

BLACKLINE MASTERS

HOUGHTON MIFFLIN HARCOURT

Response to Intervention

FOR THE COMMON CORE STATE STANDARDS FOR MATHEMATICS



TIER 1 LESSONS

GRADE 6

BLACKLINE MASTERS

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Response to Intervention

FOR THE COMMON CORE STATE STANDARDS FOR MATHEMATICS

GRADE 6



**PROVIDES Tier 1 Intervention for
Every Common Core Standard**

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Geometry

- Solve real-world and mathematical problems involving area, surface area, and volume.

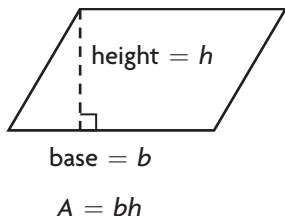
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LESSON
73

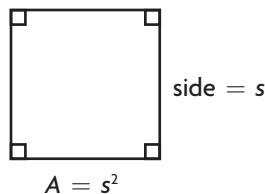
Algebra • Area of Parallelograms

OBJECTIVE Find the area of parallelograms.

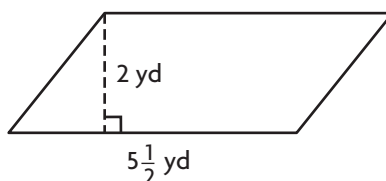
The formula for the area of a parallelogram is the product of the base and height.



The formula for the area of a square is the square of one of its sides.



Find the area.



Step 1 Identify the figure.

The figure is a parallelogram, so use the formula $A = bh$.

Step 2 Substitute $5\frac{1}{2}$ for b and 2 for h .

$$A = 5\frac{1}{2} \times 2$$

Step 3 Multiply.

$$A = 5\frac{1}{2} \times 2 = \frac{11}{2} \times \frac{2}{1} = 11$$

So, the area of the parallelogram is 11 yd^2 .

Find the area.

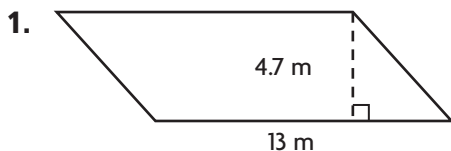
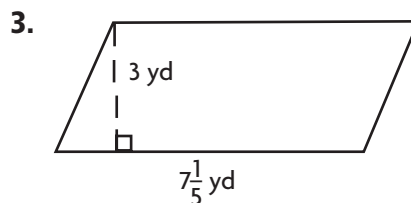
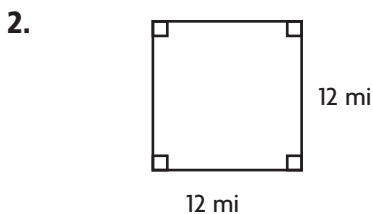


Figure: _____

Formula: $A =$ _____

$$A = \text{_____} \times \text{_____} = \text{_____} \text{ m}^2$$



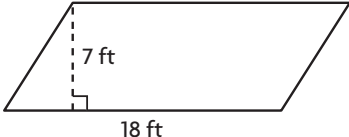
_____ mi^2

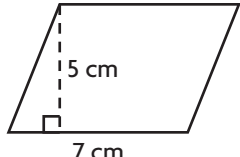
_____ yd^2



Algebra • Area of Parallelograms

Find the area of the figure.

1.  $A = bh$
 $A = 18 \times 7$
 $A = 126 \text{ ft}^2$

2. 

_____ cm^2

Find the unknown measurement for the figure.

3. square
 $A = \underline{\hspace{2cm}}$
 $s = 9 \text{ yd}$

4. parallelogram
 $A = 247 \text{ in.}^2$
 $b = 19 \text{ in.}$
 $h = \underline{\hspace{2cm}}$

5. parallelogram
 $A = 9.18 \text{ m}^2$
 $b = 2.7 \text{ m}$
 $h = \underline{\hspace{2cm}}$

6. parallelogram
 $A = 8\frac{3}{4} \text{ yd}^2$
 $b = 3\frac{1}{2} \text{ yd}$
 $h = \underline{\hspace{2cm}}$

7. parallelogram
 $A = 0.2 \text{ in.}^2$
 $b = \underline{\hspace{2cm}}$
 $h = 0.4 \text{ in.}$

8. parallelogram
 $A = \underline{\hspace{2cm}}$
 $b = 4\frac{3}{10} \text{ m}$
 $h = 2\frac{1}{10} \text{ m}$

9. square
 $A = \underline{\hspace{2cm}}$
 $s = 35 \text{ cm}$

10. parallelogram
 $A = 6.3 \text{ mm}^2$
 $b = \underline{\hspace{2cm}}$
 $h = 0.9 \text{ mm}$

Problem Solving

11. Ronna has a sticker in the shape of a parallelogram. The sticker has a base of 6.5 cm and a height of 10.1 cm. What is the area of the sticker?

12. A parallelogram-shaped tile has an area of 48 in.^2 . The base of the tile measures 12 in. What is the measure of its height?

LESSON
74

Explore Area of Triangles

OBJECTIVE Investigate the relationship among the areas of triangles, rectangles, and parallelograms.

You can use grid paper to find a relationship between the areas of triangles and rectangles.

Step 1 On grid paper, draw a rectangle with a base of 8 units and a height of 6 units. Find and record the area of the rectangle.

$A =$ 48 square units

Step 2 Cut out the rectangle.

Step 3 Draw a diagonal from the bottom left corner up to the top right corner.

Step 3 Cut the rectangle along the diagonal.

You have made 2 triangles.

- Are the triangles congruent? yes
- How does the area of one triangle compare to the area of the rectangle?

The area of the triangle is half the area of the rectangle.

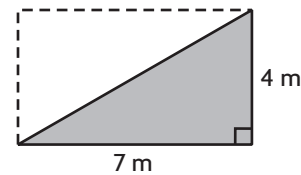
If l is the length and w is the width, you can use a rectangle to find the area of a triangle.

Find the area of the triangle.

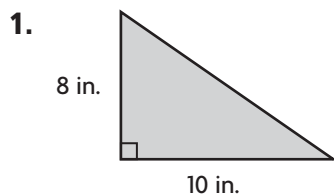
Area of rectangle: $A = lw = 7 \times 4 = 28 \text{ m}^2$

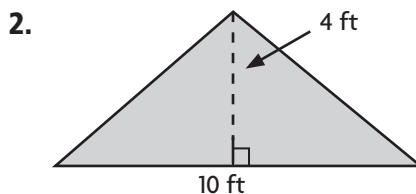
Area of triangle: $A = \frac{1}{2} \times \text{area of rectangle} = \frac{1}{2} \times 28 = 14 \text{ m}^2$

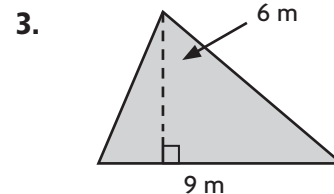
So, the area is 14 square meters.



Find the area of the triangle.

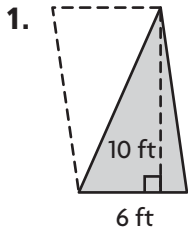




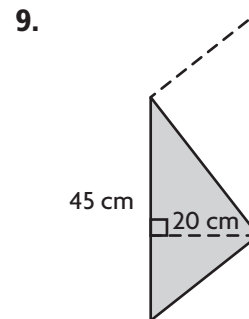
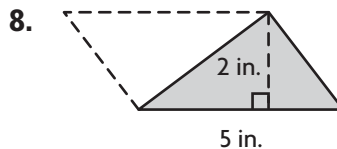
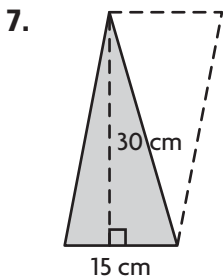
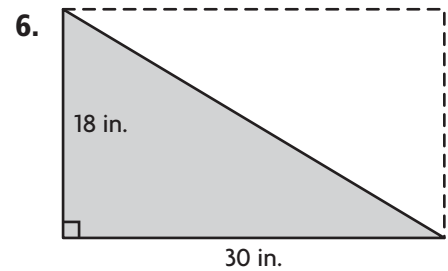
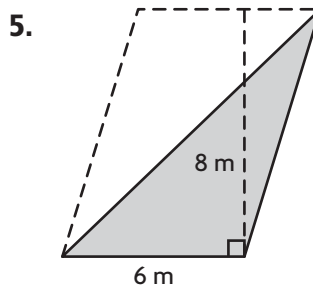
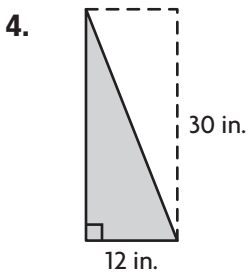
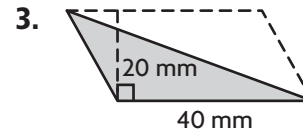
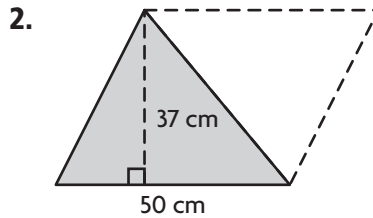


Explore Area of Triangles

Find the area of each triangle.



30 ft²



Problem Solving

10. Fabian is decorating a triangular pennant for a football game. The pennant has a base of 10 inches and a height of 24 inches. What is the total area of the pennant?

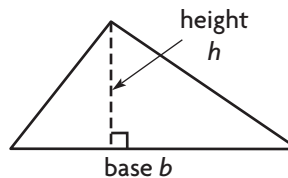
11. Ryan is buying a triangular tract of land. The triangle has a base of 100 yards and a height of 300 yards. What is the area of the tract of land?

LESSON
75

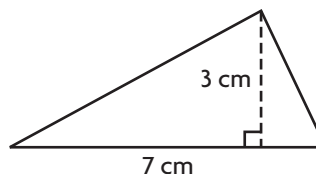
Algebra • Area of Triangles

OBJECTIVE Find the area of triangles.

To find the area of a triangle, use the formula
 $A = \frac{1}{2} \times \text{base} \times \text{height}$.



Find the area of the triangle.



Step 1 Write the formula.

$$A = \frac{1}{2}bh$$

Step 2 Rewrite the formula.
 Substitute the base and height measurements for b and h .

$$A = \frac{1}{2} \times 7 \times 3$$

Step 3 Simplify by multiplying.

$$A = \frac{1}{2} \times 21$$

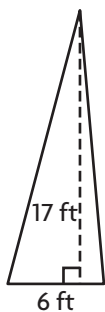
$$A = 10.5$$

Step 4 Use the appropriate units.

$$A = 10.5 \text{ cm}^2$$

Find the area of the triangle.

1.



Write the formula.

$$A = \frac{1}{2} \times \underline{\hspace{2cm}}$$

Substitute for b and h .

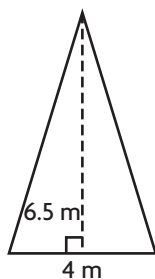
$$A = \frac{1}{2} \times \underline{\hspace{2cm}} \times \underline{\hspace{2cm}}$$

Simplify.

$$A = \frac{1}{2} \times \underline{\hspace{2cm}}$$

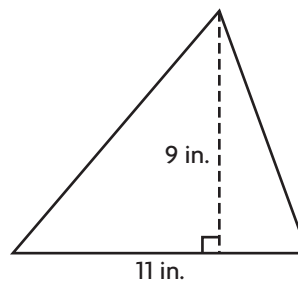
$$A = \underline{\hspace{2cm}} \text{ ft}^2$$

2.



$$A = \underline{\hspace{2cm}}$$

3.



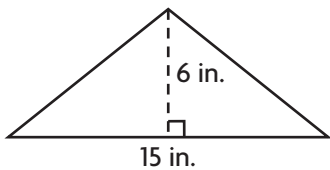
$$A = \underline{\hspace{2cm}}$$



Algebra • Area of Triangles

Find the area.

1.



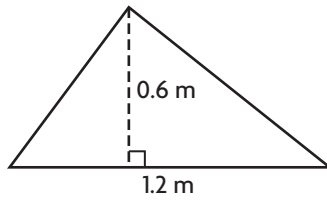
$$A = \frac{1}{2}bh$$

$$A = \frac{1}{2} \times 15 \times 6$$

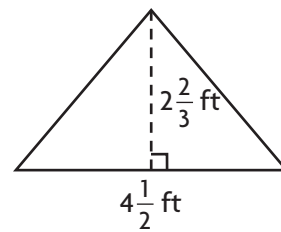
$$A = 45$$

$$\text{Area} = 45 \text{ in.}^2$$

2.



3.



Find the unknown measurement for the triangle.

4. $A = 0.225 \text{ mi}^2$

$b = 0.6 \text{ mi}$

$h = \square$

5. $A = 4.86 \text{ yd}^2$

$b = \square$

$h = 1.8 \text{ yd}$

6. $A = 63 \text{ m}^2$

$b = \square$

$h = 12 \text{ m}$

7. $A = 2.5 \text{ km}^2$

$b = 5 \text{ km}$

$h = \square$

Problem Solving

8. Bayla draws a triangle with a base of 15 cm and a height of 8.5 cm. If she colors the space inside the triangle, what area does she color?

9. Alicia is making a triangular sign for the school play. The area of the sign is 558 in.^2 . The base of the triangle is 36 in. What is the height of the triangle?

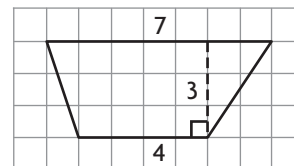
LESSON
76

Explore Area of Trapezoids

OBJECTIVE Investigate the relationship between the areas of trapezoids and parallelograms.

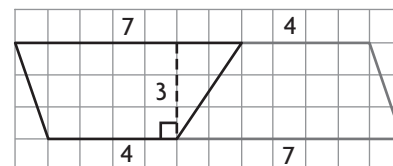
Show the relationship between the areas of trapezoids and parallelograms.

Step 1 On grid paper, draw two copies of the trapezoid. Count the grid squares to make your trapezoid match this one.



Step 2 Cut out the trapezoids.

Step 3 Turn one trapezoid until the two trapezoids form a parallelogram.



Step 4 Find the length of the base of the parallelogram. Add the lengths of one shorter trapezoid base and one longer trapezoid base.

$$4 + 7 = 11 \text{ units}$$

Step 5 Find the area of the parallelogram. Use the formula $A = bh$.

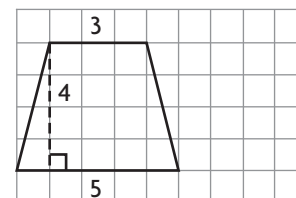
$$A = 11 \times 3 = 33 \text{ square units}$$

Step 6 The parallelogram is made of two congruent trapezoids. So, divide by 2 to find the area of one trapezoid.

$$33 \div 2 = 16.5 \text{ square units}$$

Find the area of the triangle.

1. Trace and cut out two copies of the trapezoid. Arrange them to form a parallelogram.



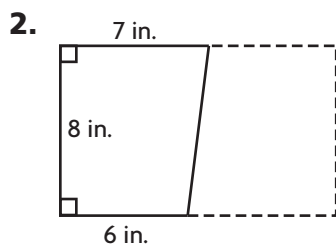
a. Find the base of the parallelogram. $3 + \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$

b. Find the area of the parallelogram, using $A = bh$.

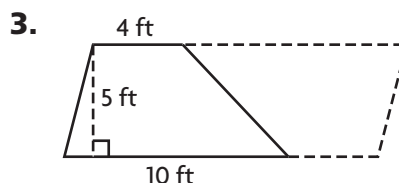
$$A = \underline{\hspace{2cm}} \times \underline{\hspace{2cm}} = \underline{\hspace{2cm}} \text{ square units}$$

c. Find the area of the trapezoid.

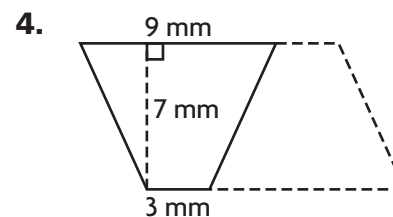
$$\underline{\hspace{2cm}} \div 2 = \underline{\hspace{2cm}} \text{ square units}$$



$$\underline{\hspace{2cm}} \text{ in.}^2$$



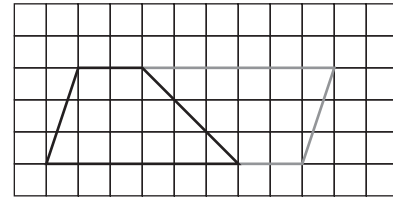
$$\underline{\hspace{2cm}} \text{ ft}^2$$



$$\underline{\hspace{2cm}} \text{ mm}^2$$

Explore Area of Trapezoids

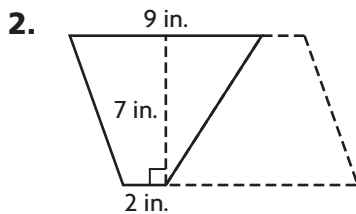
- Trace and cut out two copies of the trapezoid. Arrange the trapezoids to form a parallelogram. Find the areas of the parallelogram and the trapezoids using square units.



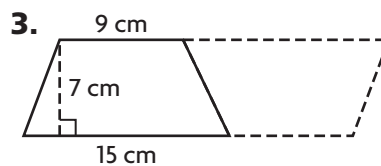
parallelogram: 24 square units;

trapezoids: 12 square units

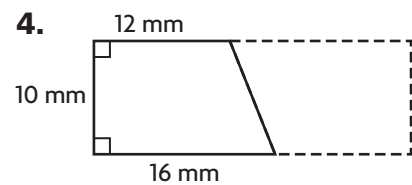
Find the area of the trapezoid.



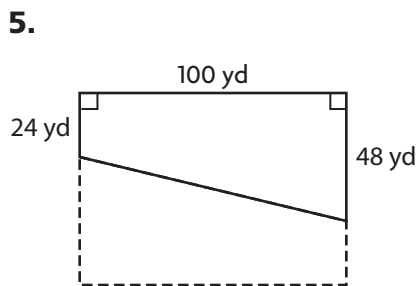
_____ in.²



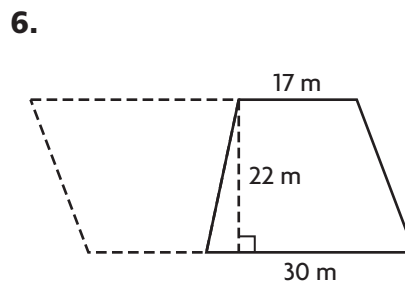
_____ cm²



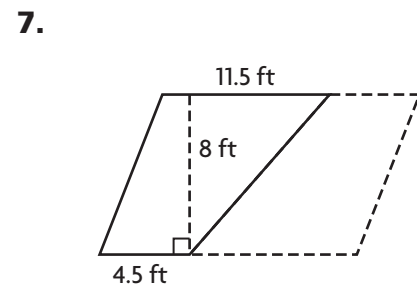
_____ mm²



_____ yd²



_____ m²



_____ ft²

Problem Solving

- A cake is made out of two identical trapezoids. Each trapezoid has a height of 11 inches and bases of 9 inches and 14 inches. What is the area of one of the trapezoid pieces?

- A sticker is in the shape of a trapezoid. The height is 3 centimeters, and the bases are 2.5 centimeters and 5.5 centimeters. What is the area of the sticker?

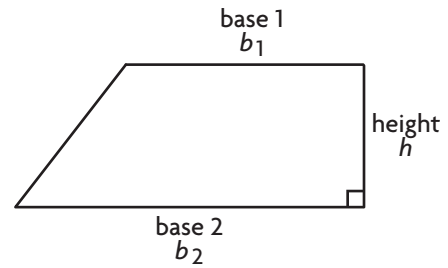


LESSON
77

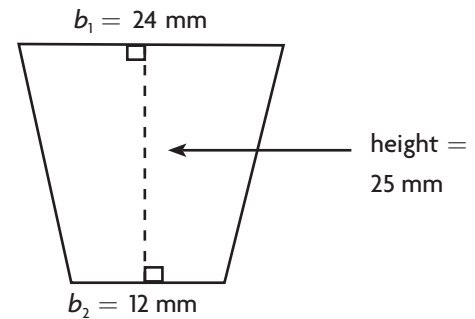
Algebra • Area of Trapezoids

OBJECTIVE Find the area of trapezoids.

To find the area of a trapezoid, use the formula
 $\text{Area} = \frac{1}{2} \times (\text{base}_1 + \text{base}_2) \times \text{height}$.



Find the area of the trapezoid.



Step 1 Write the formula to find the area.

$$A = \frac{1}{2}(b_1 + b_2)h$$

Step 2 Replace the variable b_1 with 24, b_2 with 12, and h with 25.

$$A = \frac{1}{2} \times (24 + 12) \times 25$$

Step 3 Use the order of operations to simplify.

$$A = \frac{1}{2} \times 36 \times 25$$

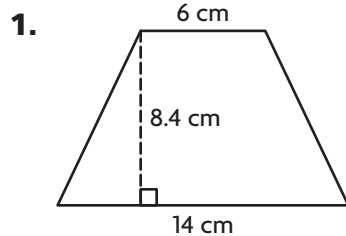
$$A = 18 \times 25$$

$$A = 450$$

Step 4 Use the appropriate units.

$$A = 450 \text{ mm}^2$$

Find the area.



Write the formula.

$$A = \underline{\hspace{2cm}}$$

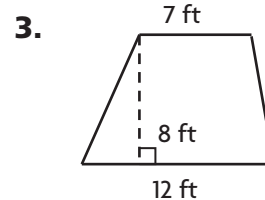
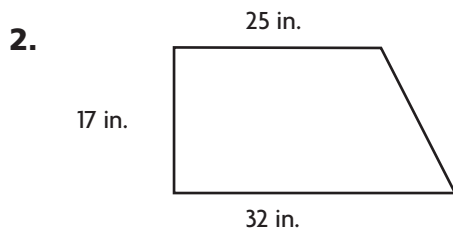
Replace the variables.

$$A = \frac{1}{2} \times (\underline{\hspace{1cm}} + \underline{\hspace{1cm}}) \times \underline{\hspace{1cm}}$$

Simplify.

$$A = \frac{1}{2} \times \underline{\hspace{1cm}} \times \underline{\hspace{1cm}}$$

$$A = \frac{1}{2} \times \underline{\hspace{1cm}}$$



Algebra • Area of Trapezoids

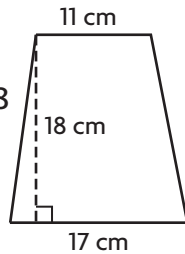
Find the area of the trapezoid.

1. $A = \frac{1}{2}(b_1 + b_2)h$

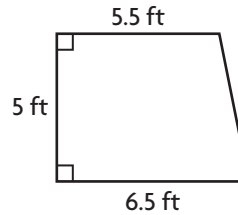
$A = \frac{1}{2} \times (\underline{11} + \underline{17}) \times 18$

$A = \frac{1}{2} \times \underline{28} \times 18$

$A = \underline{252} \text{ cm}^2$

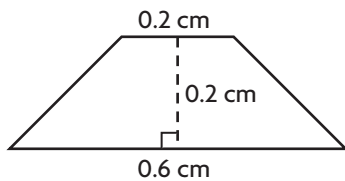


2.



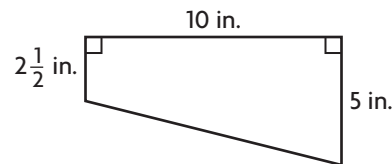
$A = \underline{\hspace{2cm}}$

3.



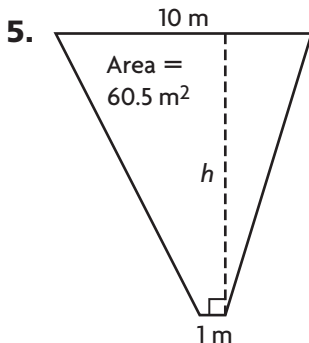
$A = \underline{\hspace{2cm}}$

4.



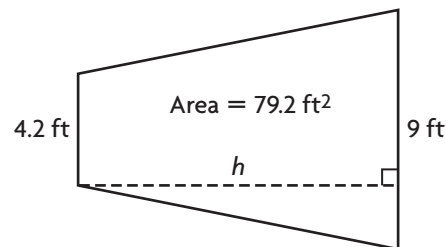
$A = \underline{\hspace{2cm}}$

Find the height of the trapezoid.



$h = \underline{\hspace{2cm}}$

6.



$h = \underline{\hspace{2cm}}$

Problem Solving

7. Sonia makes a wooden frame around a square picture. The frame is made of 4 congruent trapezoids. The shorter base is 9 in., the longer base is 12 in., and the height is 1.5 in. What is the area of the picture frame?

8. Bryan cuts a piece of cardboard in the shape of a trapezoid. The area of the cutout is 43.5 square centimeters. If the bases are 6 centimeters and 8.5 centimeters long, what is the height of the trapezoid?

LESSON
78

Area of Regular Polygons

OBJECTIVE Find the area of regular polygons.

In a regular polygon, all sides have the same length and all angles have the same measure. To find the area of a regular polygon, divide it into triangles.

Step 1 Draw line segments from each vertex to the center of the regular polygon.

Step 2 Examine the figure.

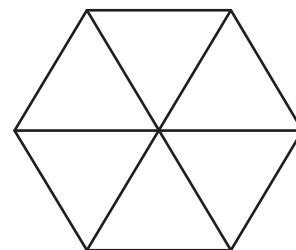
The line segments divide the polygon into congruent triangles. This polygon is a hexagon. A hexagon has 6 sides, so there are 6 triangles.

Step 3 Find the area of one triangle. Use the formula $A = \frac{1}{2}bh$

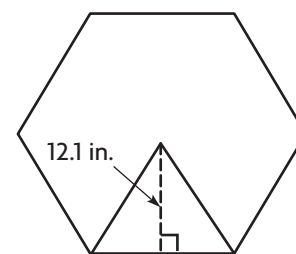
The base of the triangle (or one side of the hexagon) is 14 in. The height of the triangle is 12.1 in.

$$A = \frac{1}{2} \times 14 \times 12.1 = \frac{1}{2} \times 169.4 = 84.7 \text{ in.}^2$$

Step 4 Multiply by 6, because there are 6 triangles.



14 in.



14 in.

$$84.7 \times 6 = 508.2$$

So, the area of the regular hexagon is 508.2 square inches.

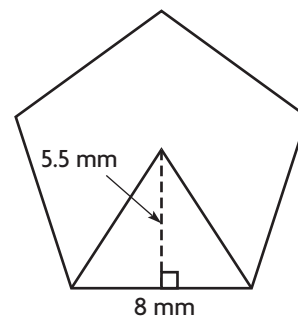
Find the area of the regular polygon.

1. Number of congruent triangles inside the pentagon: _____

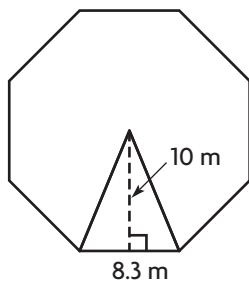
Area of each triangle:

$$A = \frac{1}{2} \times \text{_____} \times 5.5 = \frac{1}{2} \times \text{_____} = \text{_____} \text{ mm}^2$$

Area of the pentagon: _____ \times _____ = _____ mm^2

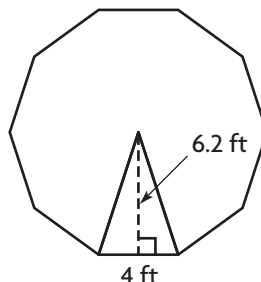


2.



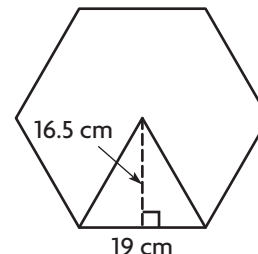
_____ m^2

3.



_____ ft^2

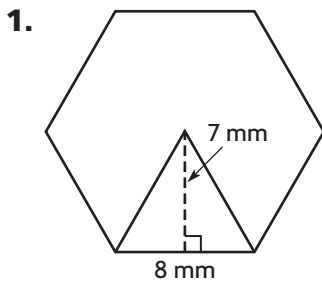
4.



_____ cm^2

Area of Regular Polygons

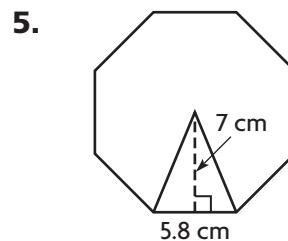
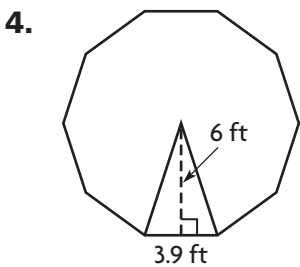
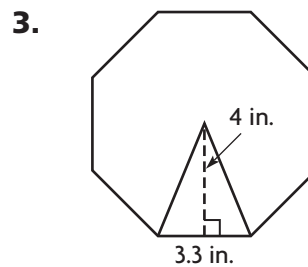
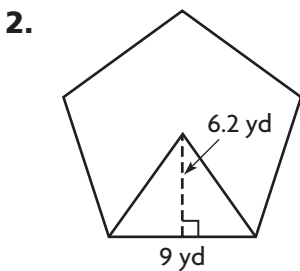
Find the area of the regular polygon.



number of congruent triangles inside the figure: 6

area of each triangle: $\frac{1}{2} \times \underline{8} \times \underline{7} = \underline{28}$ mm²

area of hexagon: 168 mm²



Problem Solving

6. Stu is making a stained glass window in the shape of a regular pentagon. The pentagon can be divided into congruent triangles, each with a base of 8.7 inches and a height of 6 inches. What is the area of the window?

7. A dinner platter is in the shape of a regular decagon. The platter has an area of 161 square inches and a side length of 4.6 inches. What is the area of each triangle? What is the height of each triangle?

LESSON
79

Composite Figures

OBJECTIVE Find the area of composite figures.

A composite figure is made up of two or more simpler figures, such as triangles and quadrilaterals.

The composite figure shows the front view of a bird house. Complete Steps 1–4 to find the area of the shaded region.

Step 1 Find the area of the rectangle.

$$A = lw = 16 \times \underline{\hspace{1cm}} = \underline{\hspace{1cm}} \text{ cm}^2$$

Step 2 Find the area of the triangle.

$$A = \frac{1}{2}bh = \frac{1}{2} \times \underline{\hspace{1cm}} \times \underline{\hspace{1cm}}$$

$$= \frac{1}{2} \times \frac{16}{1} \times \underline{\hspace{1cm}} = \underline{\hspace{1cm}} \text{ cm}^2$$

Step 3 Find the area of the square.

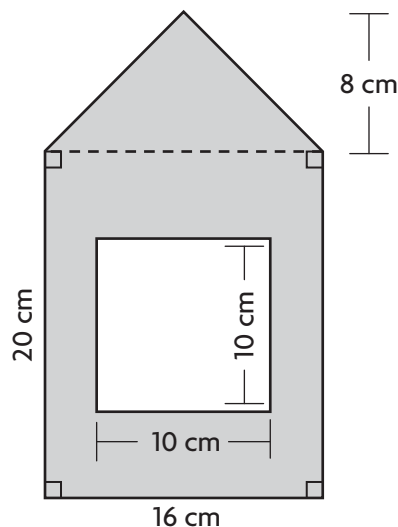
$$A = s^2 = (\underline{\hspace{1cm}})^2$$

$$= \underline{\hspace{1cm}} \text{ cm}^2$$

Step 4 Add the areas of the rectangle and triangle. Then subtract the area of the square.

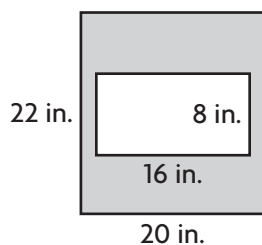
$$\text{Shaded area} = \underline{\hspace{1cm}} + \underline{\hspace{1cm}} - \underline{\hspace{1cm}} = \underline{\hspace{1cm}} \text{ cm}^2$$

So, the area of the shaded region is $\underline{\hspace{1cm}}$ cm^2 .

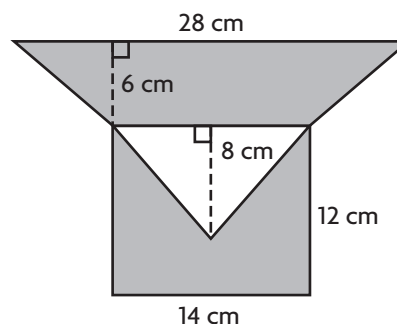


Find the area of the shaded region.

1.

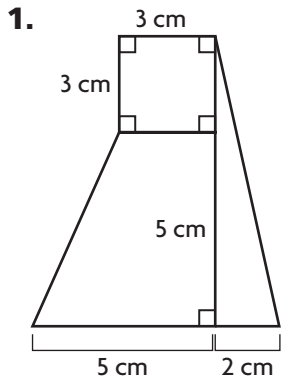


2.



Composite Figures

Find the area of the figure.



area of square

$$A = s \times s$$

$$= \underline{3} \times \underline{3} = \underline{9} \text{ cm}^2$$

area of triangle

$$A = \frac{1}{2}bh$$

$$= \frac{1}{2} \times \underline{2} \times \underline{8}$$

$$= \underline{8} \text{ cm}^2$$

area of trapezoid

$$A = \frac{1}{2}(b_1 + b_2)h$$

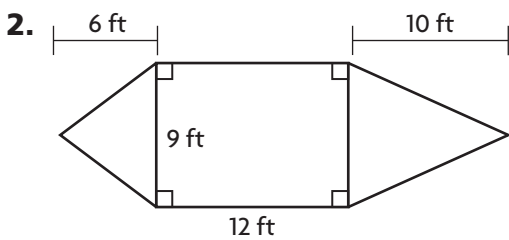
$$= \frac{1}{2} \times (\underline{5} + \underline{3}) \times \underline{5}$$

$$= \underline{20} \text{ cm}^2$$

area of composite figure

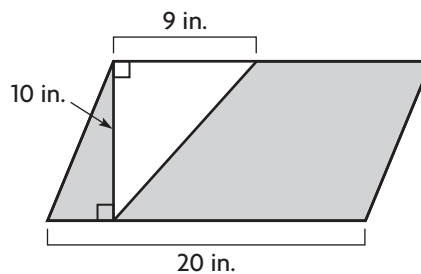
$$A = \underline{9} \text{ cm}^2 + \underline{8} \text{ cm}^2 + \underline{20} \text{ cm}^2$$

$$= \underline{37} \text{ cm}^2$$



Problem Solving

3. Janelle is making a poster. She cuts a triangle out of poster board. What is the area of the poster board that she has left?



Name _____

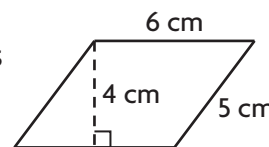


LESSON 80

Problem Solving • Changing Dimensions

OBJECTIVE Determine the effect of changing dimensions on the area of a polygon by using the strategy *find a pattern*.

Amy is sewing a quilt out of fabric pieces shaped like parallelograms. The smallest of the parallelograms is shown at the right. The dimensions of another parallelogram she is using can be found by multiplying the dimensions of the smallest parallelogram by 3. How do the areas of the parallelograms compare?



Read the Problem		
<p>What do I need to find?</p> <p>I need to find <u>how the areas of the different parallelograms compare</u>.</p>	<p>What information do I need to use?</p> <p>I need to use <u>the dimensions of the smallest parallelogram and the number by which the dimensions are multiplied</u>.</p>	<p>How will I use the information?</p> <p>I can draw a sketch of each <u>parallelogram</u> and calculate the <u>areas</u>.</p> <p>Then I can <u>look for patterns in my results</u>.</p>
Solve the Problem		
Sketch	Multiplier	Area
	none	$A = 6 \times \underline{4}$ $= \underline{24} \text{ cm}^2$
	3	$A = \underline{18} \times \underline{12}$ $= \underline{216} \text{ cm}^2$

When the dimensions are multiplied by 3, the area is multiplied by _____.

1. Sunni drew a parallelogram with area 20 in.². If she doubles the dimensions, what is the area of the new parallelogram?
2. Abe drew a square with side length 20 mm. If he draws a new square with dimensions that are half that of the previous square, what is the area of the new square?



Problem Solving • Changing Dimensions

Read each problem and solve.

1. The dimensions of a 5-in. by 3-in. rectangle are multiplied by 6. How is the area affected?

new dimensions: $l = 6 \times 5 = 30 \text{ in.}$ original area: $A = 5 \times 3 = 15 \text{ in.}^2$

$w = 6 \times 3 = 18 \text{ in.}$ new area: $A = 30 \times 18 = 540 \text{ in.}^2$

$\frac{\text{new area}}{\text{original area}} = \frac{540}{15} = 36$

The area was multiplied by 36.

2. The dimensions of a 7-cm by 2-cm rectangle are multiplied by 3. How is the area affected?

multiplied by _____

3. The dimensions of a 3-ft by 6-ft rectangle are multiplied by $\frac{1}{3}$. How is the area affected?

multiplied by _____

4. The dimensions of a triangle with base 10 in. and height 4.8 in. are multiplied by 4. How is the area affected?

multiplied by _____

5. The dimensions of a 1-yd by 9-yd rectangle are multiplied by 5. How is the area affected?

multiplied by _____

6. The dimensions of a 4-in. square are multiplied by 3. How is the area affected?

multiplied by _____

7. The dimensions of a triangle with base 1.5 m and height 6 m are multiplied by 2. How is the area affected?

multiplied by _____

8. The dimensions of a triangle are multiplied by $\frac{1}{4}$. The area of the smaller triangle can be found by multiplying the area of the original triangle by what number?

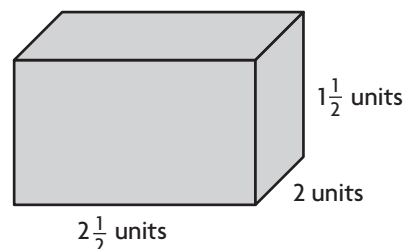
multiplied by _____

LESSON
81

Fractions and Volume

OBJECTIVE Investigate the volume of rectangular prisms with fractional edge lengths.

Find the volume of a rectangular prism that is $2\frac{1}{2}$ units long, 2 units wide, and $1\frac{1}{2}$ units high.

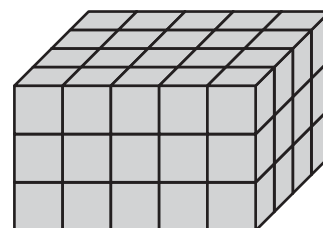


Step 1 Stack cubes with $\frac{1}{2}$ -unit side length to form a rectangular prism.

Length: 5 cubes = $\frac{1}{2} + \frac{1}{2} + \frac{1}{2} + \frac{1}{2} + \frac{1}{2} = 2\frac{1}{2}$ units

Width: 4 cubes = $\frac{1}{2} + \frac{1}{2} + \frac{1}{2} + \frac{1}{2} = 2$ units

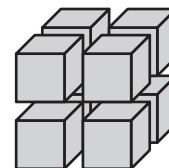
Height: 3 cubes = $\frac{1}{2} + \frac{1}{2} + \frac{1}{2} = 1\frac{1}{2}$ units



60 cubes

Step 2 Count the total number of cubes.

Step 3 It takes 8 cubes with $\frac{1}{2}$ -unit side lengths to make 1 unit cube. So, each smaller cube has $\frac{1}{8}$ the volume of a unit cube.



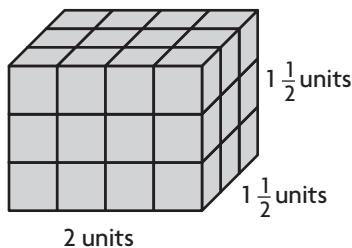
Divide 60 by 8 to find how many unit cubes it would take to form the prism. Write the remainder as a fraction and simplify.

$$60 \div 8 = 7\frac{4}{8}$$

$$7\frac{4}{8} = 7\frac{1}{2}$$

So, the volume of the prism is $7\frac{1}{2}$ cubic units.

1. Find the volume of the rectangular prism.



a. Stack cubes with $\frac{1}{2}$ -unit side lengths to form the prism.

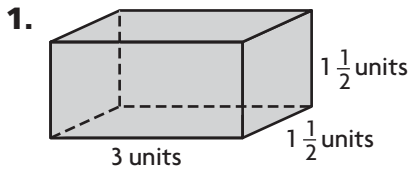
b. Count the cubes. _____

c. Divide by 8. _____ \div 8 = _____

d. The prism has a volume of _____ cubic units.

Fractions and Volume

Find the volume of the rectangular prism.

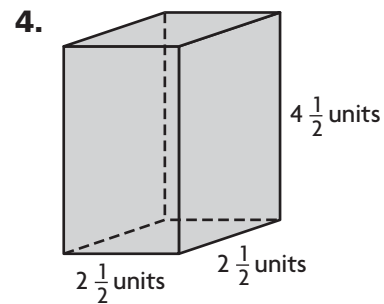
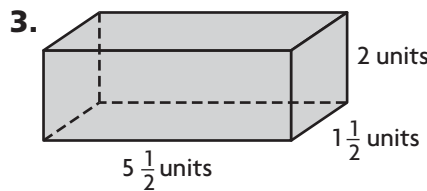
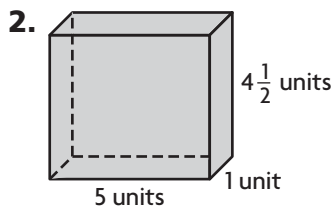


Number of cubes with side length $\frac{1}{2}$ unit: 54

$54 \div 8 = 6$ with a remainder of 6

$$54 \div 8 = 6 + \frac{6}{8} = 6\frac{3}{4}$$

Volume = $6\frac{3}{4}$ cubic units



Problem Solving

5. Miguel is pouring liquid into a container that is $4\frac{1}{2}$ inches long by $3\frac{1}{2}$ inches wide by 2 inches high. How many cubic inches of liquid will fit in the container?

6. A shipping crate is shaped like a rectangular prism. It is $5\frac{1}{2}$ feet long by 3 feet wide by 3 feet high. What is the volume of the crate?

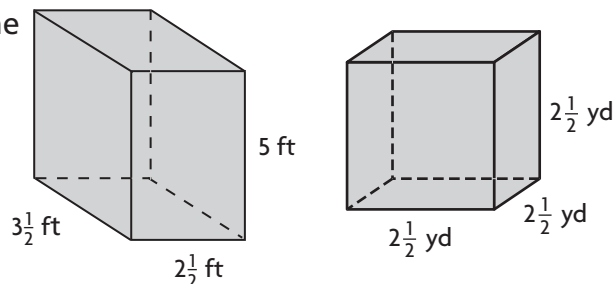
LESSON
82

Algebra • Volume of Rectangular Prisms

OBJECTIVE Use formulas to find the volume of rectangular prisms with fractional edge lengths.

You can find the volume of a prism by using the formula $V = Bh$. V stands for volume, B stands for the area of the base, and h stands for the height.

For a rectangular prism, any face can be the base, since all faces are rectangles.



Find the volume of the rectangular prism.

Step 1 Find the area of the base.

The base is $2\frac{1}{2}$ ft by $3\frac{1}{2}$ ft.

$$A = l \times w$$

$$A = 2\frac{1}{2} \text{ ft} \times 3\frac{1}{2} \text{ ft} = 8\frac{3}{4} \text{ ft}^2$$

Step 2 Multiply the area of the base by the height.

$$V = Bh$$

$$V = 8\frac{3}{4} \text{ ft}^2 \times 5 \text{ ft} = 43\frac{3}{4} \text{ ft}^3$$

So, the volume of the rectangular prism is $43\frac{3}{4} \text{ ft}^3$.

Find the volume of the cube.

Step 1 Because the length, width, and height are all equal, you can use a special formula.

$$V = Bh = l \times w \times h$$

$$V = s^3$$

Step 2 Substitute $2\frac{1}{2}$ for s .

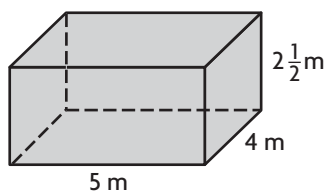
$$V = s^3 = \left(2\frac{1}{2}\right)^3 = \left(\frac{5}{2}\right)^3$$

$$V = \frac{5}{2} \text{ yd} \times \frac{5}{2} \text{ yd} \times \frac{5}{2} \text{ yd} = \frac{125}{8} \text{ yd}^3 \\ = 15\frac{5}{8} \text{ yd}^3$$

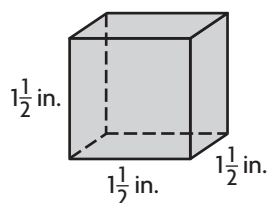
So, the volume of the cube is $15\frac{5}{8} \text{ yd}^3$.

Find the volume.

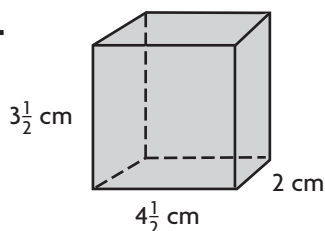
1.



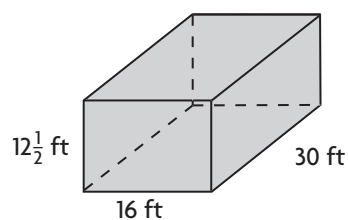
2.



3.

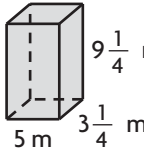


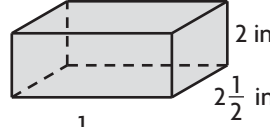
4.

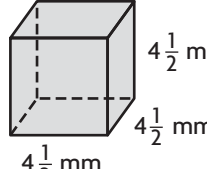


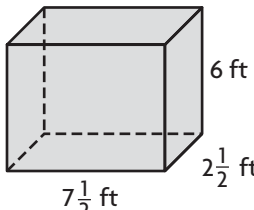
Algebra • Volume of Rectangular Prisms

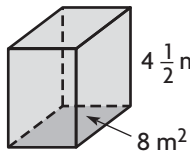
Find the volume.

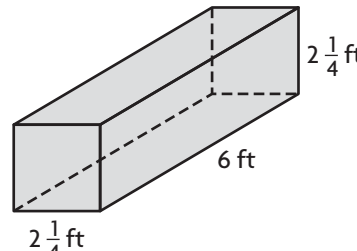
1.  $V = lwh$
 $V = 5 \times 3\frac{1}{4} \times 9\frac{1}{4}$
 $V = 150\frac{5}{16} \text{ m}^3$

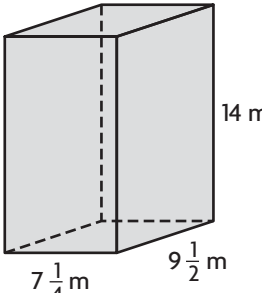
2. 

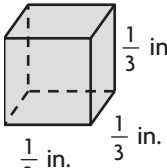
3. 

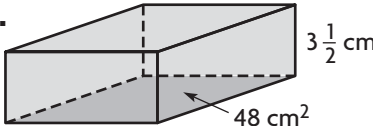
4. 

5. 

6. 

7. 

8. 

9. 

Problem Solving

10. A cereal box is a rectangular prism that is 8 inches long and $2\frac{1}{2}$ inches wide. The volume of the box is 200 in.^3 . What is the height of the box?

11. A stack of paper is $8\frac{1}{2}$ in. long by 11 in. wide by 4 in. high. What is the volume of the stack of paper?



LESSON
83

Figures on the Coordinate Plane

OBJECTIVE Plot polygons on a coordinate plane, and use coordinates to find side lengths.

The vertices of a parallelogram are $A(-2, 2)$, $B(-3, 5)$, $C(4, 5)$, and $D(5, 2)$.
Graph the parallelogram and find the length of side \overline{AD} .

Step 1 Draw the parallelogram on the coordinate plane.
Plot the points and then connect the points with straight lines.

Step 2 Find the length of side \overline{AD} .

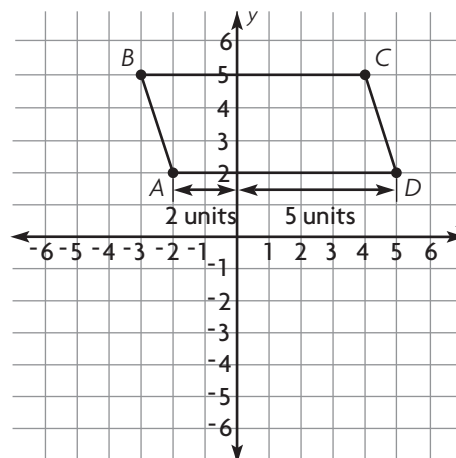
Horizontal distance of A from 0: $|-2| = 2$

Horizontal distance of D from 0: $|5| = 5$

Points A and D are in different quadrants, so add to find the distance from A to D .

$$2 + 5 = 7 \text{ units}$$

So, the length of side \overline{AD} is 7 units.



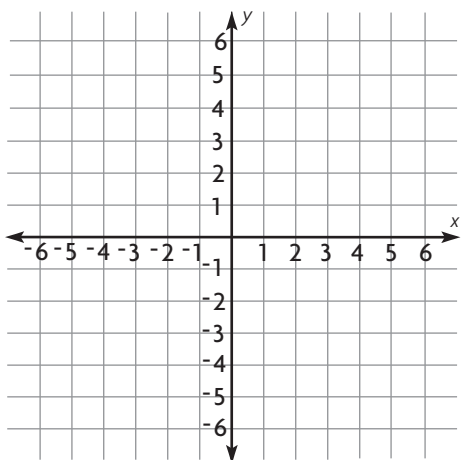
Graph the figure and find the length of the given side.

1. Triangle JKL

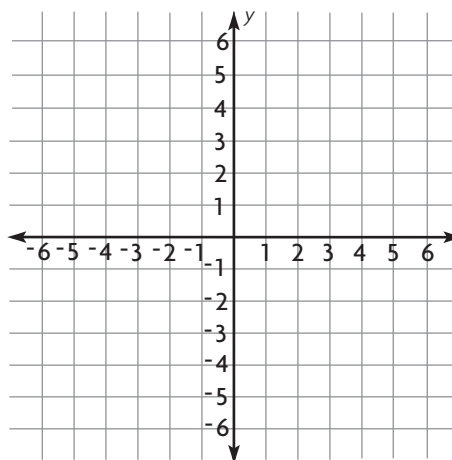
$J(-3, -3)$, $K(-3, 5)$, $L(5, 2)$

2. Trapezoid $WXYZ$

$W(-2, -3)$, $X(-2, 3)$, $Y(3, 5)$, $Z(3, -3)$



length of \overline{JK} = _____



length of \overline{WZ} = _____



Figures on the Coordinate Plane

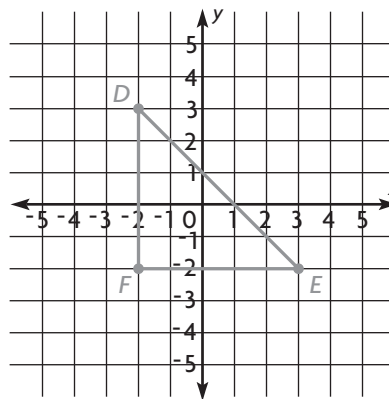
1. The vertices of triangle DEF are $D(-2, 3)$, $E(3, -2)$, and $F(-2, -2)$. Graph the triangle, and find the length of side \overline{DF} .

Vertical distance of D from 0: $|3| = \underline{3}$ units

Vertical distance of F from 0: $|-2| = \underline{2}$ units

The points are in different quadrants, so add to find the distance from D to F :

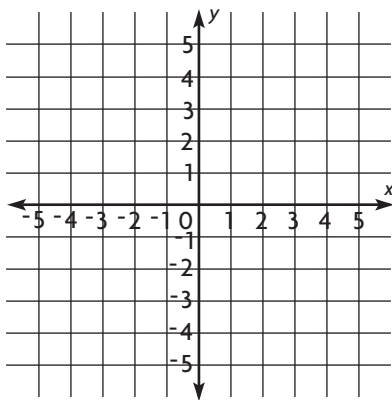
$\underline{3} + \underline{2} = \underline{5}$ units.



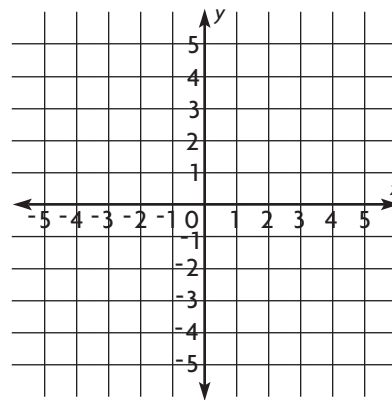
Graph the figure and find the length of side \overline{BC} .

2. $A(1, 4)$, $B(1, -2)$, $C(-3, -2)$, $D(-3, 3)$

3. $A(-1, 4)$, $B(5, 4)$, $C(5, 1)$, $D(-1, 1)$



Length of $\overline{BC} = \underline{\hspace{2cm}}$ units



Length of $\overline{BC} = \underline{\hspace{2cm}}$ units

Problem Solving

4. On a map, a city block is a square with three of its vertices at $(-4, 1)$, $(1, 1)$, and $(1, -4)$. What are the coordinates of the remaining vertex?

5. A carpenter is making a shelf in the shape of a parallelogram. She begins by drawing parallelogram $RSTU$ on a coordinate plane with vertices $R(1, 0)$, $S(-3, 0)$, and $T(-2, 3)$. What are the coordinates of vertex U ?

LESSON
84

Three-Dimensional Figures and Nets

OBJECTIVE Use nets to represent three-dimensional figures.

Solid figures have three dimensions—length, width, and height. They can be named by the shapes of their bases, the number of bases, and the shapes of their lateral faces.

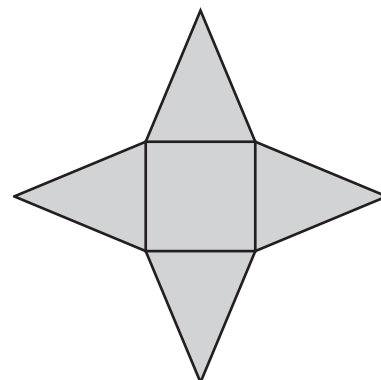
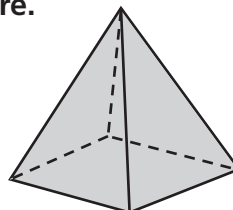
Identify and draw a net for the solid figure.

Step 1 Describe the base of the figure.
The base is a square.

Step 2 Describe the lateral surfaces.
The lateral surfaces are triangles.

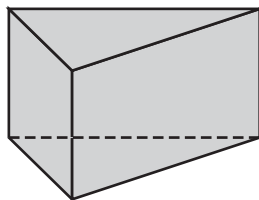
So, the figure is a square pyramid.

Step 3 Name the shapes to be used in the net. Then make a sketch. Draw a square for the base, and four triangles for the lateral faces.



Identify and draw a net for the solid figure.

1.



2.

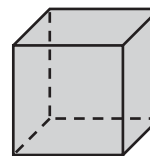


figure: _____

figure: _____

Three-Dimensional Figures and Nets

Identify and draw a net for the solid figure.

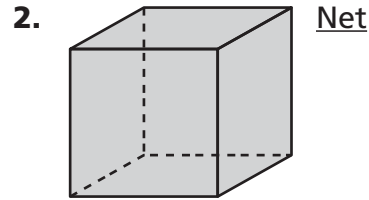
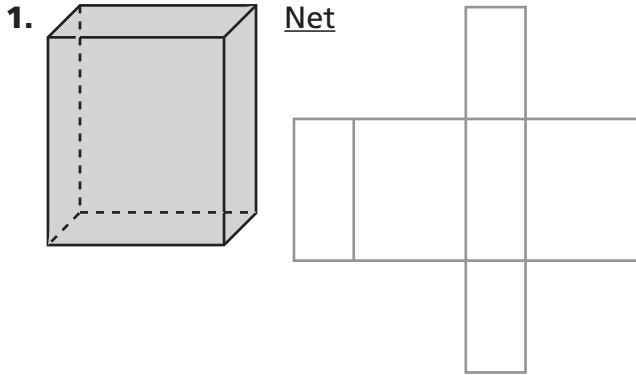


figure: rectangular prism

figure: _____

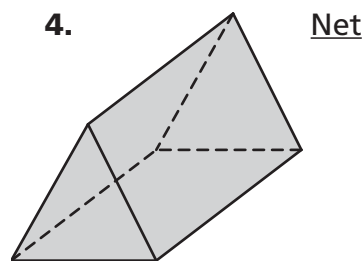
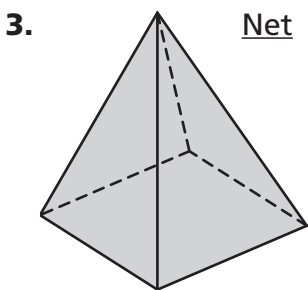


figure: _____

figure: _____

Problem Solving

5. Hobie's Candies are sold in triangular-pyramid-shaped boxes. How many triangles are needed to make one box?

6. Nina used plastic rectangles to make 6 rectangular prisms. How many rectangles did she use?

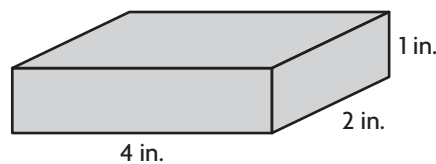
LESSON
85

Explore Surface Area Using Nets

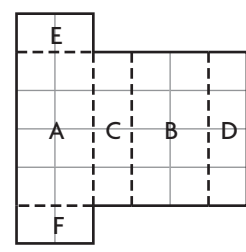
OBJECTIVE Use nets to recognize that the surface area of a prism is equal to the sum of the areas of its faces.

The net of a solid figure shows you all of the faces or surfaces of the figure. A net can help you find the **surface area** of a figure.

Find the surface area of the rectangular prism.



Step 1 Make a net of the rectangular prism.
The prism has 6 rectangular faces, so the net has 6 rectangles.



Step 2 Find the area of each face of the prism.

First Way: Count the grid squares on each rectangle to find its area.

Second Way: Calculate the area of each rectangle by multiplying *length* \times *width*.

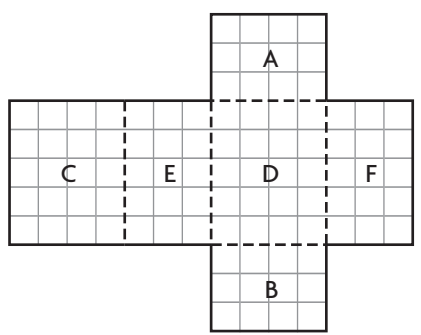
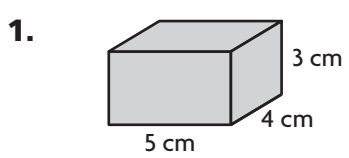
- A: 8 squares $4 \times 2 = 8$
- B: 8 squares $4 \times 2 = 8$
- C: 4 squares $4 \times 1 = 4$
- D: 4 squares $4 \times 1 = 4$
- E: 2 squares $2 \times 1 = 2$
- F: 2 squares $2 \times 1 = 2$

Step 3 Add the areas of all the rectangular faces.

28 squares 28 square inches

So, the surface area of the rectangular prism is 28 square inches (in.²).

Use the net to find the surface area of the prism.



a. Find the area of each face.

- A: _____ B: _____
- C: _____ D: _____
- E: _____ F: _____

b. Add: $A + B + C + D + E + F =$ _____

c. The surface area is _____ cm².

Explore Surface Area Using Nets

Use the net to find the surface area of the rectangular prism.

1. **A: 6 squares**
B: 8 squares
C: 6 squares
D: 12 squares
E: 8 squares
F: 12 squares

2.

52 square units

Find the surface area of the rectangular prism.

3. **7 mm**, **3 mm**, **3 mm**

4. **5 in.**, **1 in.**, **4 in.**

5. **6.5 ft**, **2 ft**, **3 ft**

Problem Solving

6. Jeremiah is covering a cereal box with fabric for a school project. If the box is 6 inches long by 2 inches wide by 14 inches high, how much surface area does Jeremiah have to cover?

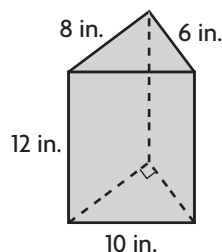
7. Tia is making a case for her calculator. It is a rectangular prism that will be 3.5 inches long by 1 inch wide by 10 inches high. How much material (surface area) will she need to make the case?

LESSON
86

Algebra • Surface Area of Prisms

OBJECTIVE Find the surface area of prisms.

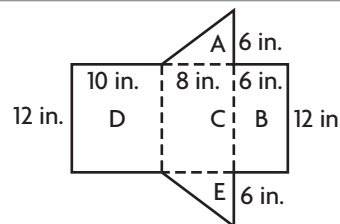
You can find the surface area of a figure by adding the lateral surface area to the sum of the areas of the bases.



Use a net to find the surface area.

Step 1 Draw a net.

Note any faces that have equal areas.



Step 2 Both triangular bases have the same area.

Base A: $A = \frac{1}{2}bh = \frac{1}{2} \times 6 \times 8 = 24 \text{ in.}^2$

Base E: $A = 24 \text{ in.}^2$

Step 3 Find the areas of the rectangular faces.

Face B: $A = lw = 6 \times 12 = 72 \text{ in.}^2$

Face C: $A = lw = 8 \times 12 = 96 \text{ in.}^2$

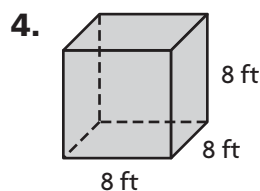
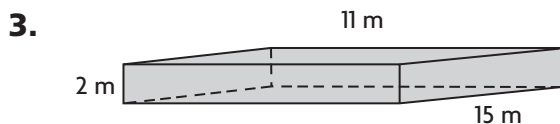
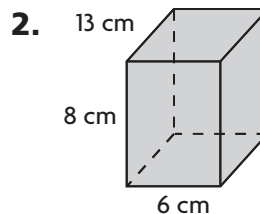
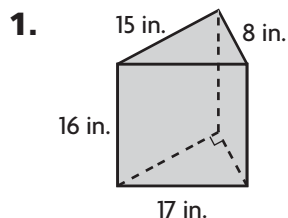
Face D: $A = lw = 10 \times 12 = 120 \text{ in.}^2$

Step 4 Add the areas: $A + B + C + D + E$

$24 + 72 + 96 + 120 + 24 = 336 \text{ in.}^2$

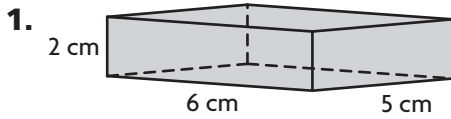
So, the surface area of the triangular prism is 336 square inches (in.^2).

Use a net to find the surface area.

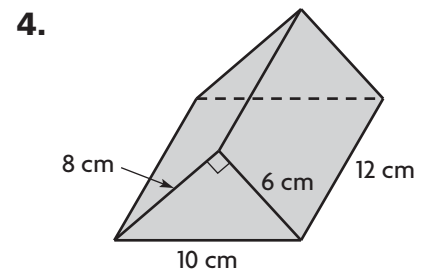
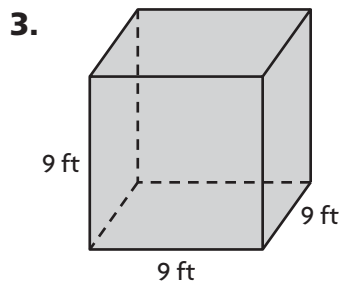
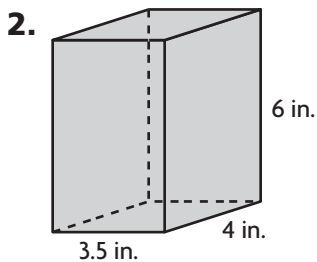
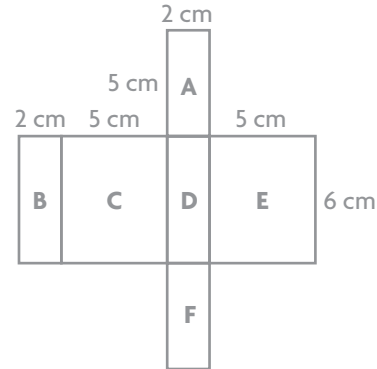


Algebra • Surface Area of Prisms

Use a net to find the surface area.



Area of A and F = $2 \times (5 \times 2) = 20 \text{ cm}^2$
 Area of B and D = $2 \times (6 \times 2) = 24 \text{ cm}^2$
 Area of C and E = $2 \times (6 \times 5) = 60 \text{ cm}^2$
 S.A. = $20 \text{ cm}^2 + 24 \text{ cm}^2 + 60 \text{ cm}^2 = 104 \text{ cm}^2$



Problem Solving

5. A shoe box measures 15 in. by 7 in. by $4\frac{1}{2}$ in. What is the surface area of the box?

6. Vivian is working with a styrofoam cube for art class. The length of one side is 5 inches. How much surface area does Vivian have to work with?

LESSON
87

Algebra • Surface Area of Pyramids

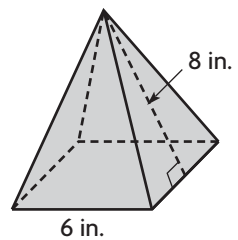
OBJECTIVE Find the surface area of pyramids.

To find the surface area of a pyramid, add the area of the base to the **lateral area**. The lateral area is the combined area of the triangular faces.

Find the surface area of the square pyramid.

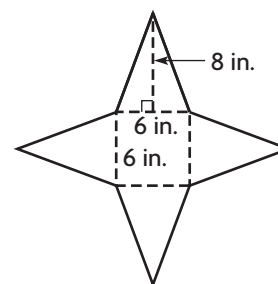
Step 1 The base is a square with side length of 6 in. Use the formula $A = s^2$ to find the area. Substitute 6 for the variable s .

$$A = 6^2 = 36 \text{ in.}^2$$



Step 2 The lateral faces are four triangles with base of 6 in. and height of 8 in. Find the area of one triangular lateral face using the formula $A = \frac{1}{2}bh$. Substitute 6 for b and 8 for h .

$$A = \frac{1}{2} (6)(8) = 24 \text{ in.}^2$$



Step 3 Multiply by 4 to find the total lateral area.

$$L = 24 \times 4 = 96 \text{ in.}^2$$

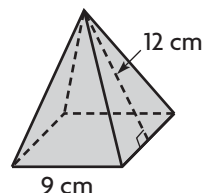
Step 4 Add the area of the base and the lateral area.

$$S = 36 \text{ in.}^2 + 96 \text{ in.}^2 = 132 \text{ in.}^2$$

So, the surface area of the square pyramid is 132 square inches (in.^2).

Use a net to find the surface area of the square pyramid.

1.



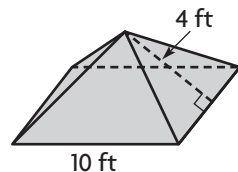
a. Area of the base: _____

b. Area of one triangular lateral face:

c. Total lateral area: _____

d. Total surface area: _____

2.



a. Area of the base: _____

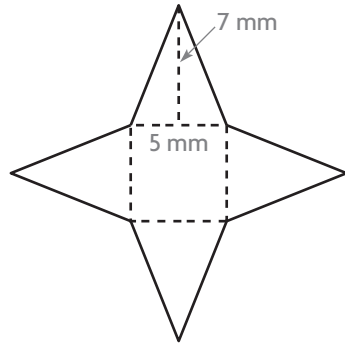
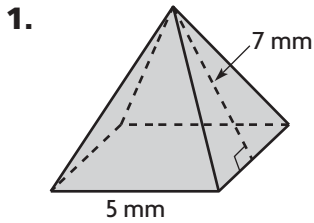
b. Area of one triangular lateral face:

c. Total lateral area: _____

d. Total surface area: _____

Algebra • Surface Area of Pyramids

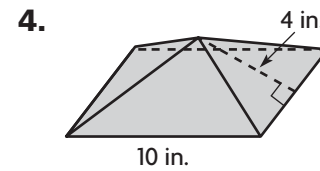
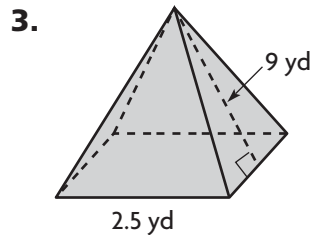
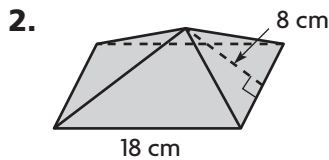
Use a net to find the surface area of the square pyramid.



$$\text{Base: } A = 5^2 = 25 \text{ mm}^2$$

$$\begin{aligned} \text{Face: } A &= \frac{1}{2} (5)(7) \\ &= 17.5 \text{ mm}^2 \end{aligned}$$

$$\begin{aligned} \text{S.A.} &= 25 + 4 \times 17.5 \\ &= 25 + 70 \\ &= 95 \text{ mm}^2 \end{aligned}$$



Problem Solving

5. Cho is building a sandcastle in the shape of a triangular pyramid. The area of the base is 7 square feet. Each side of the base has a length of 4 feet and the height of each face is 2 feet. What is the surface area of the pyramid?

6. The top of a skyscraper is shaped like a square pyramid. Each side of the base has a length of 60 meters and the height of each triangle is 20 meters. What is the lateral area of the pyramid?

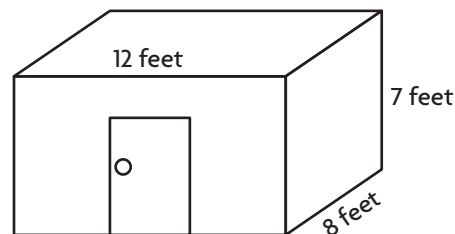


LESSON 88

Problem Solving • Geometric Measurements

OBJECTIVE Solve problems involving area, surface area, and volume by applying the strategy use a *formula*.

Leslie stores gardening supplies in this shed shaped like a rectangular prism. What is the area of the ground covered by the shed?



Read the Problem	Solve the Problem
<p>What do I need to find? I need to find <u>the area of the ground covered by the shed</u>.</p>	<p>Choose the measure—area, surface area, or volume—that gives the area of the ground covered by the shed. Explain. area; The area covered by the shed</p>
<p>What information do I need to use? I need to use <u>the dimensions of the shed</u>.</p>	<p>is the same as the area of the base of the shed</p>
<p>How will I use the information? First, I will decide <u>which measure to use</u>. Then I will choose a <u>formula</u> I can use to calculate this measure. Finally, I will <u>replace the variables and evaluate the formula</u>.</p>	<p>Choose an appropriate formula. $A = l \times w$ Replace the variables l and w in the area formula with their values in the dimensions of the shed. $l = 12$ ft $w = 8$ ft Evaluate the formula. $A = 12 \times 8$ $= 96$ ft²</p>

Solve.

- Leslie is covering bricks with paint. Each brick is 8 in. long, 4 in. wide, and 2 in. high. How many square inches will Leslie paint on each brick?

- Leslie’s planting box is shaped like a rectangular prism. It is 60 cm long, 35 cm wide, and 40 cm high. How many cubic cm of soil will Leslie need to fill the box?



Problem Solving • Geometric Measurements

Read each problem and solve.

1. The outside of an aquarium tank is 50 cm long, 50 cm wide, and 30 cm high. It is open at the top. The glass used to make the tank is 1 cm thick. How much water can the tank hold?

$$l = 50 - 2 = 48, w = 50 - 2 = 48,$$

$$h = 30 - 1 = 29$$

$$V = l \times w \times h$$

$$= 48 \times 48 \times 29$$

$$= 66,816$$

$$\underline{66,816 \text{ cm}^3}$$

2. Arnie keeps his pet snake in an open-topped glass cage. The outside of the cage is 73 cm long, 60 cm wide, and 38 cm high. The glass used to make the cage is 0.5 cm thick. What is the inside volume of the cage?

3. A gift box measures 14 in. by 12 in. by 6 in. How much wrapping paper is needed to exactly cover the box?

4. A display number cube measures 20 in. on a side. The sides are numbered 1–6. The odd-numbered sides are covered in blue fabric and the even-numbered sides are covered in red fabric. How much red fabric was used?

5. The caps on the tops of staircase posts are shaped like square pyramids. The side length of the base of each cap is 4 inches. The height of the face of each cap is 5 inches. What is the surface area of the caps for two posts?

6. A water irrigation tank is shaped like a cube and has a side length of $2\frac{1}{2}$ feet. How many cubic feet of water are needed to completely fill the tank?



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