

Parent/Student Resource Packet

Area and Perimeter Unit

Unit Summary: In this unit, students will recognize area as an attribute of two-dimensional regions. They will measure the area of a shape by finding the total number of same-size units of area required to cover the shape without gaps or overlaps. Students will understand that rectangular arrays can be decomposed into identical rows or into individual columns. By decomposing rectangles into rectangular arrays of squares, students connect area to multiplication, and justify using multiplication, and justify using multiplication to determine the area of a rectangle. Students will also recognize that perimeter is an attribute of plane figures and will diminish between linear and area measures.

Students will know and be able to:

- Determine the area of a rectangular shape by exploring the concept of covering a region with “unit squares”, which could include square tiles or shading on grid or graph paper.
- Count the square units to find the area in metric, customary, or non-standard square units.
- Tile a rectangle, then multiply the side lengths to show it is the same. For example, to find the area one could count the squares or multiply $3 \times 4 = 12$.
- Multiply side lengths to find areas of rectangles with whole number side lengths.
- Solve real world and mathematical problems. (For example, Drew wants to tile the bathroom floor, which is 6 square feet by 8 square feet. How many square tiles will he need?)
- Apply knowledge of the distributive property. For example, finding the area of two smaller parts of a figure can be used to find the total area of a figure. (Finding the area of 7×8 figure can be found by finding 2×8 and 5×8 and adding the two areas together.)
- Use the term *rectilinear figure* to describe a polygon that has all right sides.
- Decompose (break apart) a *rectilinear figure* into non-overlapping rectangles to find its total area by adding the area of each non-overlapping section together.
- Solve problems about perimeter, or the distance around a shape. (Students should have ample opportunities to measure and

determine the perimeter of polygons. For example, what rectangles can be made with a perimeter of 12 units? Which rectangle gives you the greatest area? How do you know?)

- Find the perimeter of polygons by counting units on grid paper, as well as measuring with inch and centimeter rulers.
- Find an unknown side length of a figure given a specific perimeter.
- Find rectangles with the same perimeter and different areas, or with the same area and different perimeters.
- Discuss and identify the relationship between area and perimeter. For example, a rectangle with a perimeter of 12 could be three different shapes and areas.

Vocabulary: area, perimeter, customary, metric, standard, non-standard, centimeters, inches, frame, irregular shapes, square, square inch, square centimeter, square unit, decompose, rectilinear, ruler, approximate, equivalent, half, quarter, map key, symbols, grid paper, unit, length, width, measure, two dimensional

Measurement Guidelines

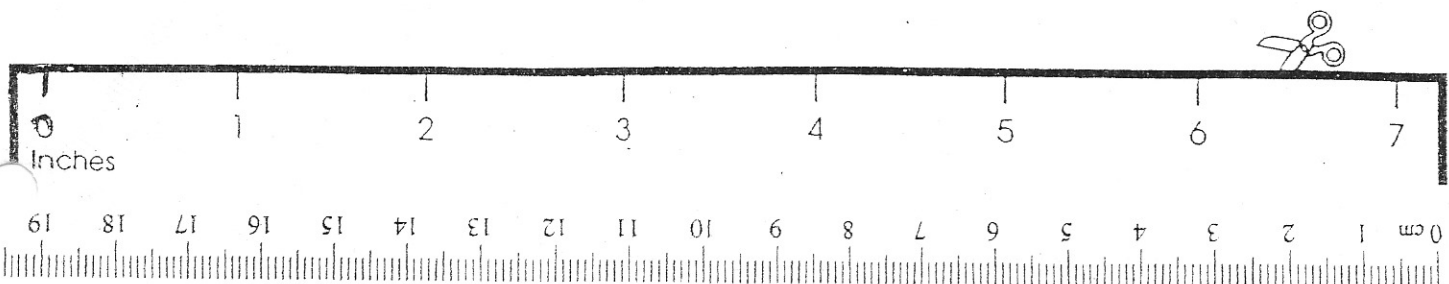
Line up the end of the ruler (yardstick/
meterstick) with the edge of the object
and hold it steady

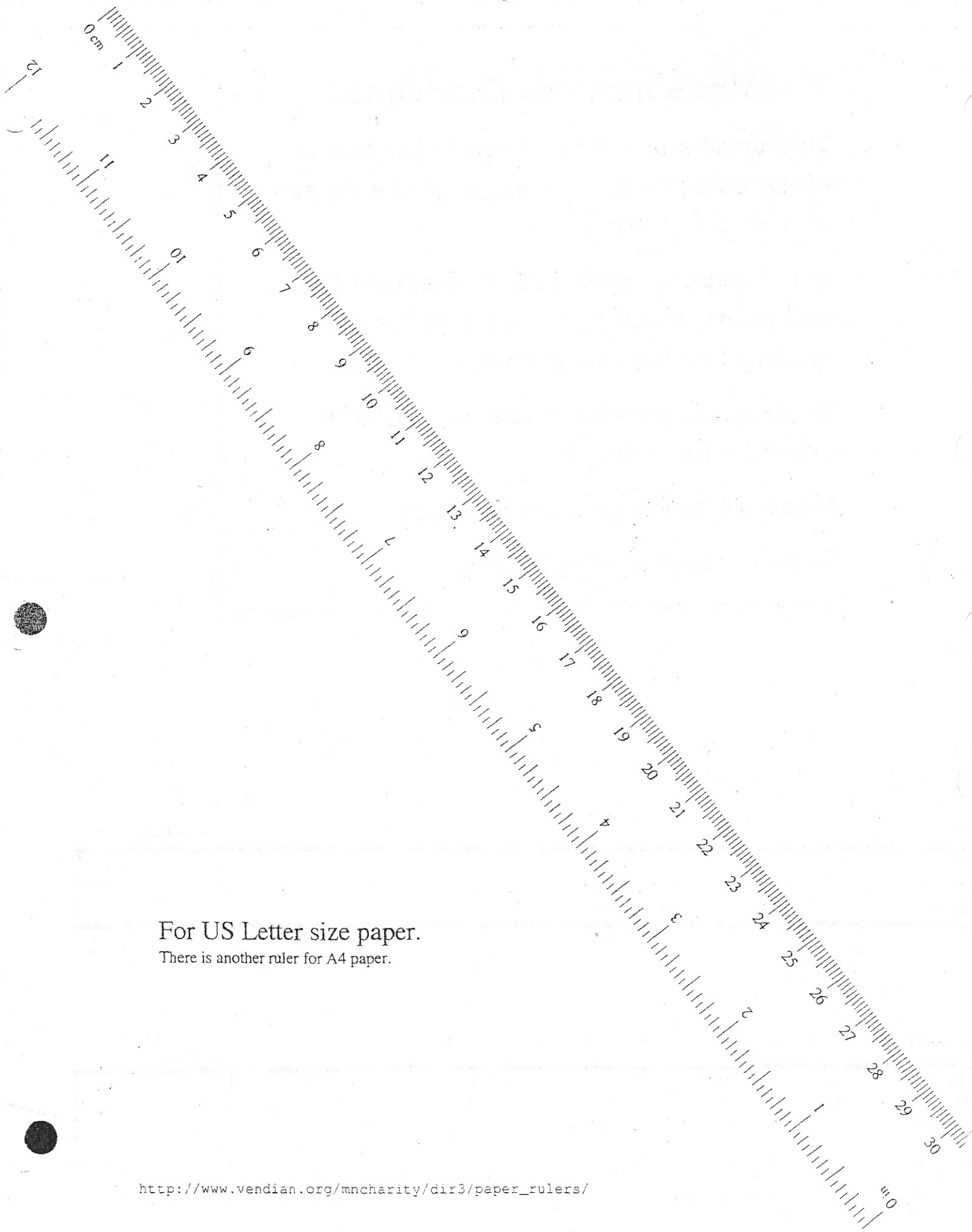
Avoid gaps or overlaps by marking the
end point of each measure before
moving the measuring tool

Write down partial measurements in
order to keep track

Measure twice to double-check

Double-check computation

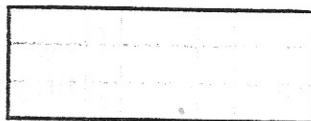
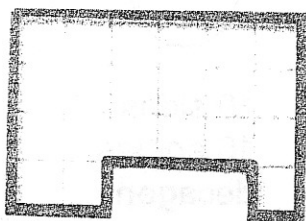
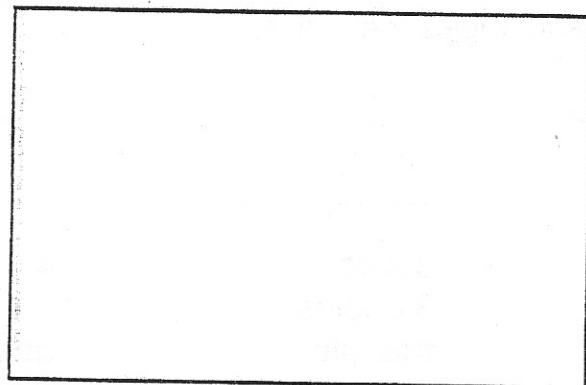
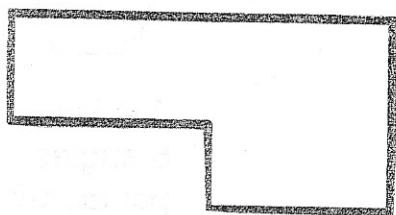
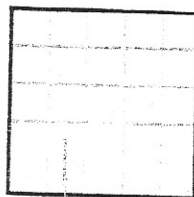
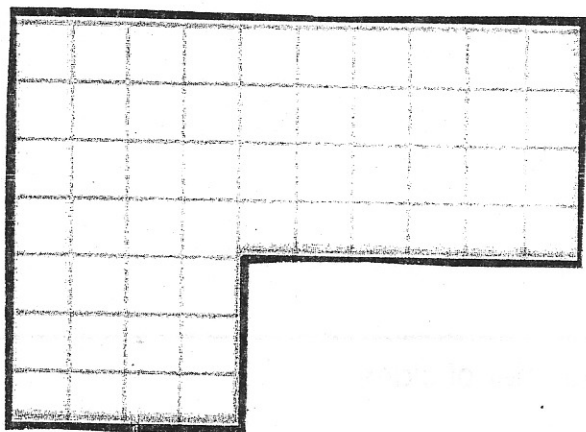




For US Letter size paper.

There is another ruler for A4 paper.

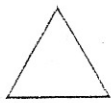
Rectilinear figures are polygons that have all right angles.



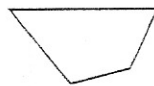
A polygon is a closed figure made up of straight-line segments.

Identify Polygons

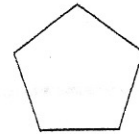
You can identify and name polygons by the number of sides and angles they have.



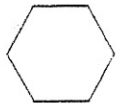
3 sides
3 angles
triangle



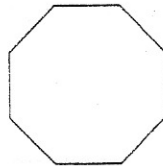
4 sides
4 angles
quadrilateral



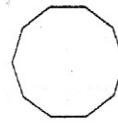
5 sides
5 angles
pentagon



6 sides
6 angles
hexagon



8 sides
8 angles
octagon



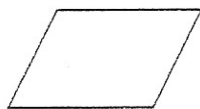
10 sides
10 angles
decagon

Describe and name this shape.

It has 4 sides.

It has 4 angles.

It is a quadrilateral.

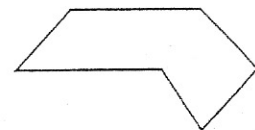


Describe and name this shape.

It has 6 sides.

It has 6 angles.

It is a hexagon.



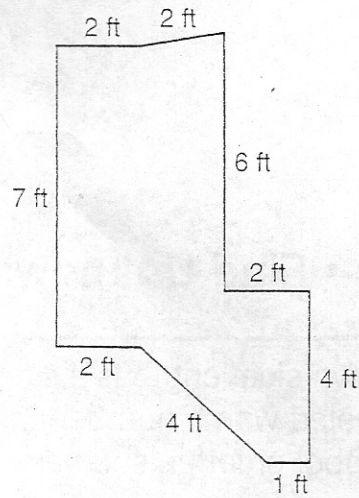
Perimeter

The **perimeter** of a figure is the distance around it.

The perimeter is found by adding the lengths of the sides. To find the perimeter of the figure, add the lengths.

$$2 \text{ ft} + 2 \text{ ft} + 6 \text{ ft} + 2 \text{ ft} + 4 \text{ ft} + 1 \text{ ft} + 4 \text{ ft} + 2 \text{ ft} + 7 \text{ ft} = 30 \text{ ft}$$

The perimeter of the figure is 30 feet.



Find Perimeter

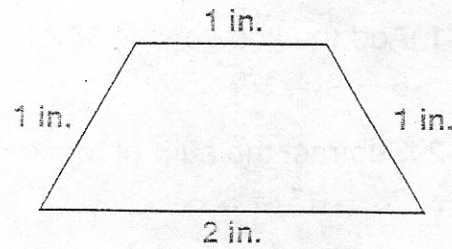
Kelsey wants to know the perimeter of the shape below. She can use an inch ruler to find the perimeter.

Step 1 Choose one side of the shape to measure. Place the zero mark of the ruler on the end of the side. Measure to the nearest inch. Write the length.

Step 2 Use the ruler to measure the other three sides. Write the lengths.

Step 3 Add the lengths of all the sides.
 $1 + 1 + 2 + 1 = 5$

So, the perimeter of the shape is 5 inches.

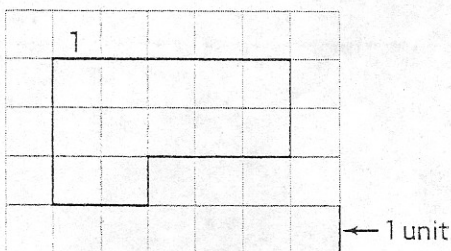


Model Perimeter

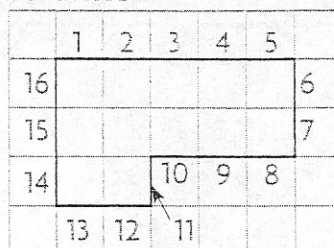
Perimeter is the distance around a shape.

Find the perimeter of the shape.

Step 1 Choose a unit to begin counting and label it 1.



Step 2 Count each unit around the shape to find the perimeter.
16 units

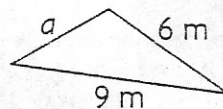


So, the perimeter of the shape is 16 units.

Algebra • Find Unknown Side Lengths

An unknown side length is a side that does not have its length labeled with a number. Instead the side is labeled with a symbol or letter, such as a .

**The perimeter of the shape is 20 meters.
Find the length of side a .**



Think: There is only one unknown side length.

Step 1 Add the *known* side lengths.

$$6 + 9 = 15$$

Step 2 Subtract the sum of the known side lengths from the perimeter.

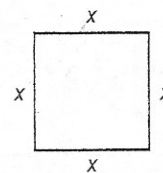
$$20 - 15 = 5$$

Step 3 Add to check your work.

$$6 + 9 + 5 = 20 \checkmark$$

So, the unknown side length, a , is 5 meters.

**The perimeter of the square is 12 feet.
What is the length of each side of the square?**



Think: A square has four sides of equal length.

Step 1 Divide the perimeter by the number of sides.

$$12 \div 4 = 3$$

Step 2 Multiply to check your work.

$$4 \times 3 = 12 \checkmark$$

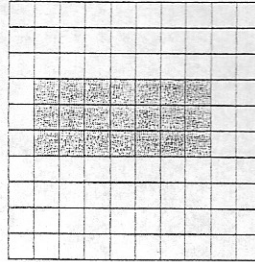
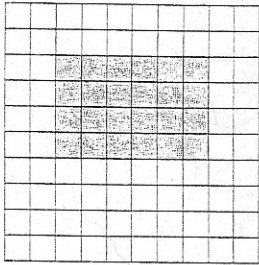
So, the length of each side, x , is 3 feet.

Area

The **area** of a figure can be found in two ways.

A **square unit** is a square with sides that are each 1 unit long.

You can think of the grid squares as an array.

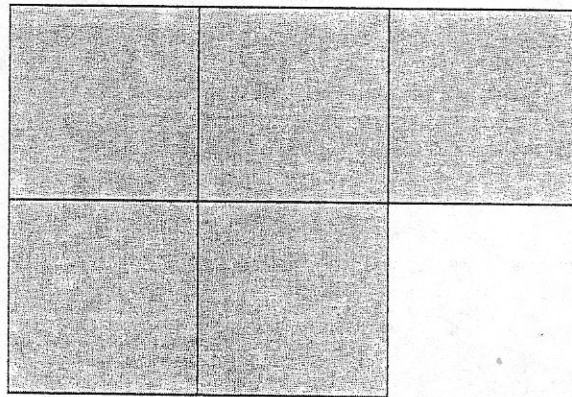


Count the square units in the shaded rectangle. Since there are 24 squares, the area of the rectangle is 24 square units.

Each row has 7 squares. To find the rectangle's area, multiply. $3 \times 7 = 21$, so the rectangle's area is 21 square units.

Measure Area

Find the area of the shape. Each unit square is 1 square inch.



Think: How many unit squares are needed to cover this flat surface?

Step 1 Use 1-inch square tiles. Cover the surface of the shape with the tiles. Make sure there are no gaps (space between the tiles). Do not overlap the tiles.

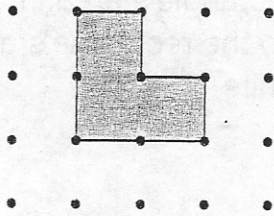
Step 2 Count the tiles you used.
5 tiles are needed to cover the shape.

So, the area of the shape is 5 square inches.

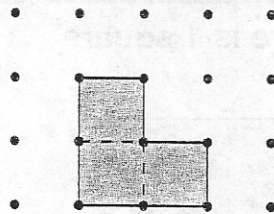
Understand Area

A **unit square** is a square with a side length of 1 unit.
Area is the measure of the number of unit squares needed to cover a surface. A **square unit** is used to measure area.

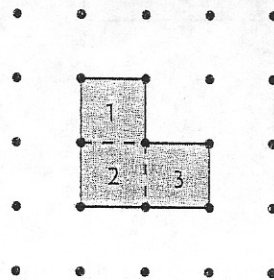
What is the area of the shape?



Step 1 Draw lines to show each unit square in the shape.

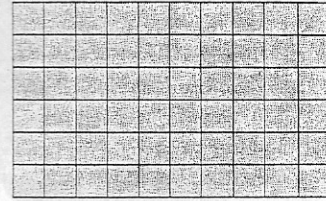


Step 2 Count the number of unit squares to find the area.

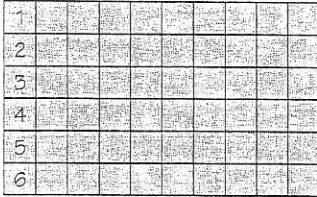


The area of the shape is **3** square units.

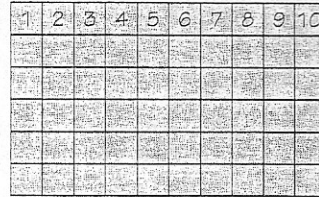
Use multiplication to find the area of the shape.
Each unit square is 1 square meter.



Step 1 Count the number of rows.
There are 6 rows.



Step 2 Count the number of unit squares in each row.
There are 10 unit squares.



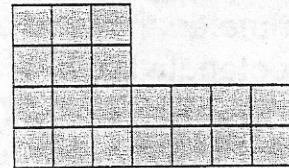
Step 3 Multiply the number of rows by the number in each row to find the area.

$$\begin{array}{rcccccc} \text{number of rows} & \times & \text{number in each row} & = & \text{area} \\ 6 & \times & 10 & = & 60 \end{array}$$

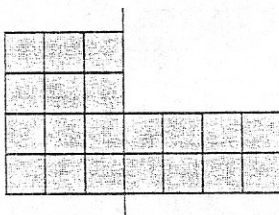
So, the area of the shape is 60 square meters.

Area of Combined Rectangles

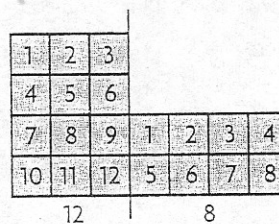
You can break apart a shape into rectangles to find the total area of the shape.



Step 1 Draw a line to break apart the shape into two rectangles.



Step 2 Count the number of unit squares in each rectangle.



Step 3 Add the number of unit squares in each rectangle to find the total area.

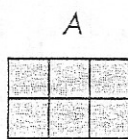
$$12 + 8 = 20 \text{ unit squares}$$

So, the area of the shape is 20 square units.

Same Perimeter, Different Areas

You can use perimeter and area to compare rectangles.

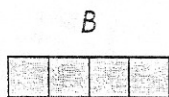
Compare the perimeters of Rectangle A and Rectangle B.



Find the number of units around each rectangle.

Rectangle A: $3 + 2 + 3 + 2 = 10$ units

Rectangle B: $4 + 1 + 4 + 1 = 10$ units



Compare: 10 units = 10 units

So, Rectangle A has the same perimeter as Rectangle B.

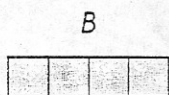
Compare the areas of Rectangle A and Rectangle B.



Find the number of unit squares needed to cover each rectangle.

Rectangle A: 2 rows of 3 = 2×3 , or 6 square units

Rectangle B: 1 row of 4 = 1×4 , or 4 square units



Compare: 6 square units $>$ 4 square units

So, Rectangle A has a greater area than Rectangle B.

Same Area, Different Perimeters

Find the perimeter and area of Rectangles A and B.

Tell which rectangle has a greater perimeter.

Step 1 Find the area of each rectangle. You can multiply the number of unit squares in each row by the number of rows.

Rectangle A: $2 \times 6 = 12$ square units

Rectangle B: $3 \times 4 = 12$ square units



A



B

Step 2 Find the perimeter of each rectangle. You can add the sides.

Rectangle A: $6 + 2 + 6 + 2 = 16$ units

Rectangle B: $4 + 3 + 4 + 3 = 14$ units

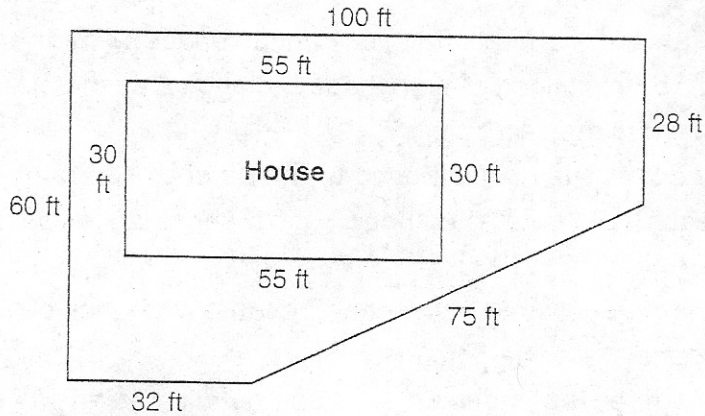
Step 3 Compare the perimeters. 16 units $>$ 14 units.

So, Rectangle A has a greater perimeter.

PROBLEM-SOLVING APPLICATION

Kay's New Home

Kay's family has just moved into a new home. Here is a map that shows the house and the land it sits on.



What is the perimeter of the land?

Remember, to find perimeter, add up all of the sides of the figure.

$$100 + 28 + 75 + 32 + 60 = 295 \text{ ft}$$

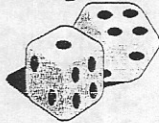
The land on which Kay's house sits has a perimeter of 295 ft.

Toss and Color

Materials: 2 or 3 players if necessary, 1 die, 1 game board for each player, pencils, scrap paper or math notebooks for adding up final area

Steps to Play:

1. Player 1 rolls a die. He or she shades in a rectilinear shape with that area. The squares can be arranged in any shape as long as each square is touching one side of another square.
2. Player 2 rolls and shades in his or her board with the area rolled on the die. Remember each turn that the shape has to share a side with a previous shape shaded.
3. When a player can no longer make their shape because they run out of space on the game board then the game is over.
4. In order to find the winner, both players add up the area of the entire shaded region on their' game boards. Use a strategy you are comfortable with (ex. skip counting or 2-digit addition)



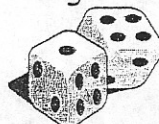
The player with the larger area is the **WINNER!!!**

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Toss and Color Game Board

Players: _____

Toss and Color Game Board

Players: _____