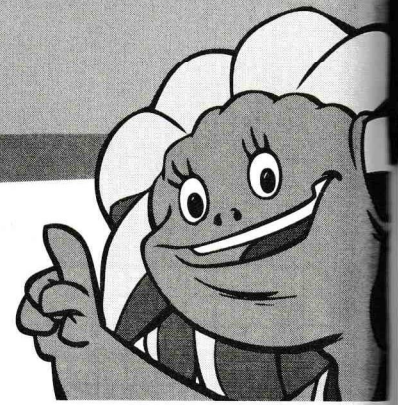> Each small square in the grid has side length 1.
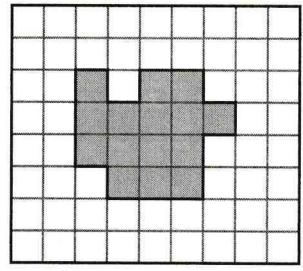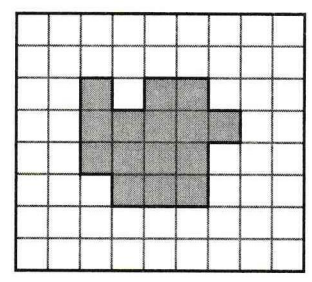
PRACTICE | Winnie is tracing rectilinear shapes on a grid. Below is one shape she traced.

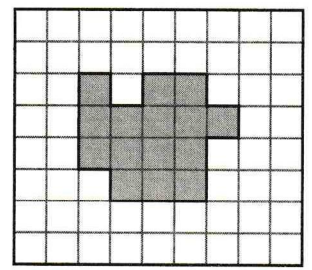**95.** What is the perimeter of Winnie's shape above?

95. _____

96. What is the area of Winnie's shape?

96. _____

97. ★ On the diagram below, shade the square that can be added to Winnie's shape that would **decrease** its perimeter.
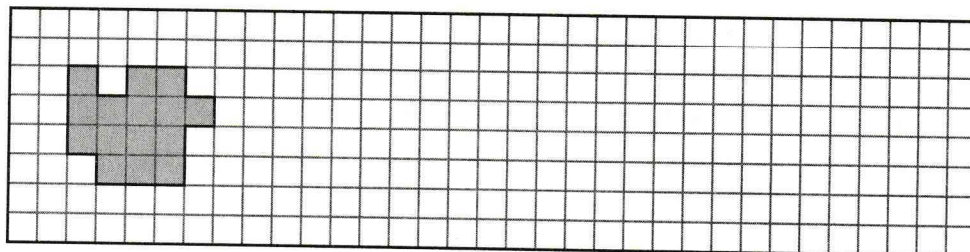

98. ★ Winnie wants to add one square to her shape **without** changing its perimeter. Shade a square that she could add.
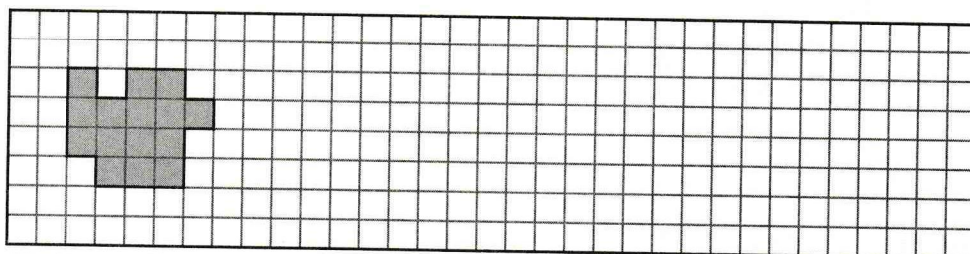*(There are three possible answers. Can you find them all?)*

99. Trace a rectangle on the grid below that has the same *area* as Winnie's shape. Is the *perimeter* of your rectangle larger, smaller, or the same as the perimeter of Winnie's shape?
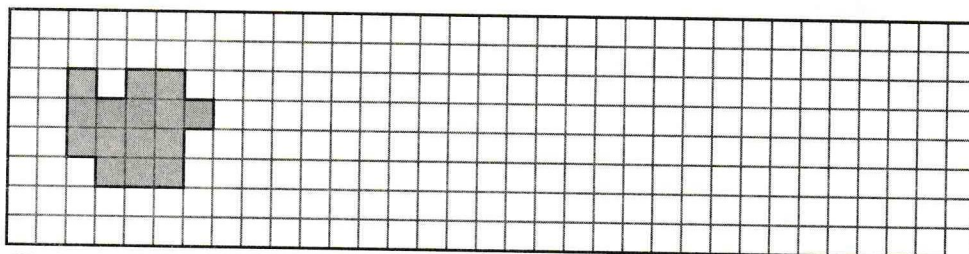
99. _____

100. Trace a rectangle on the grid below that has a *larger area* and a ★ *smaller perimeter* than Winnie's shape.

Challenge: Find the rectangle with the largest area whose perimeter is smaller than Winnie's.

101. Trace a rectangle on the grid below that has a *larger perimeter* and ★ a *smaller area* than Winnie's shape.

Challenge: Find the rectangle with the largest perimeter whose area is smaller than Winnie's.

PRACTICE | Review the problems on the previous two pages. Then, state whether each statement below is true or false.

102. Two shapes that have the same perimeter always have the same area.

102. _____

103. Given two shapes, the one with the larger area always has a larger perimeter.

103. _____

104. Given two shapes, the one with the larger perimeter always has a larger area.

104. _____

PRACTICE

105. Grogg cuts along the dashed lines in the square below to split it into
★ four congruent squares. The perimeter of each smaller square is 12.
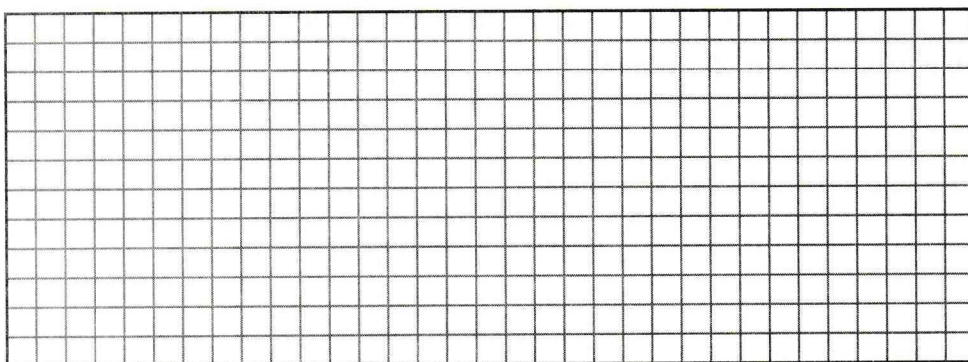What is the **area** of the larger square?
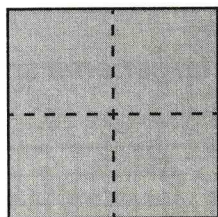
105. _____

Each small square in the grids below has side length 1.
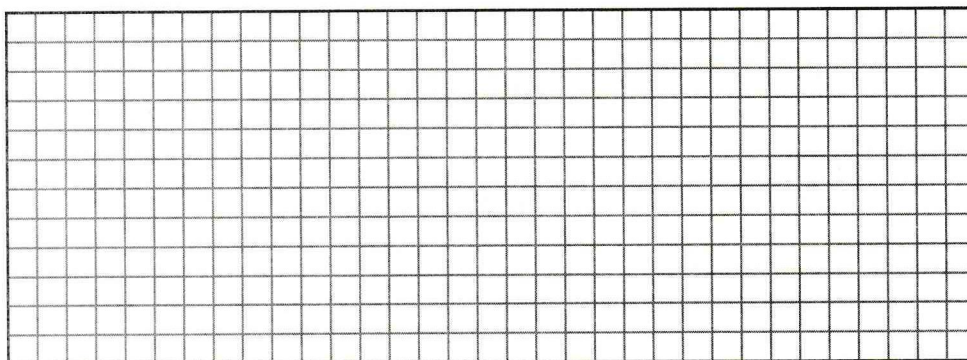*You may use the grids to help answer the questions.*

106. Rectangles with areas of 3, 10, and 12 squares can be arranged to
★ form a square. What is the perimeter of this square?
★

106. _____

107. A rectilinear shape has 12 sides. Each side has length 2.
★ What is the area of this rectilinear shape?
★

107. _____

Grogg is cutting polygons out of other shapes. Grogg always cuts along the dashed lines. He makes two kinds of cuts: **straight cuts** and **squiggle cuts.**

The dashed lines separate the shapes into small squares with side length 1.

This **straight cut** splits the 4 by 4 square into two rectangles with a total perimeter of 10+14=24.

A **squiggle cut** follows the dashed lines but doesn't have to be straight!

This squiggle cut splits the square into two polygons with a total perimeter of 10+20=30.

PRACTICE

108. Grogg splits the rectangle below into two rectangles with the straight cut shown. What is the **total perimeter** of the two smaller rectangles he creates?

108. _____

109. Grogg splits the rectangle below into two polygons with the squiggle cut shown. What is the **total perimeter** of the two polygons he creates?
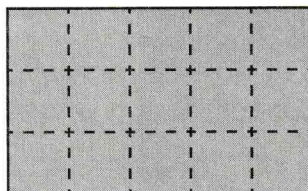
109. _____

PRACTICE | The dashed lines split the shapes below into squares of side length 1.
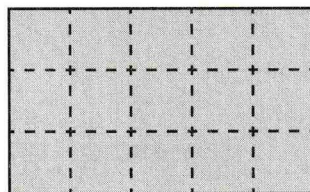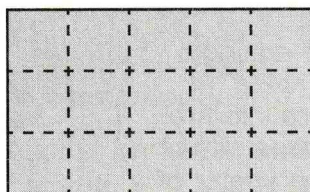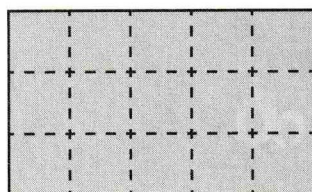
Use this rectangle for questions 110 and 111.

110. If Grogg splits the rectangle into two rectangles with one **straight** cut, what is the **smallest** possible total perimeter of the two rectangles?
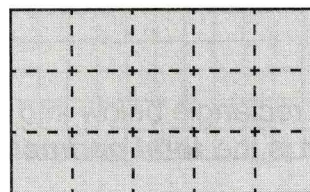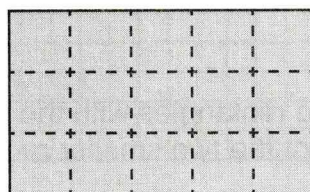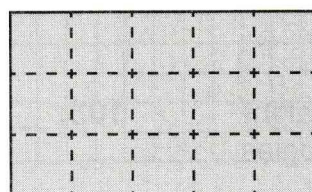
110. _____

You can experiment by drawing some possible cuts in these extra rectangles:

111. If Grogg splits the rectangle into two polygons with one **squiggle** cut, what is the **largest** possible total perimeter of the two polygons?
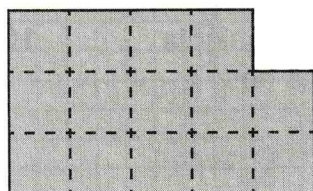
111. _____

You can experiment by drawing some possible cuts in these extra rectangles:

112. Grogg splits the shape below into two polygons with one **straight** cut.
★ Find all **four** possible values for the total perimeter of the polygons.
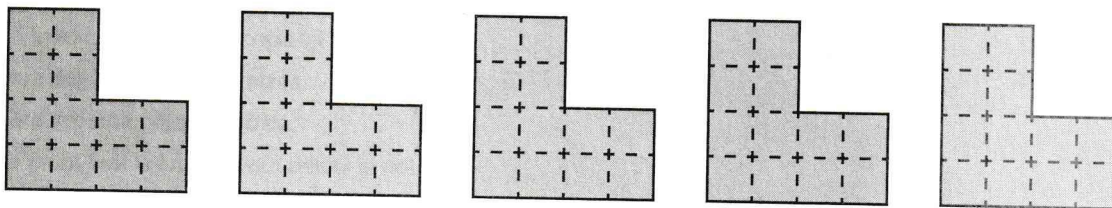
112. _____ _____

_____ _____

113. Using just one squiggle cut, Grogg can cut the shape below into two polygons that have
★ the same perimeter. Can you find a way to do this, too?
(There is more than one way, see if you can find them all.)

You can experiment by drawing some possible cuts in these extra shapes:

114. Grogg can cut the shape below into **three** polygons so that each has the same
★ perimeter. Figure out how this can be done. You can use straight and squiggle cuts.
(There is more than one way.)

You can experiment by drawing some possible cuts in these extra shapes:
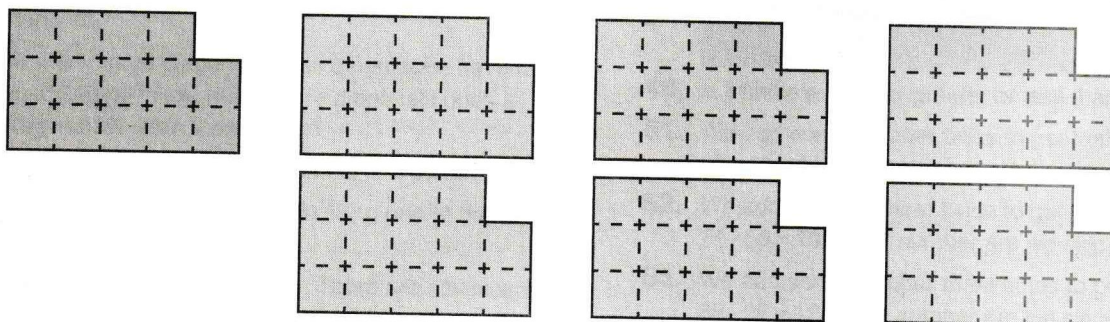
*Challenge: Figure out how to split the shape into **four** polygons with equal perimeter.*

115. Find a way to split the shape below into three polygons so that all three have the same
★ perimeter, but each has a different area. You can use straight and squiggle cuts.
★ *(There is more than one way.)*

You can experiment by drawing some possible cuts in these extra shapes:

Beast Academy Practice 3A