Practice

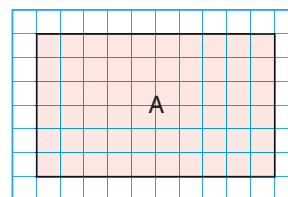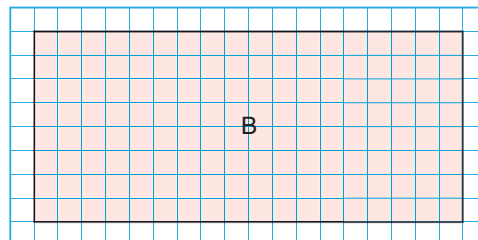**1. a)** Draw Rectangle A on grid paper.
  b) Draw a different rectangle that has the same area as Rectangle A.
  c) Do the two rectangles have the same perimeter? Explain.

2. a) Draw Rectangle B on grid paper.
  b) Draw a different rectangle that has the same area as Rectangle B, but a lesser perimeter.
  c) Draw a rectangle that has the same area as Rectangle B with the minimum perimeter.

3. a) For each number of congruent square patio stones, which arrangement would give the minimum perimeter?
  i) 25 stones   **ii)** 50 stones   **iii)** 75 stones   **iv)** 100 stones
  b) Suppose each stone in part a has side length 30 cm. What is the minimum perimeter?

> Remember that congruent squares are the same size.

4. Look at the areas and perimeters in question 3.
  a) What patterns do you see in the areas?
  b) Do the perimeters have the same pattern? Explain.

Example

What is the minimum perimeter for a rectangle with area 40 m²?

Solution The minimum perimeter occurs when the rectangle is a square.
Determine the side length, s, of a square with area 40 m².
Use the formula: $A = s^2$
Substitute: $A = 40$
$40 = s^2$
$s = \sqrt{40}$
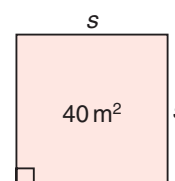$s \doteq 6.325$
Calculate the perimeter of the square.
Use the formula: $A = 4s$
Substitute: $s = 6.325$
$P = 4(6.325)$
$= 25.3$
The minimum perimeter for the rectangle is approximately 25.3 m.

In questions 5 to 7, round your answers to 1 decimal place.

5. What is the minimum perimeter for a rectangle with each area?
   a) 30 m^2 b) 60 m^2 c) 90 m^2 d) 120 m^2

6. **Assessment Focus**   Determine the dimensions of a rectangle
   with area 1000 m^2 whose perimeter is the least possible.
   What is the minimum perimeter? Justify your answer.

7. A rectangular patio is to be built from 56 congruent square tiles.
   a) Which patio design will give the minimum perimeter?
   b) Is this patio a square? Explain.

8. Keung has been comparing rectangles that have the same area.
   He says that rectangles whose lengths and widths are close in value
   have greater perimeters than rectangles whose lengths and widths
   are very different. Do you agree? Explain.

9. In a banquet room, there are small square tables
   that seat 1 person on each side.
   The tables are pushed together to create
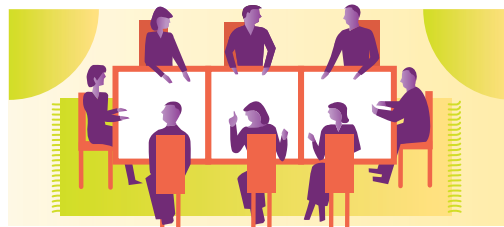   larger rectangular tables.
   a) Consider all possible arrangements of
      12 square tables.
      Sketch each arrangement on grid paper.
   b) Which arrangement seats the most people?
      The fewest people? Explain.
   c) Explain why the minimum perimeter
      might not be preferred in this situation.

10. **Take It Further**
    a) Draw a square.
    b) Draw a rectangle that has the same area as the square
       but a different perimeter.
    c) Is it possible to draw a rectangle that has the same area
       as the square but a lesser perimeter than the square?
       Explain.

In Your Own Words

For a given area, describe the rectangle that has the least perimeter.
Will the rectangle always be a square? Explain.