

MSP

Grade 6 Module 5

Lesson Refreshers

&

Homework Starters

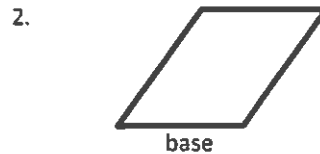
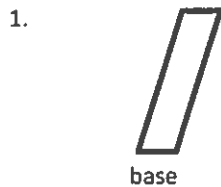
Lesson Summary

The formula to calculate the area of a parallelogram is $A = bh$, where b represents the base and h represents the height of the parallelogram.

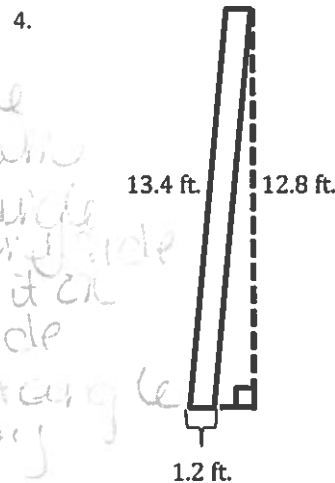
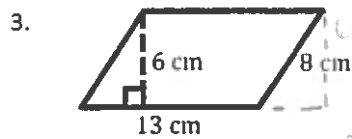
The height of a parallelogram is the line segment perpendicular to the base. The height is usually drawn from a vertex that is opposite the base.

Problem Set

Draw and label the height of each parallelogram.

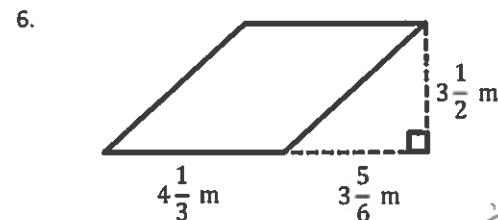
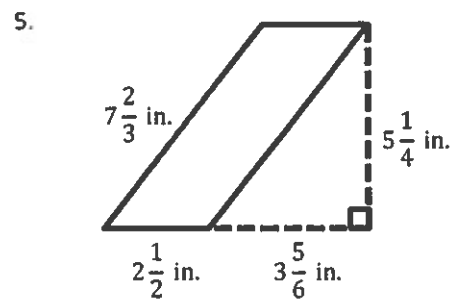


Calculate the area of each parallelogram. The figures are not drawn to scale.



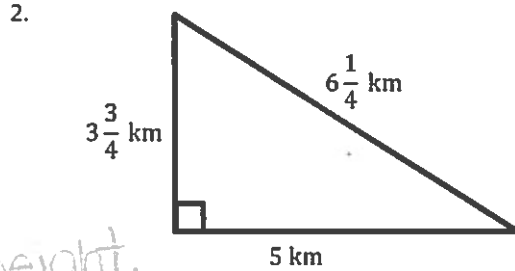
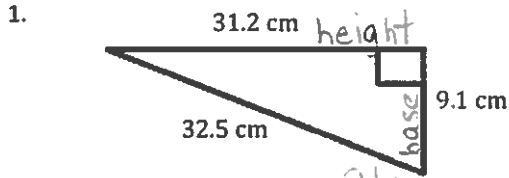
steps
change the
parallelogram
into a rectangle
by cutting big side
and putting it on
the other side
(2) Once you have a rectangle
then find the area by
using $b \times h$.

$A = b \times h$
 $A = 13 \times 6$
 $A = 78 \text{ cm}^2$



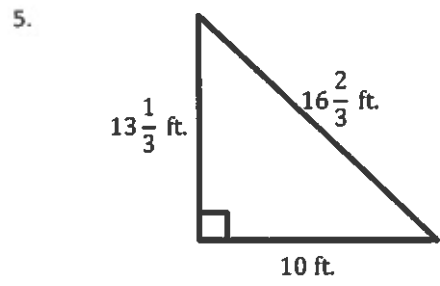
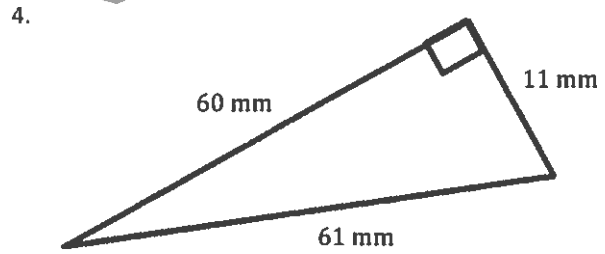
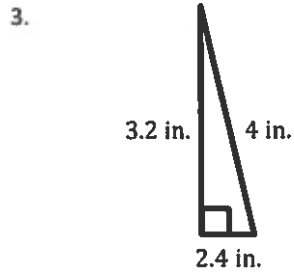
Problem Set

Calculate the area of each right triangle below. Note that the figures are not drawn to scale.



$A = \frac{1}{2} bh$
 $A = \frac{1}{2} (9.1 \times 31.2)$
 $A = \frac{1}{2} (283.92)$
 $A = 141.96 \text{ cm}^2$

Steps:
 ① multiply the base and height.
 ② then divide that answer by 2

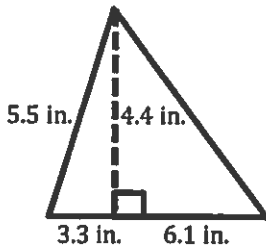


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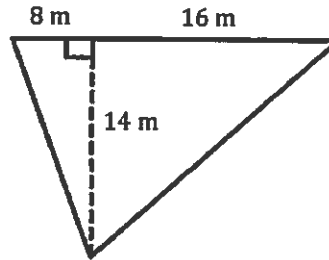
Problem Set

Calculate the area of each shape below. Figures are not drawn to scale.

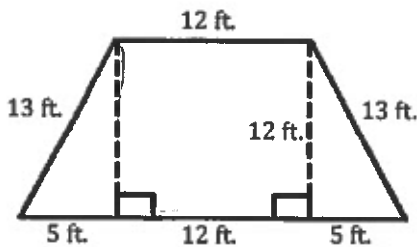
1.



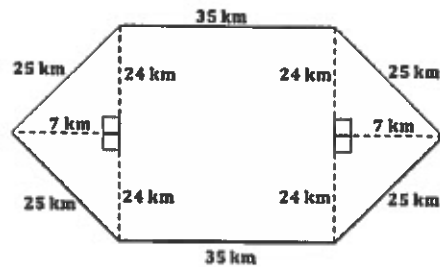
2.



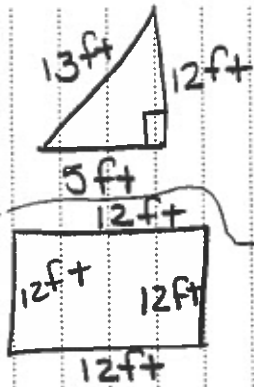
3.



4.



③



$$A = \frac{1}{2} b \times h$$

$$A = \frac{1}{2} (5 \times 12)$$

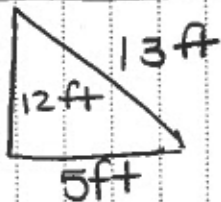
$$A = \frac{1}{2} (60)$$

$$A = 30 \text{ ft}^2$$

$$A = b \times h$$

$$A = 12 \times 12$$

$$A = 144 \text{ ft}^2$$



$$A = \frac{1}{2} b h$$

$$A = \frac{1}{2} (5 \times 12)$$

$$A = \frac{1}{2} (60)$$

$$A = 30 \text{ ft}^2$$

$$A = 30 + 144 + 30$$

$$A = 204 \text{ ft}^2$$

Steps:

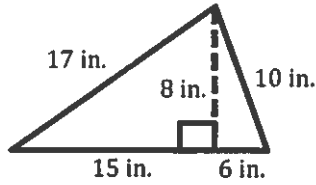
- ① Separate each shape.
- ② Solve each shape separately.
- ③ Then add the three shapes areas.

u

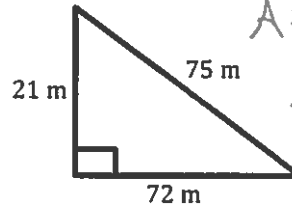
Problem Set

Calculate the area of each figure below. Figures are not drawn to scale.

1.

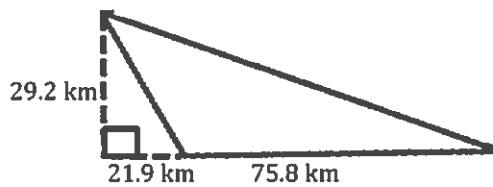


2.

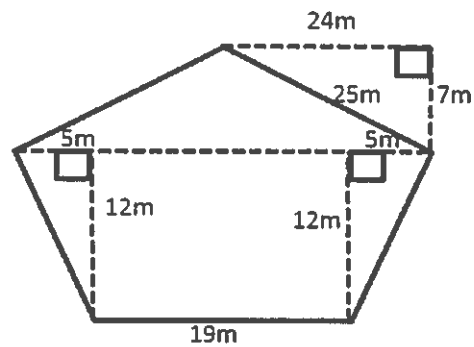


② $A = \frac{1}{2} bh$
 $A = \frac{1}{2} (72 \times 21)$
 $A = \frac{1}{2} (1512)$
 $A = 756 \text{ m}^2$

3.

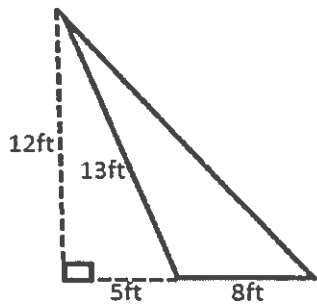


4.



5. The Andersons are going on a long sailing trip during the summer. However, one of the sails on their sailboat ripped, and they have to replace it. The sail is pictured below.

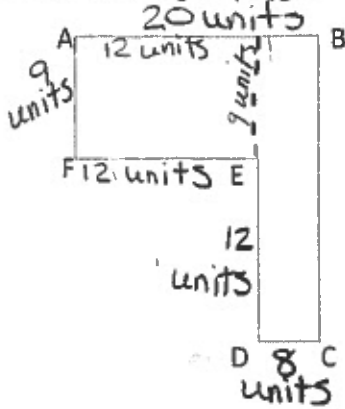
If the sailboat sails are on sale for \$2 per square foot, how much will the new sail cost?



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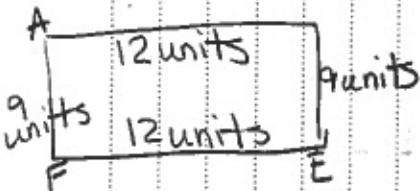
Problem Set

1. If $AB = 20$ units, $FE = 12$ units, $AF = 9$ units, and $DE = 12$ units, find the length of the other two sides. Then, find the area of the irregular polygon.



Steps:

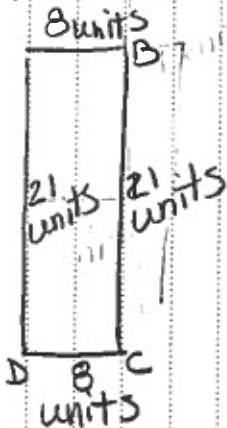
- ① Label each side.
- ② create a line the opposite side of AF and label it 9 units
- ③ Find the difference of AB and FE . Subtract 12 units from 20 units and you will get 8 units.
- ④ The length of DC will be 8 units because it's on the opposite side.
- ⑤ Then, add lengths AF and DE .



$$A = b \times h$$

$$A = 12 \times 9$$

$$A = 108 \text{ square units}$$



$$A = b \times h$$

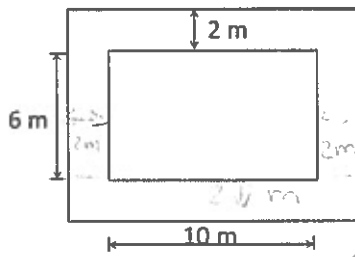
$$A = 21 \times 8$$

$$A = 168 \text{ square units}$$

- ⑥ you will get 21 units.
- ⑦ that will be length BC because it's on the opposite side
- ⑧ To solve the area of the irregular polygon, separate each shape.
- ⑨ Then, solve each shape.
- ⑩ Then, add each shape.
 $108 + 168 = 276$ square units

W

4. A rectangular flower bed measures 10 m by 6 m. It has a path 2 m wide around it. Find the area of the path.

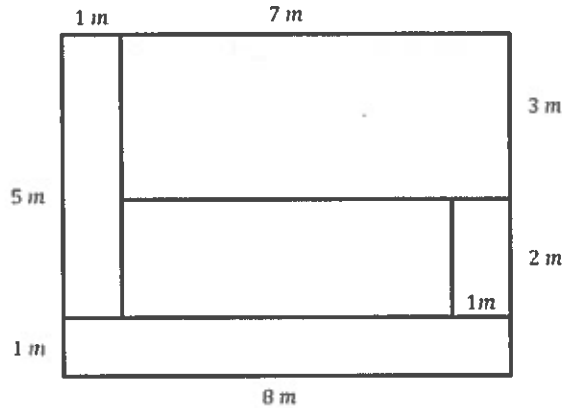


Total Area:
 ① $10m + 2m + 2m = 14m$
 ② $6m + 2m + 2m = 10m$
 ③ $14m \times 10m = 140m^2$

Flower Bed Area
 ① $10m \times 6m = 60m^2$

5. A diagram of Tracy's deck is shown below, shaded blue. He wants to cover the missing portion of his deck with soil in order to grow a garden.

- a. Find the area of the missing portion of the deck. Write the expression and evaluate it.

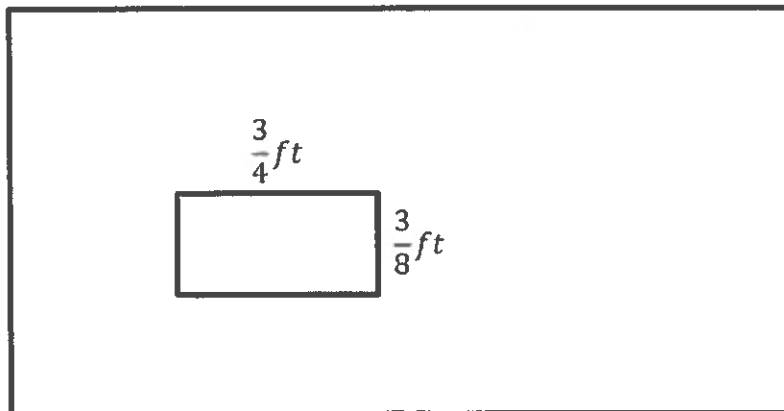


Area of Path
 ① $140m^2 - 60m^2 = 80m^2$

$$\begin{array}{r} 140 \\ - 60 \\ \hline 80m^2 \end{array}$$

- b. Find the missing portion of the deck using a different method. Write the expression and evaluate it.
 c. Write two equivalent expressions that can be used to determine the area of the missing portion of the deck.
 d. Explain how each expression demonstrates a different understanding of the diagram.

6. The entire large rectangle below has an area of $3\frac{1}{2} \text{ ft}^2$. If the dimensions of the white rectangle are as shown below, write and solve an equation to find the area, A , of the shaded region.



(u)

Problem Set

1. Given the pairs of points, determine whether the segment that joins them is horizontal, vertical, or neither.

- a. $X(3, 5)$ and $Y(-2, 5)$ _____
- b. $M(-4, 9)$ and $N(4, -9)$ _____
- c. $E(-7, 1)$ and $F(-7, 4)$ _____

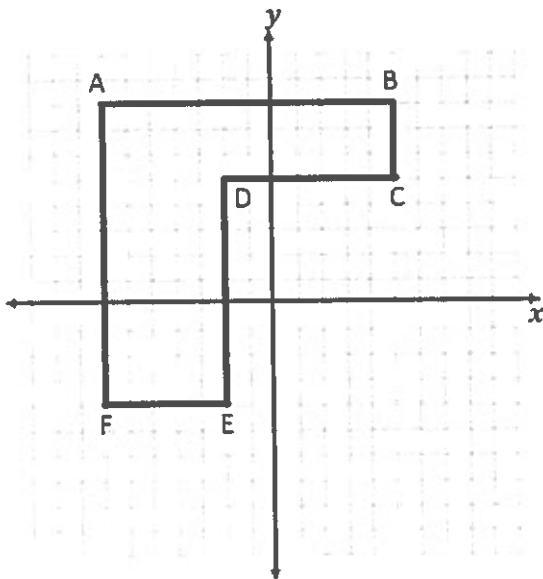
** To find the distance count from the first x point to the second x point*

2. Complete the table using absolute value to determine the lengths of the line segments.

Line Segment	Point	Point	Distance	Proof
\overline{AB}	$(-3, 5)$	$(7, 5)$	10	$ -3 - 7 = 10$
\overline{CD}	$(1, -3)$	$(-6, -3)$	7	$ 1 - (-6) = 7$
\overline{EF}	$(2, -9)$	$(2, -3)$	6	$ -9 - (-3) = 6$
\overline{GH}	$(6, 1)$	$(6, 16)$	15	$ 16 - 1 = 15$
\overline{JK}	$(-3, 0)$	$(-3, 12)$	12	$ 12 - 0 = 12$

** If the two x's are the same you have to subtract the second y point from the first y point.*

3. Complete the table using the diagram and absolute value to determine the lengths of the line segments.



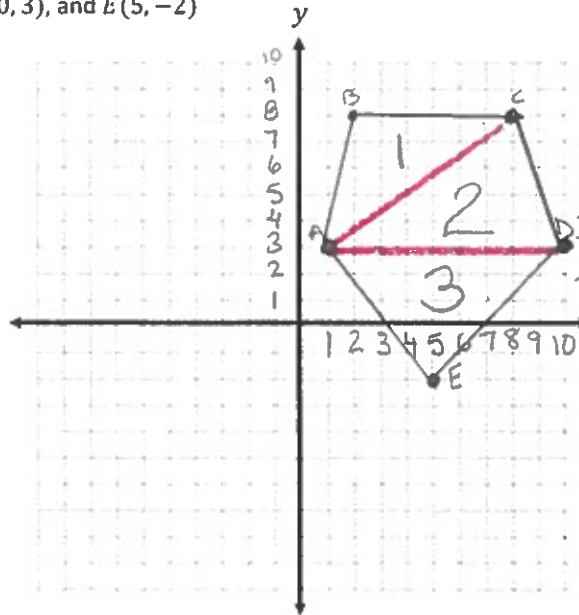
Line Segment	Point	Point	Distance	Proof
\overline{AB}				
\overline{BC}				
\overline{CD}				
\overline{DE}				
\overline{EF}				
\overline{FA}				

W

Problem Set

Plot the points for each shape, determine the area of the polygon, and then write an expression that could be used to determine the area of the figure. Explain how each part of the expression corresponds to the situation.

1. $A(1, 3)$, $B(2, 8)$, $C(8, 8)$, $D(10, 3)$, and $E(5, -2)$



Area of Triangle 1

$A = \frac{1}{2}bh$
 $A = \frac{1}{2}(6 \text{ units} \times 5 \text{ units})$
 $A = \frac{1}{2}(30 \text{ units}^2)$
 $A = 15 \text{ units}^2$

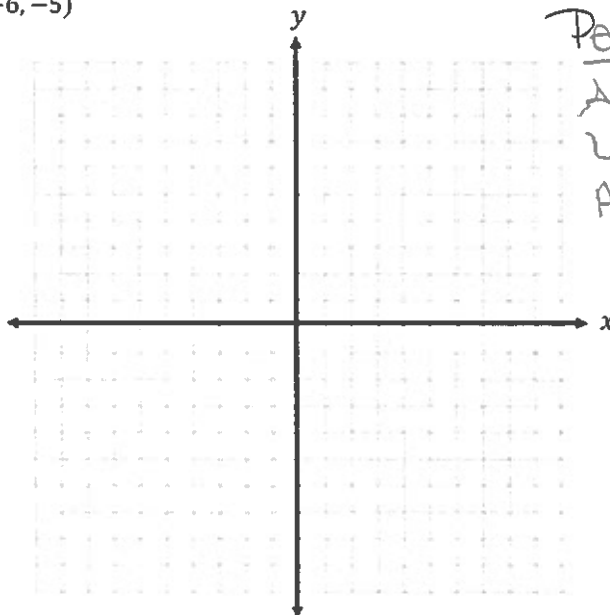
Area of Triangle 2:

$A = \frac{1}{2}bh$
 $A = \frac{1}{2}(9 \text{ units} \times 5 \text{ units})$
 $A = \frac{1}{2}(45 \text{ units}^2)$
 $A = 22.5 \text{ units}^2$

Area of Triangle 3:

$A = \frac{1}{2}bh$
 $A = \frac{1}{2}(9 \text{ units} \times 5 \text{ units})$
 $A = \frac{1}{2}(45 \text{ units}^2)$
 $A = 22.5 \text{ units}^2$

2. $X(-10, 2)$, $Y(-3, 6)$, and $Z(-6, -5)$



Pentagon Total Area

Add all 3 Triangle units
 $A = 15 \text{ units}^2 + 22.5 \text{ units}^2 + 22.5 \text{ units}^2 = 60 \text{ units}^2$



Problem Set

Steps for #2:

- ① create 3 shapes from the original figure.
- ② solve each shape
- ③ To find the total Area add all the shapes: $4\text{units}^2 + 65\text{units}^2 + 45\text{units}^2 = 114\text{units}^2$
- ④ To find the perimeter, look at the shape as a whole.
- ⑤ Add the outside of the shape.
 $2\text{units} + 2\text{units} + 7\text{units} + 13\text{units} + 14\text{units} + 5\text{units} + 9\text{units} = 58\text{units}$

shape 1: Square:

$$A = s^2$$

$$A = (2\text{units})^2$$

$$A = 4\text{units}^2$$

shape 2: rectangle:

$$A = bh$$

$$A = 13\text{units} \times 5\text{units}$$

$$A = 65\text{units}^2$$

shape 3: rectangle

$$A = bh$$

$$A = 5\text{units} \times 9\text{units}$$

$$A = 45\text{units}^2$$

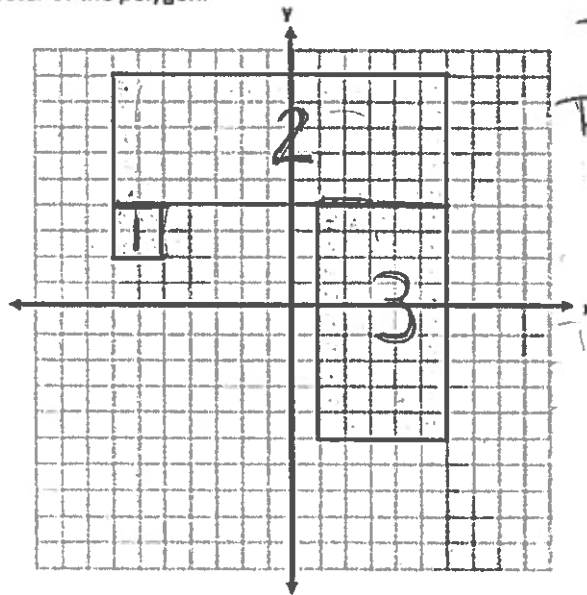
Total Area:

$$4\text{units}^2 + 65\text{units}^2 + 45\text{units}^2 = 114\text{unit}^2$$

Perimeter:

$$P = 2\text{units} + 2\text{units} + 7\text{units} + 13\text{units} + 14\text{units} + 5\text{units} + 9\text{units} = 58\text{units}$$

2. Determine the area and perimeter of the polygon.



(u)

Problem #5:

Steps:

- ① write the formula - $A = lw$
- ② substitute each letter for its number.
- ③ to find "w," you need to have "w" by itself so you need to divide 1.4m to itself and to 1.82m²
- ④ Answer = 1.3m

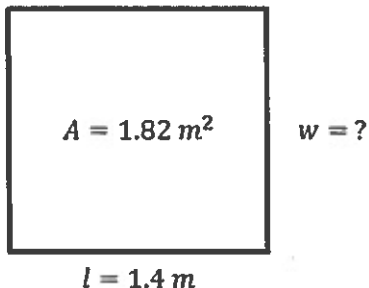
- a. What are all of the possible dimensions of the garden?
 b. Which plan yields the maximum area of the garden? Which plan yields the minimum area?

5. Write and then solve the equation to find the missing value below.

$$A = l \cdot w$$

$$\frac{1.82m^2}{1.4m} = \frac{1.4m \cdot w}{1.4m}$$

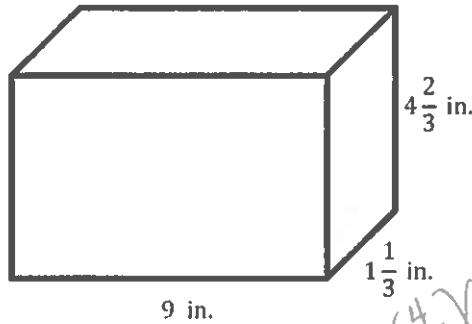
$$1.3m = w$$



(w)

Problem Set

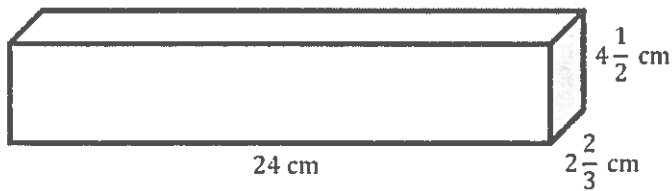
1. Answer the following questions using this rectangular prism:



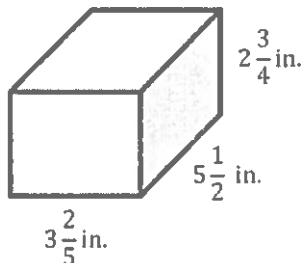
- a. What is the volume of the prism?
 $V = (9 \text{ in.}) \cdot (1 \frac{1}{3} \text{ in.}) \cdot (4 \frac{2}{3} \text{ in.}) = V = (\frac{9}{1}) (\frac{4}{3}) (\frac{14}{3}) = \frac{36}{3} \cdot \frac{14}{3} = \frac{504}{9} = 56 \text{ in}^3$
- b. Linda fills the rectangular prism with cubes that have side lengths of $\frac{1}{3}$ in. How many cubes does she need to fill the rectangular prism?
- c. How is the number of cubes related to the volume?
- d. Why is the number of cubes needed different from the volume?
- e. Should Linda try to fill this rectangular prism with cubes that are $\frac{1}{2}$ in. long on each side? Why or why not?

2. Calculate the volume of the following prisms.

a.



b.



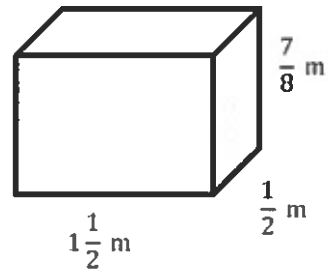
Problem Set

1. Determine the volume of the rectangular prism.

$$V = lwh$$

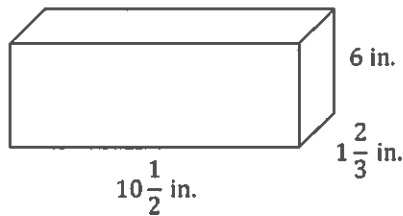
$$V = \left(1\frac{1}{2}\right)\left(\frac{1}{2}\right)\left(\frac{7}{8}\right)$$

$$V = \frac{3 \cdot 7}{4 \cdot 8} = \frac{21}{32} \text{ m}^2$$



2. The area of the base of a rectangular prism is $4\frac{3}{4} \text{ ft}^2$, and the height is $2\frac{1}{3} \text{ ft}$. Determine the volume of the rectangular prism.
3. The length of a rectangular prism is $3\frac{1}{2}$ times as long as the width. The height is $\frac{1}{4}$ of the width. The width is 3 cm. Determine the volume.

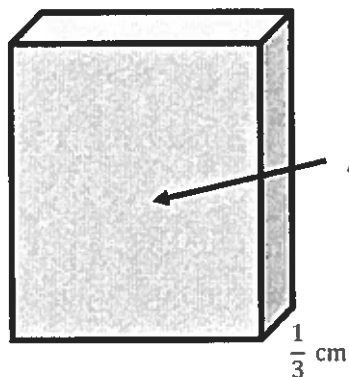
4.



- a. Write numerical expressions to represent the volume in two different ways, and explain what each reveals.
- b. Determine the volume of the rectangular prism.
5. An aquarium in the shape of a rectangular prism has the following dimensions: length = 50 cm, width = $25\frac{1}{2} \text{ cm}$, and height = $30\frac{1}{2} \text{ cm}$.
- a. Write numerical expressions to represent the volume in two different ways, and explain what each reveals.
- b. Determine the volume of the rectangular prism.

Problem Set

- Determine the volume of the rectangular prism.



$$V = A \cdot b \cdot h$$

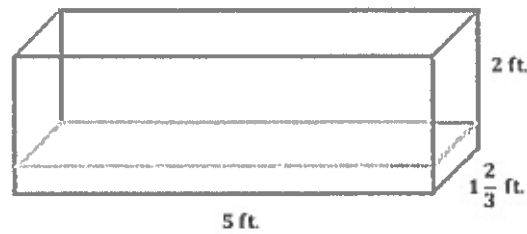
$$V = \frac{30}{7} \cdot \frac{1}{3} = \frac{30}{21} = \frac{10}{7} \text{ cm}^3$$

$$V = \frac{10}{7} \text{ cm}^3$$

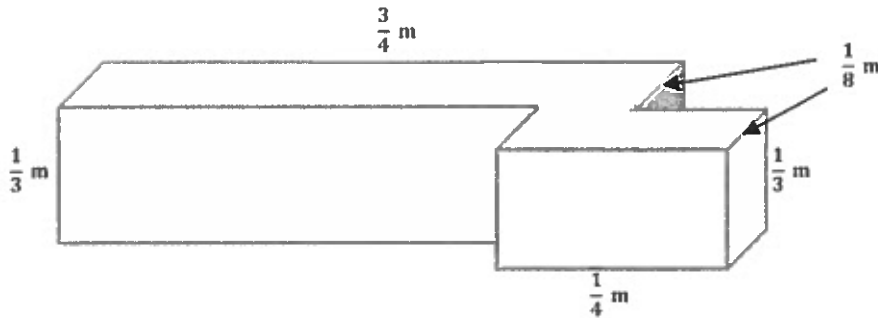
- Determine the volume of the rectangular prism in Problem 1 if the height is quadrupled (multiplied by four). Then, determine the relationship between the volumes in Problem 1 and this prism.
- The area of the base of a rectangular prism can be represented by B , and the height is represented by h .
 - Write an equation that represents the volume of the prism.
 - If the area of the base is doubled, write an equation that represents the volume of the prism.
 - If the height of the prism is doubled, write an equation that represents the volume of the prism.
 - Compare the volume in parts (b) and (c). What do you notice about the volumes?
 - Write an expression for the volume of the prism if both the height and the area of the base are doubled.
- Determine the volume of a cube with a side length of $5\frac{1}{3}$ in.
- Use the information in Problem 4 to answer the following:
 - Determine the volume of the cube in Problem 4 if all of the side lengths are cut in half.
 - How could you determine the volume of the cube with the side lengths cut in half using the volume in Problem 4?

Problem Set

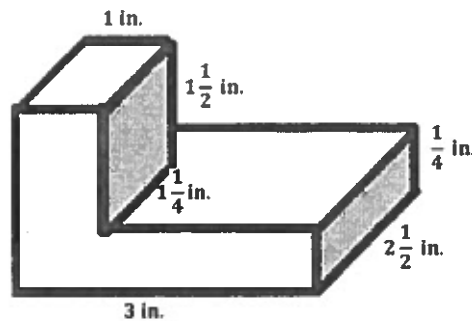
- The volume of a rectangular prism is $\frac{21}{12}$ ft³, and the height of the prism is $\frac{3}{4}$ ft. Determine the area of the base.
 $V = bh$ $\frac{21}{12} = b\left(\frac{3}{4}\right) \rightarrow \times \frac{4}{3} = \frac{9}{12}$ $\frac{9}{12} + \frac{21}{12} = b\left(\frac{9}{12}\right) + \frac{9}{12} = \frac{21}{9} = b$
- The volume of a rectangular prism is $\frac{21}{21}$ ft³. The area of the base is $\frac{2}{3}$ ft². Determine the height of the rectangular prism.
- Determine the volume of the space in the tank that still needs to be filled with water if the water is $\frac{1}{3}$ ft. deep.



- Determine the volume of the composite figure.



- Determine the volume of the composite figure.



Lesson Summary

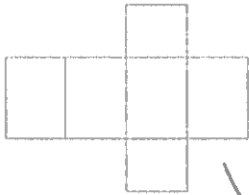
NET: If the surface of a 3-dimensional solid can be cut along sufficiently many edges so that the faces can be placed in one plane to form a connected figure, then the resulting system of faces is called a *net of the solid*.

Problem Set

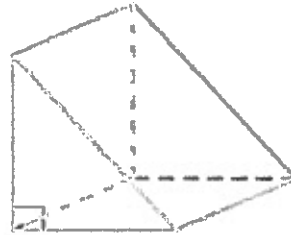
SC

1. Match the following nets to the picture of its solid. Then, write the name of the solid.

a.

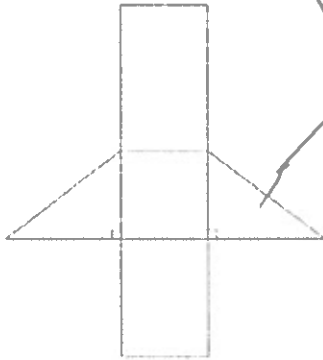


d.

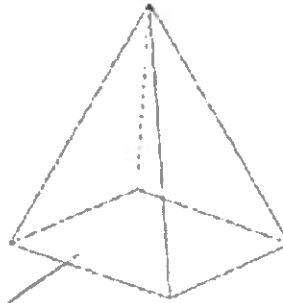


Right triangular prism

b.

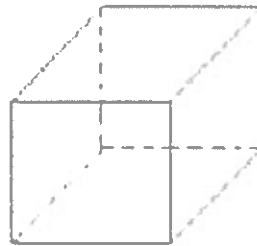
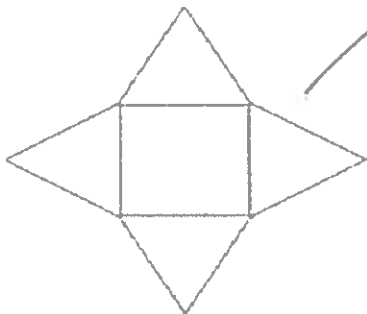


e.



Rectangular pyramid

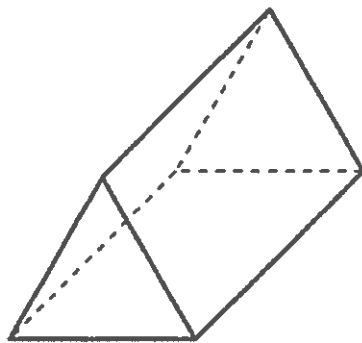
c.



Problem Set

1. Sketch and label the net of the following solid figures, and label the edge lengths.
 - a. A cereal box that measures 13 inches high, 7 inches long, and 2 inches wide
 - b. A cubic gift box that measures 8 cm on each edge
 - c. Challenge: Write a numerical expression for the total area of the net in part (b). Tell what each of the terms in your expression means.

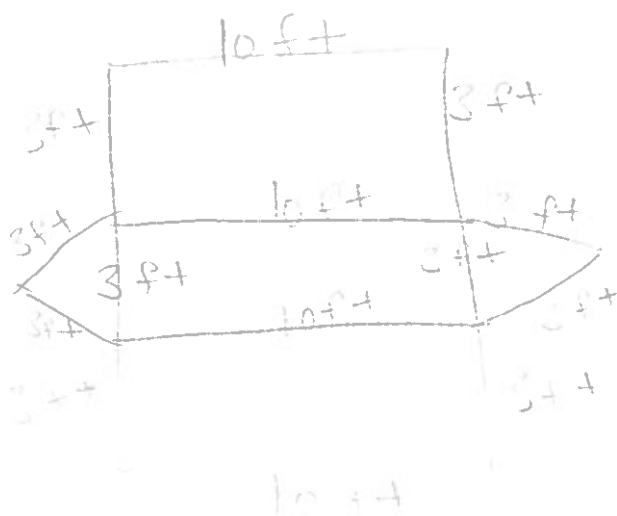
2. This tent is shaped like a triangular prism. It has equilateral bases that measure 5 feet on each side. The tent is 8 feet long. Sketch the net of the tent, and label the edge lengths.



3. The base of a table is shaped like a square pyramid. The pyramid has equilateral faces that measure 25 inches on each side. The base is 25 inches long. Sketch the net of the table base, and label the edge lengths.

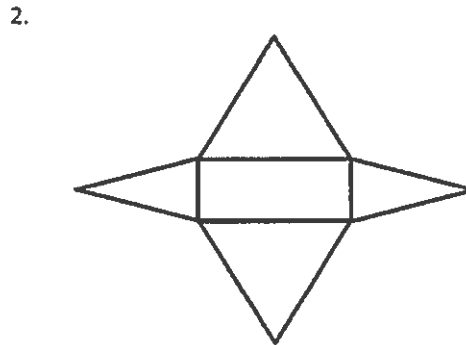
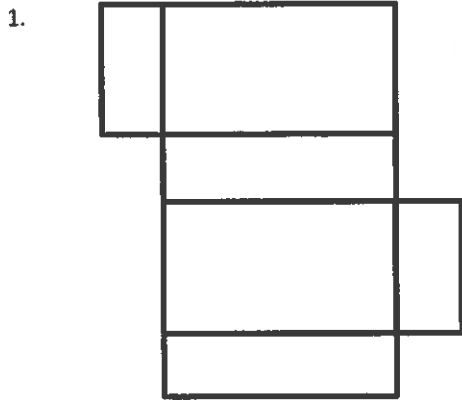
4. The roof of a shed is in the shape of a triangular prism. It has equilateral bases that measure 3 feet on each side. The length of the roof is 10 feet. Sketch the net of the roof, and label the edge lengths.

SC



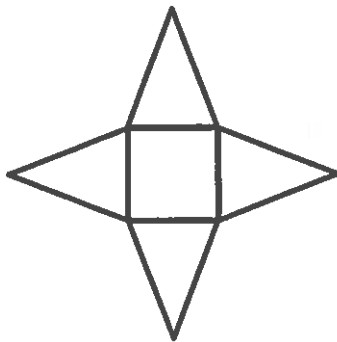
Problem Set

Name the shape, and write an expression for surface area. Calculate the surface area of the figure. Assume each box on the grid paper represents a 1 ft. × 1 ft. square.



Explain the error in each problem below. Assume each box on the grid paper represents a 1 m × 1 m square.

3.



Name of Shape: Rectangular Pyramid, but more specifically a Square Pyramid
 Area of Base: $3\text{ m} \times 3\text{ m} = 9\text{ m}^2$
 Area of Triangles: $3\text{ m} \times 4\text{ m} = 12\text{ m}^2$
 Surface Area: $9\text{ m}^2 + 12\text{ m}^2 + 12\text{ m}^2 + 12\text{ m}^2 + 12\text{ m}^2 = 57\text{ m}^2$

~~The error is in the solution~~
 the area of the triangle.

In order to calculate the correct area of the triangle, you must use the correct formula, $A = \frac{1}{2}bh$.

The ^{area of each} triangle would be 6 m^2 and not 12 m^2

Lesson Summary

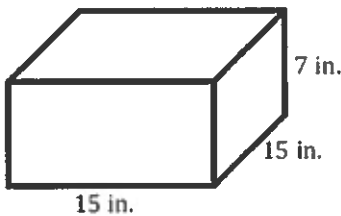
Surface Area Formula for a Rectangular Prism: $SA = 2lw + 2lh + 2wh$

Surface Area Formula for a Cube: $SA = 6s^2$

Problem Set

Calculate the surface area of each figure below. Figures are not drawn to scale.

1.



Rectangular prism

$$SA = 2lw + 2lh + 2wh$$

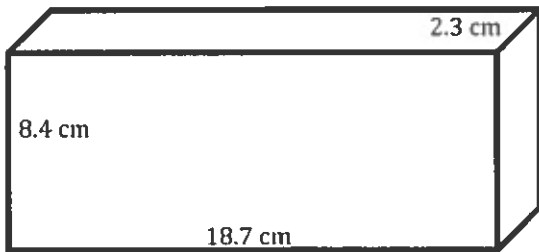
$$SA = 2(15\text{ in})(15\text{ in}) + 2(15\text{ in})(7\text{ in}) + 2(15\text{ in})(15\text{ in})$$

$$SA = 2(225\text{ in}^2) + 2(105\text{ in}^2) + 2(105\text{ in}^2)$$

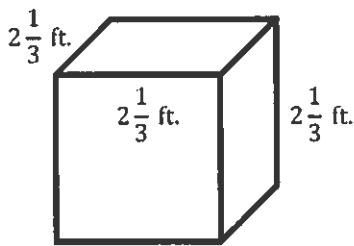
$$SA = 450\text{ in}^2 + 210\text{ in}^2 + 210\text{ in}^2$$

$$SA = 870\text{ in}^2$$

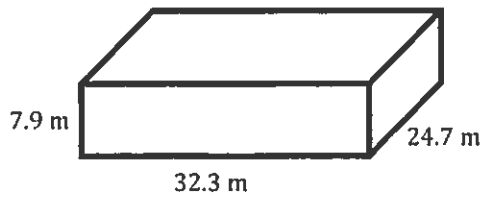
2.



3.



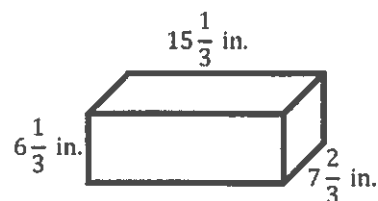
4.



Problem Set

Solve each problem below.

- Dante built a wooden, cubic toy box for his son. Each side of the box measures 2 feet.
 - How many square feet of wood did he use to build the box?
 - How many cubic feet of toys will the box hold?
- A company that manufactures gift boxes wants to know how many different-sized boxes having a volume of 50 cubic centimeters it can make if the dimensions must be whole centimeters.
 - List all the possible whole number dimensions for the box.
 - Which possibility requires the least amount of material to make?
 - Which box would you recommend the company use? Why?
- A rectangular box of rice is shown below. What is the greatest amount of rice, in cubic inches, that the box can hold?



- The Mars Cereal Company has two different cereal boxes for Mars Cereal. The large box is 8 inches wide, 11 inches high, and 3 inches deep. The small box is 6 inches wide, 10 inches high, and 2.5 inches deep.
 - How much more cardboard is needed to make the large box than the small box?
 - How much more cereal does the large box hold than the small box?
- A swimming pool is 8 meters long, 6 meters wide, and 2 meters deep. The water-resistant paint needed for the pool costs \$6 per square meter. How much will it cost to paint the pool?
 - How many faces of the pool do you have to paint?
 - How much paint (in square meters) do you need to paint the pool?
 - How much will it cost to paint the pool?
- Sam is in charge of filling a rectangular hole with cement. The hole is 9 feet long, 3 feet wide, and 2 feet deep. How much cement will Sam need?

$$V = 9 \text{ ft} \times 3 \text{ ft} \times 2 \text{ ft}$$

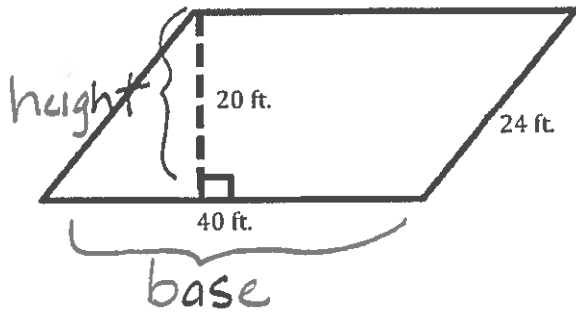
$$V = 54 \text{ ft}^3$$

Sam will need 54 cubic feet of cement to fill the hole.

Problem Set

This Problem Set is a culmination of skills learned in this module. Note that the figures are not drawn to scale.

1. Calculate the area of the figure below.

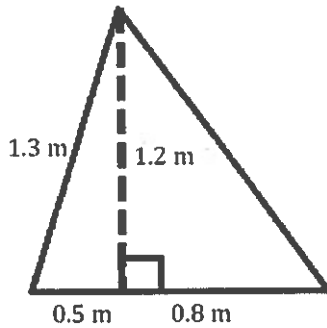


$$A = bh$$

$$A = (40 \text{ ft})(20 \text{ ft})$$

$$A = 800 \text{ ft}^2$$

2. Calculate the area of the figure below.



3. Calculate the area of the figure below.

