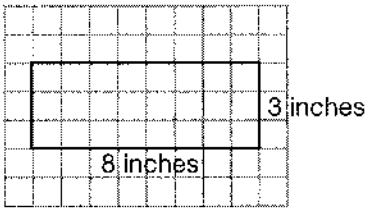
Name _____

Reteaching
12-1

Area of Rectangles

Find the area of a rectangle that is 8 inches long and 3 inches wide.

Use Counting
Draw the rectangle on grid paper. Let each square represent 1 square inch.



Count the squares inside the rectangle. There are 24 squares, so the area is 24 sq in.

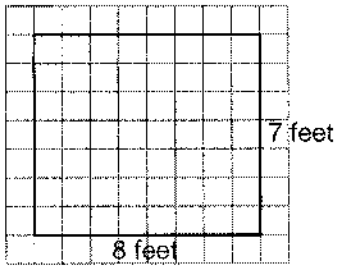
Use a Formula
Use the formula for area.To find area, multiply length times width.

$A = \ell \times w$ ℓ = length, w = width
$A = 8 \times 3$ $\ell = 8, w = 3$
$A = 24$

The area of the rectangle is 24 in^2.

A garden measures 8 ft by 7 ft. What is the area of the garden?

Use Counting
Draw the figure on grid paper. Let each square represent 1 square foot.

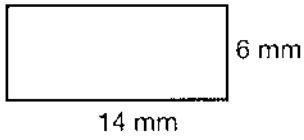


Count the squares inside the garden. There are 56 squares, so the area is 56 sq ft.

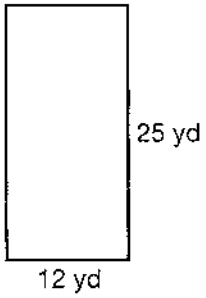
Use a Formula
Find the area of the rectangular garden by multiplying length times width.
Garden:
$A = \ell \times w$
$A = 8 \times 7$
$A = 56$ sq ft

The area of the garden is 56 ft^2.

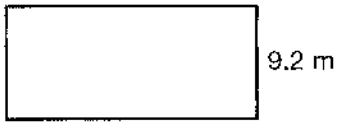
Find the area of each figure.

1. 

84 mm^2

2. 

300 yd^2

3. 

184 m^2

4. Suppose a rectangular garden measures $4\frac{1}{2}$ feet by 10 feet. What is the area of the garden?
45 ft^2

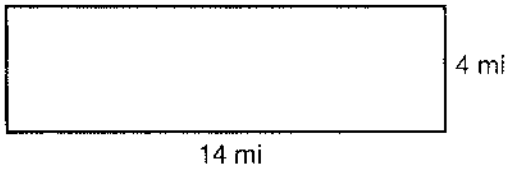
Name _____

Practice
12-1

Area of Rectangles

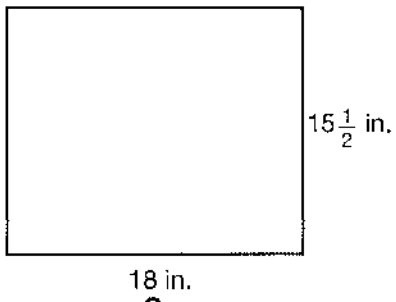
Find the area of each figure.

1.



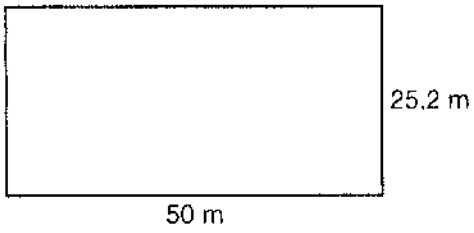
56 mi^2

2.



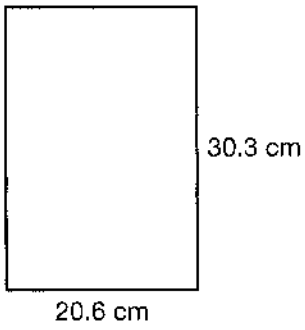
279 in^2

3.



1,260 m^2

4.



624.18 cm^2

For **5** and **6**, draw and label the figures described using grid paper. Then calculate the area of each figure.

5. A rectangle that is 13 units by 9 units

Check students' drawings; 117 square units

6. Carlos is laminating a kitchen counter that has dimensions of 12 feet by 3 feet. What is the area of the kitchen counter that Carlos will laminate?

Check students' drawings; 36 ft^2

7. What is the area of a square that is 30 centimeters on one side?

A 60 cm^2 **B** 120 cm^2 **C** 300 cm^2 **D** 900 cm^2

8. Writing to Explain If you know the area of a rectangle, can you determine its length and width? Explain.

No; sample answer: Rectangles can have the same area but have different lengths and widths.

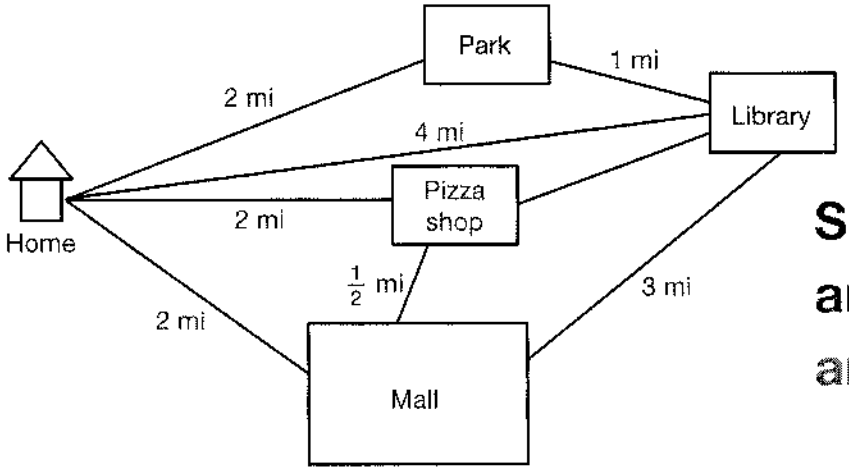
Name _____

Enrichment
12-1

Making Plans

Decision Making

Use the information in the diagram and the questions to plan a trip to one or more of the places shown. You can only travel on the paths shown. Remember to plan to spend some time at each place you visit.



Sample answers are given.

1. Plan an outing that will take about 2 hours. You will be traveling by bike at a rate of 6 miles per hour. You must start and finish your trip at home. You must visit at least one location shown on the map. Where will you go? How much time will you spend riding your bike? How much time will you spend at each location? Exactly how long will your trip take?

I will go to the library. I will spend 1 h 20 min riding my bike and 40 min at the library. My trip will take 2 h.

2. Plan an outing that will take about 4 hours. This time, your little sister needs to tag along, so you can only bike 4 miles per hour. You must start and finish your trip at home. You must visit at least two locations shown on the map. Where will you go? How much time will you and your sister spend riding your bikes? How much time will you spend at each location? Exactly how long will your trip take?

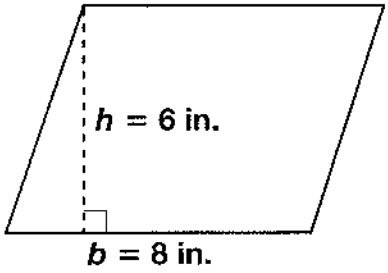
We will go to the mall and the pizza shop. We will spend 1 h $7\frac{1}{2}$ min riding our bikes, 1 h 30 min at the mall, and 1 h at the pizza shop. The trip will take exactly 3 h $37\frac{1}{2}$ min.

Name _____

Reteaching
12-2

Area of Parallelograms and Rhombuses

Find the area of this parallelogram.



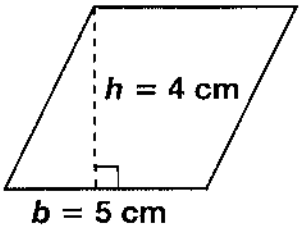
Use the formula $A = bh$.

$A = 8 \times 6$

$A = 48$ in^2

The area of the parallelogram is 48 sq in.

Find the area of this rhombus.



Use the formula $A = bh$.

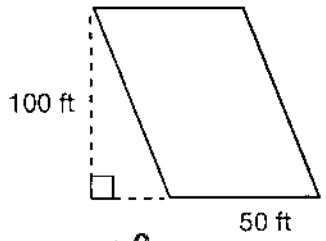
$A = 5 \times 4$

$A = 20$ cm^2

The area of the rhombus is 20 cm^2.

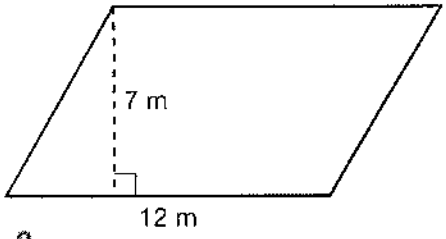
Find the area of each parallelogram or rhombus.

1.



5,000 ft^2

2.



84 m^2

3. Rhombus: $b = 6$ ft, $h = 4$ ft

24 ft^2

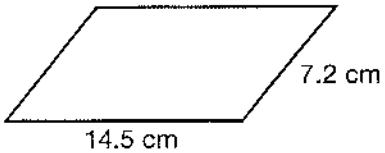
4. Parallelogram: $b = 18$ m, $h = 13.5$ m

243 m^2

5. Parallelogram: $b = 20$ in., $h = 9\frac{1}{2}$ in.

190 in^2

6. Writing to Explain Tony says he does not have enough information to find the area of this parallelogram. Is he correct? Explain.



He is correct. He needs the height of the parallelogram to calculate the area.

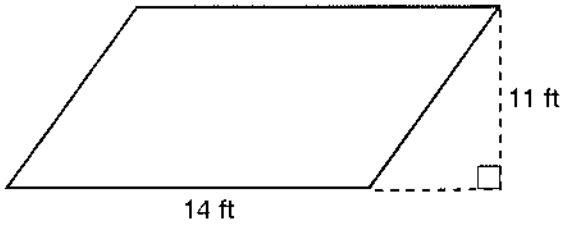
Name _____

Practice
12-2

Area of Parallelograms and Rhombuses

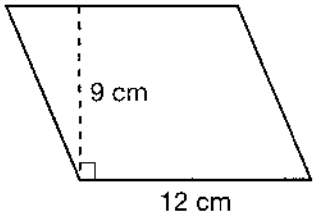
Find the area of each parallelogram or rhombus.

1.



$A = 154 \text{ ft}^2$

2.



$A = 108 \text{ cm}^2$

3. Rhombus
$b = 30$ m
$h = 15.5$ m

$A = 465 \text{ m}^2$

4. Parallelogram
$b = 18$ in.
$h = 2\frac{1}{2}$ in.

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

5. Parallelogram
$b = 20$ ft
$h = 3$ yd

$A = 180 \text{ ft}^2$

6. Writing to Explain The area of a parallelogram is 42 square inches. The parallelogram's base is 6 inches. Find the height of the parallelogram. Explain how you do it.

Sample answer: I substituted the numbers I know into the formula and solved for h. $A = bh$; $42 = (6)h$; $42 \div 6 = 6h \div 6$; $7 \text{ in.} = h$.

7. Number Sense A parallelogram has a base of 4 m and a height of 3 m. Find the area of the parallelogram in square centimeters.

$(400)(300) = 120{,}000 \text{ cm}^2$

8. Estimation Which is the best estimate of the area of a parallelogram that has a base of 11.42 cm and a height of 8.33 cm?

A 200 cm^2 **B** 160 cm^2 **C** 100 cm^2 **D** 50 cm^2

9. Reasoning The area of a figure is 36 cm^2. Give 3 possible shapes of the figure. Where possible give 3 possible sets of dimensions for each possible shape.

Square, rectangle, parallelogram; If the figure is a square, the only possible dimensions are 6 cm × 6 cm. If the figure is a rectangle or a parallelogram, possible dimensions are 3 cm × 12 cm, 4 cm × 9 cm, 1 cm × 36 cm.

Name _____

Enrichment
12-2

Fantastic Formulas

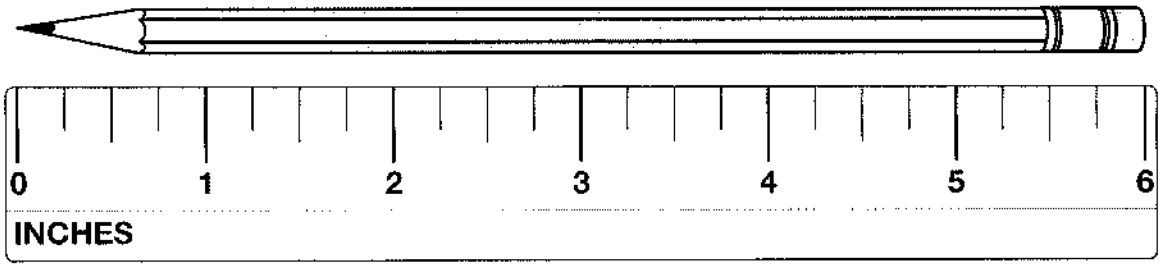
Data

Choose a formula from the chart to solve the problems below. There may be more than one formula that would work for each problem. Show your work.

Formula File

inches × 2.54 = centimeters	pounds × 0.45 = kilograms
miles × 1.61 = kilometers	meters × 1.09 = yards
kilometers × 0.62 = miles	grams × 0.04 = ounces
ounces × 28.35 = grams	yards × 0.91 = meters
centimeters × 0.39 = inches	kilograms × 2.2 = pounds

1. How many centimeters long is this pencil?



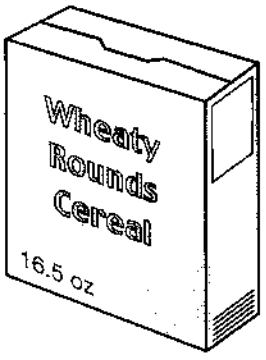
15.24 cm; 6 × 2.54 = 15.24

2. How many grams of cereal does this box measure?

467.775 g;

16.5 × 28.35 =

467.775

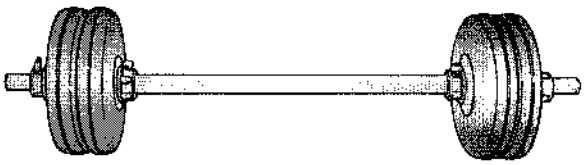


3. How many kilograms does this dumbbell measure?

90 kg;

50 × 4 = 200 lb;

200 × 0.45 = 90



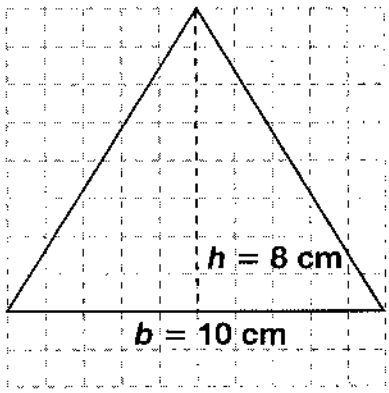
Each  = 50 lb.

Name _____

Reteaching
12-3

Area of Triangles

Find the area of this triangle.



Use the formula $A = \frac{1}{2}bh$.

$A = \frac{1}{2} \times 10 \times 8$

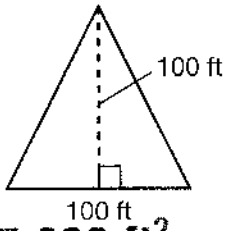
$A = 5 \times 8$

$A = 40 \text{ cm}^2$

The area of the triangle is 40 cm^2.

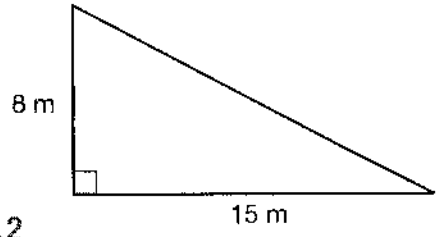
Find the area of each triangle.

1.



5,000 ft^2

2.



60 m^2

3. Triangle: $b = 6$ ft, $h = 9$ ft

27 ft^2

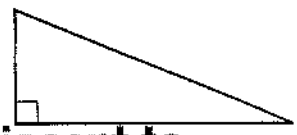
4. Triangle: $b = 18$ m, $h = 13$ m

117 m^2

5. Triangle: $b = 20$ in., $h = 9\frac{1}{2}$ in.

95 in^2

6. Writing to Explain Rebekah needs to find the area of a right triangle. She knows all the side lengths of the right triangle, but she says that she also needs to know the height. Is she correct? Explain.



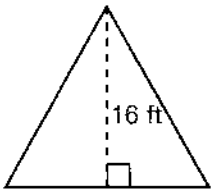
She is not correct. The lengths of the sides adjacent to the right angle in a right triangle are the height and the base. So, she has the measurements that she needs to find the area.

Name _____

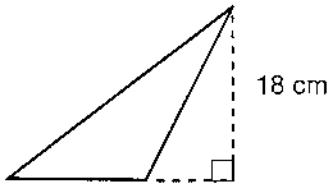
Practice
12-3

Area of Triangles

Find the area of each triangle.

1. 

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

2. 

$A = 108 \text{ cm}^2$

3. Triangle
$b = 30$ m
$h = 15.6$ m

$A = 234 \text{ m}^2$

4. Triangle
$b = 18$ in.
$h = 6\frac{1}{2}$ in.

$A = 58\frac{1}{2} \text{ in}^2$

5. Triangle
$b = 20$ ft
$h = 3$ yd

$A = 90 \text{ ft}^2$

6. **Writing to Explain** The area of a triangle is 42 square inches. The triangle's base is 6 inches. Find the height of the triangle. Explain how you do it.

Sample answer: I substituted the numbers I know into the formula and solved for h. $A = \frac{1}{2}bh$; $42 = \frac{1}{2}(6)h$; $42 = 3h$; $42 \div 3 = 3h \div 3$; $14 \text{ in.} = h$.

7. **Number Sense** A triangle has a base of 2 m and a height of 4 m. Find the area of the triangle in square millimeters.

$\frac{1}{2}(2{,}000)(4{,}000) = 4{,}000{,}000 \text{ mm}^2$

8. **Estimation** Which is the best estimate of the area of a triangle that has a base of 23.62 cm and a height of 8.33 cm?

A 200 cm^2 **B** 160 cm^2 **C** 100 cm^2 **D** 50 cm^2

9. **Reasoning** The area of a triangle is 36 cm^2. Give 3 possible sets of dimensions for the triangle and explain whether or not you can also give the triangles' side lengths.

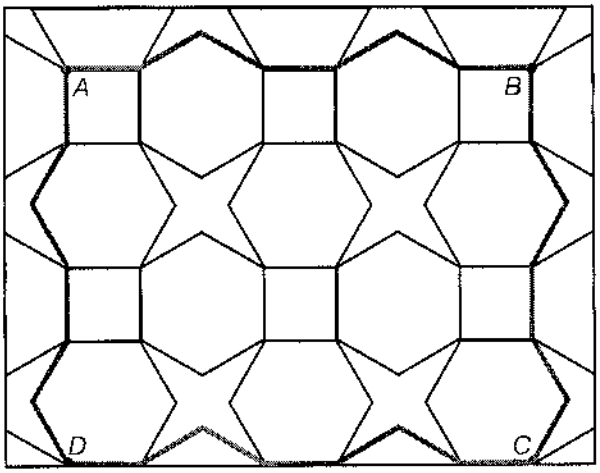
Possible dimensions are 6 cm × 12 cm, 8 cm × 9 cm, 2 cm × 36 cm. The base of the triangle gives us one side length. But we can not determine the other side lengths from the information given.

Name _____

Enrichment
12-3

Design Patterns

Reasoning



Sample answer

Three shapes, a square, a hexagon, and an eight-sided star, are repeated in the design. It may not appear so, but the line segments on each polygon are exactly the same length, 1 unit.

1. What is the perimeter of the square, the hexagon, and the star?

   4 units, 6 units, 8 units

2. If the side of the square were doubled, what would happen to its perimeter?

   The perimeter would double.

3. If the side of the square were halved, what would happen to its perimeter?

   The perimeter would be halved.

4. If you traced the perimeter of a shape created by joining points *A*, *B*, *C*, and *D*, what would the perimeter be?

   Sample answer: 26 units

5. What fractional part of the perimeter of *ABCD* is formed from the sides of squares that are inside *ABCD*? What is the rest composed of?

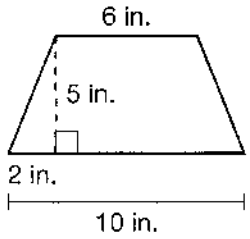
   Sample answer: $\frac{7}{26}$; $\frac{4}{26}$ star, $\frac{15}{26}$ hexagon

Name _____

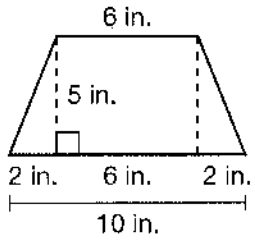
Reteaching
12-4

Area of Special Quadrilaterals

Find the area of this trapezoid.



Find the area of each part.

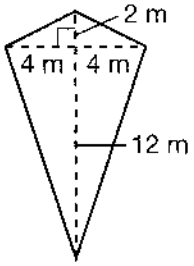


Each Triangle
$A = \frac{1}{2}bh = \frac{1}{2} \times 2 \times 5 = 5 \text{ in}^2$

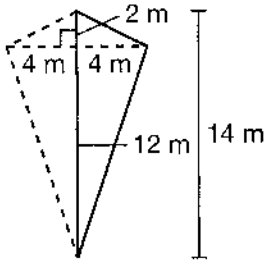
Rectangle
$A = lw = 6 \times 5 = 30 \text{ in}^2$

Add the areas together.
$5 + 5 + 30 = 40 \text{ in}^2$

Find the area of this kite.



You can find the area of a kite by dividing it into two identical triangles and finding the area of each triangle.

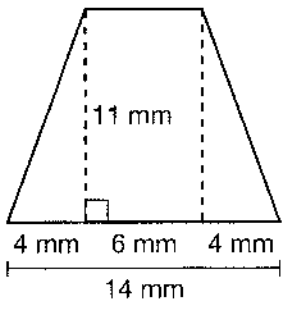


$A = \frac{1}{2}bh = \frac{1}{2} \times 14 \times 4 = 28$

The area of the kite is $2 \times 28 = 56 \text{ m}^2$.

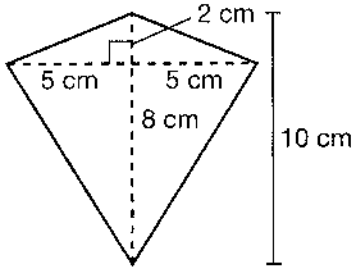
Find the area of the trapezoid or kite.

1.



110 mm²

2.



50 cm²

3. Which figure above has a greater area, the trapezoid or the kite? Explain your answer.

The kite; sample answer: 1 cm = 10 mm; so 1 cm² = 100 mm²; 50 cm² = 5,000 mm².

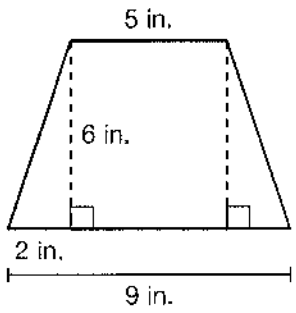
Name _____

Practice
12-4

Area of Special Quadrilaterals

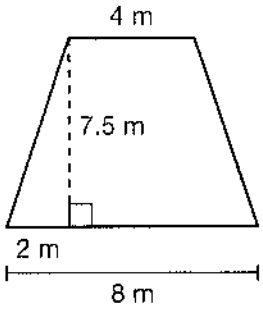
Find the area of each figure.

1.



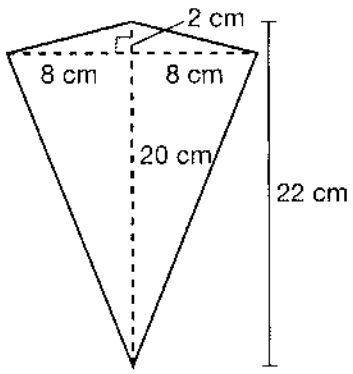
42 in^2

2.



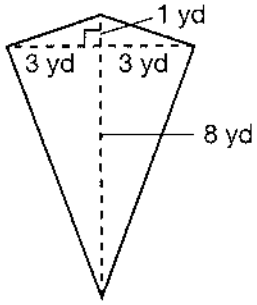
45 m^2

3.



176 cm^2

4.

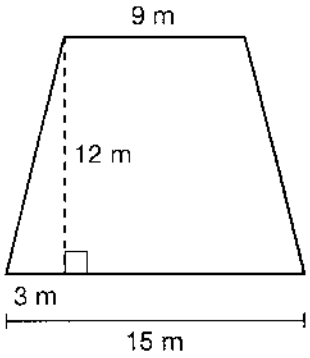


27 yd^2

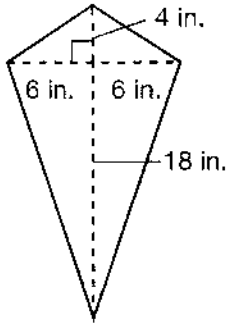
Solve each problem.

5. Rita wants to paint the area shown at the right. What is the area that she needs to cover?

144 m^2



6. Writing to Explain Joshua received this kite as a gift. The dimensions were labeled as shown. Joshua says that he does not have enough information to find the area of the kite. Is he correct? Explain your answer.



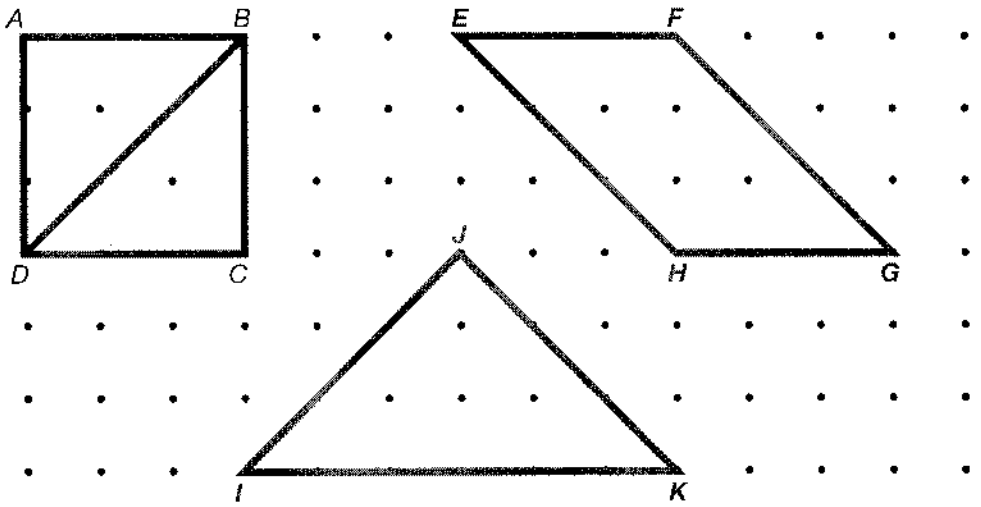
No; Sample answer: Joshua can use the dimensions on the kite to break the area into two triangles. Then he can find the total area: 132 in^2

Name _____

Enrichment
12-4

Translations in Space

Visual Thinking



Draw the square *ABCD.*

Draw the diagonal *BD.*

Redraw the two triangles together to form a parallelogram *EFGH* where *BD* = *EH* and *BC* = *GH.*

Put the triangles together to form one triangle, *IJK*, where *BD* = *IJ.*

Distance *AB* = 3 units.

1. What is the area of the square, the parallelogram, triangle *IJK*, and triangle *ABD*?

   9, 9, 9, 4.5 sq units

2. If *AB* = 4 units, what is the area of the square, the parallelogram, triangle *IJK*, and triangle *ABD*?

   16, 16, 16, 8 sq units

3. If *AB* = *n* units, what happens to the area of triangle *ABD* or *BCD*?

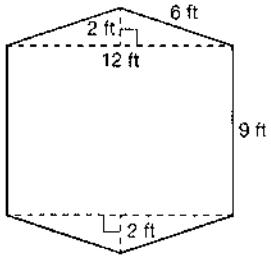
   Always $\frac{1}{2}(n \times n)$ sq units

Name _____

Reteaching
12-5

Finding Areas of Polygons

Find the area of this polygon.



Find the area of each part.

Each Triangle:

$A = \frac{1}{2}bh = \frac{1}{2} \times 12 \times 2 = 12 \text{ ft}^2$

Rectangle:

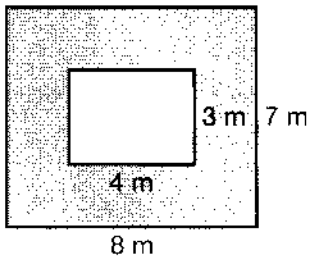
$A = \ell w = 9 \times 12 = 108 \text{ ft}^2$

Add the areas together.

$12 + 12 + 108 = 132 \text{ ft}^2$

The area of the polygon is 132 ft^2.

A path around a garden measures 8 m by 7 m. The garden measures 4 m by 3 m. What is the area of the path?



Find the area of the path and the garden together. Then subtract the area of the garden.

Path and garden together:

$A = \ell w$

$A = 8 \times 7$

$A = 56 \text{ m}^2$

Garden:

$A = \ell w$

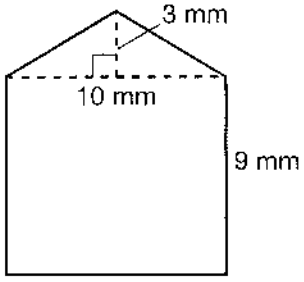
$A = 4 \times 3$

$A = 12 \text{ m}^2$

$56 - 12 = 44$, so the area of the path is 44 m^2.

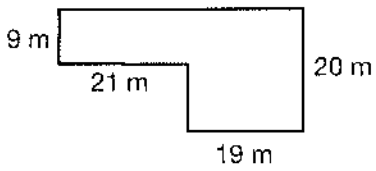
Find the area of each figure.

1.



105 mm²

2.



569 m²

3. The outside of a rectangular path around a rectangular garden measures 4 meters by 7 meters. The garden measures 3 meters by 6 meters. What is the area of the path?

10 m²

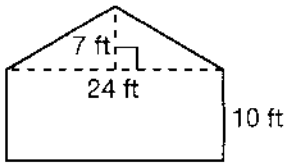
Name _____

Practice
12-5

Finding Areas of Polygons

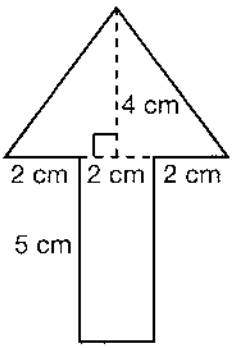
Find the area of each figure.

1.



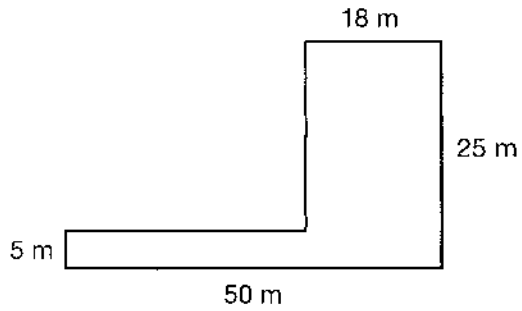
324 ft²

2.



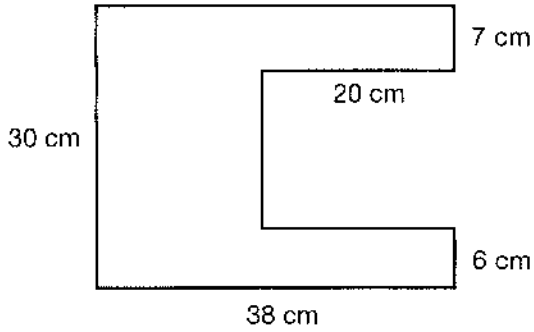
22 cm²

3.



610 m²

4.



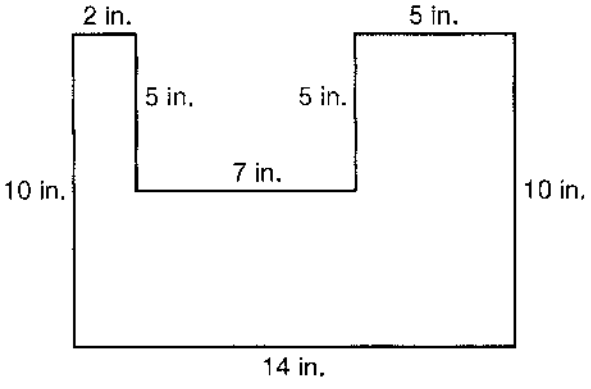
800 cm²

Read and solve each problem.

5. Carlos is tiling a kitchen counter that is 12 feet by 3 feet. The counter has a rectangular hole 3 feet by 2 feet cut in it for a sink. What is the area of the kitchen counter that Carlos will tile?

30 ft²

6. Writing to Explain Explain into which shapes you could break this polygon in order to find its area. Find the area.



Sample answer: A square 5 in. by 5 in., a rectangle 14 in. by 5 in., and a rectangle 2 in. by 5 in. Area = 105 in²

Name _____

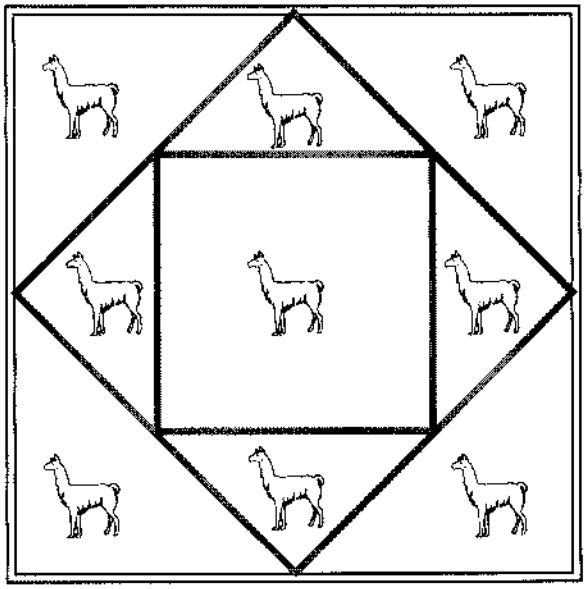
Enrichment
12-5

Corral the Animals

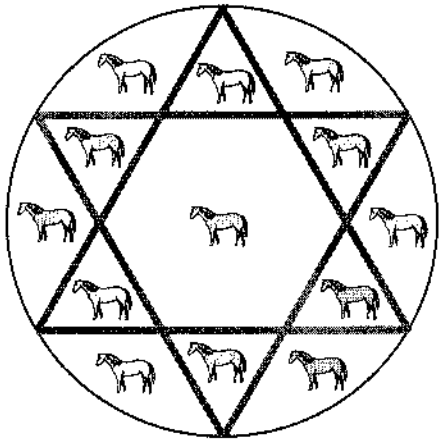
Decision Making

The Granger family raises llamas and horses. They have decided to build new barns to house the animals. They want each animal to have its own space in each barn. Help them by drawing fences on the barn plans below.

1. Draw only 2 square fences on the plan for the square barn so that each of the 9 llamas has its own area.



2. Draw only 2 triangular fences on the plan for the circular barn so that each of the 13 horses has its own area.

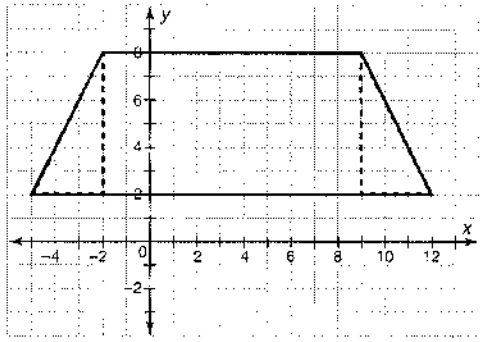


Name _____

Reteaching
12-6

Areas of Polygons on the Coordinate Plane

To find the area of the polygon on the coordinate grid below, divide the trapazoid into 2 triangles and 1 rectangle. Next, count the squares on the grid or use the absolute value to find the base and height of each triangle and the length and width of the rectangle. Then use these measurements to calculate the area of each part.



Area of each Triangle
$b = 3, h = 6$
$A = \frac{1}{2}bh = \frac{1}{2} \times 3 \times 6 = 9$ sq units

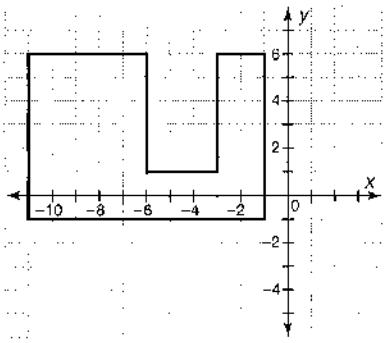
Area of the Rectangle
$\ell = 11, w = 6$
$A = \ell w = 11 \times 6 = 66$ sq units

Add the areas of the smaller shapes to find the total area of the polygon.

$9 + 9 + 66 = 84$ square units

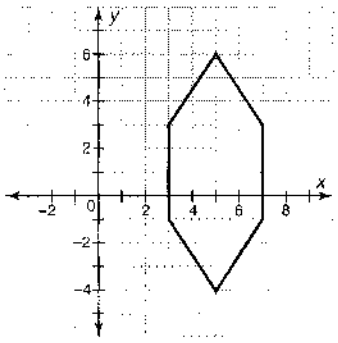
Find the area of each polygon.

1.



55 square units

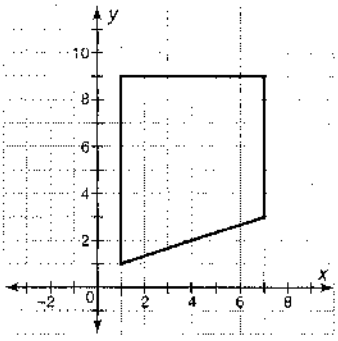
2.



28 square units

3. Writing to Explain Jamal drew a sketch of the garden he is going to plant. Each grid represents 1 sq ft. Each different vegetable will need 3 sq ft, and he wants to plant 12 different vegetables. Does he have enough space in his garden? Explain you answer.

Sample answer: Yes, he will have enough space. He needs to have 36 sq ft for 12 different vegetables. His garden is 42 sq ft.

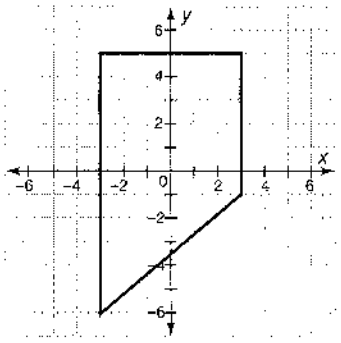


Name _____

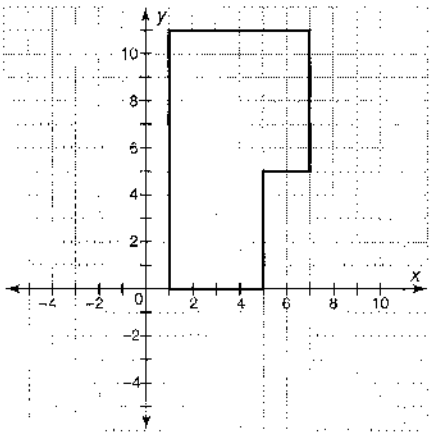
Practice
12-6

Areas of Polygons on the Coordinate Plane

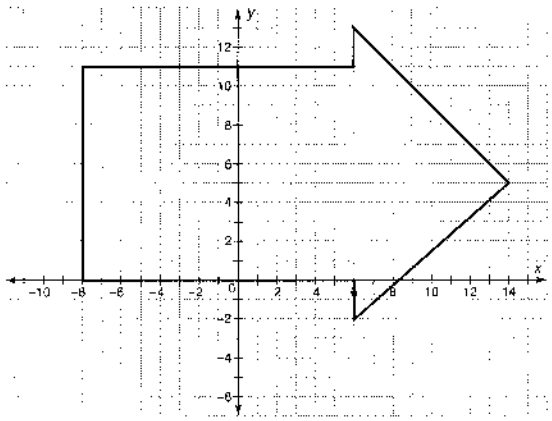
Find the area of each figure.

1. 

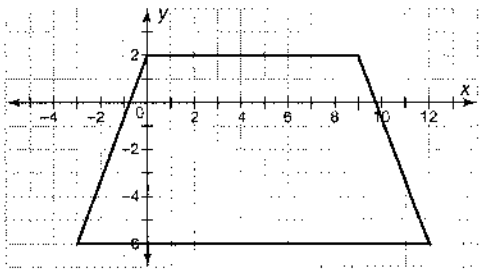
51 square units

2. 

56 square units

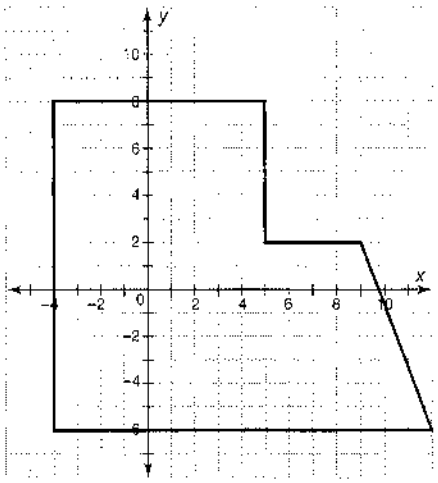
3. 

214 square units

4. 

96 square units

5. **Reasoning** Which expression can you use to find the area of this figure?



(A) $(9 \times 14) + (8 \times 4) + \frac{1}{2}(8 \times 3)$

B $(8 \times 14) + (9 \times 4) + \frac{1}{2}(9 \times 3)$

C $(9 \times 14) + (8 \times 4) + (8 \times 3)$

D $(9 \times 14) + (8 \times 4) + \frac{1}{4}(8 \times 3)$

6. **Model** On a coordinate grid, draw a polygon that has an area of 12 square units. Draw a second polygon that completely encloses the first polygon that has an area of 24 square units.

Answers will vary. Check student drawings.

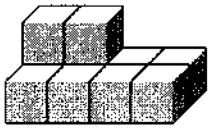
Name _____

Enrichment
12-6

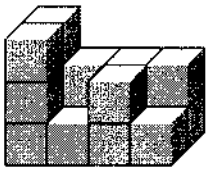
On the Blocks

Count the blocks in each structure. Each block sits on top of another, unless the picture shows differently.

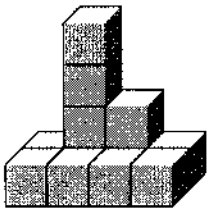
Visual Thinking

1. 

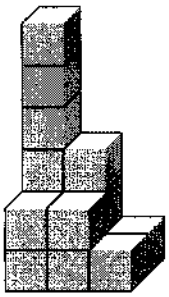
10

2. 

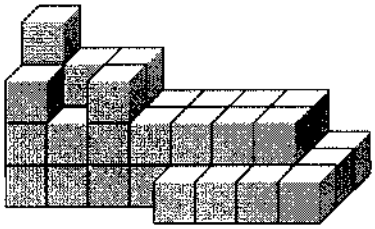
16

3. 

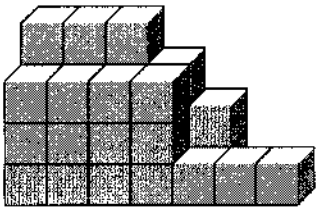
12

4. 

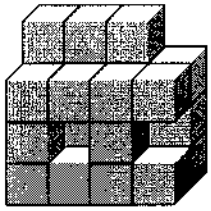
15

5. 

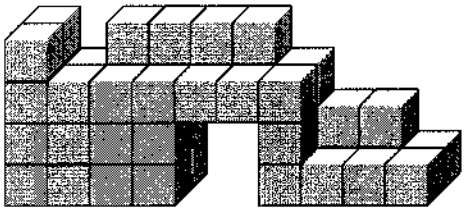
40

6. 

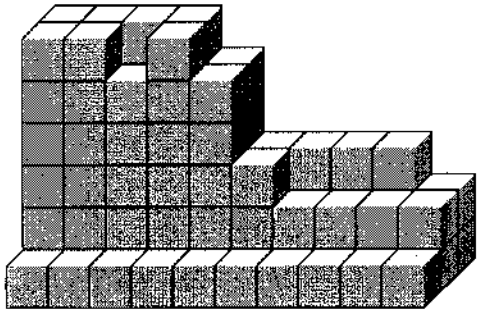
32

7. 

25

8. 

48

9. 

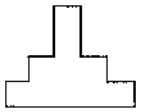
92

Name _____

Reteaching
12-7

Problem Solving: Use Objects

Pentomino Construction Company There are 12 different pentominoes. Which two pentominoes can be used to make this shape?



Read and Understand

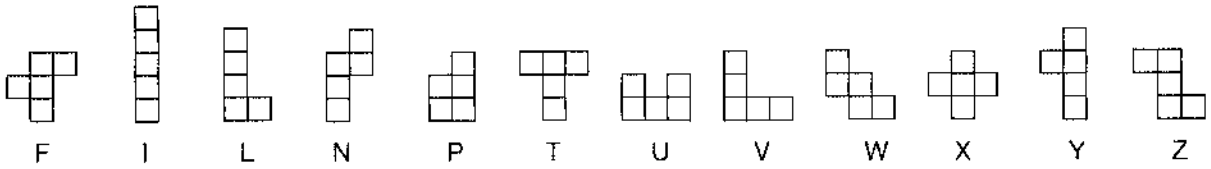
What do you know? There are 12 different pentominoes. Two pentominoes are used to construct this shape.

What are you trying to find? The two pentominoes used to make the shape.

Plan and Solve

What strategy will you use? Use objects, in this case pentominoes.

Study the shape and compare the corners and angles to the group of pentominoes. Choose two pentominoes to make the figure.



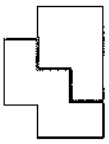
Since the base is 5 units, try the I and the T pentominoes. If your first choice does not work, try other pentominoes.

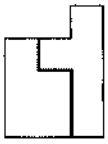
Look Back and Check

Is your answer reasonable? Yes. The two pentominoes make the same shape.

Fit two pentominoes together to create each shape. Draw the pentominoes used in each figure.

Sample answers are shown.

1.  **P,W**

2.  **P,Y**

3. **Writing to Explain** A figure is made from three pentominoes. What is the area of the figure in square units? How did you find your answer?

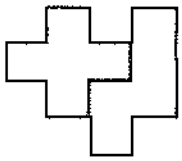
15 square units; Sample answer: I multiplied 3 and 5.

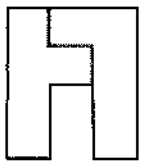
Name _____

Practice
12-7

Problem Solving: Use Objects

Fit two pentominoes together to create each shape. Draw the pentominoes used in each figure.

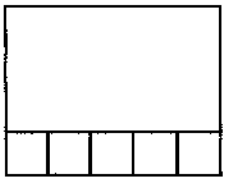
1. 

2. 

3. What is the area in square units of each figure you made in Problems 1 and 2?

10 square units

4. Tessa used pentominoes to make this rectangle. The I pentomino is shown. What is the area of the rectangle in square units?



A 5 square units

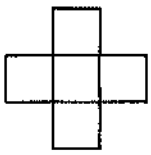
C 20 square units

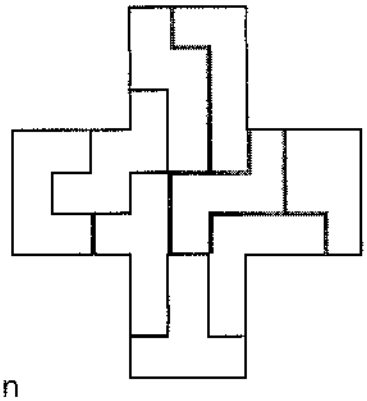
B 6 square units

D 25 square units

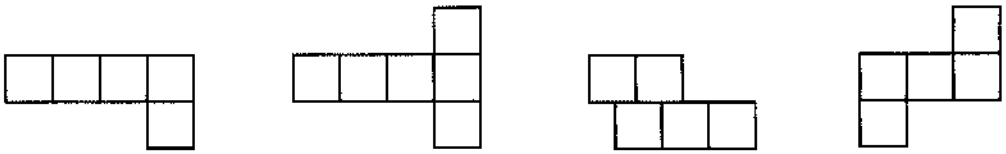
5. Use nine pentominoes to make a figure that has three times the perimeter of the pentomino X below. Two pentominoes have been placed to get you started.

X





6. **Writing to Explain** Circle the pentominoes. Explain why any figures not circled are not pentominoes.



First and last figures circled; The second figure is not a pentomino because there are six squares. The third figure is not a pentomino because some of the squares share only part of a common side.

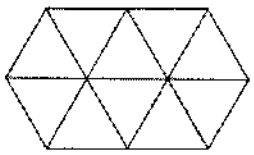
Name _____

Enrichment
12-7

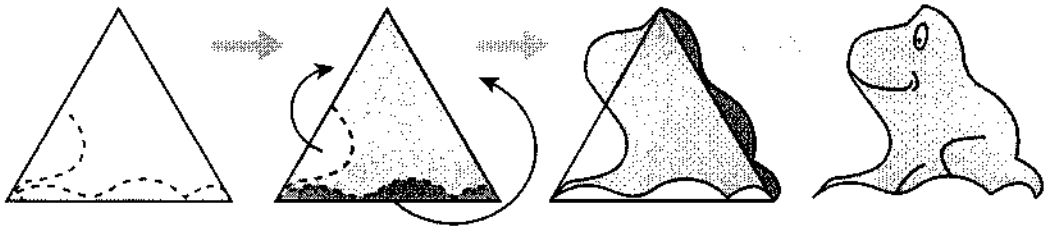
Frog Tiles

Visual Thinking

Tiles are usually shaped like polygons. For example, the tiles shown at the right are shaped like equilateral triangles.



More interesting tiles can be made by changing the shape of a polygon. Notice how a frog-shaped tile can be made by breaking an equilateral triangle into smaller parts and then rearranging those parts.



1. Suppose the triangle that was broken into smaller parts has a base of 3 cm and a height of 2.6 cm. What is the area of the triangle?

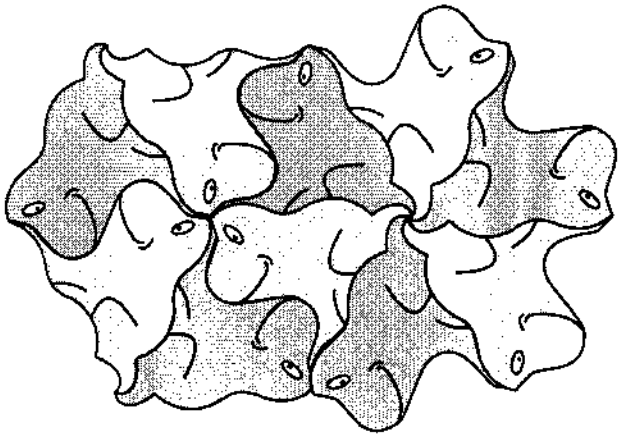
   3.9 cm^2

2. What is the area of the frog tile? How do you know?

   3.9 cm^2; the smaller parts of the triangle were rearranged, but no parts were added or subtracted.

3. What is the total area of a tile pattern made with 10 frog tiles, as shown at the right?

   39 cm^2



4. Suppose a frog-shaped tile is made from a larger triangle. If the triangle's base is 12 cm and its height is 10.4 cm, what would be the area of a tile pattern made with 50 frog tiles?

   3,120 cm^2

