meet each other on the running trail. Show or explain your thinking.

8. Shawn wants to take photography lessons. The instructor offers two options. Option 1 costs $\$60$ per lesson and comes with a camera. Option 2 costs $\$40$ per lesson but you have to purchase your own camera. Suppose Shawn buys the $\$200$ camera and chooses Option 2. After how many lessons, x, is Shawn's total cost the same as it would have been if Shawn had chosen Option 1? Show your thinking.

Name: ..... Date: ..... Period: .....

Additional Practice 4.09

Problems 1–5: Here is a coordinate plane.



1. Which line represents this condition:
The coordinates of each point have a sum of 4?

Which line represents this condition:
The y-coordinate of each point is 8 less than the x-coordinate.

3. Select *all* the points whose coordinates have a sum of 4.

- ☐ **A.** Point *A*
- ☐ **B.** Point *B*
- ☐ **C.** Point *C*
- ☐ **D.** Point *D*
- ☐ **E.** Point *E*

4. Select *all* the points whose y-coordinate is 8 less than the x-coordinate.

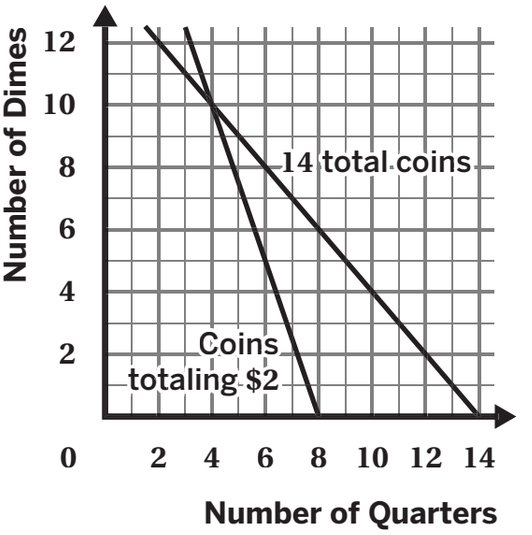
- ☐ **A.** Point *A*
- ☐ **B.** Point *B*
- ☐ **C.** Point *C*
- ☐ **D.** Point *D*
- ☐ **E.** Point *E*

5. Select *all* the points whose coordinates have a sum of 4 and the y-coordinate is 8 less than the x-coordinate.

- ☐ **A.** Point *A*
- ☐ **B.** Point *B*
- ☐ **C.** Point *C*
- ☐ **D.** Point *D*
- ☐ **E.** Point *E*

Name: ..... Date: ..... Period: .....

Problems 6–8: On the coordinate plane shown, one line represents combinations of dimes and quarters that have a total value of $2. The other line represents combinations of dimes and quarters when the total number of coins is 14.



6. Select *all* the combinations of coins that have a total value of $2.

- ☐ **A.** 14 quarters and 0 dimes
- ☐ **B.** 4 quarters and 10 dimes
- ☐ **C.** 6 quarters and 8 dimes
- ☐ **D.** 8 quarters and 0 dimes
- ☐ **E.** 2 quarters and 12 dimes

7. Select *all* combinations of quarters and dimes that have a total of 14 coins.

- ☐ **A.** 10 quarters and 4 dimes
- ☐ **B.** 8 quarters and 0 dimes
- ☐ **C.** 4 quarters and 10 dimes
- ☐ **D.** 2 quarters and 12 dimes
- ☐ **E.** 4 quarters and 8 dimes

8. What combination of quarters and dimes would equal both 14 coins and total $2?

- **A.** 10 quarters and 4 dimes
- **B.** 8 quarters and 0 dimes
- **C.** 2 quarters and 12 dimes
- **D.** 4 quarters and 10 dimes

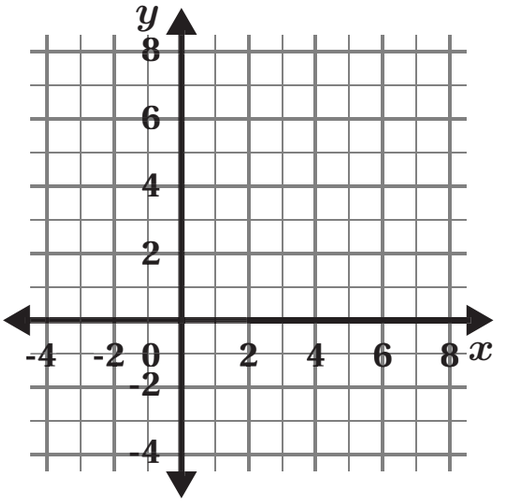
Name: ..... Date: ..... Period: .....

Additional Practice 4.10

1. Jack and Yusef are gaining weight for football. Jack weighs 205 pounds and is gaining 2 pounds per week. Yusef weighs 195 pounds and is gaining 3 pounds per week. Is there a week when they will weigh the same amount? Explain your thinking.

2. Draw a graph to determine x- and y-values that make both of the equations

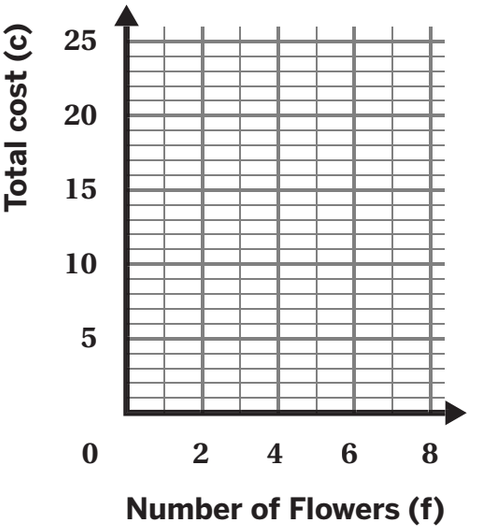
$y = 2x + 1$ and $y = -\frac{1}{2}x + 6$ true.



Problems 3–4: Trevor and Angela each bought an arrangement of flowers in a vase. The cost, c, of f flowers for Trevor's arrangement is represented by the equation $c = 2.5f + 8$. The cost, c, of f flowers in dollars for Angela's arrangement is represented by the equation c = $2f + 10$.

3. Graph the equations for the cost of each arrangement of flowers on the same coordinate plane.

4. Identify the point of intersection. What does the intersection point mean in this context?



Name: Date: Period:

Problems 5–6: Han and Elena are hosting a school bake sale.

Before the sale, Han received $\$5$ in donations and will earn $\$2.50$ per baked good sold.

The table shown represents the amount of money Elena raised, where b represents the number of baked goods sold and t represents the total amount of money raised.

Number of Baked Goods Sold (b)	Total Money Raised (t)
2	14
3	16
10	30

5. How many baked goods must be sold before they raise the same amount of money? Show or explain your thinking.

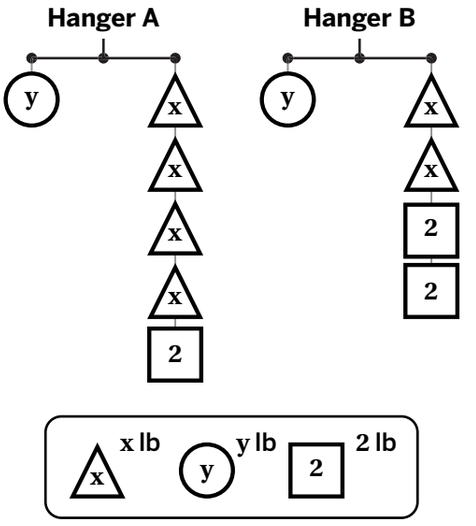
6. How much will each of them have earned at that time? Show or explain your thinking.

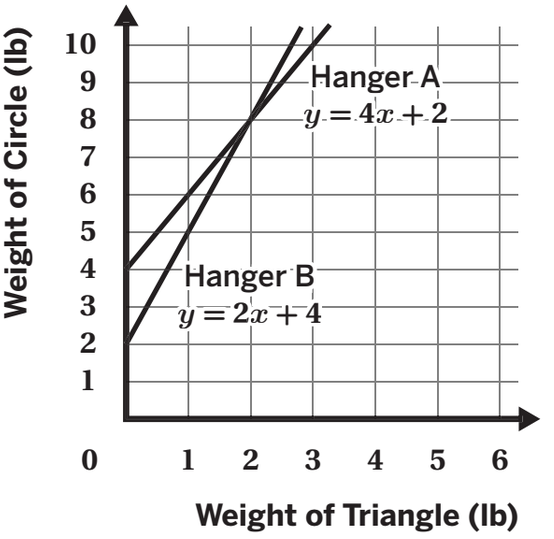
7. The point where the graphs of two equations intersect has a y-coordinate of -6.
One equation is $y = 2x - 4$.
Determine the other equation if its graph has a slope of -3.
Show or explain your thinking.

Name: Date: Period:

Additional Practice 4.11

Problems 1–2: The hangers and the graph represent the same system of equations.



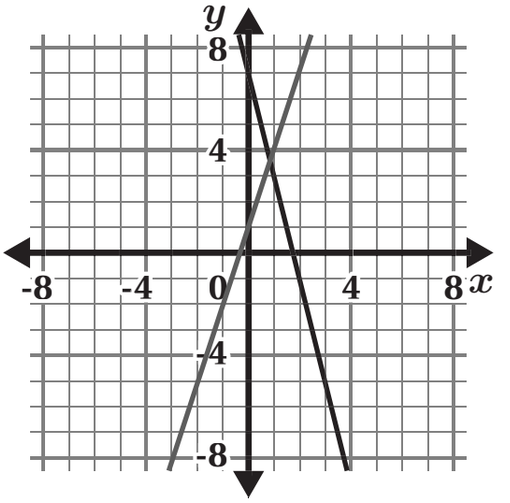


1. Determine the solution to the systems of equations.

2. What does the solution tell you about the weight of a triangle and the weight of a circle that will balance the hanger?

Name: ..... Date: ..... Period: .....

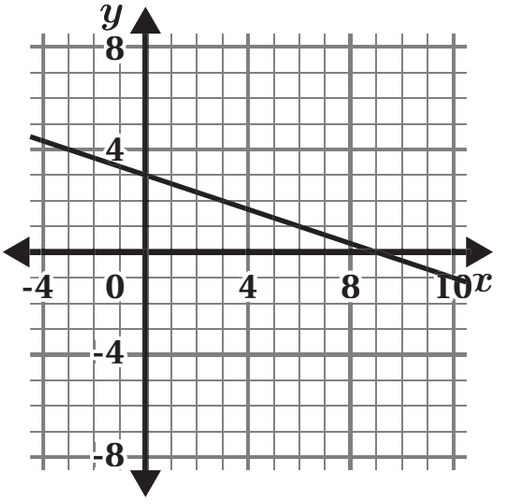
Problems 3–4: Here is a graph.



3. Write an equation that can represent each line.

4. Estimate the solution to the system.

Problems 5–7: Here is a graph that represents one equation in a system of equations.



5. Write a second equation for the system so that it has *infinitely many solutions*.

6. Write a second equation whose graph goes through $(0, -2)$ so that the system has *no solution*.

7. Write a second equation whose graph goes through $(0,-4)$ so that the system has one solution $(6, 0)$. Show or explain your thinking.

Name: ..... Date: ..... Period: .....

Additional Practice 4.12

1. What is the solution to the system of equations below?

$$y = 6$$
$$y = -\frac{1}{2}x + 4$$

A. $(6, -4)$

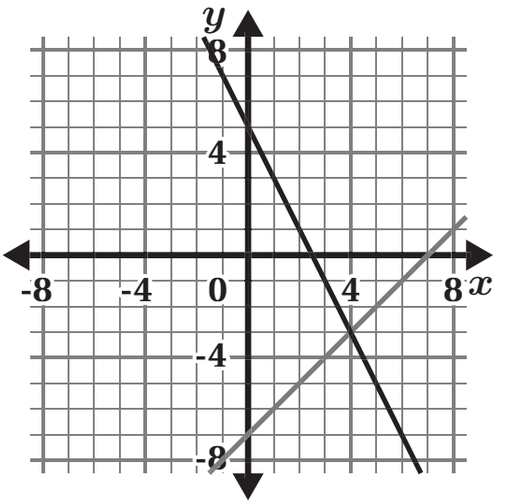
B. $(-4, -6)$

C. $(4, 6)$

D. $(-4, 6)$

Problems 2–3: Here is a graph of the systems of equations:

$$y = x - 7$$
$$y = -2x + 5$$



2. How can you determine the solution to this system of equations by looking at the graph?

3. What is the solution to the system of equations?

Problems 4–5: Solve each system of equations. Show your thinking.

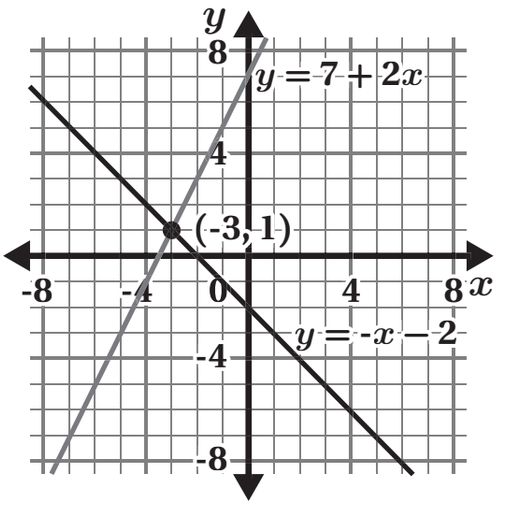
4. $y = 2x + 5$
$x = -3$

5. $y = 2x - 4$
$y = -2x + 12$

Name: ..... Date: ..... Period: .....

Problems 6–8: Use the lines in the graph to decide whether each statement is true or false. Show your thinking.

6. The solution to the equation $7 + 2x = -x - 2$ is $x = 1$.



7. The point $(-3, 1)$ is the solution to the following systems of equations:

$y = 7 + 2x$

$y = -x - 2$

8. The point $(0, -2)$ is a solution to the equation $y = -x - 2$.

9. The solution to a system of equations is $(-1, -4)$. Select *two* equations that might make up the system. Show or explain your thinking.

- ☐ **A.** $y = 2x + 5$
- ☐ **B.** $y = x - 3$
- ☐ **C.** $y = 3x - 1$
- ☐ **D.** $y = x + 3$
- ☐ **E.** $y = -\frac{1}{2}x + 1$

Name: ..... Date: ..... Period: .....

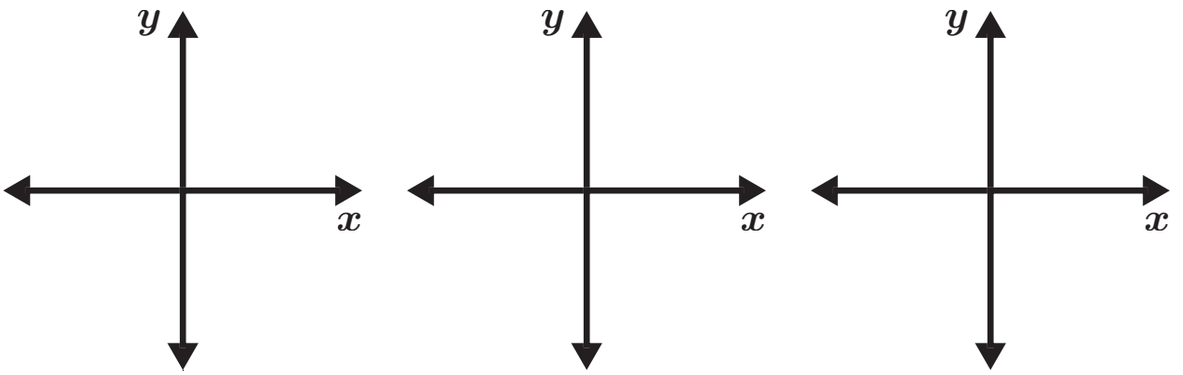
Additional Practice 4.13

Problems 1–3: Sketch two lines that match each description. Then describe the number of solutions for each system of equations.

1. Two lines with different slopes but the same y-intercept.

2. Two lines with the same slope and the same y-intercept.

3. Two lines with the same slope and different y-intercepts.



4. Which equation, together with the equation $y = -8x + 4$, creates a system with no solution? Select all that apply.

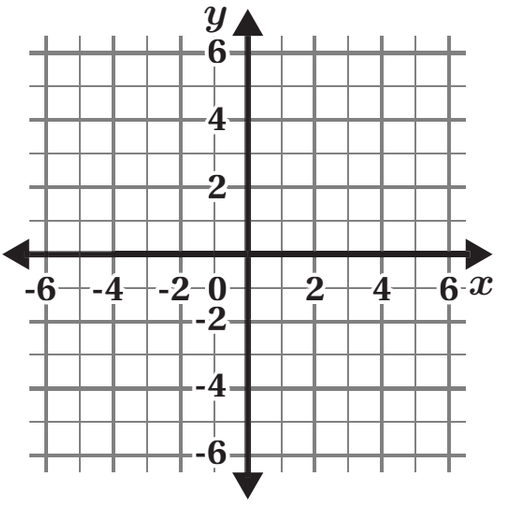
- ☐ **A.** $y = 2(4x + 2)$
- ☐ **B.** $y = 8x - 4$
- ☐ **C.** $y = -2(4x + 2)$
- ☐ **D.** $y = -8(x - \frac{1}{2})$
- ☐ **E.** $y = 4(-2x - 1)$

5. How many solutions does this system have? A graph is provided to help with your thinking, if needed.

$$y = \frac{2}{3}x - 4$$

$$y = \frac{1}{3}(2x - 6)$$

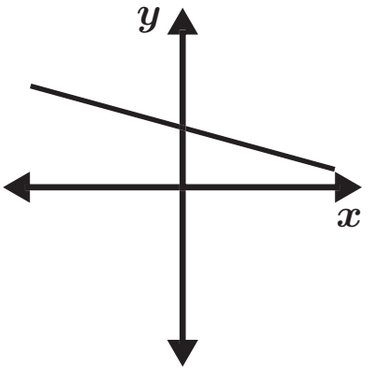
Show or explain your thinking.



Name: ..... Date: ..... Period: .....

Problems 6–7: A graph of a system of equations is provided.

6. Select ***two*** of the equations below that the systems of equations shown on the graph.



- ☐ **A.** $y = -\frac{1}{2}x + 4$
- ☐ **B.** $y = -\frac{1}{2}(x + 4)$
- ☐ **C.** $y = -\frac{1}{2}(x + 16)$
- ☐ **D.** $y = -\frac{1}{2}(x - 8)$
- ☐ **E.** $y = -4 - \frac{1}{2}x$

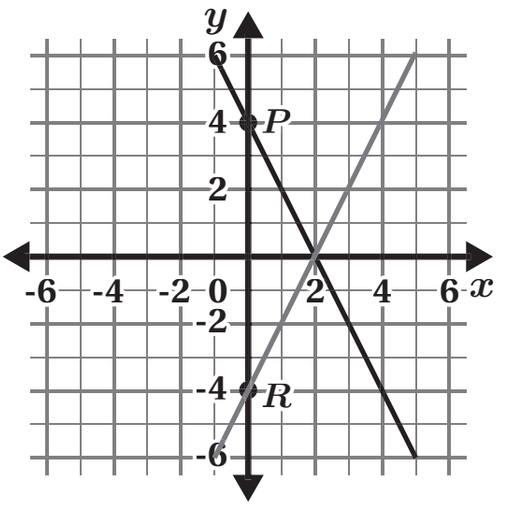
7. How many solutions does this system of equations have? Explain your thinking.

Problems 8–9: Alex graphed this system:

$$y = 2x - 4$$

$$y = -2x + 4$$

He marked its solutions with points P and R.



8. Which statement describes Alex's solutions?

- **A.** His solutions are correct.
- **B.** He marked the y-intercepts instead of the x-intercepts.
- **C.** He marked only the y-intercepts instead of the x- and y-intercepts.
- **D.** He marked the y-intercepts instead of the intersection point of the two lines.

9. What is the solution to the system of equations?

Name: ..... Date: ..... Period: .....

Additional Practice 4.14

Problems 1–6: Solve each system of equations. Show your thinking.

1. $y = -2x$
$3x + y = 10$

2. $y = 2x$
$x = 4y - 14$

3. $y = 6x + 10$
$y = -2x - 14$

4. $y = -3x + 12$
$y = 5x - 8$

5. $x = -3$
$y = 4x + 8$

6. $y = 12$
$y = \frac{1}{2}x - 4$

Problems 7–9: Here is an incomplete system of equations.

$$y = \frac{4}{5}x + 6$$
$$y = ???$$

7. Create a second equation so that the system has no solution. Show or explain your thinking.

8. Create a second equation so that the system has an infinite number of solutions. Show or explain your thinking.

9. Create a second equation so that the system has a solution of $(10, 14)$.

Grade 8 | Unit 5

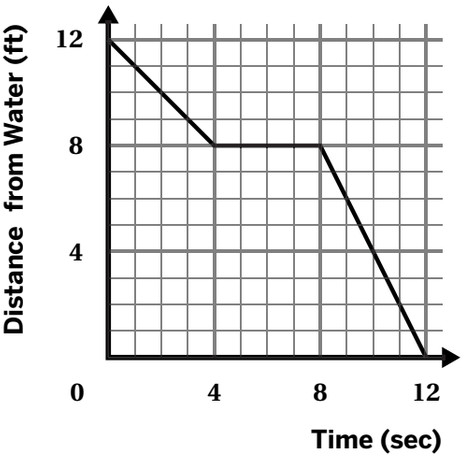
Additional Practice

Practice Problems

Name: ..... Date: ..... Period: .....

Additional Practice 5.01

Problems 1–3: This graph shows a turtle's journey towards the ocean. Determine whether each statement is true or false. If the statement is false, explain your thinking.



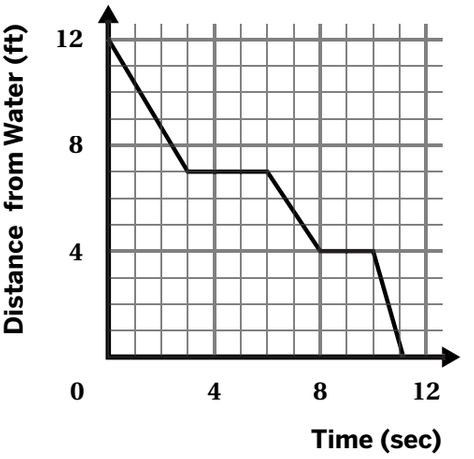
1. The turtle was 4 feet from the water at 4 seconds.

2. The turtle was 12 feet from the water at 0 seconds.

3. The turtle's distance from the water did not change from 4 to 9 seconds.

Name: ..... Date: ..... Period: .....

Problems 4–6: This graph represents another turtle walking across the sand towards the water.



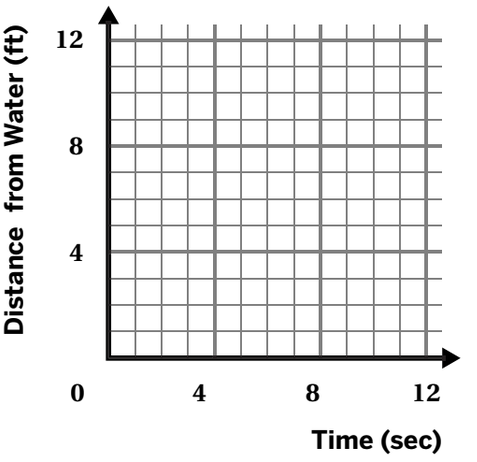
4. What story does the graph tell about the turtle's journey?

5. How far was the turtle from the water after 5 seconds?

6. After how many seconds is the turtle's distance 4 feet from the water?

A. 3 seconds **B.** 6 seconds **C.** 8 seconds **D.** 11 seconds

7. A turtle started their journey towards the ocean. When the turtle started their journey, they were 6 feet from the water. The turtle traveled for 4 seconds. When the turtle was 4 feet from the water, they rested for 4 seconds. Then, the turtle kept traveling towards the water. They reached the water at 12 seconds. Sketch a graph that could represent the turtle's distance from the water.



Name: ..... Date: ..... Period: .....

Additional Practice 5.02

1. Each table shows a set of input values with their corresponding output values. Determine whether each table could represent a function. Explain your thinking.

a

Input	Output
4	6
5	7
6	8
4	9
7	10

b

Input	Output
−4	17
−2	5
0	0
2	5
3	17

2. A birthstone is a gemstone that represents the month in which you were born. Both tables show a relationship between birthday and birthstone. For each table, the input is shown on the left, and the output is shown on the right.

Table A

Birthdate	Gemstone
October 16	Opal
July 5	Ruby
March 20	Aquamarine
June 22	Pearl
October 26	Opal

Table B

Gemstone	Birthdate
Opal	October 16
Ruby	July 5
Aquamarine	March 20
Pearl	June 22
Opal	October 26

Which table(s) represent a function?

A. Table A **B.** Table B **C.** Neither **D.** Both

3. Kiran earns an hourly wage. Determine whether each statement is *true* or *false*. Explain your thinking.

a Kiran's earnings are a function of his hours worked.

b Kiran's hours worked are a function of his earnings.

c Kiran's earnings are a function of the number of people working.

4. A partially completed input-output table is shown. Complete the table so that it represents a function.

Input	Output
−5	25
	9
−1	1
	4
5	
10	

5. Diego wants to know if it is possible for a function to have more than one input value, but only one output value. What would you tell Diego? Explain your thinking.

Input			
Output			

6. Identify a possible rule for the table shown.

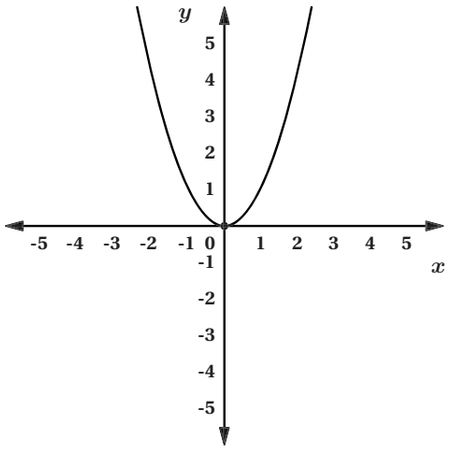
Input	Output
1	1
2	1
0	No output
−1	0
−2	0

Name: ..... Date: ..... Period: .....

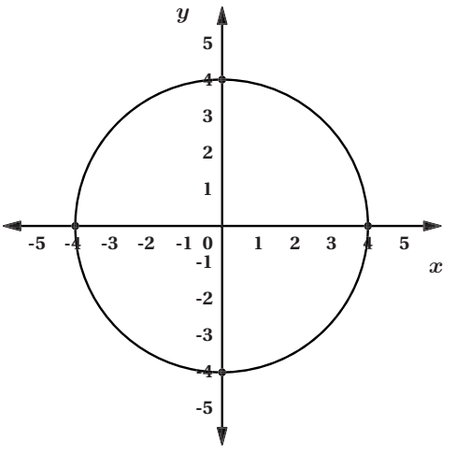
Additional Practice 5.03

1. Which graph represents y as a function of x?

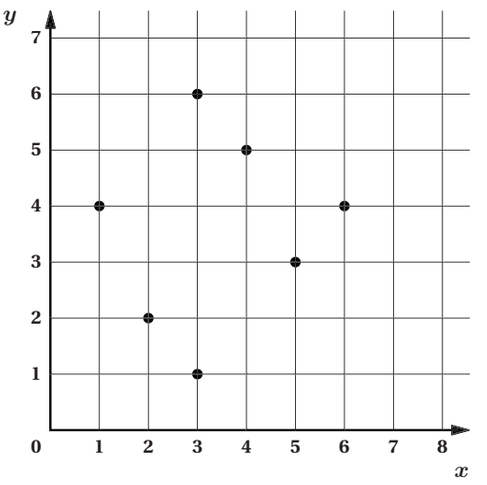
A.



B.



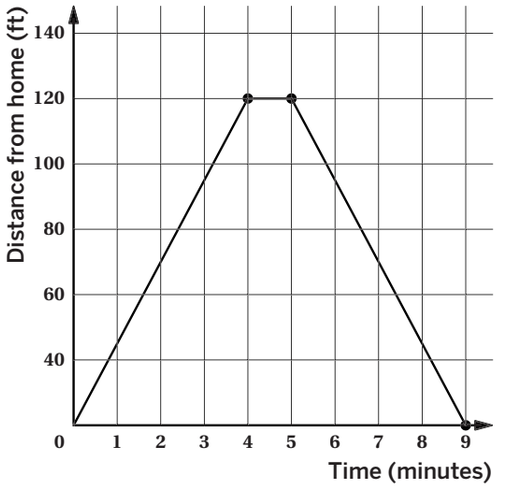
2. Refer to the graph. Which point on the graph could you remove so that y is a function of x?



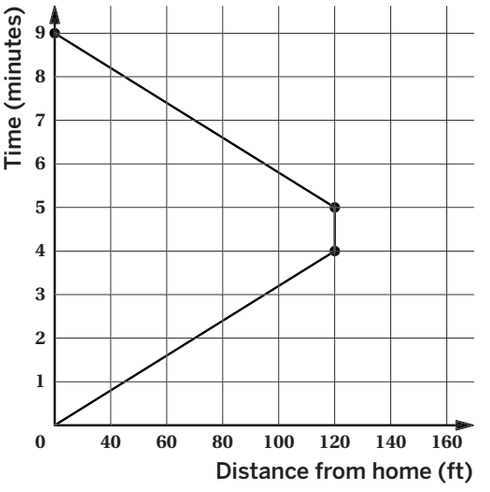
Name: ..... Date: ..... Period: .....

3. Clare rode her bike to her friends house and back. Both graphs show the relationship between her time and the distance from the starting point.

Graph A



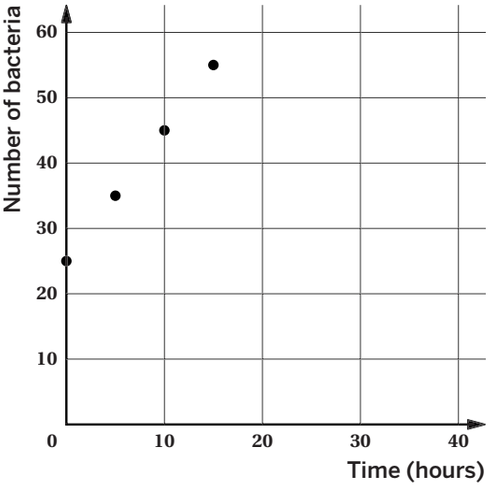
Graph B



Which graph represents Clare's distance from her house as a function of time? Explain your thinking.

A. Graph A **B.** Graph B **C.** Both graphs **D.** Neither graph

4. A scientist graphs the growth of a strain of bacteria. The graph represents a function. Suppose there was the same number of bacteria at 20 and 22 hours. Would the graph still be a function? Explain your thinking.



Name: ..... Date: ..... Period: .....

Additional Practice 5.04

1. Which equation expresses the output as a function of the input for the following scenario?

The amount your school charges c for t tickets to the school play that cost $\$4$ each.

A. $c = \frac{1}{4}t$

B. $t = \frac{1}{4}c$

C. $c = 4t$

D. $t = 4c$

2. Refer to the real-world description in Problem 1. Identify the independent variable and dependent variable.

a amount your school charges or c

b tickets or t

3. For each description, write an equation that expresses the output as a function of the input. Then determine the independent and dependent variables.

a The circumference C, of a circle with diameter, d.

Equation:

Independent variable:

Dependent variable:

b The selling price p, after a markup of 15% is applied to the original price of an item r.

Equation:

Independent variable:

Dependent variable:

c The area A, of a square with a side length s.

Equation:

Independent variable:

Dependent variable:

Name: Date: Period:

4. Han's family car averages 25 miles per gallon when driven. Han writes the equation $y = 25x$ to represent the distance, in miles, his family has traveled on a certain number of gallons of gasoline.

a Based on the equation, which variable represents the independent variable? Which variable represents the dependent variable?

b What do the independent variable and dependent variable represent in this situation?

5. Mai is buying vegetable plants for her garden. Tomato plants cost $\$3$ each and pepper plants cost $\$1$ each. Mai has $\$24$ to spend on these plants. Let t represent the number of tomato plants Mai buys and p represent the number of pepper plants Mai buys.

a Write an equation relating the two variables.

b Rewrite the equation so that it expresses p as the dependent variable in terms of t as the independent variable.

c Rewrite the equation so that it expresses t as the dependent variable in terms of p as the independent variable.

6. To determine the number of degrees Fahrenheit of a temperature given in degrees Celsius, you multiply the degrees Celsius by $\frac{9}{5}$ and add 32. For each description, write an equation that expresses the output as a function of the input. Then determine the independent and dependent variables.

a The temperature in degrees Celsius C, based on the temperature in degrees Fahrenheit F.

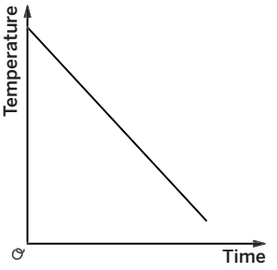
b The temperature in degrees Fahrenheit F, based on the temperature in degrees Celsius C.

Name: ..... Date: ..... Period: .....

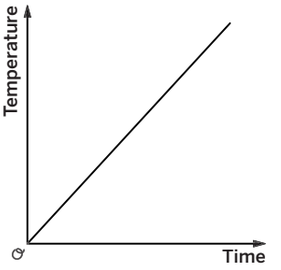
Additional Practice 5.05

1. Which graph(s) represents an increasing function? Select *all* that apply.

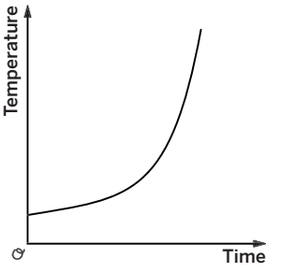
☐ A



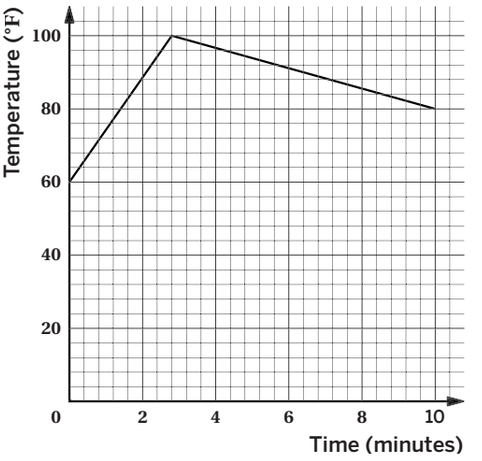
☐ B



☐ C



2. The graph shows the temperature of a liquid in a mug over time. Which best describes the graph of the function?



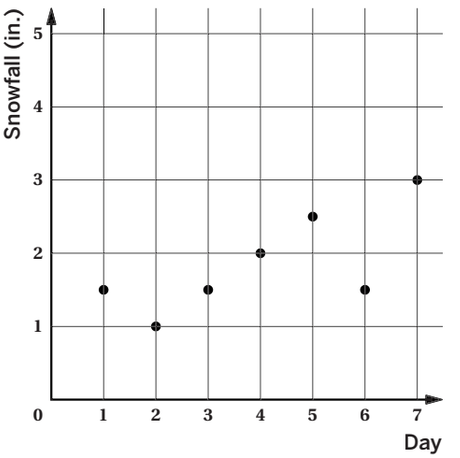
A. The temperature of the liquid slowly increases, and then slowly decreases over time.

B. The temperature of the liquid quickly decreases, and then slowly increases over time.

C. The temperature of the liquid quickly increases, and then decreases even faster over time.

D. The temperature of the liquid quickly increases, and then decreases more slowly over time.

3. The graph shows the total amount of snow that fell each day over a 7-day period.



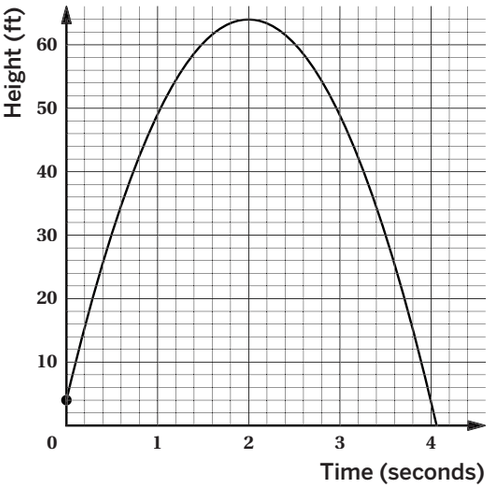
a What was the amount of snowfall for Day 2?

b On which day(s) was the amount of snowfall 1.5 in.?

c Is the amount of snowfall a function of the day or is the day a function of the amount of snowfall? Explain your thinking. Then determine the independent and dependent variables.

Name: ..... Date: ..... Period: .....

4. Andre's science class is launching model rockets from a picnic table. The graph represents a model rocket that is launched upward, that then falls to the ground.



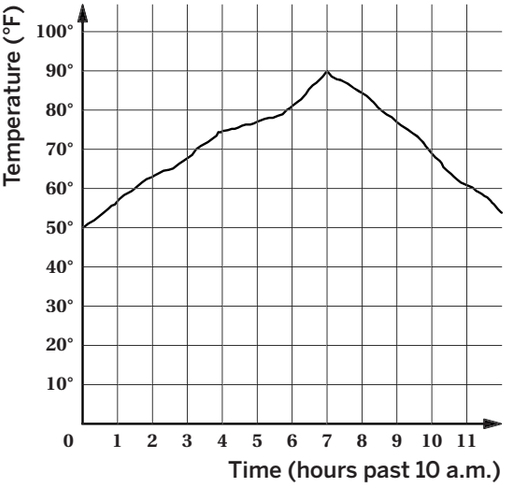
a What is the height at which the model rocket was launched?

b Plot the point that represents the greatest height of the model rocket. How long did it take for the model rocket to reach that height?

c Determine one time interval when the height of the object was increasing.

d Determine one time interval when the height of the object was decreasing.

5. The graph shows the temperature between 10 a.m. and 10 p.m. for one day in the city in which Lin lives.

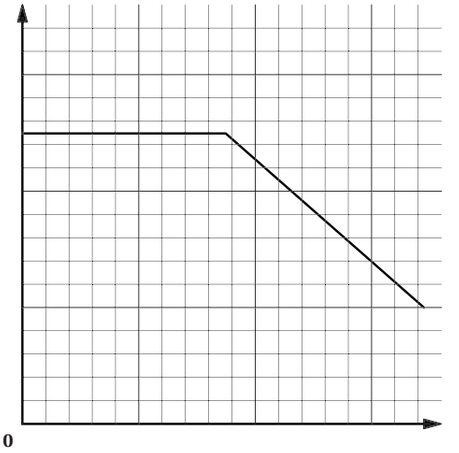


a When the input is 7, what is the output? What does that tell you about the time and temperature?

b Determine one time interval when the height of the object was increasing.

c Determine one time interval when the height of the object was decreasing.

6. Describe a real-world situation that would represent the graph. Label your axis.



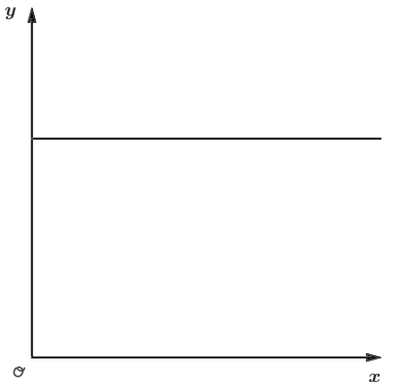
Name: ..... Date: ..... Period: .....

Additional Practice 5.06

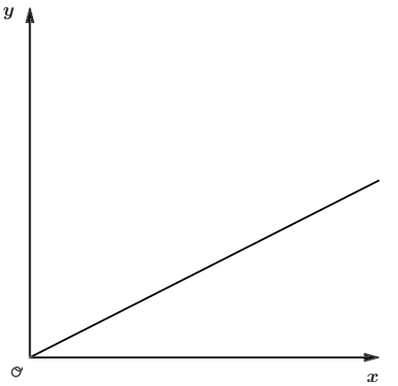
1. Which graph represents the following scenario?

Noah walks from his home to the park at a steady pace without stopping.

Graph A



Graph B



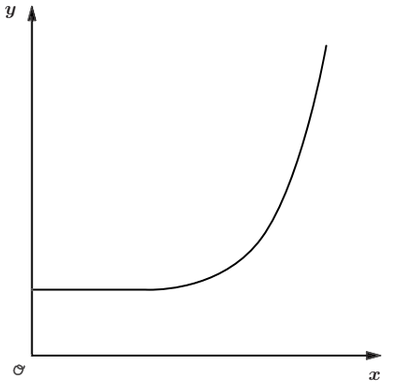
2. Refer to the scenario in Problem 1. Indicate whether the variable described is the possible *independent* or *dependent* variable.

a Distance from home

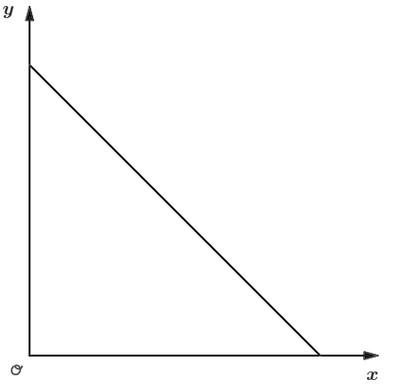
b Time

3. For each scenario, determine which graph best represents it. Then identify the possible independent and dependent variables and how you would label the axes. **Note:** You may select a graph more than once.

Graph 1



Graph 2



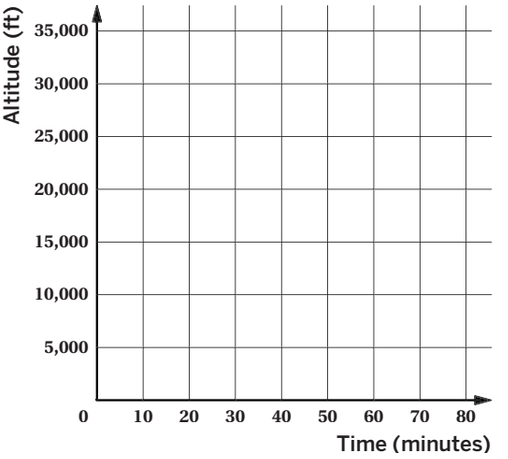
a Mai has some money saved and starts spending the same amount each week.

b The day started cold, but then it got warmer.

c The attendance at fitness class was low and consistent, and then started increasing each week.

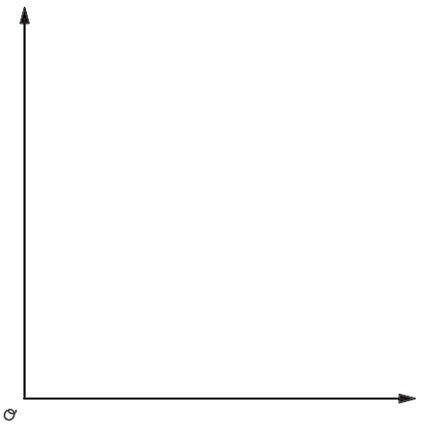
4. An airplane was at an altitude of $5{,}000$ ft. It took the airplane 30 minutes to go from an altitude of $5{,}000$ ft to $30{,}000$ ft. Once at that altitude, the airplane flew for 20 minutes. Then it took the plane 20 minutes to reach an altitude of $10{,}000$ ft.

Sketch a graph that represents this situation.



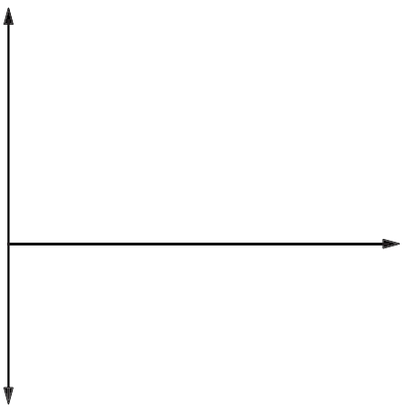
5. Tyler got on his rollerblades. He was slowing increasing his speed but then fell down. He got up and continued rollerblading, gradually increasing his speed.

Sketch a graph that corresponds with Tyler's speed, in miles per hour, after several minutes. Be sure to label the axes.



6. Kiran was on a water slide. He slid down the slide and dove into the water. He was below the surface water and immediately swam to the surface of the water. He swam at the surface of the water for a few minutes.

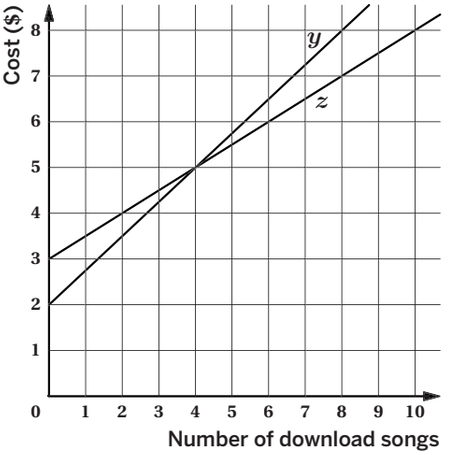
Sketch a graph that corresponds with Kiran's elevation at the distances from the edge of the pool. Be sure to label the axes.



Name: ..... Date: ..... Period: .....

Additional Practice 5.07

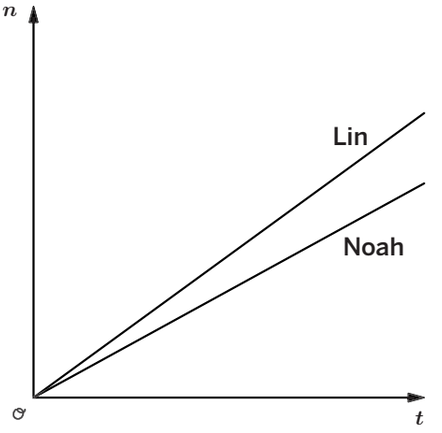
1. Andre is considering two online music subscriptions. Company A charges $\$3$ per month plus $\$0.50$ per downloaded song. Company B charges $\$2$ per month plus d dollars per downloaded song. Match the companies to the lines y and z shown on the graph.



Company A represents line .....

Company B represents line .....

2. Noah and Lin are having a typing contest. The graph shows the number of words typed n for each student from the start of the contest as a function of time t. Who is typing faster? Explain your thinking.



3. Mai and her sister each want to buy a new scooter and they plan to borrow money from their parents. They each plan to repay their parents the same amount of money every week, but Mai's scooter costs less than her sister's scooter. On a graph, the amount they owe their parents, in dollars, is a function of the time from when they begin paying their parents back the money they owe them.

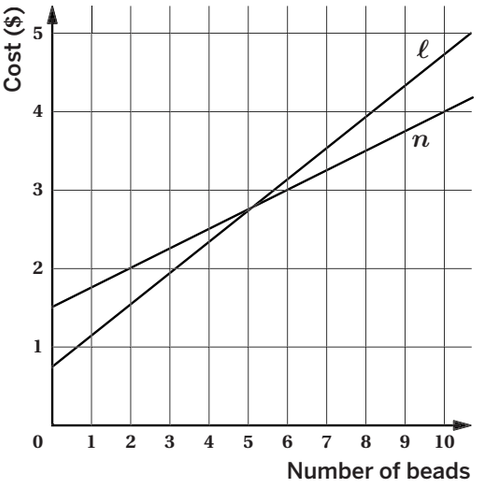
a As you read the graphs from left to right, would you expect the lines to increase or decrease?

b What would you expect to be *different* about the lines representing the amount Mai owes her parents and the amount her sister owes her parents? Explain your thinking.

c What would you expect to be *similar* about the lines representing the amount Mai owes her parents and the amount her sister owes her parents? Explain your thinking.

Name: Date: Period:

4. Shawn and Elena each sell customized bracelets. Shawn charges $\$0.75$ plus $\$0.40$ per bead added to the bracelet. Elena charges $\$1.50$ plus d dollars per bead added to the bracelet.

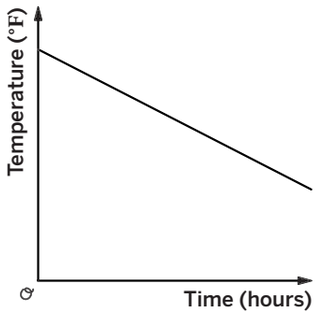


a Match each person to the lines ℓ and n shown on the graph.

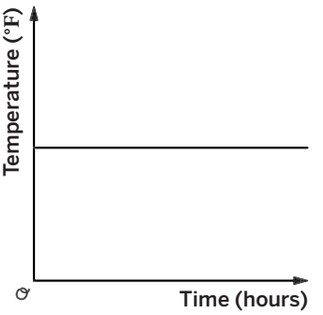
b For Elena, is the additional charge per bead greater than or less than $\$0.40$ per bead? Explain your thinking.

5. One day, a certain city's temperature steadily increased from noon to 6 p.m. Then from 6 p.m. until midnight its temperature steadily decreased.

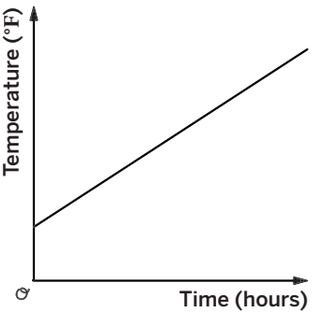
A.



B.



C.



a Which of the graphs is most likely to represent the temperature from noon to 6 p.m.? Explain your thinking.

b Which of the graphs is most likely to represent the temperature from 6 p.m. to midnight? Explain your thinking.

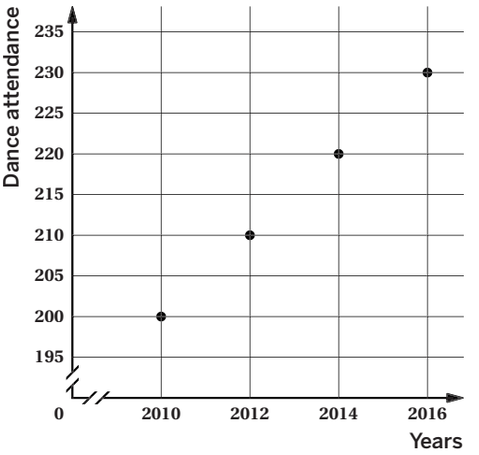
c Why does the other graph not likely represent the temperature during either time span? Explain your thinking.

6. Fitness Center A charges $\$25$ per month plus $\$2$ per visit. The monthly cost of Fitness Center B is represented by $y = 2x + 20$ where x is the number of visits. What can you conclude about the monthly costs of the fitness centers? Explain your thinking.

Name: ..... Date: ..... Period: .....

Additional Practice 5.08

1. This graph shows the attendance at an annual school dance over time. Select the statement that best describes the graph.

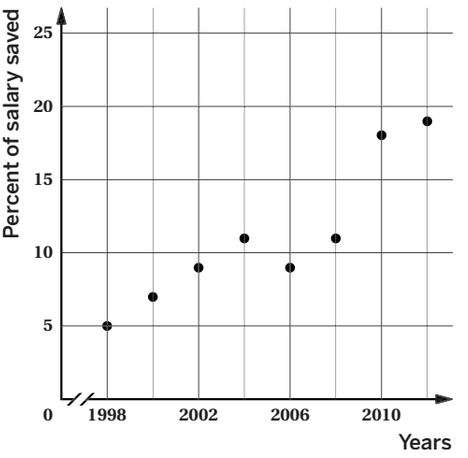


A. The graph represents a linear function because the attendance increases a constant rate.

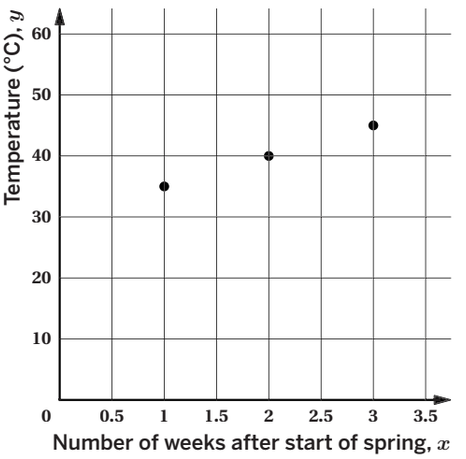
B. The graph does not represent a linear function because the attendance increases at a variable rate.

C. The graph represents a linear function because the attendance decreases a constant rate.

2. The graph shows the percent of Tyler's father's salary, saved over time. Tyler draws a linear function that models the change from 1998 to 2010. For which years is the model good at making predictions? For which years is it not as good?

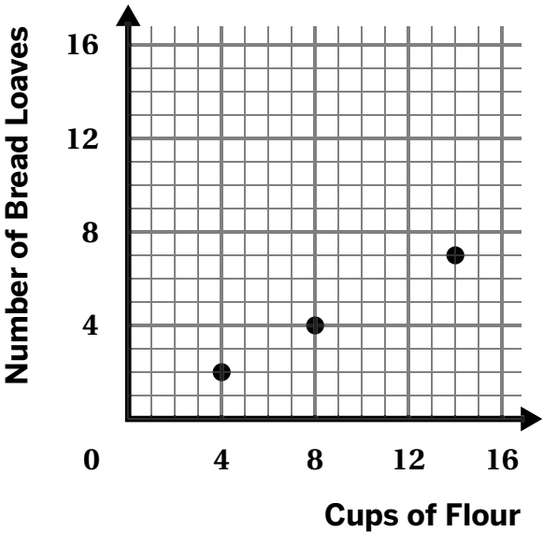


3. The graph shows the surface temperature at noon of a lake, y, (in degrees Celsius) for the number of weeks, x, after the start of spring. Based on this information, is the temperature at noon of the lake a linear function of the number of weeks after the start of spring? Explain your thinking.



Name: Date: Period:

Problems 4–6: This graph shows the relationship between the number of bread loaves, y, and the amount of flour used in a recipe, x, in cups.



4. How much does the flour increase for each bread loaf?

5. What should be the number of bread loaves for 12 cups of flour?

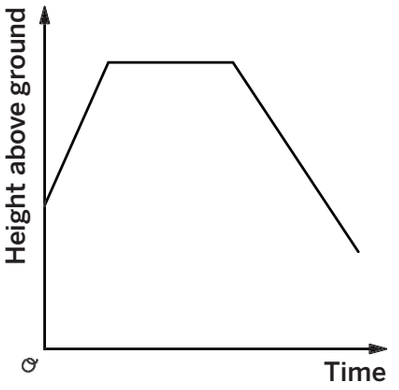
6. Is the relationship between the cups of flour and the number of bread loaves a linear function? If so, what does the slope of the line represent? If not, explain why not.

Name: ..... Date: ..... Period: .....

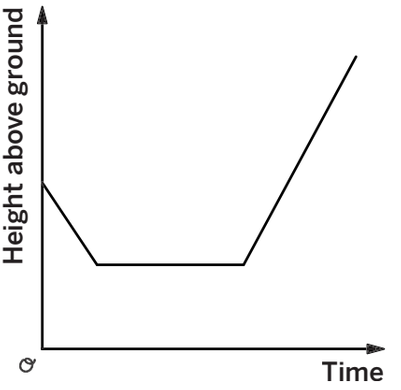
Additional Practice 5.09

1. The graph shows the height above ground of two elevators over time. Match each graph to the situation it represents.

Graph 1



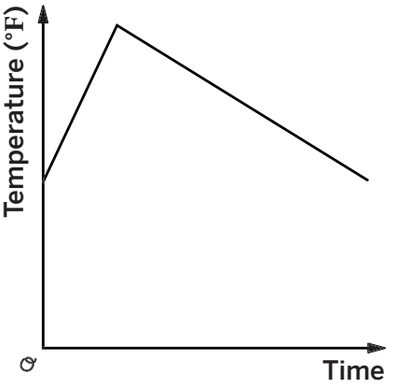
Graph 2



a The elevator starts at the fourth floor, then stops at the second floor, and then goes up to the seventh floor.

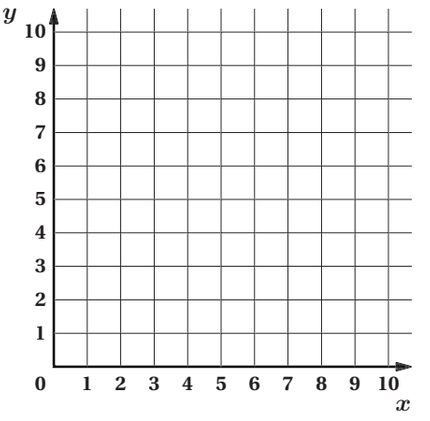
b The elevator starts at the third floor, then stops at the sixth floor, and then goes down to the second floor.

2. Mai had a teacup of water. The graph shows the temperature of water in a teacup. Describe a possible situation that could represent the graph.



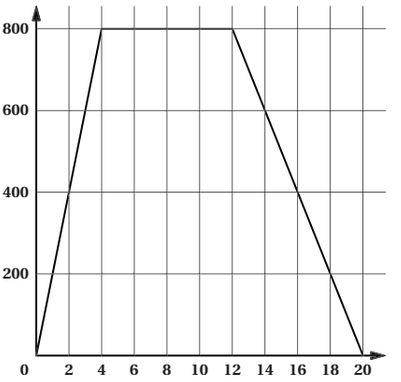
3. The following statements are descriptions of the linear segments that make up a piecewise function. Draw a graph of the piecewise function described.

- Starts at the y-intercept 1.
- Increasing at its greatest constant rate from $x = 0$ to $x = 3$.
- Has a slope of 0 from $x = 3$ to $x = 6$.
- Decreasing at a constant rate from $x = 6$ to $x = 8$.
- Has a slope of 0 from $x = 8$ to $x = 10$.



Name: ..... Date: ..... Period: .....

4. Clare walked her dog to the dog park and let the dog play at the park. Then she walked home.



a The graph shows her distance walked in yards, as a function of time, in minutes. Add the axes labels to the graph to show this.

b When did she reach the dog park?

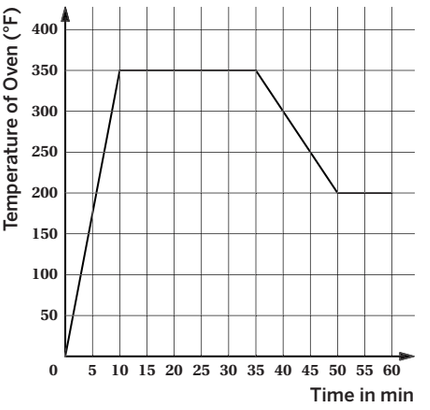
c How far did Clare walk to get to the dog park?

d How long were Clare and her dog at the dog park?

e At what rate did she walk to the dog park?

f At what rate did she walk home from the dog park?

5. Andre's dad is baking a casserole. He preheated the oven. The graph shows the temperature of the oven from when he turned the oven on.

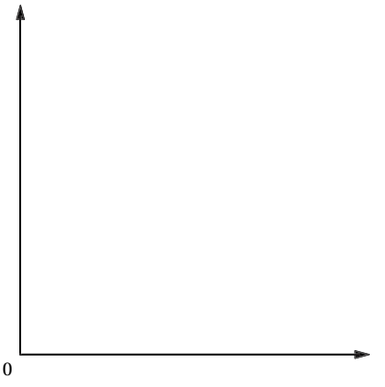


a When was the temperature of the oven increasing?

b What was happening from 10 minutes to 35 minutes after the stove was turned on?

c What rate did the temperature of the oven increase?

6. Noah graphed the growth of his flower. The flower grew at a steady rate until it reached its full height and then stopped growing.



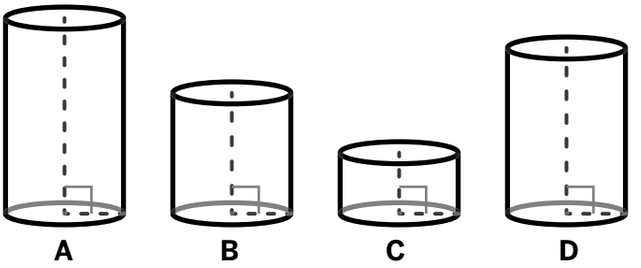
a What does Noah's graph look like?

b Han suggested that Noah's flower had a constant growth rate during this time because all parts of the graph can be represented by straight lines. Is he correct? Explain your thinking.

Name: Date: Period:

Additional Practice 5.10

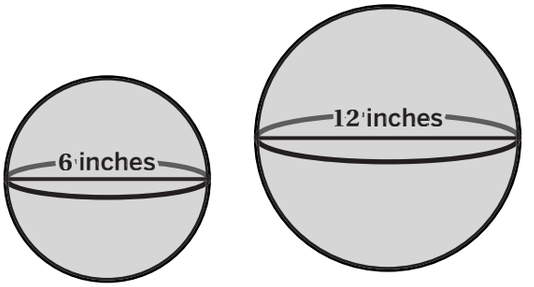
1. Cylinders A, B, and C have the same radius but different heights.



Order the cylinders from *least* volume to *greatest* volume.

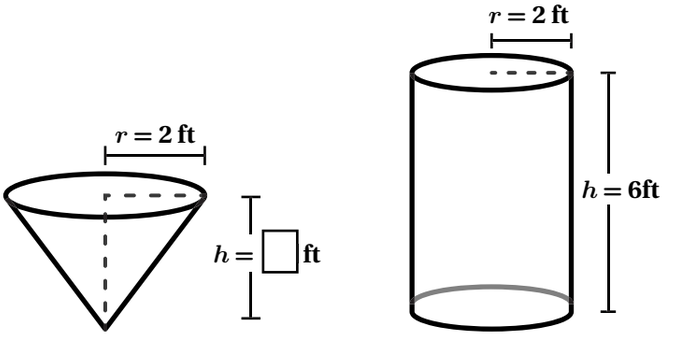
Least			**Greatest**

2. Kai bought a balloon for a birthday party. The diameter of the balloon measures 6 inches and has a volume of approximately 113 cubic inches. Kai would like a balloon that has double the diameter. He finds a sphere balloon that measures 12 inches in diameter. What is the approximate volume of this balloon? Explain your thinking.



Name: ..... Date: ..... Period: .....

3. Here is a cylinder and a cone. What does the height of the cone need to be so that the cylinder will have a volume that is three times greater than the cone?



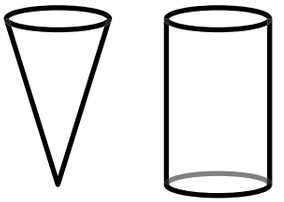
A. 2 feet

B. 3 feet

C. 6 feet

D. 18 feet

4. Maia bought two items at a flower shop, a bouquet of flowers and a vase. The bouquet of flowers is in the shape of a cone. The base of the bouquet has a height of 12 inches and a diameter of 6 inches. The vase is in the shape of a cylinder. The base of the vase also has a height of 12 inches and a diameter of 6 inches. How many bouquets would it take to fill the vase? Explain your thinking.

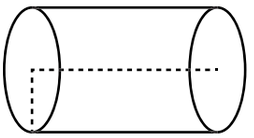


Name: ..... Date: ..... Period: .....

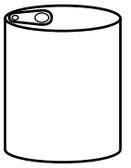
Additional Practice 5.11

1. For Cylinders A–D, draw the radius and the height. Label each radius with r and each height with h.

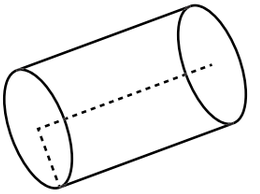
Cylinder A



Cylinder B

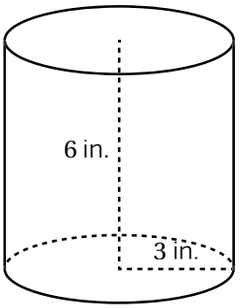


Cylinder C



Cylinder D

2. What is the volume of the cylinder shown?



A. 9π in^3

B. 18π in^3

C. 54π in^3

D. 108π in^3

3. Respond to the following questions.

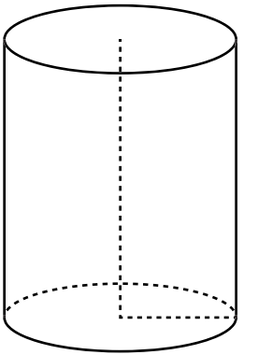
a Draw a cylinder. Label the radius 4 units and the height 10 units.

b Determine the area of the base. Write your response in terms of π.

c Determine the volume of the cylinder. Write your response in terms of π.

Name: ..... Date: ..... Period: .....

4. The cylinder shown has a height of 12 cm and a radius of 5 cm.



a How many cubic centimeters of fluid can fill this cylinder? Write your response in terms of π.

b Give a decimal approximation of your answer to the nearest hundredths place.

5. A preschool teacher stores modeling clay in two types of containers. One type of container is in the shape of a rectangular prism. The base has side lengths 14 cm and 21 cm, and the height is 8 cm. The second container is in the shape of a cylinder with a diameter of 20 cm. The height of the cylinder container is 8 cm, the same height as the rectangular container.

a Which is greater in area, the rectangular base of the rectangular container or the circular base of the cylinder container? Show your thinking.

b Which is greater in volume, the rectangular container or the cylinder container? Show your thinking.

6. Cylinder A has a radius of 9 in. Cylinder B has the same height as Cylinder A and a radius of one third as long as Cylinder A. What fraction of the volume of Cylinder A is the volume of Cylinder B? Show or explain your thinking.

7. Andre says that if you double the height of a cylinder, it will have the same effect on the volume as doubling the radius of the cylinder. Do you agree with Andre? Show or explain your thinking.

Name: Date: Period:

Additional Practice 5.12

1. Each row of this table lists information about a specific cylinder. Complete the table.

Diameter (units)	Area of Base (square units)	Height (units)	Volume (cubic units)
	9π	3	
4		5	
2			2π
	25π	6	

Problems 2–5: George buys soup at the store. The soup cans are in the shape of cylinders. All the soup cans have a height of 5 inches. Let r represent the radii of the soup cans, in inches, and V represent the volume of the soup cans, in cubic inches.

2. Write an equation that represents the relationship between the volume, V, and the radius, r, for all the soup cans with a height of 5 inches.

3. Complete this table:

r (inches)	4	5	6
V (cubic inches)			

4. George notices a jumbo soup can that is now available at the store. The jumbo soup can is also in the shape of a cylinder and has a height of 5 inches, but the radius is 8 inches. What is the volume of this jumbo soup can in cubic inches?

A. 80π

B. 160π

C. 240π

D. 320π

Name: Date: Period:

5. If the radius of the soup can is doubled, does the volume double?

Yes No Maybe

6. A cylinder has a volume of 216π cubic inches and a height represented by h. Complete this table with the volumes of other cylinders that have the same radius but different heights.

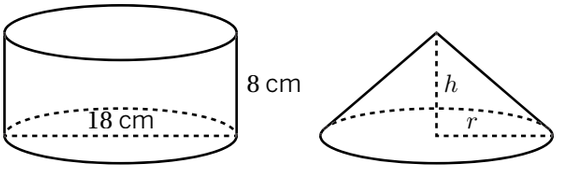
Height (inches)	Volume (cubic inches)
$\frac{h}{2}$	
$\frac{h}{3}$	
$2h$	
$3h$	
$4h$	

7. Using the volumes from the table, what do you think the volume of a cylinder with a height of $8h$ will be? Explain your thinking.

Name: ..... Date: ..... Period: .....

Additional Practice 5.13

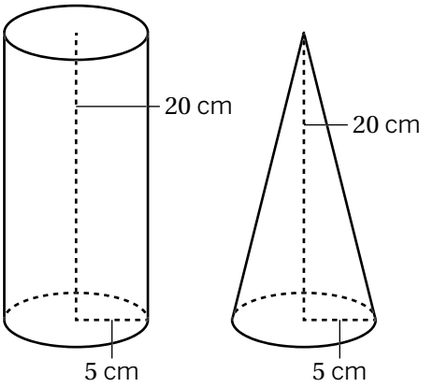
1. The cylinder and cone shown have the same height and the same base area.



a What is the radius r of the cone?

b What is the height h of the cone?

2. Which is a true statement about the volumes of the cylinder and cone?



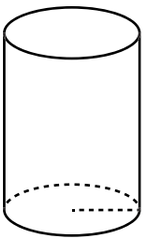
A. The volumes are equal.

B. The volume of the cone is $\frac{1}{3}$ times the volume of the cylinder.

C. The volume of the cylinder is $\frac{1}{3}$ times the volume of the cone.

D. The volume of the cone is 3 times the volume of the cylinder.

3. The volume of this cylinder is 72π mm^3. What is the volume of a cone that has the same base area and the same height?



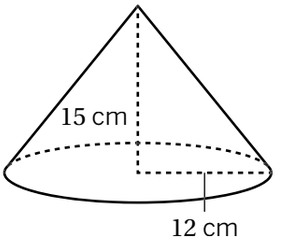
A. 24π mm^3

B. 36π mm^3

C. 72π mm^3

D. 216π mm^3

4. What is the volume of the cone shown?



A. 60π cm^3

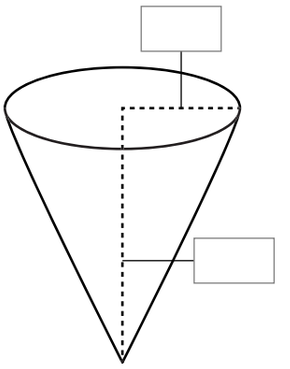
B. 180π cm^3

C. 720π cm^3

D. 900π cm^3

Name: ..... Date: ..... Period: .....

5. A cone-shaped hanging basket is used to grow flowers. The basket has a diameter of 14 in. and a height of 15 in.

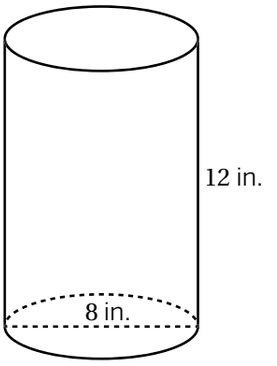


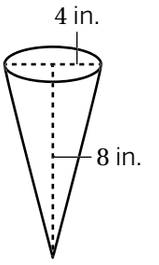
a Label the height and radius of the hanging basket.

b If the container is filled completely with potting soil, about how many cubic inches can the container hold? Round to the nearest tenth. Show your thinking.

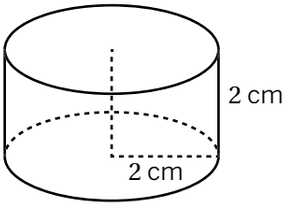
6. The volume of a cylinder is 96π cubic units. What is the volume of a cone that has the same base area and the same height as the cylinder? Explain your thinking.

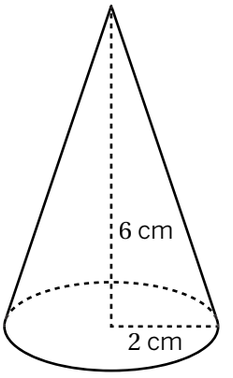
7. At a frozen yogurt shop, a cylinder-shaped container of frozen yogurt has the base diameter and height shown. The shop serves the frozen yogurt in waffle cones that have a base diameter of 4 in. and a height of 8 in. If each waffle cone is filled completely with frozen yogurt, how many cones can be filled from one container of frozen yogurt? Explain your thinking.





8. Study the cylinder and cone shown. Bard claims that the cone has a greater volume than the cylinder. Han argues that the cylinder has the greater volume. Who is correct? Explain your thinking.





Name: Date: Period:

Additional Practice 5.14

1. Each row of the table has information about a particular cylinder. Determine the missing dimensions and complete the table.

Radius (units)	Area of base (square units)	Height (units)	Volume (cubic units)
2			24π
4		9	
	64π	3	

2. A cylinder has a volume of 90π mm^3 and a height of 10 mm. What are the radius and diameter of the cylinder?

A. The radius is 4.5 mm; the diameter is 9 mm.

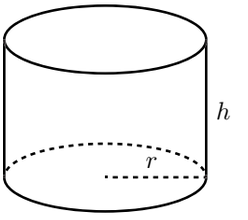
B. The radius is 3 mm; the diameter is 6 mm.

C. The radius is 1.5 mm; the diameter is 3 mm.

D. The radius is 9 mm; the diameter is 18 mm.

3. A cylinder has a volume of 112π in^3 and a height of 7 in. What is its radius? Show or explain your thinking.

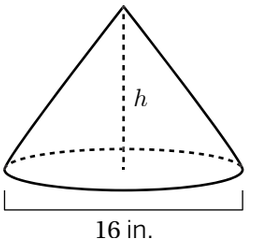
4. This cylinder has a volume of 45π cm^3 and a diameter of 6 cm. Determine the radius and height of the cylinder.



Name: ..... Date: ..... Period: .....

5. The volume of a cylinder is 245π cubic units. What is the exact volume of a cone that has the same base area and the same height? Explain your thinking.

6. The cone shown has a volume of 256 in^3. What is its height?



A. $\frac{4}{\pi}$ in.

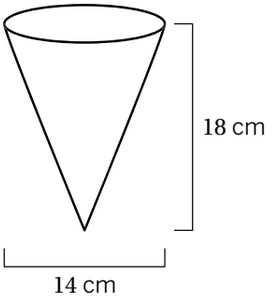
B. $\frac{12}{\pi}$ in.

C. $\frac{16}{\pi}$ in.

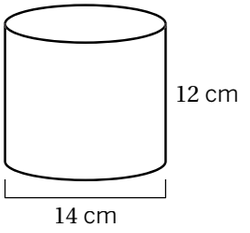
D. $\frac{48}{\pi}$ in.

7. Two containers of potpourri are sold for the prices advertised:

Container A: $\$5.25$



Container B: $\$11.50$



Which container is the better value? Show or explain your thinking.

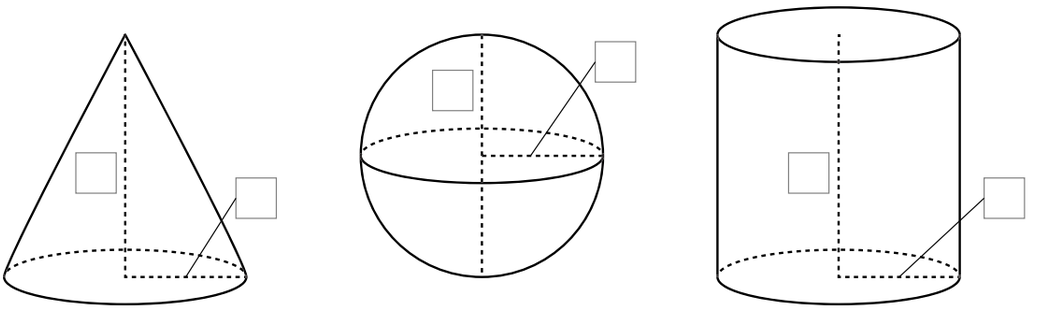
Name: Date: Period:

Additional Practice 5.15

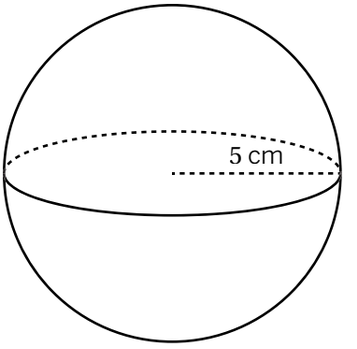
1. Complete the following table for different spheres.

Radius	14 in.		$\frac{500}{3}$ ft		4.09 m	
Diameter		16 cm		$\frac{700}{3}$ yd		4.09 m

2. The cylinder, cone, and sphere all have the same radius and height. The radius of the cone is 7 units. Label the radius and height on each figure, in units.



3. Use the formula $V = \frac{4}{3}\pi r^3$ to determine the volume of the sphere with a radius of 5 cm.



A. $\frac{125}{3}\pi$ cm^3

B. $\frac{500}{3}\pi$ cm^3

C. 125π cm^3

D. 500π cm^3

4. A sphere has a diameter of 12 in. What is the volume of the sphere? Write your response in terms of π.

Name: ..... Date: ..... Period: .....

5. Which of the following are true statements about the volumes of a sphere, a cone, and a cylinder with the same dimensions? Select *all* that apply.

- ☐ **A.** The sphere has the greatest volume.
- ☐ **B.** The cone's volume is half the sphere's volume.
- ☐ **C.** The cone's volume is half the cylinder's volume.
- ☐ **D.** The sphere's volume is double the cone's volume.
- ☐ **E.** The cylinder's volume is $\frac{3}{2}$ the sphere's volume.
- ☐ **F.** The sphere's volume is $\frac{2}{3}$ the cylinder's volume.

6. Match the description of each sphere to its volume.

a. Sphere A: radius of 7 cm ..... $\frac{32}{3}\pi \text{ cm}^3$

b. Sphere B: radius of 2 cm ..... $\frac{256}{3}\pi \text{ cm}^3$

c. Sphere C: diameter of 8 cm ..... $\frac{1372}{3}\pi \text{ cm}^3$

d. Sphere D: radius of 9 cm ..... $972\pi \text{ cm}^3$

7. A cube's volume is 216 in^3.

a What is the length of its edge?

b If a sphere fits snugly inside this cube, what is the volume of the sphere? Show or explain your thinking.

c What percent of the cube is taken up by the sphere? Round to the nearest whole percent. Show or explain your thinking.

Grade 8 | Unit 6

Additional Practice

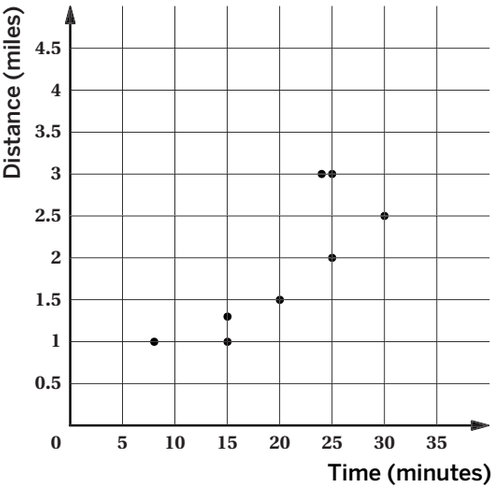
Practice Problems

Name: ..... Date: ..... Period: .....

Additional Practice 6.01

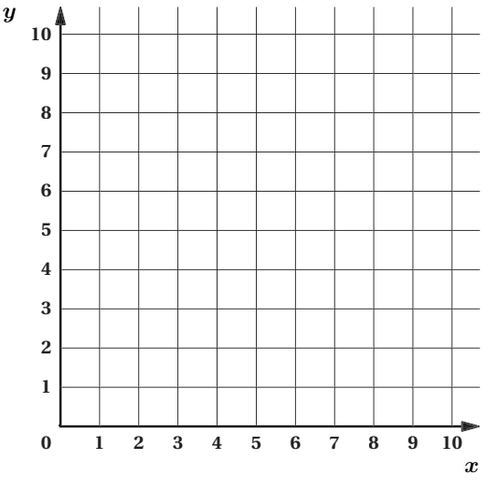
1. The graph shows the relationship between the amount of time, in minutes, and the distance, in miles, ran by eight different runners. Determine the coordinates for each point in the scatter plot.

Time (minutes) x	Distance (miles) y



2. Create a scatter plot from the data shown in the table.

x	y
3	2
4	4
2	5
7	5
4	3
3	6
1	8
6	6

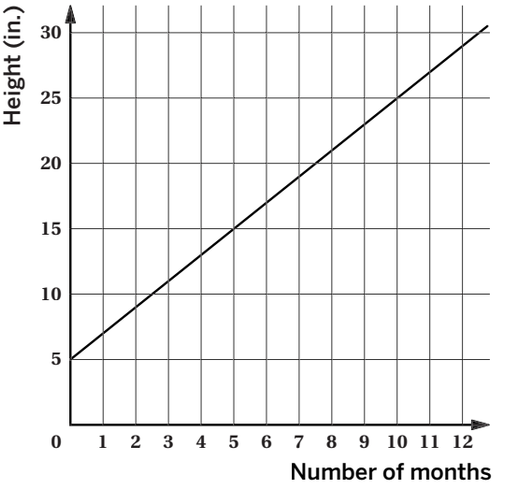


Name: ..... Date: ..... Period: .....

3. Refer to the scatter plot in Problem 1. What patterns, if any, do you see in the data? Explain your thinking.

4. When is it helpful to use a table to represent data instead of a scatter plot? Explain your thinking.

5. The graph shows the height h in inches of a house plant m months after it has been planted.



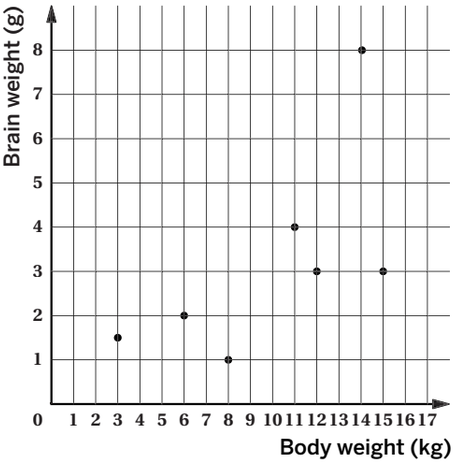
a Write an equation that gives the plant's height h after m months.

b After how many months will the plant be 95 in. tall? Show or explain your thinking.

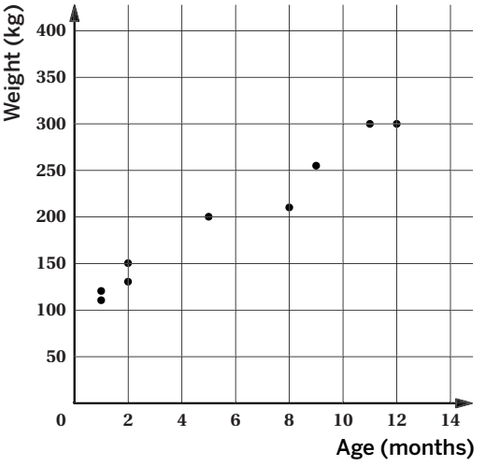
Name: ..... Date: ..... Period: .....

Additional Practice 6.02

1. The scatter plot shows the body weight and brain weight, in grams, of eight small animals. Circle the point that represents the animal with the lightest brain.

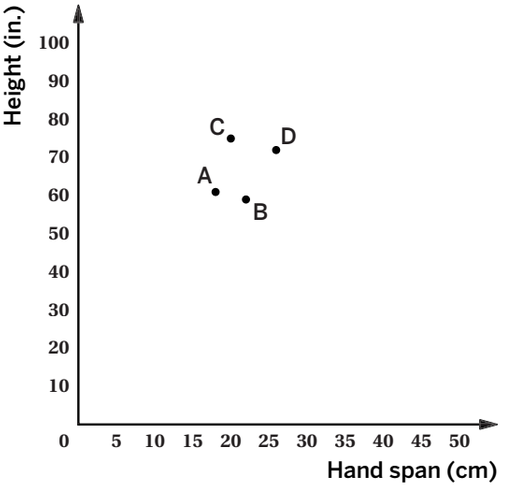


2. The scatter plot shows the age, in months, and weight, in kilograms, of nine elephants. Which elephant(s) weigh the most? Circle those points. Then list the age(s) and weight(s) of the elephant(s).



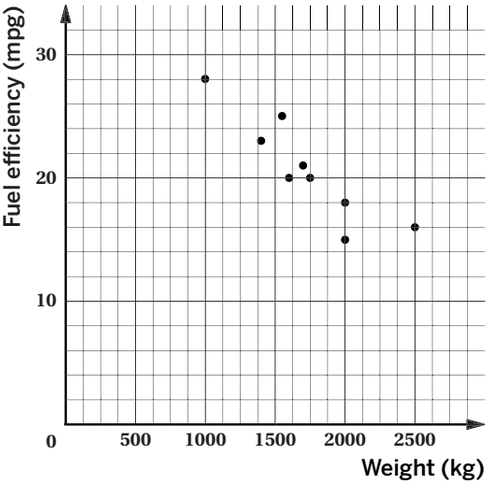
3. The table shows the hand span, in centimeters, and the height, in inches, of five middle school students. Add a point to the graph that represents Student E.

Student	Hand span (cm)	Height (in.)
A	18	61
B	22	59
C	20	75
D	26	72
E	20	72



Name: ..... Date: ..... Period: .....

4. The fuel efficiency of a vehicle can be expressed as the distance traveled per unit of fuel used, e.g., miles per gallon (mpg). The scatter plot shows the weight and fuel efficiency of nine different cars.



a How much does the heaviest car weigh?

b What is the weight and fuel efficiency of the car with the highest fuel efficiency?

c Plot a point on the graph that represents a car that has a fuel efficiency less than 20 mpg and a weight of 1,500 kg.

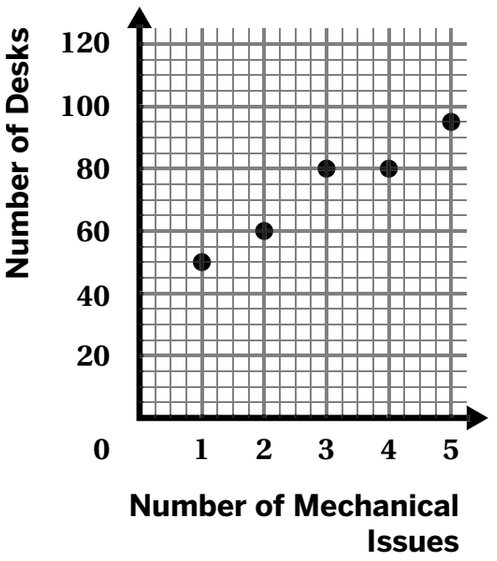
5. The table from a local clothing store compares the average monthly temperature, in degrees Celsius, to coat sales, in dollars. Elena plans to create a graph to represent this data. What does the point $(13, 840)$ represent?

Temperature (degrees Celsius)	Coat sales (dollars)
1	1,245
3	1,040
7	1,115
13	840
24	235

Name: Date: Period:

Additional Practice 6.03

Problems 1–4: A factory produces wood desks for offices. This scatter plot shows the number of mechanical issues and the number of desks produced for five machines at a factory.



1. What is the number of desks produced at a machine with the most mechanical issues?

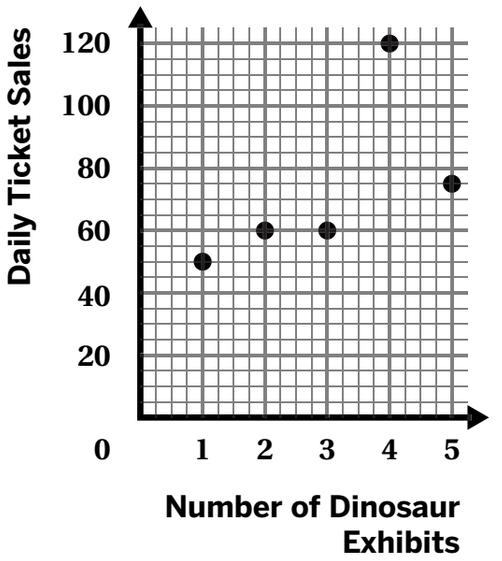
2. What is the number of mechanical issues for a machine that produces the least number of desks?

3. The number of desks produced at a machine that has 0 mechanical issues is 60 desks. Plot a point on the graph that represents this machine.

Name: ..... Date: ..... Period: .....

Problems 5–6: A study gathered data about different natural history museums. The table and scatter plot shows the number of exhibits and the number of daily ticket sales for each museum.

Museum	Dinosaur Exhibits	Daily Ticket Sales
National Dinosaur Museum	4	120
Time Capsule Institute	2	60
The Hall of History	1	50
The Museum of National Treasures	5	75
The Hall of Historical Tales	3	60



5. Circle the point on the scatter plot that represents the data for the National Dinosaur Museum.

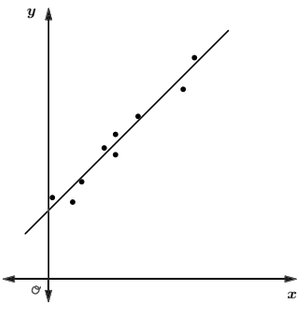
6. What does the point $(1, 50)$ represent?

Name: ..... Date: ..... Period: .....

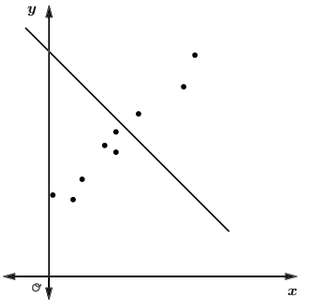
Additional Practice 6.04

1. Select the graph whose line best fits the data.

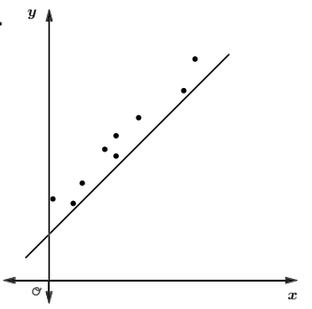
☐ A.



☐ B.

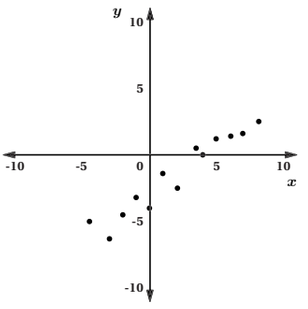


☐ C.

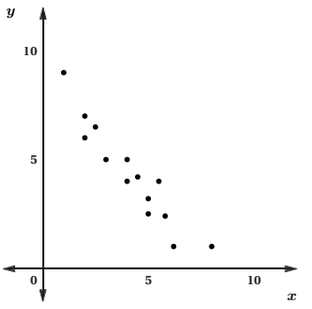


2. For each graph, draw a line that models the data.

a

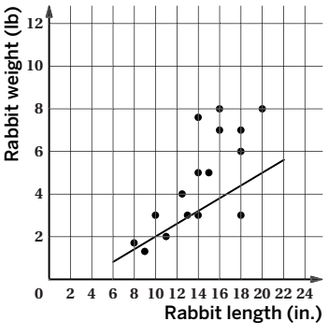


b

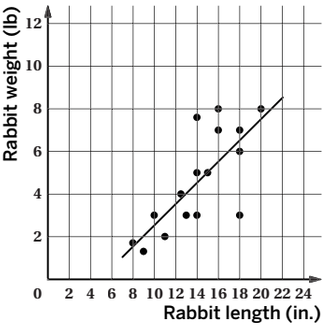


3. The two scatter plots have the same data, but different lines. Which line is a better fit? Explain your thinking.

A.



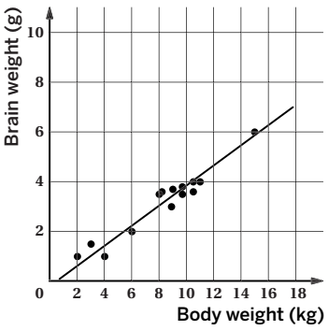
B.



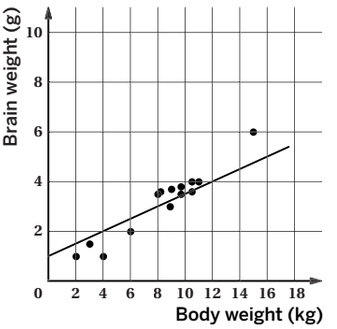
Name: ..... Date: ..... Period: .....

4. The two scatter plots have the same data, but different lines. Which line is a better fit? Explain your thinking.

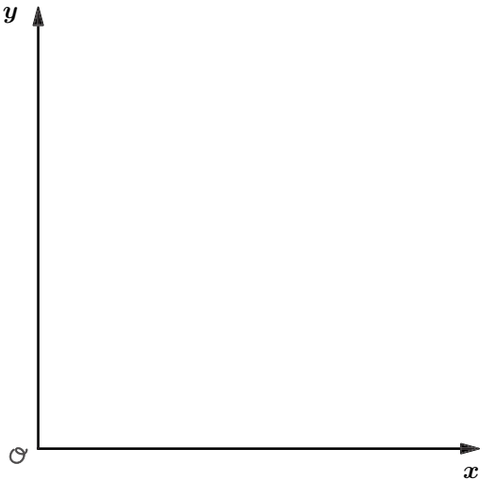
A.



B.



5. Create a scatter plot that has a positive association without clustering. Then draw a line of fit for your scatter plot.



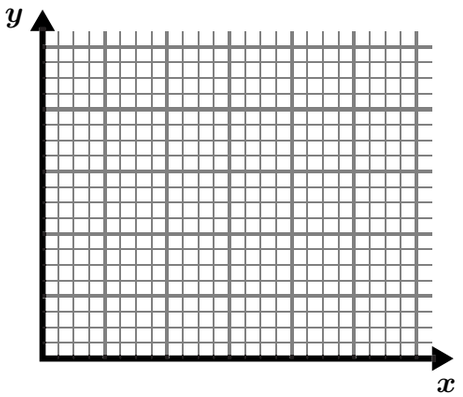
Name: ..... Date: ..... Period: .....

Additional Practice 6.05

Problems 1–2: Use the table.

x	y
1	2
2	5
3.5	6
4	8
5	8.5
5.5	9

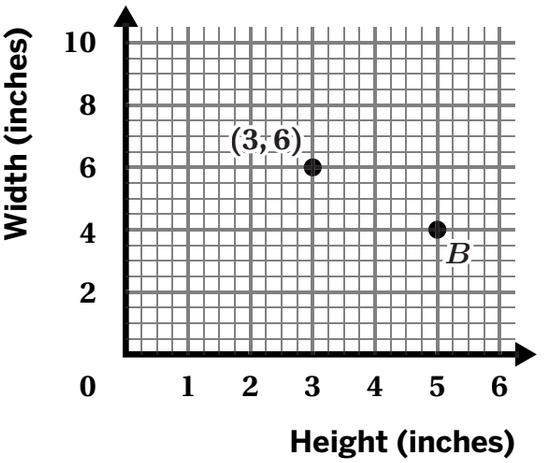
1. Create a scale for the graph so it fits all the data. Then create a scatter plot of the data.



2. What pattern do you notice in the scatter plot?

Name: ..... Date: ..... Period: .....

Problems 3–5: The graph shows the height and width of sketchbooks available at an art store.



3. What does the point $(3, 6)$ tell you about the sketchbook?

4. Plot a point to represent a different sketchbook that has a height of 4 inches and a width of 9 inches.

5. What values represent point *B*?

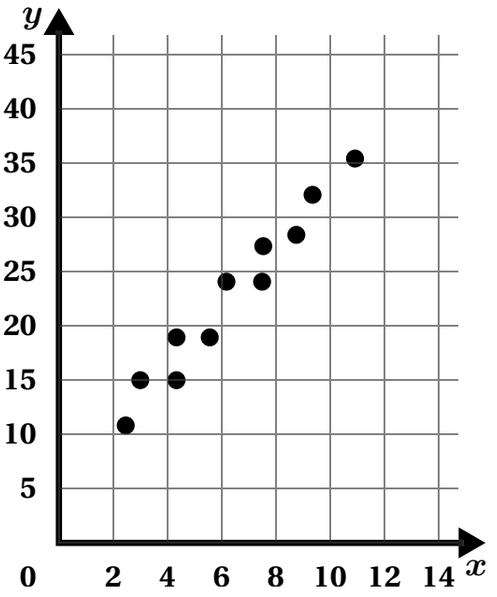
- ☐ **a.** $(5, 4)$
- ☐ **b.** $(4, 5)$
- ☐ **c.** $(4, 4)$
- ☐ **d.** $(4, 6)$

Name: ..... Date: ..... Period: .....

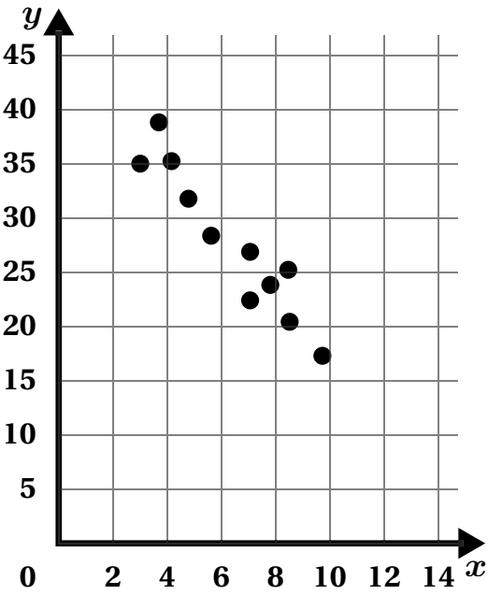
Additional Practice 6.06

Problems 1–2: Sketch a line that fits the data.

1.

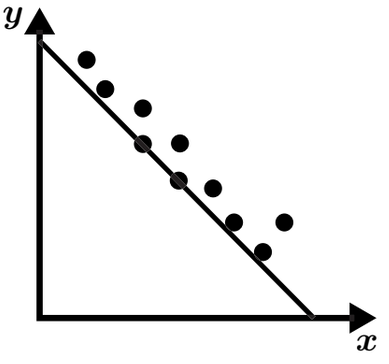


2.

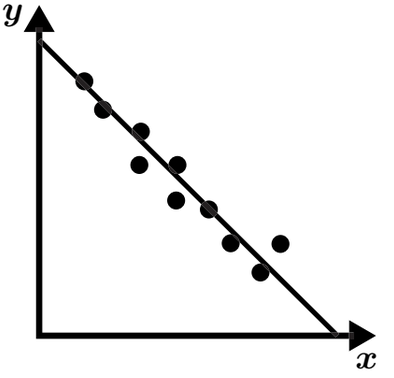


3. Which line best fits the data? Explain your thinking.

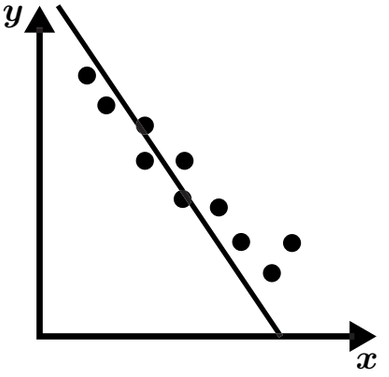
A.



B.

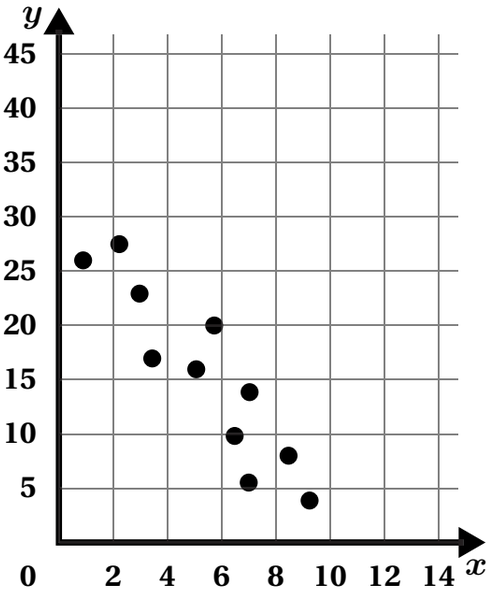


C.



Name: Date: Period:

Problems 4–5: Use this scatter plot.



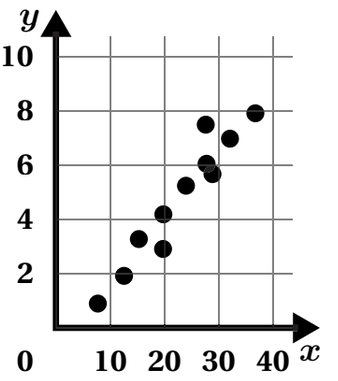
4. Sketch a line of fit for the data.

5. If a new data point has an x-value of 4, what does your line of fit predict for the value of y? Explain your thinking.

Name: ..... Date: ..... Period: .....

Additional Practice 6.07

1. Which type of association does the scatter plot show?



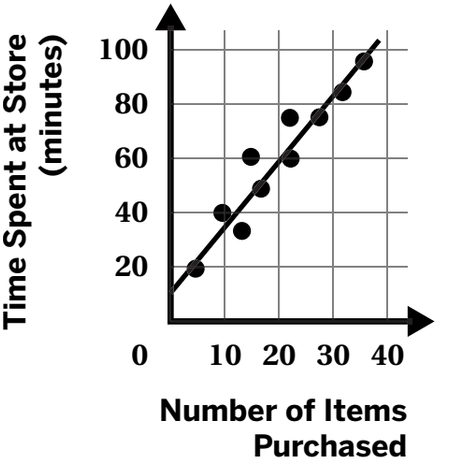
A. Positive association

B. Negative association

C. No association

Explain your thinking.

Problems 2–4: The scatter plot shows the data from 10 customers shopping at a supermarket. The equation for this linear model is $y = 4.1x + 15.6$.



2. What is the slope of the linear model?

3. What does the slope represent in this situation?

4. What type of association is there between the number of items purchased and time spent at the store? Circle your choice.

Positive association **Negative association** **No association**

Explain your thinking.

Name: ..... Date: ..... Period: .....

Problems 5–6: Librarians looked at the relationship between the minutes spent reading a book (daily) and the number of spelling errors made when writing an email. They found the variables had a negative association.

5. What does this negative association mean about the relationship between time spent reading and the number of spelling errors when writing an email?

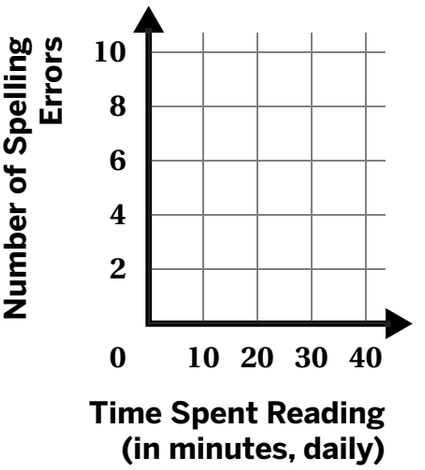
A. As the time spent reading increases, the number of spelling errors decreases.

B. As the time spent reading increases, the number of spelling errors increases.

C. As the time spent reading decreases, the number of spelling errors decreases.

D. There is no relationship between the time spent reading and the number of spelling errors.

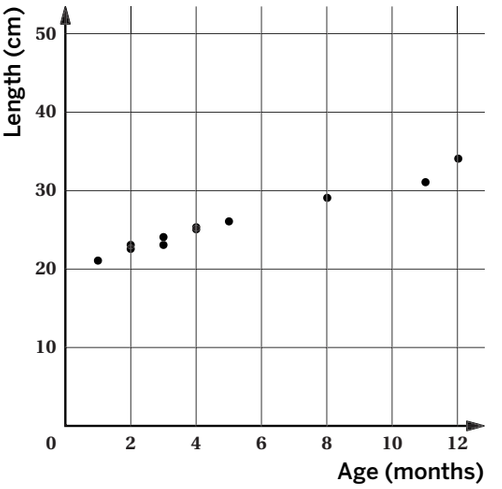
6. Create a scatter plot that represents this situation.



Name: ..... Date: ..... Period: .....

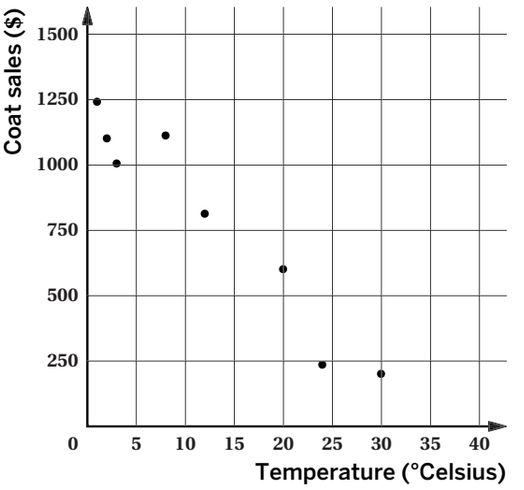
Additional Practice 6.08

1. Select *all* the following terms that describe the association represented in the scatter plot.



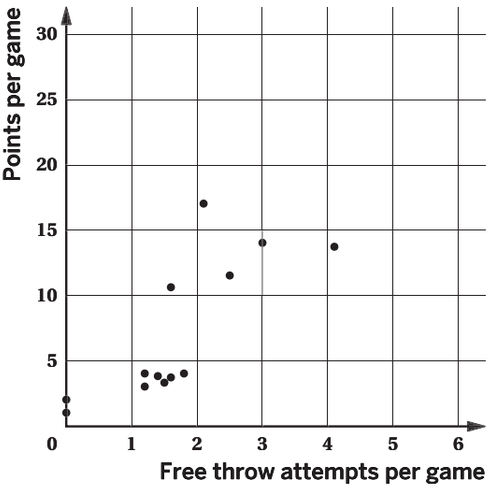
- ☐ **A.** Linear association
- ☐ **B.** Nonlinear association
- ☐ **C.** Positive association
- ☐ **D.** Negative association
- ☐ **E.** No association

2. Select *all* the following terms that describe the association represented in the scatter plot.



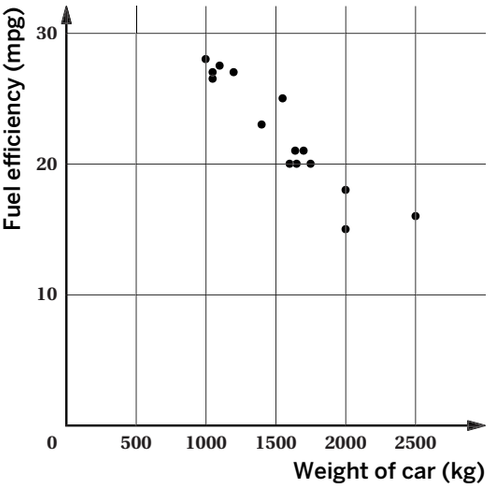
- ☐ **A.** Linear association
- ☐ **B.** Nonlinear association
- ☐ **C.** Positive association
- ☐ **D.** Negative association
- ☐ **E.** No association

3. Circle any clusters in the data. Use the labels on the axes to explain what the clusters mean in context.



Name: ..... Date: ..... Period: .....

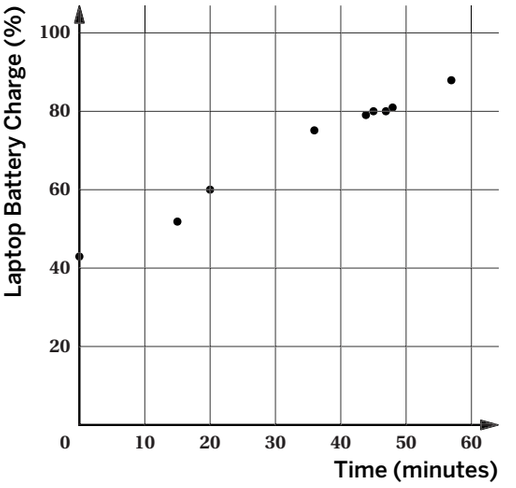
4. Circle any clusters in the data. Use the labels on the axes to explain what the clusters mean in context.



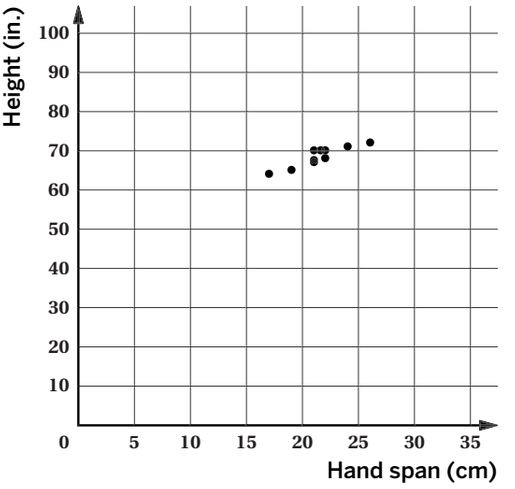
5. Consider the scatter plot shown.

a Determine the type(s) of association and indicate whether there is any clustering.

b Describe the association and clustering, if any, in context.



6. Noah creates the scatter plot shown and says that it has a positive, linear association and clustering. He explains that the association means that as a hand span increases the height of a person decreases. Do you agree with Noah? Explain your thinking.

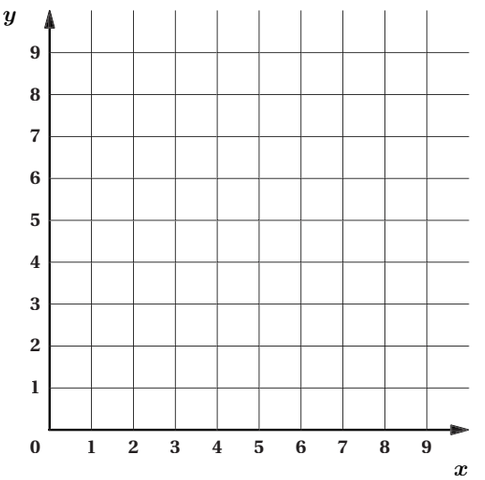


Name: ..... Date: ..... Period: .....

Additional Practice 6.09

1. Plot the points to create a scatter plot of the data, and then draw a line to model the data.

x	y
2.4	7.6
3.7	8.9
3.1	8
2	4.9
1.5	4

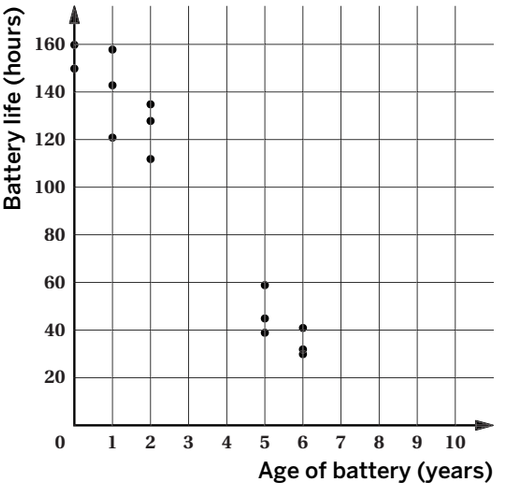


2. Kiran wants to draw a line to model the data shown on the graph. Which type of slope would best fit his line?

A. Positive

B. Negative

C. Zero



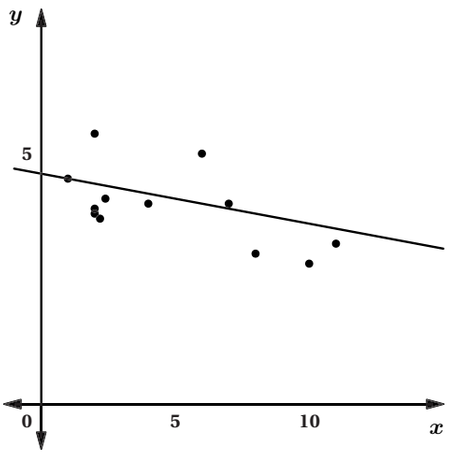
3. Which of the following equations might be the linear model that describes the data?

A. $y = -0.1x$

B. $y = 0.1x - 4.5$

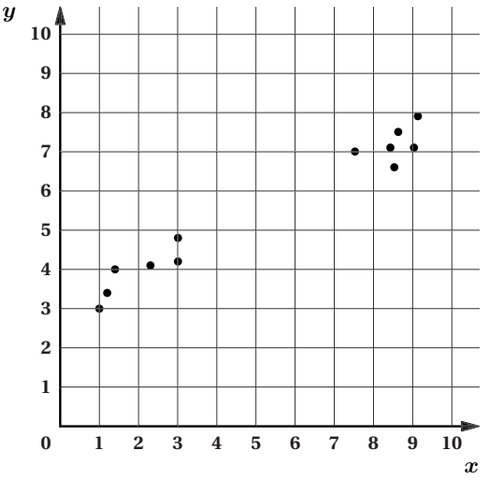
C. $y = -0.1x + 4.5$

D. $y = 4.5x + 4.5$



Name: ..... Date: ..... Period: .....

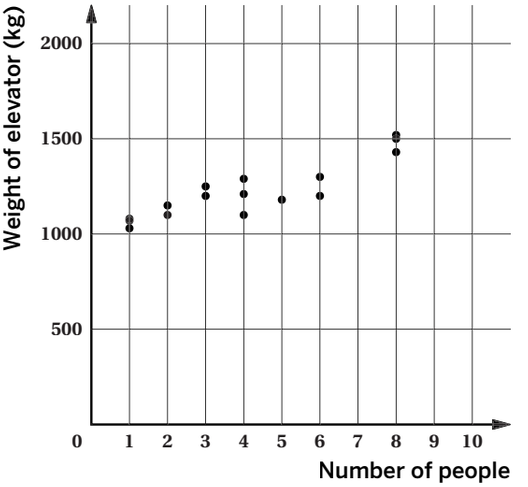
4. For the scatter plot shown, complete the following.



a Draw a line of fit to model the data.

b If a new point is added to the scatter plot where $x = 6$, what do you predict for the value of y of this point? Add this point to the scatter plot.

5. The scatter plot shows the relationship between the number of people in an elevator and weight in kilograms.



a Draw a line of fit to model the data.

b Write an equation for your line.

c What does your linear model's slope represent in this context?

d What does your linear model's y-intercept represent in this context?

6. Clare determined the equation for the line of fit of a data set. She noticed that, for a given value of x, her equation predicts a different value of y than is observed in the data. Is her equation incorrect? Explain your thinking.

Name: ..... Date: ..... Period: .....

Additional Practice 6.10

1. The two-way table shows the relationship between news-reading habits among different age groups. What does the number 132 represent in the table?

	Internet media	Print media	Total
18–25 year olds	151	28	179
26–45 year olds	132	72	204
Total	283	100	383

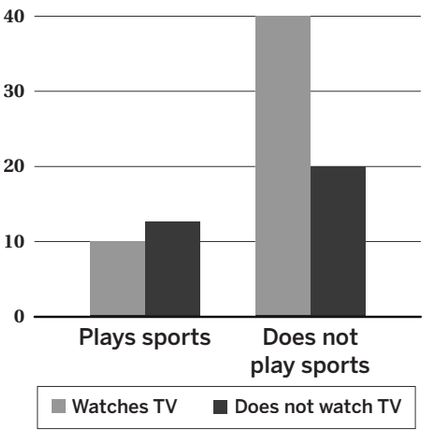
A. 132 people, who are 18–25 years old and read print media.

B. 132 people, who are 26–45 years old and read print media.

C. 132 people, who are 18–25 years old and read internet media.

D. 132 people, who are 26–45 years old and read internet media.

2. The double bar graph shows the relationship between watching TV and playing sports for several students in a middle school. How many students do not play sports and do not watch TV?



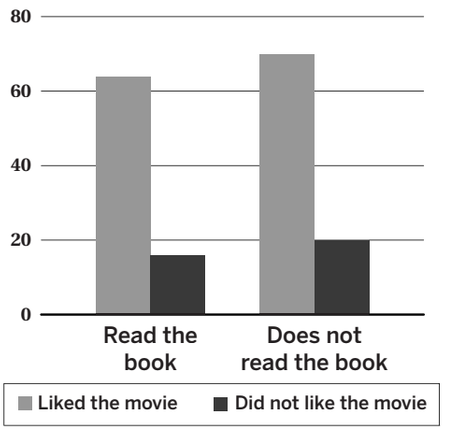
A. 10

B. 12

C. 20

D. 40

3. A teacher wants to know whether reading a certain book affects liking the movie adaptation of the book for middle school students. Several students' responses were recorded and then graphed using the bar graph shown. Is there evidence to suggest an association between reading the book and liking the movie? Explain your thinking.



	Liked the movie	Did not like the movie	Total
Read the book	64	16	80
Did not read the book	70	20	90
Total	134	36	170

Name: ..... Date: ..... Period: .....

4. A restaurant manager records whether people were satisfied with their food and service. Complete the two-way table. Then create a double bar graph to represent the data.

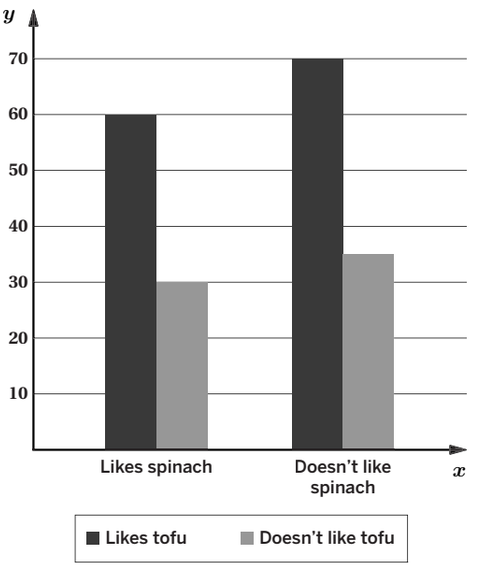
	Satisfied with the service	Dissatisfied with the service	Total
Satisfied with the food		8	
Dissatisfied with the food	9		30
Total		29	110

5. A journalist surveys several people about whether they will vote for or against two issues. Complete the two-way table. Then create a double bar graph to represent the data.

	For	Against	Total
Issue A	832		997
Issue B		160	
Total	912		1,237

6. Create a real-world example that is supported by this double bar graph. Create a two-way table with data that would support your example. Be sure to describe what association, if any, is in your data, and add labels to the graph and table.

	Likes spinach	Doesn't like spinach	Total
Likes tofu			
Doesn't like tofu			
Total			

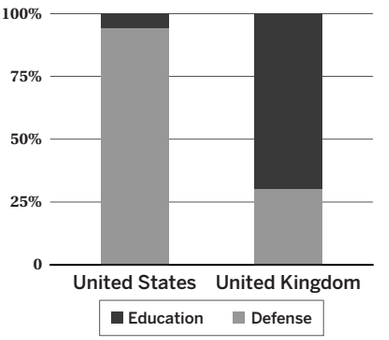


Name: ..... Date: ..... Period: .....

Additional Practice 6.11

1. The two-way table and segmented bar graph displays the government budgets for 2009, in billions of U.S. dollars. Which of the following describes the data?

	Defense	Education	Total
United States	718.4	44.9	763.3
United Kingdom	49.2	113.9	163.1
Total	767.6	158.8	926.4



A. There is no association; the relative frequency for each country is roughly the same.

B. There is a greater percentage of budget spent on education in the United States.

C. There is a greater percentage of budget spent on defense in the United States.

D. There is a greater percentage of budget spent on defense in the United Kingdom.

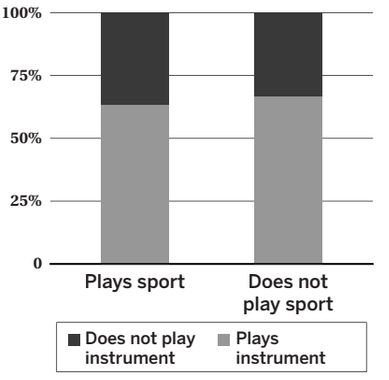
2. Complete the frequency table to represent the data from the two-way table, showing relative frequencies by column. Round to the nearest percent.

	Class A	Class B
Prefers math	6	8
Prefers science	2	10
Total	8	18

	Class A	Class B
Prefers math	75%	
Prefers science		
Total		

3. Students were asked if they play a sport or play a musical instrument. The results are shown in the table and in the segmented bar graph. Is there evidence of an association between playing a sport and playing an instrument? Explain your thinking.

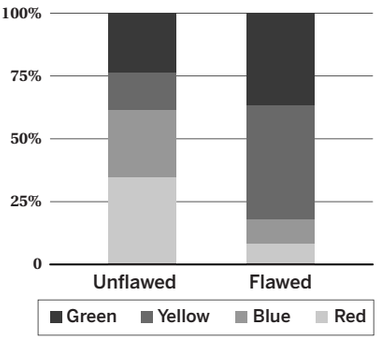
	Plays instrument	Does not play instrument	Total
Plays sport	12	7	19
Does not play sport	10	5	15
Total	22	12	34



Name: ..... Date: ..... Period: .....

4. The manager of an eraser factory notices some flaws in certain erasers. Each color eraser is made through a different machine. The manager collects data on the number of flawed and unflawed erasers of each color. The results are recorded in the table and are shown in the segmented bar graph. Is there evidence that the flawed erasers are associated with certain colors? Explain your thinking.

	Unflawed	Flawed
Red	285	15
Blue	223	17
Yellow	120	80
Green	195	65



5. A scientist is interested in whether certain plants attract more bees or butterflies. Do these data show an association between bees and butterflies and flower types? Explain your thinking.

	Daisies	Lavender
Bees	17	23
Butterflies	22	28

6. Several students at a middle school were asked whether they preferred drama or band classes. The results are shown in the two-way table.

Write a question that could be answered by the data in the table.

	Drama	Band	Total
7th grade	72	51	123
8th grade	85	32	117
Total	157	83	240

Grade 8 | Unit 7

Additional Practice

Practice Problems

Name: ..... Date: ..... Period: .....

Additional Practice 7.01

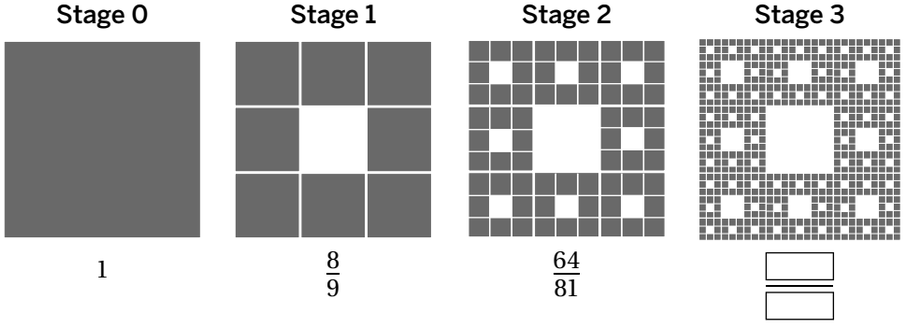
1. Match each single power with its expanded form.

Single power	Expanded form
a. 2^6	..... $3 \cdot 3 \cdot 3 \cdot 3$
b. 6^2	..... $4 \cdot 4 \cdot 4$
c. 4^3	..... $6 \cdot 6$
d. 3^4	..... $2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2$

2. Complete the table by writing the missing single power or expanded form.

Single power	Expanded form
10^2	
	$4 \cdot 4 \cdot 4 \cdot 4 \cdot 4$
	$\frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2}$
	$\frac{7}{9}$
$\left(1\frac{2}{3}\right)^4$	

3. The pattern shown is called Sierpiński's carpet. Study the pattern. The shaded area of each square in Stages 0–2 is written as a fraction of the total area, in square units. Write the fraction that represents the shaded area for Stage 3.



Name: ..... Date: ..... Period: .....

4. Han made $\$240$ mowing lawns last summer. He put the money in a savings account that pays 2% interest per year. If Han does not touch the money in his account, he can determine the amount he will have the next year by multiplying his current amount by 1.02.

a How much money will Han have in his account after 1 year? Explain your thinking.

b How much money will Han have in his account after 3 years? Explain your thinking.

c Write an expression for the amount of money Han would have after 20 years if he never withdraws money from the account.

5. Bard received $\$150$ as a gift and put the money in a savings account that pays 2.5% interest per year. If Bard does not touch the money in the account, Bard can determine the amount that will be in the account the next year by multiplying the current amount by 1.025.

a How much money will Bard have in the account after 1 year? Explain your thinking.

b How much money will Bard have in the account after 5 years? Explain your thinking.

c Write an expression for the amount of money Bard would have after 40 years if money was never withdrawn from the account.

6. Use exponents to write another expression equivalent to $(6)^3$. Explain your thinking.

7. The first three terms of a pattern are shown.

$\frac{3}{5}, \frac{9}{25}, \frac{27}{125}, \ldots$

a What is the 10th term of this pattern? Explain your thinking.

b Write an expression for the $n\text{th}$ term of this pattern. Explain your thinking.

Name: ..... Date: ..... Period: .....

Additional Practice 7.02

1. Write each expression as a single power. Show your thinking.

a $7^4 \cdot 7^7$

b $25^8 \cdot 25^3$

c $\left(\frac{2}{3}\right)^9 \cdot \left(\frac{2}{3}\right)^5$

d $(5.4)^{13} \cdot (5.4)^6$

e $(-3) \cdot (-3)^6$

f $6^{15} \cdot 16^7 \cdot 16^3$

2. Which expressions are equivalent to 10^{16}? Select *all* that apply.

- ☐ **A.** $10^4 \cdot 10^4$
- ☐ **B.** $10^2 \cdot 10^8$
- ☐ **C.** $10^8 \cdot 10^8$
- ☐ **D.** $10^{16} \cdot 10$
- ☐ **E.** $10^{15} \cdot 10$

3. Two of the following expressions are equivalent. Identify the expression that is *not* equivalent. Explain your thinking.

10^6 $10 + 10 + 10 + 10 + 10 + 10$ $10^3 \cdot 10 \cdot 10 \cdot 10$

4. A new large rectangular aquarium is 81 in. long, 81 in. wide, and 9 in. deep. The aquarium is filled to the top with water.

a Write each measurement of the aquarium as a single power of 9.

Length: ..... **Width:** ..... **Depth:** .....

b Use your responses from part a to write an expression that represents the volume, in cubic inches, of the aquarium.

c How much water does the aquarium hold? Write your response as a single power of 9.

Name: Date: Period:

5. Replace the empty box with a single power of 4 to make each equation true.

a $4^7 \cdot \square = 4^{16}$

b $\square \cdot 4^6 = 4^7$

c $4^{10} \cdot \square \cdot 4 = 4^{18}$

6. Replace the empty box with a single power of a to make each equation true.

a $a^9 \cdot \square = a^{10}$

b $\square \cdot a^{10} = a^{20}$

c $a^3 \cdot \square \cdot a = a^6$

7. Lin wants to write a multiplication expression that is equivalent to 2^8. She writes the expression $2^4 \cdot 2^2$. Is her expression correct? Explain your thinking and correct Lin's expression, if necessary.

8. If $a^b \cdot a^b = a^c$ is true, is $\frac{c}{2}$ greater than, less than, or equal to b? Show or explain your thinking.

Name: ..... Date: ..... Period: .....

Additional Practice 7.03

1. Which equations are true? Select *all* that apply.

- ☐ **A.** $(6 \cdot 8)^4 = 6^4 \cdot 8^4$
- ☐ **B.** $4^6 \cdot 4^8 = 16^{14}$
- ☐ **C.** $6^4 \cdot 8^4 = 48^8$
- ☐ **D.** $4^6 \cdot 4^8 = 4^{14}$
- ☐ **E.** $6^4 \cdot 8^4 = 48^4$

2. Match an expression from Column A to its equivalent expression in Column B.

Column A	Column B
a. $(5 \cdot 5 \cdot 5) \cdot (6 \cdot 6 \cdot 6)$	_____ $(4 \div 2)(4 \div 2)(4 \div 2)$
b. $7^3 \cdot 9^3$	_____ 30^3
c. $(4 \cdot 4 \cdot 4) \div (2 \cdot 2 \cdot 2)$	_____ $30 \cdot 30$
d. $(1 \cdot 5)(1 \cdot 5)(1 \cdot 5)$	_____ $\left(\frac{5}{6}\right)^3$
e. $(5 \cdot 5) \cdot (6 \cdot 6)$	_____ $5 \cdot 5 \cdot 5$
f. $(5 \cdot 5 \cdot 5) \div (6 \cdot 6 \cdot 6)$	_____ 63^3

3. Replace the boxes with values that make each equation true.

a $(2 \cdot 7)^{\square} \cdot (13 \cdot 7)^{\square} = 2^{\square} \cdot 7^{\square} \cdot 13^{\square}$

b $(7 \cdot 3)^{\square} \cdot (3 \cdot 5)^{\square} = 3^{\square} \cdot 5^{\square} \cdot 7^{\square}$

c $(11 \cdot 3)^{\square} \cdot (5 \cdot 11)^{\square} = 3^{\square} \cdot 5^{\square} \cdot 11^{\square}$

Name: ..... Date: ..... Period: .....

4. Replace the boxes with values that make each equation true.

a $(a \cdot b)^{\square} \cdot (a \cdot c)^{\square} = a^{\square} \cdot b^{\square} \cdot c^{\square}$

b $(z \cdot x)^{\square} \cdot (x \cdot y)^{\square} = x^{\square} \cdot y^{\square} \cdot z^{\square}$

c $(w \cdot u)^{\square} \cdot (v \cdot w)^{\square} = u^{\square} \cdot v^{\square} \cdot w^{\square}$

5. Of the following three expressions, two of them are equivalent. Identify the expression that is *not* equivalent with the other two. Explain your thinking.

$(6^2 \cdot 2^2) \cdot (3^2 \cdot 4^2)$ $(12^2 \cdot 1^2) \cdot (3^2 \cdot 4^2)$ $(12^2)^8$

6. Without computing, which expression is greater: $-(2 \cdot 9)^6$ or $(-2)^6 \cdot 9^6$? Explain your thinking.

7. How many times greater is $2^3 \cdot 6^3$ than $3^2 \cdot 4^2$? Show or explain your thinking.

8. Shawn says the equation $2^n \cdot 2^n = 2(2^n)$ is *never* true. Do you agree with Shawn? Explain your thinking.

Name: ..... Date: ..... Period: .....

Additional Practice 7.04

1. Select *all* expressions that are equivalent to 12^4.

- ☐ **A.** $\frac{12^7}{12^3}$
- ☐ **B.** $2 \cdot 6^4$
- ☐ **C.** $12^{10} - 12^6$
- ☐ **D.** $12 \cdot 12^3$
- ☐ **E.** $(12^2)^2$

Problems 2–9: Rewrite each expression as a single power.

2. $3^2 \cdot 4^2$

3. $\frac{7^{12}}{7^8}$

4. $(16^2)^3$

5. $\frac{5^8 \cdot 5^4}{5^9}$

6. $31^2 \cdot 31^{10}$

7. $\frac{9^5}{9}$

8. $(11^4)^5 \cdot 11$

9. $\frac{8^{11}}{4^{11}}$

Name: Date: Period:

10. Michael and Amelia were asked to rewrite the expression $\frac{4^{10}}{4^4} \cdot 4$ as a single power.

Michael says the answer is 4^7. Amelia says the answer is 2^{14}.

Who is correct? Circle your choice.

Michael Amelia Neither Both

Show or explain your thinking.

Name: ..... Date: ..... Period: .....

Additional Practice 7.05

1. Rewrite each expression using a single *negative* exponent.

a $\frac{1}{10} \cdot \frac{1}{10} \cdot \frac{1}{10} \cdot \frac{1}{10} \cdot \frac{1}{10}$

b $\frac{1}{6 \cdot 6 \cdot 6 \cdot 6}$

c $\frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2}$

d $\frac{1}{y \cdot y \cdot y}$

2. Rewrite each expression using a single *positive* exponent.

a 10^{-2}

b 5^{-5}

c 8^{-7}

d 2^{-8}

3. Rewrite each expression using a single *positive* exponent.

a $10^{7} \cdot 10^{-2}$

b $9^{-3} \cdot 9^{-5}$

c $\frac{10^{6}}{10^{8}}$

d $\frac{4^{2}}{4^{7}}$

4. Which expressions are equivalent to $\frac{1}{1{,}000}$? Select *all* that apply.

- ☐ **A.** $(-10)^{4}$
- ☐ **B.** 10^{-3}
- ☐ **C.** $1{,}000^{-1}$
- ☐ **D.** 100^{-2}
- ☐ **E.** $-1{,}000$

Name: ..... Date: ..... Period: .....

5. Which expressions are equivalent to 10^{-5}? Select *all* that apply.

- ☐ **A.** $\frac{10^5}{10^{10}}$
- ☐ **B.** -50
- ☐ **C.** $10^{-2} + 10^{-3}$
- ☐ **D.** $10^{-5} \cdot 10$
- ☐ **E.** $\frac{1}{10} \cdot \frac{1}{10} \cdot \frac{1}{10} \cdot \frac{1}{10} \cdot \frac{1}{10}$

6. Replace the empty box with a single power of 10 to make each equation true.

a $\frac{10^3}{\square} = \frac{1}{10^4}$

b $\frac{\square}{10^4} = \frac{1}{10}$

c $10^{-4} \cdot \square \cdot 10 = \frac{1}{10}$

7. Without evaluating, order the expressions 12^{-3}, 12^2, and 12^0 from least to greatest. Explain your thinking.

8. Mai states the missing single power of b in the expression $\frac{b^{-12}}{\square} = \frac{1}{b^{10}}$ is b^2. Do you agree? Show or explain your thinking.

Name: ..... Date: ..... Period: .....

Additional Practice 7.06

Problems 1–3: Evaluate each expression.

1. $\frac{5^4}{5^3}$

2. 19^0

3. $3^2 + 3^1 + 3^0$

Problems 4–9: Rewrite each expression as a single power. Show your thinking.

4. $(5^2)^3 \cdot \frac{5^6}{5^4}$

5. $\left(\left(\frac{3}{4}\right)^2\right)^5$

6. $\left(\frac{2^8}{2^5}\right)^4$

7. $\frac{4^{10} \cdot 4^6}{4^{15}}$

8. $\frac{(6^4)^5}{(6^3)^2}$

9. $\frac{7^6 \cdot 7^5 \cdot 7^0}{7^3 \cdot 7^5}$

Name: ..... Date: ..... Period: .....

10. Rewrite each expression as a single power with a negative exponent.

	Expression	Single Power with a Negative Exponent
a	$\left(\frac{1}{5}\right)^6$	5^{-6}
b	$\frac{1}{3} \cdot \frac{1}{3} \cdot \frac{1}{3} \cdot \frac{1}{3}$	
c	$\frac{1}{4^7}$	
d	$\left(\frac{1}{2^3}\right)^5$	

Name: Date: Period:

Additional Practice 7.07

1. Show three different ways to write each number as a multiple of a power of 10. For example, one way is writing $576{,}000$ as $5{,}760 \cdot 10^2$.

a $576{,}000$

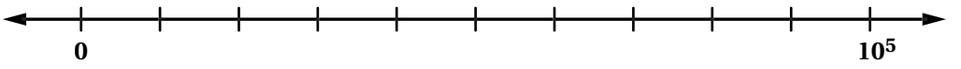
b $9{,}510{,}000$

2. Rewrite the quantity in each statement as a multiple of a power of 10.

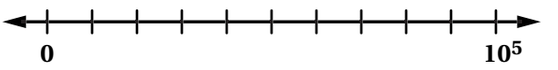
a One light-year is about 6 trillion miles.

b On average, the human brain has 86 billion neurons.

3. Refer to the number line.



a Label the tick marks on the number line.

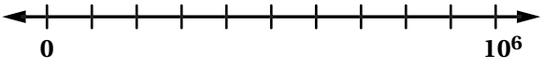


b Plot and label the values $35{,}000$ and $5 \cdot 10^4$ on the number line.

c Which value is less, $35{,}000$ or $5 \cdot 10^4$? Estimate how many times less.

Name: ..... Date: ..... Period: .....

4. Refer to the number line.



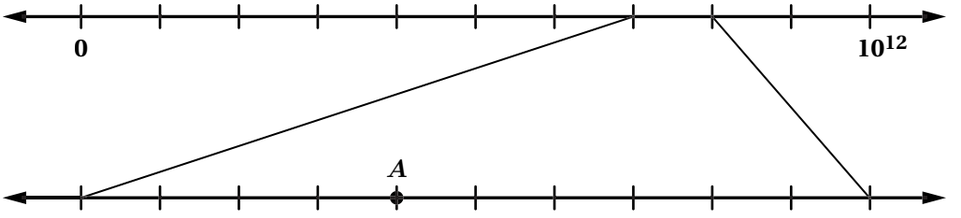
a Plot and label the values $250{,}000$ and $6 \cdot 10^5$ on the number line.

b Which is greater: $250{,}000$ or $6 \cdot 10^5$? Estimate how many times greater.

5. Which value is less: $2 \cdot 10^4$ or $2 \cdot 10^5$? Explain your thinking.

6. Which value is greater: $500{,}000$ or $50 \cdot 10^4$? Explain your thinking.

7. What number is represented by point A? Show or explain your thinking.



8. The distance from Pluto to the Sun is about 4 billion miles. Andre claims that this is less than $4 \cdot 10^8$ miles. Do you agree? Explain your thinking.

Name: ..... Date: ..... Period: .....

Additional Practice 7.08

1. Select *all* expressions that are equivalent to $\frac{1}{100}$.

- ☐ **A.** $-1 \cdot 10^2$
- ☐ **B.** $1 \cdot 10^{-2}$
- ☐ **C.** $-1 \cdot 10^2$
- ☐ **D.** $10 \cdot 10^{-3}$
- ☐ **E.** $-1 \cdot 10^{-3}$

2. Order the expressions from least to greatest.

$-4 \cdot 10^0$	$-5 \cdot 10^{-2}$	$4 \cdot 10^2$	$5 \cdot 10^{-2}$	$-4 \cdot 10^2$
Least				**Greatest**

Problems 3–4: Write the sum as a decimal.

3. $7 \cdot 10^{-3} + 3 \cdot 10^{-4} + 2 \cdot 10^{-5}$

4. $5 \cdot 10^{-6} + 1 \cdot 10^{-3} + 4 \cdot 10^{-1}$

Problems 5–6: Write each value as a number times a single power of 10.

5. $\frac{1}{100{,}000}$

6. 0.012

Name: Date: Period:

7. Write $-625{,}000$ in three different ways, using a single power of 10.

8. Write 0.000986 in three different ways, using a single power of 10.

9. Which value is greater: 0.91 thousands or $9 \cdot 10^{-3}$. Explain your thinking.

10. Consider the statement $5 \cdot 10^{-x} > 5 \cdot 10^{-y}$. For what values of x and y will the statement be true? Show or explain your thinking.

Name: Date: Period:

Additional Practice 7.09

1. Determine whether the following statements are *true* or *false*. Explain your thinking.

a 18.2 billion written in scientific notation is 18.2×10^9.

b 95 million written in scientific notation is 9.5×10^7.

c 0.00083 written in scientific notation is 83×10^{-4}.

d 0.0005 written in scientific notation is 5×10^{-4}.

2. Complete the table to show equivalent forms of each number written in scientific notation.

Number	Scientific notation
$23{,}400$	
0.0035	
	6.4×10^7
	9.7×10^{-4}
$3{,}500$	
	6×10^{-2}
0.35	
3.5	
$350{,}000{,}000{,}000$	
	6×10^{-9}

Name: Date: Period:

3. Han and Clare were determining the correct way to write the approximate radius of Jupiter, 71-million m, in scientific notation. Han wrote the value as 71×10^6 m. Clare wrote the value as 7.1×10^7 m. Who is correct? Explain your thinking.

4. Bard and Elena were determining the correct way to write the approximate diameter of a red blood cell, 0.000007 m, in scientific notation. Bard wrote the value as 7×10^{-6} m. Elena wrote the value as 0.7×10^{-5} m. Who is correct? Explain your thinking.

5. The radius of a certain fish egg is 0.0028 m. Andre claims that the number written in scientific notation is 2.8×10^3 m. Andre is incorrect. Without evaluating, how do you know he is incorrect? Explain your thinking.

6. Shawn analyzed a microorganism in science class. Using a microscope, Shawn measured the diameter to be 0.0000035 cm. Shawn was asked to write this value in meters and rewrote the value as 3.5×10^{-6} m. Did Shawn correctly rewrite the value in scientific notation? Explain your thinking.

7. The volume of a drop of a liquid is 0.05 ml. Priya was asked to write this value in liters, so she rewrote the value as 5×10^{-6} liters. Did she correctly rewrite the value in scientific notation? Explain your thinking.

Name: ..... Date: ..... Period: .....

Additional Practice 7.10

1. Select *all* the expressions that are equivalent to $6 \cdot 10^4$.

- ☐ **A.** $(2 \cdot 10^8) \cdot (3 \cdot 10^{-4})$
- ☐ **B.** $\frac{6 \cdot 10^3}{1 \cdot 10^{-1}}$
- ☐ **C.** $(3 \cdot 10^2) \cdot (2 \cdot 10^2)$
- ☐ **D.** $\frac{6 \cdot 10^3}{2 \cdot 10^{-1}}$
- ☐ **E.** $(2 \cdot 100) \cdot (3 \cdot 100)$

2. What is the value of $\frac{2.4 \cdot 10^{-3}}{1.2 \cdot 10^{-5}}$? Write your answer in scientific notation.

Problems 3–6: Determine the value of b that makes each equation true.

3. $\frac{3.6 \cdot 10^5}{0.9 \cdot 10^2} = 4 \cdot 10^b$

$b =$ .....

4. $\frac{2.1 \cdot 10^7}{0.3 \cdot 10^b} = 7 \cdot 10^5$

$b =$ .....

5. $(4 \cdot 10^b) \cdot (3 \cdot 10^2) = 1.2 \cdot 10^6$

$b =$ .....

6. $(2 \cdot 10^3) \cdot (6 \cdot 10^4) = 1.2 \cdot 10^b$

$b =$ .....

Name: Date: Period:

7. Changing the sign of which part of the expression would make the value of $\frac{4 \cdot 10^5}{2 \cdot 10^3}$ less than 1? Select *all* that apply.

- ☐ **A.** 4
- ☐ **B.** 2
- ☐ **C.** 5
- ☐ **D.** 3

Name: ..... Date: ..... Period: .....

Additional Practice 7.11

1. Evaluate each expression. Write the result in scientific notation. Show your thinking.

a $(2.5 \times 10^3) \times (3 \times 10^7)$

b $\frac{9 \times 10^{-10}}{3 \times 10^{-4}}$

c $(7 \times 10^5) \times (4 \times 10^6)$

d $(8.4 \times 10^2) \div (2.1 \times 10^7)$

2. Replace the empty box with the correct value to make each equation true.

a $(\square \times 10^8) \times (3 \times 10^2) = 9 \times 10^{10}$

b $\frac{8 \times 10^9}{\square \times 10^2} = 4 \times 10^7$

c $(5 \times 10^{\square}) \times (8 \times 10^3) = 4 \times 10^8$

d $(15 \times 10^5) \div (3 \times 10^{\square}) = 5 \times 10^{-2}$

3. On planet Zerg, there are two different types of alien species, zings and zangs. One zing has a mass of 5.6×10^6 kg and one zang has a mass of 2.1×10^2 kg. About how many times less in mass is one zang than one zing? Show your thinking.

Name: Date: Period:

4. The mass of one Brachiosaurus is estimated to have been 8.7×10^4 kg. The mass of one antarctic krill is 4.86×10^{-4} kg. About how many times more massive is one Brachiosaurus than one antarctic krill? Show your thinking.

5. The radius of an atom of silver is 0.000000000125 m. The radius of the Moon is $1{,}740{,}000$ m. To determine how many times greater the radius of the Moon is than the radius of an atom of silver, Elena says it will be more efficient to estimate using scientific notation. Shawn says it will be more efficient to estimate using the values given in standard form. Do you agree with Elena or Shawn? Explain your thinking.

6. The mass of one white-toothed pygmy shrew is 4.86×10^{-3} kg. One of the largest blue whales to ever have lived had a mass of about 1.7×10^5 kg. Clare and Diego were determining how many times more massive the largest blue whale is than the mass of one white-toothed pygmy shrew. Their strategies are shown.

Clare's strategy:	Diego's strategy:
$\frac{1.7 \times 10^5}{4.86 \times 10^{-3}} \approx \frac{20 \times 10^4}{5 \times 10^{-3}} \approx 4 \times 10^7$	$\frac{1.7 \times 10^5}{4.86 \times 10^{-3}} \approx 0.4 \times 10^8 \approx 4 \times 10^7$

What do you notice about each strategy used and their solutions?

7. How many Olympic-sized swimming pools would it take to hold all the water in the world's oceans? Write your response in scientific notation.

Some useful information:

- The world's oceans hold about 1.4×10^9 km^3 of water.
- An Olympic-sized swimming pool holds about $2{,}500{,}000$ cm^3 of water.
- There are 10^{15} cm^3 in a cubic kilometer.

Name: ..... Date: ..... Period: .....

Additional Practice 7.12

1. Select *all* expressions that are equivalent to $8 \cdot 10^6$.

- ☐ **A.** 80^6
- ☐ **B.** $\frac{24 \cdot 10^6}{3 \cdot 10^6}$
- ☐ **C.** $(4 \cdot 10^9) \cdot (2 \cdot 10^{-3})$
- ☐ **D.** $\frac{24 \cdot 10^{10}}{3 \cdot 10^4}$
- ☐ **E.** $2 \cdot 2 \cdot 2 \cdot 10^4 \cdot 10^2$

2. The Burj Khalifa in Dubai is the tallest structure in the world with a height of approximately $8.3 \cdot 10^2$ meters. The Statue of Liberty in New York has a height of about 93 meters. Approximately how many times shorter is the Statue of Liberty than the Burj Khalifa? Show your thinking.

3. About $1.2 \cdot 10^9$ people speak Mandarin Chinese around the world. About 12 million people speak Hungarian around the world. Shawn estimates that about 100 times more people speak Mandarin Chinese than Hungarian.

Is Shawn correct? Show or explain your thinking.

4. Dinosaurs roamed the Earth for about 160 million years. Humans have only been around for about $200{,}000$ years. Visha says that dinosaurs were around about $10{,}000$ times longer than humans. Is Visha correct? Explain or show your thinking.

Name: Date: Period:

Problems 5–6: Here are some interesting facts.

- There are about 37 trillion cells in the human body.
- The universe contains about 10^{10} galaxies.
- There are about 100 billion stars in most galaxies.
- One cubic meter of sand contains about $8 \cdot 10^9$ grains of sand.
- There are about $75 \cdot 10^8$ cubic meters of sand on Earth.

5. Approximately how many stars are there in the universe? Show or explain your thinking.

6. How many times greater is the number of grains of sand on Earth than the number of cells in the human body? Show or explain your thinking.

7. Write and solve your own question using the facts shared about. Show your thinking.

Name: ..... Date: ..... Period: .....

Additional Practice 7.13

1. State whether each statement is *true* or *false*. Show or explain your thinking.

a $(6 \times 10^3) + (2 \times 10^4) = 8 \times 10^7$

b $(8 \times 10^{-3}) + (4 \times 10^{-2}) = 4.8 \times 10^{-2}$

c $(5 \times 10^3) - (3.3 \times 10^4) = 1.7 \times 10^2$

2. Evaluate each expression. Write the result in scientific notation. Show your thinking.

a $(1.9 \times 10^{-5}) + (8.9 \times 10^{-5})$

b $(4.9 \times 10^6) - (4.1 \times 10^5)$

c $(3.8 \times 10^3) + (6.2 \times 10^3)$

d $(5.3 \times 10^{-4}) - (5.2 \times 10^{-4})$

3. Select *all* the expressions that are equal to the expression 1×10^5.

- ☐ **A.** $(7.9 \times 10^4) + (2.1 \times 10^4)$
- ☐ **B.** $(6.3 \times 10^5) - (5.3 \times 10^4)$
- ☐ **C.** $(8 \times 10^4) + (2 \times 10^4)$
- ☐ **D.** $(3 \times 10^5) + (7 \times 10^5)$
- ☐ **E.** $(2.1 \times 10^5) - (1.1 \times 10^5)$

Name: Date: Period:

4. Select *all* the expressions that are equal to the expression 6×10^{-3}.

- ☐ **A.** $(8.8 \times 10^{-3}) - (8.2 \times 10^{-3})$
- ☐ **B.** $(7.7 \times 10^{-2}) - (7.1 \times 10^{-2})$
- ☐ **C.** $(3 \times 10^{-3}) + (3 \times 10^{-3})$
- ☐ **D.** $(4 \times 10^{-4}) + (2 \times 10^{-3})$
- ☐ **E.** $(4.7 \times 10^{-2}) - (4.1 \times 10^{-2})$

5. Tardigrades, also known as water bears, are eight-legged micro-animals. One tardigrade has a length of 5×10^{-3} cm. One adult male Kodiak bear has a length of 2.44×10^{2} cm. Compare the length of one Tardigrade with the length of an adult Kodiak bear. Explain your thinking.

6. The average mass of one Brachiosaurus is estimated to have been 8.7×10^{4} kg. The mass of one human is 6.2×10^{1} kg. How much greater is the average mass of one Brachiosaurus than the average mass of five humans? Explain your thinking.

7. Priya wants to find $(4.3 \times 10^{4}) + (3.5 \times 10^{5})$ and writes $(4.3 \times 10^{4}) + (3.5 \times 10^{5}) = 7.8 \times 10^{5}$. Explain Priya's mistake and determine the correct sum.

8. Bard wants to find $(2.8 \times 10^{3}) - (2.7 \times 10^{3})$ in scientific notation and writes $(2.8 \times 10^{3}) - (2.7 \times 10^{3}) = 1 \times 10^{3}$. Is Bard correct? Show or explain your thinking.

Name: Date: Period:

Additional Practice 7.14

Problems 1–4: In 2023, the European countries had an approximate population of 742.3 million people. Russia, Turkey, Germany, and the United Kingdom had the greatest populations out of all the countries.

1. What was the total population of all four countries? Write your answer in scientific notation.

County	Population (people)
Russia	$1.5 \cdot 10^8$
Turkey	$8.5 \cdot 10^7$
Germany	$8.4 \cdot 10^7$
United Kingdom	$6.8 \cdot 10^7$

2. What was the total population of other European countries not listed? Write your answer in scientific notation. Show or explain your thinking.

3. What percentage of the European population is made up of these top 4 populated countries? Show your thinking.

4. One of the smaller European countries is Liechtenstein which has a population of about 40,000 people. How many times greater is the population of Germany than the population of Liechtenstein?

Name: Date: Period:

Problems 5–8: Here are some interesting facts about the weight and length of very large and very small sea creatures.

- The blue whale can weigh up to $400{,}000$ pounds and can be up to 100 feet long.
- The great white shark can weigh up to 5000 pounds and can be up to 20 feet long.
- An orca, or killer whale, can weigh up to $12{,}000$ pounds and can be up to 32 feet long.
- A manta ray can weigh up to 6000 pounds and can be up to 29 feet long.
- An angler fish can weigh up to 5 pounds and can be up to 3.3 feet long.
- A clownfish can weigh up to 0.1 pound and can be up to 0.3 feet long.
- A sea horse can weigh up to 0.5 pound and can be up to 1.2 feet long.
- A krill can weigh up to 0.004 pounds and can be up to 0.12 feet long

5. What is the sum of the weights of the blue whale, great white shark, and orca (killer) whale? Write your answer in standard form and in scientific notation.

6. How much longer is a manta ray than a clownfish? Write your answer in standard form and in scientific notation.

7. A blue whale can consume an astonishing amount of krill each day. On average, a blue whale eats around 8000 pounds of krill daily during feeding seasons. Approximately how many krill does a blue whale consume in one day? Show your thinking.

8. Write and solve your own question using the facts shared about sea creatures. Show your thinking.

Grade 8 | Unit 8

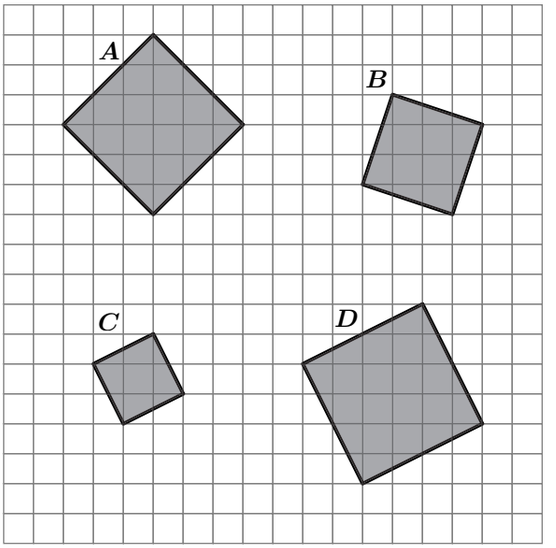
Additional Practice

Practice Problems

Name: ..... Date: ..... Period: .....

Additional Practice 8.01

Problems 1–4: Determine the area of each tilted square. Each square grid represents 1 square unit.



1. Square *A*

2. Square *B*

3. Square *C*

4. Square *D*

Problems 5–6: Determine the area of each square given its side length.

5. Side length: 4 centimeters

6. Side length: x units

Name: Date: Period:

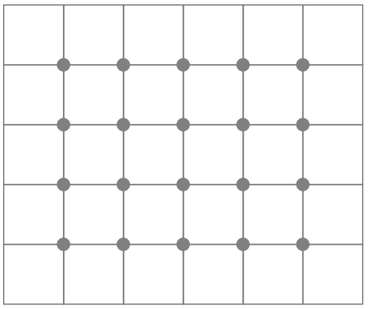
Problems 7–9: Here are the areas of three squares. Determine the side length of each square.

7. Area: 36 square meters

8. Area: $\frac{9}{49}$ square inches

9. Area: w^2 square units

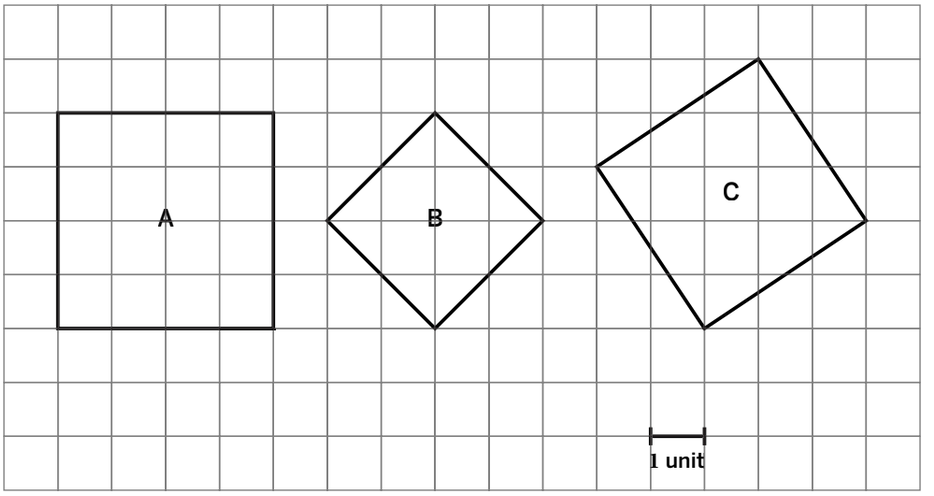
10. Determine the area of the largest tilted square that can be created on the dot grid. Show your thinking.



Name: ..... Date: ..... Period: .....

Additional Practice 8.02

1. Determine the area and exact side length of each square.



2. Determine the side length of a square if the area of the square is . . .

a $9\ \text{cm}^2$

b $\frac{1}{4}\ \text{in}^2$

c $25\ \text{m}^2$

d $\frac{4}{49}\ \text{ft}^2$

3. Compare each pair of expressions using the symbol $<$, $>$, or $=$.

a $\sqrt{15} \square \sqrt{51}$

b $\sqrt{100} \square 8$

c $\sqrt{7} \square \sqrt{0.7}$

d $\sqrt{25} \square 5$

Name: Date: Period:

4. Write each square root under the corresponding column in the table according to its value.

$\sqrt{37}$	$\sqrt{52}$	$\sqrt{60}$	$\sqrt{43}$	$\sqrt{58}$

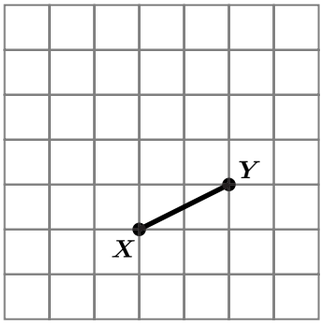
Between 6 and 7	Between 7 and 8

5. Order the squares by side length, from least to greatest.

Area: 81 square units	Side length: 8 units	Side length: 8.5 units	Side length: $\sqrt{61}$ units

Least **Greatest**

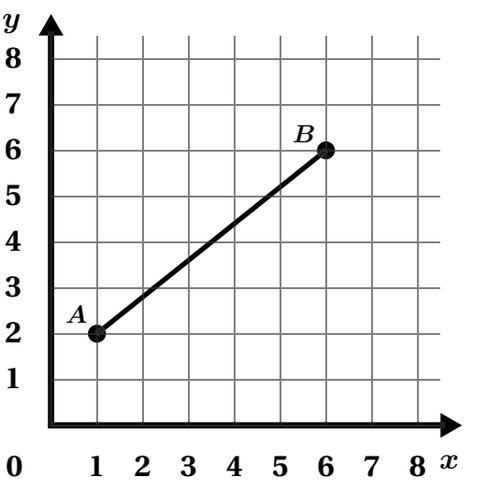
6. Determine the exact length of line segment XY. Explain your thinking.



Name: ..... Date: ..... Period: .....

Additional Practice 8.03

Problems 1–4: Here is a line segment AB. Each grid square represents 1 square unit. Use the ruler, circle, or square if they help with your thinking.



1. Determine the approximate length of AB.

2. Determine the exact length of AB.

3. Which method did you choose to help with your thinking?

Ruler **Circle** **Square**

4. Why did you choose that particular method?

Problems 5–6: Determine the value of each square root.

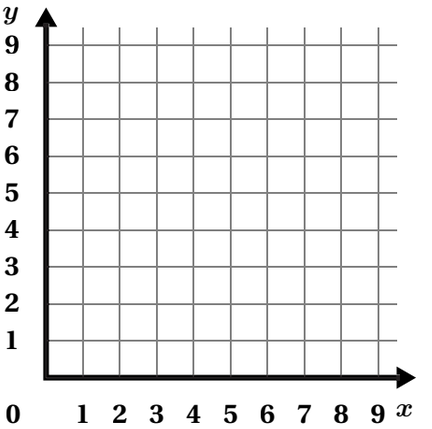
5. $\sqrt{81}$

6. $\sqrt{36}$

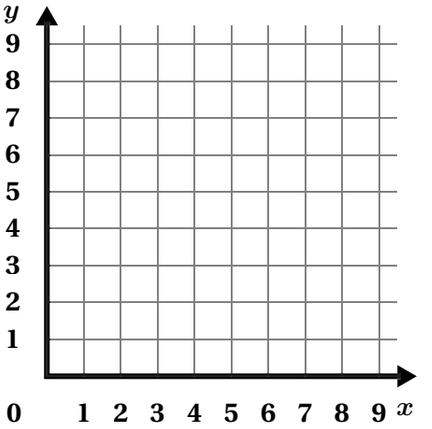
Name: Date: Period:

Problems 7–8: Estimate each square root. Draw a square if it helps with your thinking.

7. $\sqrt{27}$



8. $\sqrt{50}$



Problems 9–10: Determine which two whole numbers each square root is between.

9. $\sqrt{38}$

10. $\sqrt{72}$

11. Here is a list of values ordered from least to greatest. One value is unknown. Which could be the unknown value?

$\frac{9}{2}$, 4.8, ? , $\sqrt{26}$

A. 5.5

B. $(2.5)^2$

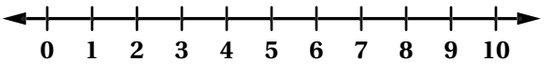
C. 5.1

D. $\frac{5}{2}$

Name: ..... Date: ..... Period: .....

Additional Practice 8.04

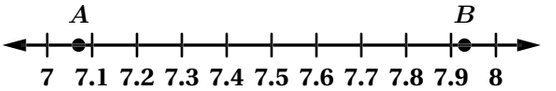
1. Plot and label the approximate value for each number on the number line.
$\sqrt{77}$, 1.5, 6.7, $\sqrt{94}$, $\sqrt{18}$



2. Estimate each square root to the nearest tenth.

a $\sqrt{13}$ **b** $\sqrt{28}$ **c** $\sqrt{78}$ **d** $\sqrt{85}$

3. Refer to the number line.



a Write a number using square root notation that could represent Point A.

b Write a number using square root notation that could represent Point B.

4. Between which two decimals is the solution for the equation $x^2 = 7$?

A. 2.3 and 2.4

B. 2.4 and 2.5

C. 2.5 and 2.6

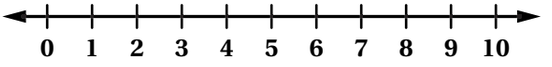
D. 2.6 and 2.7

Name: ..... Date: ..... Period: .....

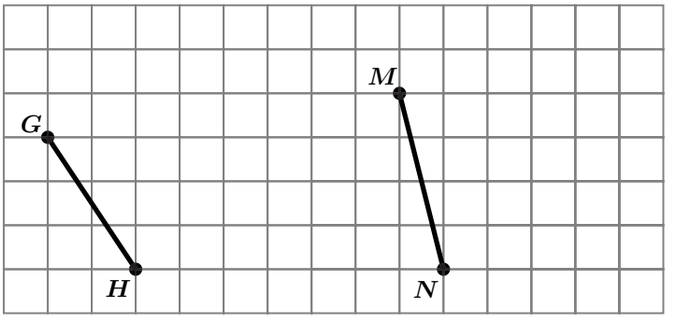
5. Determine whether each statement is *true* or *false*. Circle your response.

a	$\sqrt{14}$ is greater than 3.5.	True	False
b	$\sqrt{125}$ is greater than 11.5.	True	False
c	$\sqrt{22}$ is between 4.5 and 4.6.	True	False
d	$\sqrt{77}$ is between 8.7 and 8.8.	True	False

6. Consider the equations $a^2 = 3$ and $b^2 = 35$, where a is a positive solution for the first equation and b is a positive solution for the second equation. Plot and label the approximate values of a and b on the number line.



7. Which line segment, GH or MN, has an approximate length of 4.1 units? Show or explain your thinking.
Note: Each grid square has a side length of 1 square unit.



Name: Date: Period:

Additional Practice 8.05

1. Write an equivalent value *without* using a cube root symbol.

a $\sqrt[3]{27}$ **b** $\sqrt[3]{8}$ **b** $\sqrt[3]{125}$

2. Complete the table. If possible, write your response without using cube root notation.

x	x^3
1	
$\sqrt[3]{10}$	
	64
	24

3. Order the numbers from least to greatest.

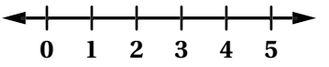
$\sqrt[3]{27}$	$\sqrt[3]{120}$	$\sqrt{48}$	$\sqrt{121}$	$\sqrt[3]{\frac{1}{64}}$

Least **Greatest**

Name: ..... Date: ..... Period: .....

4. Cube A is smaller than Cube B. Cube B is smaller than Cube C. The edge lengths of the cubes are $\sqrt[3]{62}$ units, $\sqrt[3]{7}$ units, and 8.5 units. Determine the edge length of Cube A, Cube B, and Cube C.

5. Consider the equation $x^3 = 33$. Plot the approximate value of x on the number line.



6. Determine whether each statement is *true* or *false*. Circle your response.

a $\sqrt[3]{41}$ is less than 3. True False

b $\sqrt{4}$ is equal to $\sqrt[3]{8}$. True False

c $\sqrt[3]{29}$ is between 3 and 4. True False

d $\sqrt[3]{\frac{64}{125}}$ is between 1 and 2. True False

7. If you double the edge length of a cube, what happens to the volume?

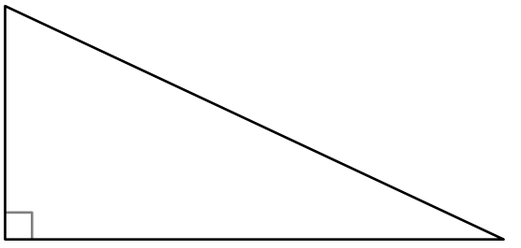
8. If you double the volume of a cube, what happens to the edge length?

Name: ..... Date: ..... Period: .....

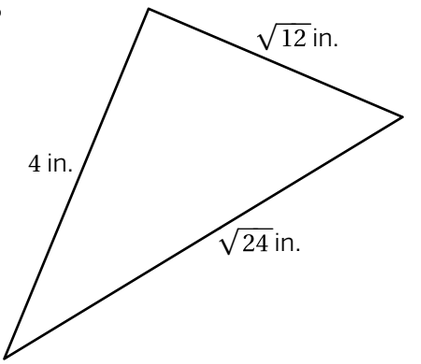
Additional Practice 8.06

1. Show that the Pythagorean Theorem is true for a right triangle with legs 3 units and 4 units and a hypotenuse of 5 units.

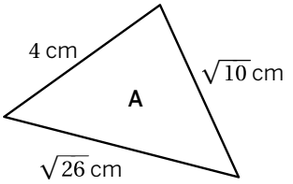
2. Label the legs and hypotenuse of the right triangle.

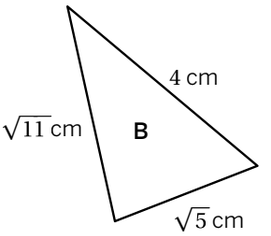


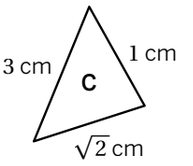
3. Is the Pythagorean Theorem true for the triangle shown? Show or explain your thinking.



4. Consider the three triangles. For which triangles is the Pythagorean Theorem true? Show or explain your thinking.







Name: Date: Period:

5. If a right triangle has legs a and b and hypotenuse c, which of the following statements are true? Select *all* that apply.

- ☐ **A.** $c^2 - b^2 = a^2$
- ☐ **B.** $c^2 + b^2 = a^2$
- ☐ **C.** $c^2 = a^2 + b^2$
- ☐ **D.** $c^2 - a^2 = b^2$
- ☐ **E.** $c^2 - a^2 - b^2 = 0$

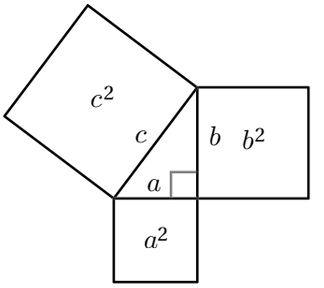
6. Han is asked to determine lengths for a triangle with legs a and b and hypotenuse c that would make the Pythagorean Theorem true for the triangle. Han claims that if $a = \sqrt{5}$, $b = \sqrt{31}$, and $c = 6$, the Pythagorean Theorem will be true for the triangle. Do you agree? Explain your thinking.

7. Can the Pythagorean Theorem ever be true for an isosceles triangle? What about an equilateral triangle? **Hint:** An isosceles triangle has two congruent sides and an equilateral triangle has three congruent sides.

Name: ..... Date: ..... Period: .....

Additional Practice 8.07

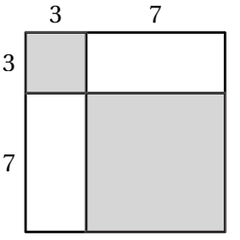
1. Consider the diagram shown. If $a = 6$ and $b = 8$, what is the value of c^2? Show or explain your thinking.



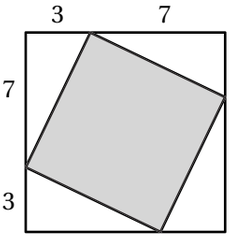
2. Consider Squares E and F.

a Determine the total area of the shaded region for each square in square units.

Square E



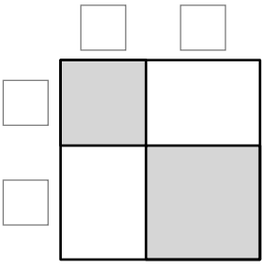
Square F



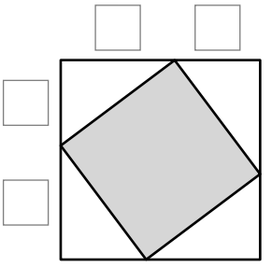
b For Square F, determine the exact side length of the shaded square.

3. Complete the diagram to show that $3^2 + 4^2 = 5^2$.

Square X

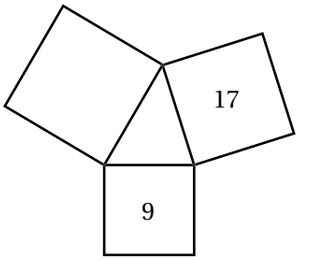


Square Y



Name: ..... Date: ..... Period: .....

4. The diagram shows an acute triangle and three squares.



Tyler says the area of the large unmarked square is 26 square units because $9 + 17 = 26$. Do you agree with Tyler? Explain your thinking.

5. The lengths of the three sides are given for several right triangles in inches. For each, write an equation that expresses the relationship between the lengths of the three sides.

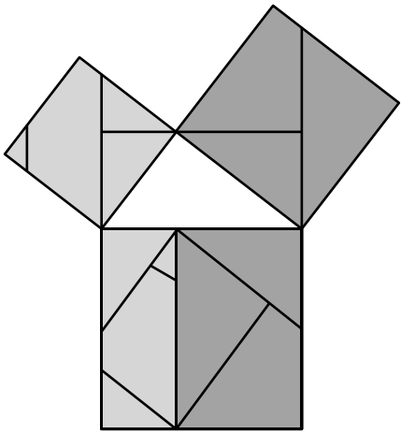
a $\sqrt{5}, \sqrt{3}, \sqrt{8}$

b $1, \sqrt{37}, 6$

c $5, \sqrt{5}, \sqrt{30}$

d $3, \sqrt{2}, \sqrt{7}$

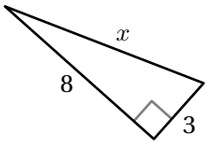
6. How does the figure show that the Pythagorean Theorem is true for the right triangle shown?



Name: ..... Date: ..... Period: .....

Additional Practice 8.08

1. Clare was solving for the unknown side measure, x, for the right triangle shown. Which equation should she use to help her solve for x?



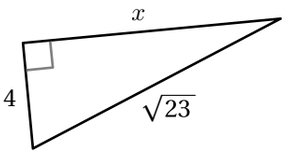
A. $3^2 - 8^2 = x^2$

B. $8^2 + x^2 = 3^2$

C. $8^2 + 3^2 = x^2$

D. $3^2 + x^2 = 8^2$

2. Mai was solving for the unknown side measure, x, for the right triangle shown. Which equation should she use to help her solve for x?



A. $4 + x = \sqrt{23}$

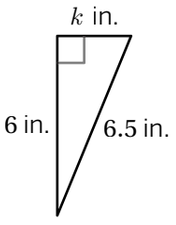
B. $4^2 + x^2 = (\sqrt{23})^2$

C. $4^2 + (\sqrt{23})^2 = x^2$

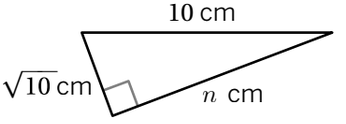
D. $(\sqrt{23})^2 + x^2 = 4^2$

3. Determine the exact value of each variable that represents a side length in a right triangle. Show your thinking.

a



b



Name: ..... Date: ..... Period: .....

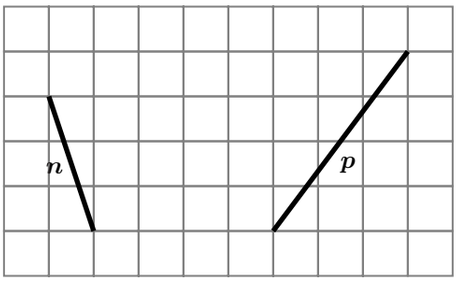
4. A right triangle has side lengths of a, b, and c units. The longest side has a length of c units. Complete each equation to show three relations among a, b, and c.

a $c^2 =$ .....

b $a^2 =$ .....

c $b^2 =$ .....

5. Consider the two line segments. One segment is n units long and the other is p units long. Determine the exact values of n and p. **Note:** Each small grid square is 1 square unit. Show or explain your thinking.



6. One leg of a right triangle has length of $\frac{1}{4}$ m. If the length of the hypotenuse is $\frac{1}{2}$ m, what is the length of the other leg? Show or explain your thinking.

7. A right triangle has side lengths of 2 cm and 5 cm.

Clare said that the other side must be $\sqrt{21}$ cm.
Diego said that the other side must be $\sqrt{29}$ cm.

Who is correct? Use drawings or equations to support your thinking.

Name: ..... Date: ..... Period: .....

Additional Practice 8.09

1. A triangle has side lengths $\sqrt{11}$, 2, and $\sqrt{15}$ such that $(\sqrt{11})^2 + 2^2 = (\sqrt{15})^2$. Is it a right triangle?

2. A right triangle has side lengths 5, $\sqrt{7}$ and $\sqrt{32}$. A second triangle has side lengths 5, $\sqrt{7}$, and the longest side is greater than $\sqrt{32}$. What type of triangle is the second triangle, *acute* or *obtuse*?

3. For each right triangle, select the side that is the hypotenuse.

a Triangle A

A. 6 in.

B. 10 in.

C. 8 in.

b Triangle B

A. 3 cm

B. 7 cm

C. $\sqrt{40}$ cm

c Triangle C

A. 11 ft

B. 4 ft

C. $\sqrt{137}$ ft

d Triangle D

A. $\sqrt{14}$ m

B. $\sqrt{11}$ m

C. 5 m

4. A triangle has side lengths 4, 7 and $\sqrt{61}$. Is this triangle acute, right, or obtuse? Show or explain your thinking.

Name: Date: Period:

5. Consider the set of triangles and their side lengths.

Triangle A: $6, 8, 10$

Triangle B: $6, 8, 9$

Triangle C: $5, 12, 13$

Triangle D: $5, 12, 14$

Triangle E: $1, \sqrt{10}, \sqrt{11}$

a Which are acute triangles?

b Which are obtuse triangles?

c Which are right triangles?

6. In each set of numbers, a and b represent the length of a leg of a right triangle, and c represents the length of its hypotenuse. Determine the missing length, given the other two lengths. Show or explain your thinking.

a $a = 12, b = 5$

b $b = 21, c = 29$

7. A triangle with legs of 5 and 12 and a hypotenuse of 13 is a right triangle because $5^2 + 12^2 = 169$ and $13^2 = 169$. Is a triangle with legs of 50, 120, and a hypotenuse of 130 also a right triangle? Show or explain your thinking *without* using the Pythagorean Theorem. Then, use the Pythagorean Theorem to check your thinking.

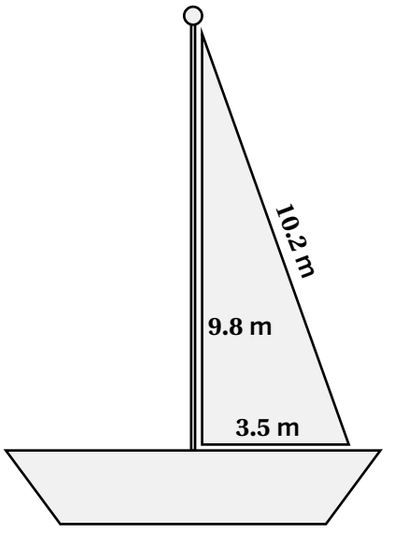
Name: ..... Date: ..... Period: .....

Additional Practice 8.10

1. Television screens are classified by the length of their diagonal. If a television screen is 22.5 in. tall and 40 in. wide, what is the length of its diagonal? Estimate your answer to the nearest inch. Show your thinking.

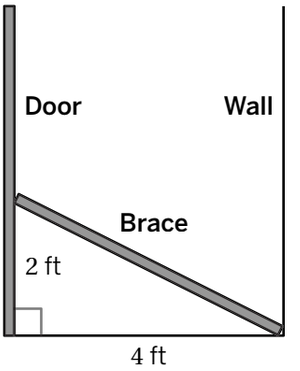
2. Lin leaves her house for a jog. She jogs 4 miles directly north, and then 3 miles directly west. If Lin wants to return home, what is the shortest distance she can travel directly back to her house? Show your thinking.

3. Sails come in many shapes and sizes. Is the sail shown a right triangle? Show or explain your thinking.



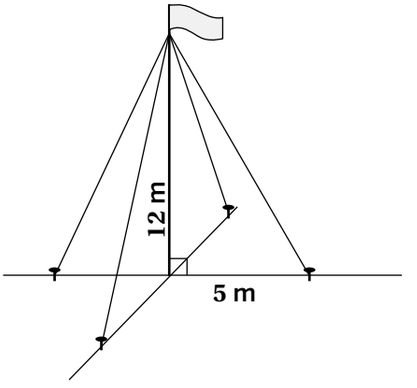
Name: ..... Date: ..... Period: .....

4. A carpenter cuts a length of wood that will brace a door against a wall. The wall is 4 ft away from the door, and she wants the brace to rest on the door, 2 ft above the floor. About how long should she cut the brace? Estimate your answer to the nearest tenth of a foot. Show or explain your thinking.



5. Jada is building a marble run track. She wants to create a straight path from the top of one section to the top of a second section. The height of the first section is 8 in., and the height of the second section is 4 in. If the distance between the bottom of the two sections is 10 in., how long should the connected path be? Estimate your answer to the nearest tenth. Show or explain your thinking.

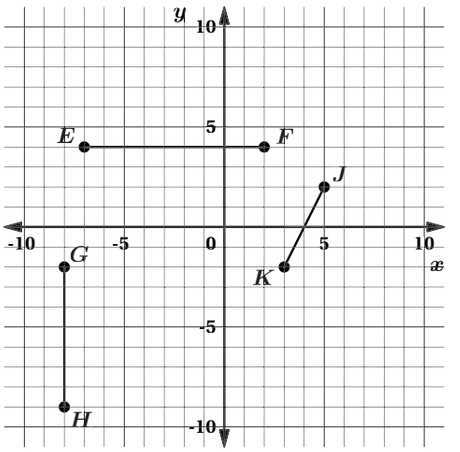
6. Four cables are used to mount a 12 m post. Each cable is mounted at the top of the post to the ground, where it is 5 m from the bottom of the post. What is the total amount of cable needed to mount the post? Show or explain your thinking.



Name: ..... Date: ..... Period: .....

Additional Practice 8.11

1. Determine the exact length of each line segment. Show or explain your thinking.

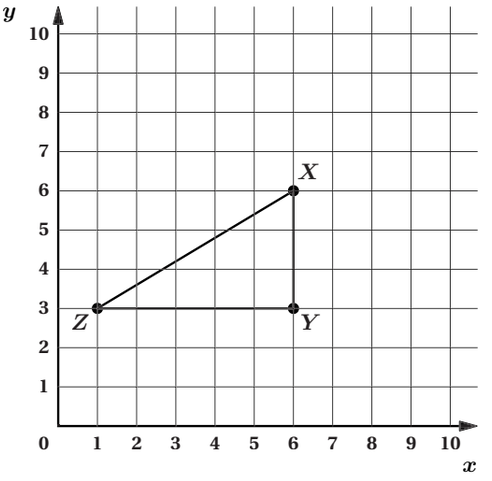


a Line segment EF

b Line segment GH

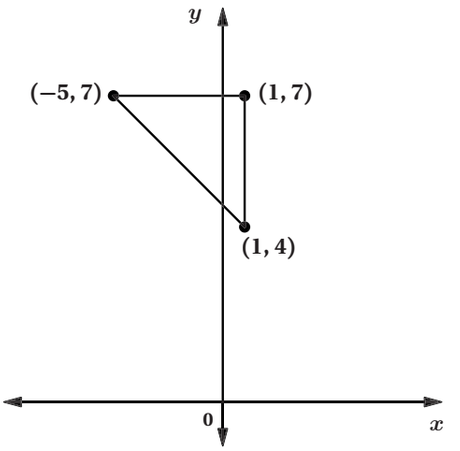
c Line segment JK

2. Determine the exact length of segment XZ. Show or explain your thinking.

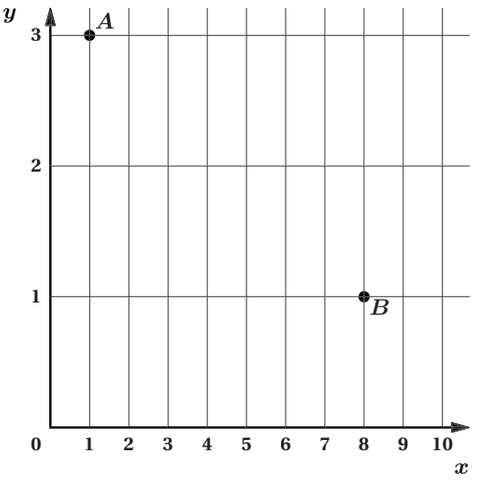


Name: Date: Period:

3. A right triangle is drawn on the coordinate plane, and the coordinates of its vertices are labeled. Label each side of the triangle with its exact length.



4. Determine the exact distance from Point A to Point B. Show or explain your thinking.



5. Estimate the perimeter of a triangle whose vertices are $(-1, 2)$, $(4, 2)$ and $(-1, 1)$ to the nearest tenth. To help with your thinking, plot the points on graph paper.

6. Estimate the perimeter of a triangle whose vertices are $(-3, 2)$, $(2, -3)$ and $(-7, -1)$ to the nearest tenth. To help with your thinking, plot the points on graph paper.

Name: ..... Date: ..... Period: .....

Additional Practice 8.12

1. Rewrite each fraction as a decimal.

a $\frac{3}{5}$

b $-\frac{23}{100}$

c $\frac{7}{45}$

2. Determine whether the decimal representation of each fraction *terminates* or *repeats*. Circle your response.

a $\frac{1}{20}$ Terminates Repeats

b $\frac{1}{11}$ Terminates Repeats

c $\frac{1}{15}$ Terminates Repeats

3. Select *all* of the decimals that have the digit 4 in the thousandths place.

- ☐ **A.** $0.\overline{4}$
- ☐ **B.** $0.4\overline{1}$
- ☐ **C.** $0.\overline{41}$
- ☐ **D.** $4.\overline{04}$
- ☐ **E.** 0.44

Name: Date: Period:

4. What is the value of $0.\overline{3} + 0.5$?

A. $\frac{8}{10}$

B. $\frac{6}{13}$

C. $\frac{8}{9}$

D. $\frac{5}{6}$

5. Determine whether each inequality is *true* or *false*. Circle your response.

a $\frac{1}{12} = 0.08$ True False

b $-0.\overline{46} = -\frac{7}{15}$ True False

c $\frac{2}{33} = 0.\overline{6}$ True False

d $5.\overline{3} = 5\frac{1}{3}$ True False

6. Let $x = \frac{25}{11} = 2.272727\ldots$ and $y = \frac{58}{33} = 1.757575\ldots$. For each problem, determine whether the fraction or decimal representation of each number is more helpful to respond to the problem, and then determine your response.

a Is x or y is closer to 2? Explain your thinking.

b What is the value of x^2? Show or explain your thinking.

Name: ..... Date: ..... Period: .....

Additional Practice 8.13

1. Write each number as a fraction. Show your thinking.

a 0.4

b $0.\overline{4}$

2. Select the fraction that is equivalent to $0.\overline{23}$.

- ☐ **A.** $\frac{2}{3}$
- ☐ **B.** $\frac{23}{99}$
- ☐ **C.** $\frac{23}{100}$
- ☐ **D.** $\frac{2}{9}$
- ☐ **E.** $\frac{3}{2}$

3. Complete the table.

Fraction	Decimal expansion
$\frac{14}{5}$	
$\frac{2}{9}$	
	$-0.\overline{51}$
	-2.67
	$0.9\overline{1}$

4. Write each rational number as an equivalent fraction.

a $\sqrt{\frac{100}{121}}$

b $\sqrt{1.44}$

c $\sqrt[3]{0.064}$

Name: ..... Date: ..... Period: .....

5. Match each decimal with its fraction.

Decimal	Fraction
a. 0.07	..... $\frac{7}{100}$
b. $0.0\overline{7}$	..... $\frac{5}{9}$
c. $0.\overline{5}$	..... $\frac{7}{90}$
d. $0.\overline{05}$	..... $\frac{5}{99}$

6. Complete the statement by writing the word *always*, *sometimes*, or *never*, so that the statement is true.

a A repeating decimal is ..... a rational number.

b If the digits in the decimal expansion do not repeat and do not terminate, the number is .....rational.

c A non terminating decimal can .....be written as a fraction.

7. Consider the fractions $\frac{3}{7}$ and $\frac{4}{7}$.

a Write each fraction as a decimal. Then determine the sum, written as decimal.

b Determine the sum of $\frac{3}{7}$ and $\frac{4}{7}$, written as a fraction.

c Compare the the decimal representation and fractional representation for the sum of $\frac{3}{7}$ and $\frac{4}{7}$. What do you notice?

Name: ..... Date: ..... Period: .....

Additional Practice 8.14

1. Write three examples of *rational numbers*, including at least one number written as a square root or cube root.

2. Write three examples of *irrational numbers*, including at least one number written as a square root or cube root.

3. Write each number as a ratio of integers. If it is impossible, write "irrational number."

a 0.12

b $\sqrt[3]{27}$

c $\sqrt{73}$

d $-\sqrt{49}$

e $\sqrt[3]{11}$

4. Han says that the solution to $x^2 = 50$ is a rational number. Is Han correct or incorrect? Explain your thinking.

Name: ..... Date: ..... Period: .....

5. Write each number under its corresponding column in the table.

$\sqrt{9}$	$\sqrt[3]{29}$	0.123	$-\frac{2}{13}$	$\sqrt{8}$	$\sqrt[3]{125}$

Rational number	Irrational number

6. Complete the statement by writing the word *always*, *sometimes*, or *never*, so that the statement is true.

a Perfect squares are ..... irrational numbers.

b The square root of a number is ..... an irrational number.

c Irrational numbers can ..... be written as fractions.

d The cube root of a perfect cube is ..... a rational number.

7. Does the exact length of the line segment MN represent a rational number or irrational number? Explain your thinking.