Activity: Selected Assignments from the May Optional Work Packet

Week: May 26 – May 29

Grade 6

Class Math

Teachers: Ms. Carter, Mr. Dedrick, Ms. Hartley
Ms. K. Ross, Mr. Reed

Key Content/Modeling:
Pearson Topic 7: Understand and Use Percents

- Find Areas of Parallelograms and Rhombuses
- Solve Triangle Area Problems
- Find Areas of Trapezoids and Kites
- Find Areas of Polygons

You Try:

- Try-It
- Do You Understand?
- Do You Know How?
- Practice

Show me what you know (Proof of learning):
Complete your work and e-mail pictures (or solutions) to your teachers.

Self-Assessment:
Did I complete all of the tasks?
Did I try my best?

Priority Standard(s):
6.G.A.1 Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.

What am I learning?
I can find the area of triangles and special quadrilaterals and use that ability to find the area of irregular polygons.

How do I know I learned?
Learning Evidence in 1-3 Descriptors
I fully completed all tasks and checked my answers to make sure they made sense to answer the questions.

Extra Learning Opportunities: Find some math in your community! Did you use ratio reasoning for cooking? Did you have to add or subtract decimals when you were shopping? Did you find any ratios in your video games? Tell us about what you’ve found on e-mail; we’d love to hear all about it!
Good Morning Students
Tuesday May 26, 2020

Today Focus:

- In the May 2020 Family Resource Packet
- Resource Packet Link:

Learning Target:

- Make Sense of Problems and Persevere in Solving Them
- Construct Viable Arguments
- Model with Mathematics

Special Note:

- Read each example and do your best in completing all work. If you have any questions, are stuck on a problem, or want me to check your work, please email me and I will be sure to get back with you.
- Take a picture of your work and send it via email for all feedback.
- If you are having trouble accessing the resource packet, please let me know so I can work on ways of getting it to you.
- Paper copies of the resource packet are available to pick up at First Creek on Tuesdays and Thursdays at lunch time.

Tips + Hints:

- Read the entire problem before beginning to work on an answer.
- What do you know about each problem?
- What’s unknown about each problem (what are you trying to discover)?
- Can you draw a diagram (or picture) to help understand the problem?
- https://youtu.be/xCdxURXMdFY (Math Antics - Area)
- https://youtu.be/5jMGzubygjg (Vivid Math - Area of a Kite)
The following pages can also be accessed through your Pearson account.

7-1 Find Areas of Parallelograms and Rhombuses

Area is the space inside of a shape.

To find the area of a:

Rectangle: \[ A = l \times w \]

Parallelogram (\& Rhombus): \[ A = b \times h \]
**Example 1**

**Find the Area Formula of a Parallelogram**

Look at the parallelogram below. If you move the triangle to the opposite side, you form a rectangle with the same area as the parallelogram. How can you find the area of a parallelogram?

**Use Structure** To compose a rectangle from a parallelogram, first decompose the parallelogram into a right triangle and a trapezoid.

Create a rectangle.

- The height of the parallelogram, $h$, which is perpendicular to the base, equals the width of the rectangle, $w$.
- The base of the parallelogram, $b$, equals the length of the rectangle, $l$.

The area of the parallelogram equals the area of the rectangle.

- **Area of a Rectangle** $A = l \times w$
- **Area of a Parallelogram** $A = b \times h$

The formula for the area of a parallelogram is $A = bh$.

**Try It!**

Find the area of the parallelogram.

\[ A = b \times h \]

\[ A = \boxed{7} \times \boxed{4.5} \]

The area of the parallelogram is $\boxed{31.5}$ cm$^2$.

**Convince Me!** Compare the area of this parallelogram to the area of a rectangle with a length of 7 cm and a width of 4.5 cm. Explain.
7-1 Example 2

**Example 2** Find the Area of a Rhombus

The pendant at the right is in the shape of a rhombus. A rhombus is a parallelogram with sides of equal length. What is the area of the pendant?

**Be Precise** You can use the formula for the area of a parallelogram to find the area of a rhombus. Remember to record area in square units.

\[ A = b \times h \]

\[ A = 3.8 \times 3 \]

\[ A = 11.4 \]

The area of the pendant is 11.4 cm².

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7-1 Example 3

**Example 3** Find the Base or Height of a Parallelogram

A. The area of the parallelogram is 72 m². What is the height of the parallelogram?

\[ A = b \times h \]

\[ 72 = 12 \times h \]

\[ 6 = h \]

The height of the parallelogram is 6 m.

B. The area of the parallelogram is 135 in.². What is the base of the parallelogram?

\[ A = b \times h \]

\[ 135 = b \times 15 \]

\[ 9 = b \]

The base of the parallelogram is 9 in.

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Try It!

a. Find the area of the rhombus.

\[ 20 \text{ mm} \]

\[ 22.5 \text{ mm} \]

b. The area of the parallelogram is 65 ft². What is its height?

\[ 13 \text{ ft} \]
Do You Understand?

1. **Essential Question** How can you use the area formula of a rectangle to find the area formula of a parallelogram?

2. Ken combined a triangle and a trapezoid to make a parallelogram. If the area of the triangle is 12 in.² and the area of the trapezoid is 24 in.², what is the area of the parallelogram? Explain.

3. **Critique Reasoning** A parallelogram is 3 meters long and 7 meters high. Liam said that the parallelogram’s area is greater than the area of a rectangle with the same dimensions. Is he correct? Explain. "MP3"

Do You Know How?

In 4–6, use a formula to find the area.

4.

5.

6.

7. A rhombus has an area of 440 m² and a base of 22 m. What is its height?

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**LESSON 7–1** Find Areas of Parallelograms and Rhombuses

**Quick Review**
You can use the formula \( A = bh \) to find the area of a parallelogram or a rhombus.

**Example**
Find the area of the parallelogram.

\[
A = bh \\
A = 12 \times 8 \\
A = 96
\]

The area of the parallelogram is 96 ft².

**Practice**
In 1–4, find the area of each parallelogram or rhombus.

1.

2.

3. Rhombus
   \( b = 14 \text{ in} \) \\
   \( h = 9 \text{ in} \)

4. Parallelogram
   \( b = 12 \text{ ft} \) \\
   \( h = 8.5 \text{ ft} \)

5. A rhombus has an area of 375 mm² and a base of 25 mm. What is its height?
Area is the space inside of a shape.

A triangle is half of a quadrilateral, to find the area of a:

**Triangle:** \[ A = \frac{1}{2} \times b \times h \]
EXAMPLE 1 Find the Area of a Triangle

A parallelogram can be decomposed into two identical triangles. How can you use the formula for the area of a parallelogram to find the area of a triangle?

**Reasoning** How are the areas of parallelograms and triangles related? [MP2]

A parallelogram can be decomposed into two identical triangles when divided diagonally.

Identical triangles have the same base and height, so they also have the same area.

The area of one triangle is half the area of the related parallelogram.

Area of a Parallelogram \( A = bh \)

Area of a Triangle \( A = \frac{1}{2}bh \)

The formula for the area of a triangle is \( A = \frac{1}{2}bh \).

**Try It!**

Use the formula \( A = \frac{1}{2}bh \) to find the area of the triangle.

\[
A = \frac{1}{2} \times b \times h
\]

\[
A = \frac{1}{2} \times \square \times \square
\]

\[
A = \frac{1}{2} \times \square
\]

\[
A = \square
\]

The area of the triangle is \( \square \text{ cm}^2 \).

**Convince Me!** Two identical triangles form a parallelogram with a base of 8 inches and a height of 6 inches. What is the area of each triangle? Explain.
7–2 Example 2

**Example 2** Find the Area of a Right Triangle

The side of a birdhouse is in the shape of a right triangle. What is the area of the side of the birdhouse? Draw a triangle and compose a square.

The two sides that form the right angle in a right triangle are its base and height.

Find the area of the triangle.

\[ A = \frac{1}{2}bh \]

\[ A = \frac{1}{2} \times 8 \times 8 = 32 \]

The area of the side of the birdhouse is 32 in.².

7–2 Example 3

**Example 3** Identify the Corresponding Base and Height to Find the Area

Kaylan drew the triangle shown below. What is the area of the triangle?

Any side of a triangle can be its base. The height is the perpendicular distance from the base to the height of the opposite vertex.

**One Way**

\[ A = \frac{1}{2}bh \]

\[ A = \frac{1}{2} \times 10 \times 8 \]

\[ A = 40 \]

The area is 40 ft².

**Another Way**

\[ A = \frac{1}{2}bh \]

Substitute a corresponding base of 10 ft and height of 8 ft.

\[ A = \frac{1}{2} \times 16 \times 5 \]

\[ A = 40 \]

The area is 40 ft².

**Try It!**

Find the area of each triangle.

a. 

\[ \triangle \text{ with base 6 cm and height 9 cm} \]

b. 

\[ \triangle \text{ with base 4 m and height 9 m} \]
Do You Understand?

1. **Essential Question** How can you find the area of a triangle?

2. **Reasoning** If you cut a rectangle into 2 identical triangles, what type of triangles will they be? MP.2

3. **Construct Arguments** In Example 1, if the other diagonal were used to divide the parallelogram into two triangles, would the area of each of these triangles be half the area of the parallelogram? Explain. MP.3

Do You Know How?

In 4–6, find the area of each triangle.

4. 
   \[ \text{4 ft} \quad \text{2 ft} \]

5. 
   \[ \text{3.5 in.} \quad \text{7 in.} \quad \text{4.2 in.} \]

6. 
   \[ \text{6.5 cm} \quad \text{5 cm} \]

**Lesson 7-2** Solve Triangle Area Problems

**Quick Review**

You can use the formula \( A = \frac{1}{2}bh \) to find the area of any triangle.

**Example**

Find the area of the triangle.

\[ A = \frac{1}{2} \times (26 \times 20) \]
\[ A = 260 \text{ cm}^2 \]

**Practice**

Find the area of each triangle.

1. 
   \[ \begin{array}{c}
   \text{5 yd} \\
   \text{2 yd} \\
   \text{20 cm} \\
   \text{26 cm} \\
   \end{array} \]

2. 
   \[ \begin{array}{c}
   \text{6 ft} \\
   \text{10 ft} \\
   \text{8 ft} \\
   \end{array} \]

3. \( b = 12.4 \text{ cm} \quad h = 18 \text{ cm} \)

4. \( b = 3.5 \text{ m} \quad h = 6 \text{ m} \)
7-3 Find Areas of Trapezoids and Kites

**KEY CONCEPT**

You can find the area of a trapezoid or a kite by decomposing the shapes into rectangles and triangles.

**Trapezoid**

Decompose the trapezoid into two triangles and a rectangle. Find the length of the unknown triangle base.

Each triangle: \( A = \frac{1}{2}(4.5)(10) = 22.5 \)
Rectangle: \( A = 9(10) = 90 \)
Trapezoid: \( A = 22.5 + 22.5 + 90 = 135 \)
The area of the trapezoid is 135 m\(^2\).

**Kite**

Decompose the kite into two identical triangles.

Each triangle: \( A = \frac{1}{2}(16)(4) = 32 \)
Kite: \( A = 32 + 32 = 64 \)
The area of the kite is 64 ft\(^2\).

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Area is the space inside of a shape.

To find the area of a:

**Trapezoid:** \( A = \frac{1}{2} \times (b_1 + b_2) \times h \)

-or- Decompose the trapezoid into two triangles and a rectangle.

**Kite:** Decompose the kite into two triangles.
Example 1

Find the Area of a Trapezoid

The pasture is in the shape of a trapezoid. What is the area of the pasture?

Be Precise What are the properties of a trapezoid and how can they help you to find the area of a trapezoid?

Decompose the trapezoid into a rectangle and two right triangles.

Find the area of each shape and then add the areas. The triangles are identical.

\[ A = \frac{1}{2}bh = \frac{1}{2} \times 4 \times 12 = 24 \text{ yd}^2 \]

\[ A = \frac{1}{2}bh = \frac{1}{2} \times 4 \times 12 = 24 \text{ yd}^2 \]

Add the areas: \(24 + 120 + 24 = 168\)

The area of the pasture is 168 \(\text{yd}^2\).

Try It!

How would you decompose this trapezoid to find its area?

Find the area of the trapezoid.

Convince Me! How is finding the area of the trapezoid in Example 1 different from finding the area of the trapezoid in the Try It?
7-3 Example 2

**EXAMPLE 2**

Find the Area of a Different Trapezoid

A builder needs to cut one stone in the shape of a trapezoid to fit in the space. What is the area of the front side of that stone?

**Look for Relationships**

When you decompose a trapezoid into a rectangle and two triangles, the triangles are not always identical.

Draw lines to show the rectangle and the two triangles. Label needed measurements.

The triangles have different bases.

Find the areas:
- **Triangle:** \( A = \frac{1}{2}bh = \frac{1}{2}(4 \times 5) = 10 \)
- **Rectangle:** \( A = lw = 6 \times 5 = 30 \)
- **Triangle:** \( A = \frac{1}{2}bh = \frac{1}{2}(2 \times 5) = 5 \)

Add the areas:
- \( 10 \text{ in.}^2 + 30 \text{ in.}^2 + 5 \text{ in.}^2 = 45 \text{ in.}^2 \)

The area of the side of the stone is 45 in.².

7-3 Example 3

**EXAMPLE 3**

Find the Area of a Kite

Jackson has a rectangular piece of cloth that has an area of 298 cm². Does Jackson have enough cloth to make the kite shown?

**STEP 1** Decompose the kite into two identical triangles. Find the area of the triangles.

- \( A = \frac{1}{2}bh \)
- \( A = \frac{1}{2} \times 30 \times 10 \)
- \( A = 150 \text{ cm}^2 \)

Each triangle has an area of 150 cm². The area of the kite is 300 cm².

**STEP 2** Find the area of the kite. Compare the area of the kite to the area of the cloth.

- \( 2 \times 150 \text{ cm}^2 = 300 \text{ cm}^2 \)
- \( 300 \text{ cm}^2 > 298 \text{ cm}^2 \)

Jackson does not have enough cloth to make the kite.

**Try It!**

Find the area of the trapezoid and the area of the kite.

- **a.**
  - Trapezoid: \( \frac{1}{2}(8 + 12) \times 20 = 160 \text{ cm}^2 \)
  - Kite: \( \frac{1}{2}(3 + 5) \times 13 = 52 \text{ in.}^2 \)

- **b.**
  - Trapezoid: \( \frac{1}{2}(3 + 5) \times 10 = 40 \text{ in.}^2 \)
  - Kite: \( \frac{1}{2}(3 + 5) \times 3 = 9 \text{ in.}^2 \)
Do You Understand?

1. **Essential Question** How can you find the areas of trapezoids and kites?

2. Draw a line to divide the pasture in Example 1 into two triangles. What are the measures of the bases and the heights of the two triangles?

3. **Construct Arguments** In Example 3, how could you use 4 triangles to find the kite’s area? **MP3**

Do You Know How?

In 4–6, find the area of each trapezoid or kite.

4. 

5. 

6. 

---

**LESSON 7–8 Find Areas of Trapezoids and Kites**

**Quick Review**

You can find the area of a trapezoid by decomposing it into a rectangle and one or more triangles. You can find the area of a kite by decomposing it into triangles.

**Example**

Find the area of the trapezoid and the kite.

\[
\frac{1}{2}(1 \times 8) = 4 \\
\frac{1}{2}(1 \times 8) = 4 \\
8 \times 8 = 64 \\
4 + 4 + 64 = 72 \text{ yd}^2
\]

\[
\frac{1}{2}(8 + 4) \times 3 = 18 \\
\frac{1}{2}(8 + 4) \times 3 = 18 \\
18 + 18 = 36 \text{ ft}^2
\]

**Practice**

Find the area of each trapezoid or kite.

1. 

2. 

3. 

4. 
7-4 Find Areas of Polygons

**Area is the space inside of a shape.**

To find the area of any polygon, you can cut that polygon up into triangles and quadrilaterals that you know how to find the area of.

**Key Concept**

There are many ways to find the area of a polygon. You can decompose or compose shapes, or you can use addition or subtraction, to calculate the area.

**Use Addition**

Blue triangle: $A = \frac{1}{2}(12)(6) = 36$
Green triangle: $A = \frac{1}{2}(8)(6) = 24$
Rectangle: $A = (12)(6) = 72$
$36 + 24 + 72 = 132$

The area of the polygon is 132 cm².

**Use Subtraction**

Draw a rectangle around the polygon.
Rectangle: $A = 8 \times 5 = 40$
Triangle: $A = \frac{1}{2} \times 8 \times 2 = 8$
$40 - 8 = 32$

The area of the polygon is 32 square units.
Denise is building a patio in her backyard as shown in the diagram. She needs to know the area before she orders patio tiles. What is the area of the patio?

**Use Structure** How can you use shapes you know to help you find the area?

### ONE WAY
Decompose the polygon into a rectangle and two identical triangles.

```
4 m

6 m 6 m

6 m 6 m

4 m
```

Find the area of each shape.

<table>
<thead>
<tr>
<th>Each Triangle</th>
<th>Rectangle</th>
</tr>
</thead>
<tbody>
<tr>
<td>( A = \frac{1}{2}bh )</td>
<td>( A = lw )</td>
</tr>
<tr>
<td>( = \frac{1}{2}(6 \cdot 2) )</td>
<td>( = 6 \cdot 4 )</td>
</tr>
<tr>
<td>( = 6 )</td>
<td>( = 24 )</td>
</tr>
</tbody>
</table>

Add the areas: \( 6 + 6 + 24 = 36 \).

The area of the patio is 36 m².

### ANOTHER WAY
Decompose and recompose the shapes to make a square.

```
6 m

3 m 6 m

3 m
```

Find the area of the square.

\[
A = lw = 6 \cdot 6 = 36
\]

The area of the patio is 36 m².

**Try It!**
Shari found the area of the patio by composing the shapes as shown at the right. How is Shari’s strategy different?

**Convince Me!** How could you decompose the figure in the Try It! into two rectangles?
Example 2

**Example 2**  Subtract to Find the Total Area

The Robinsons are planning to resurface the path that surrounds their garden, as shown. What is the area of the path?

**Make Sense and Persevere**  The area of the path can be found by subtracting the area of the garden from the total area of the garden and the path.

**STEP 1** Find the total area of the garden and the path.

\[ A = l \times w \]

\[ = 8 \times 7 \]

\[ = 56 \text{ m}^2 \]

**STEP 2** Find the area of the garden.

\[ A = l \times w \]

\[ = 4 \times 3 \]

\[ = 12 \text{ m}^2 \]

**STEP 3** Subtract the area of the garden from the total area of the garden and the path.

\[ 56 - 12 = 44 \]

The area of the path is 44 m².

---

Example 3

**Example 3**  Find the Area of a Polygon on the Coordinate Plane

The floor plan for a new stage at a school is sketched on a coordinate plane. A flooring expert recommends bamboo flooring for the stage floor. How much bamboo flooring, in square meters, does the school need?

**STEP 1** Decompose the polygon. Find the needed dimensions.

**STEP 2** Find the area of each part.

- **Right Triangle**
  
  \[ A = \frac{1}{2}bh \]
  
  \[ = \frac{1}{2} \times 5 \times 4 \]
  
  \[ = 10 \]

- **Rectangles**
  
  \[ A = l \times w \]
  
  \[ = 6 \times 4 \]
  
  \[ = 24 \]
  
  \[ = 11 \times 5 \]
  
  \[ = 55 \]

Add the areas: \( 10 + 24 + 55 = 89 \)

The school needs 89 m² of bamboo flooring.

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**Try It!**

Find the area of the shaded region in square units.
Do You Understand?

1. **Essential Question** How can you find the areas of polygons?

2. Describe a way in which you can use subtraction to find the area of the shape in Exercise 4.

3. **Model with Math** Describe how to break the floor plan in Example 3 into a trapezoid and a rectangle. Use coordinates to describe the line you can draw.

---

Do You Know How?

In 4 and 5, find the area of each polygon.

4. [Diagram of a shape with dimensions: 10 in., 8 in., 20 in., 6 in.]

5. A polygon with vertices at (6, 2), (9, 5), (12, 2), (12, -4), and (6, -4)

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**Lesson 7-4** Find Areas of Polygons

**Quick Review**
To find the area of a polygon, you can decompose or compose shapes, then use addition or subtraction to calculate the area.

**Example**
Find the area of the polygon.

Area = (3 \times 5) + (10 \times 4) + (4 \times 10)
= 15 + 40 + 40 = 95

The area of the polygon is 95 \text{yd}^2.

**Practice**
1. Find the area of the polygon.