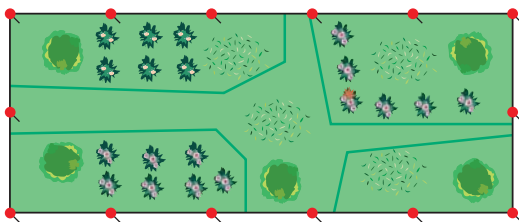## Practice

1. a) On 1-cm grid paper, draw all possible rectangles with each perimeter.
   Each dimension is a whole number of centimetres.
   i) 8 cm   **ii)** 12 cm   **iii)** 22 cm
   b) Calculate the area of each rectangle in part a.
   c) For each perimeter in part a, what are the dimensions of
   the rectangle with the maximum area?

2. Suppose you have 14 sections of fence to enclose a rectangular garden.

Each section is 1 m long and cannot be cut.
a) Sketch the possible gardens that can be enclosed by the fence.
   Label each garden with its dimensions.
b) Calculate the area of each garden in part a.
c) Which garden has the maximum area?
   Is this garden a square? Explain.

Example

What is the maximum area of a rectangle with perimeter 30 m?

Solution   The maximum area occurs when the rectangle is a square.
Determine the side length, s, of a square with perimeter 30 m.
Use the formula: $P = 4s$
Substitute: $P = 30$
$30 = 4s$
Think: What do we multiply 4 by to get 30?
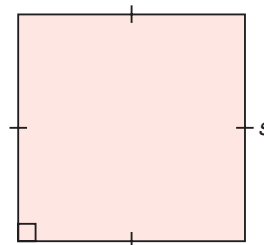Divide 30 by 4 to find out.
$s = \frac{30}{4}$
$s = 7.5$
Calculate the area of the square. Use the formula: $A = s^2$
Substitute: $s = 7.5$
$A = (7.5)^2$
$ = 56.25$
The maximum area is 56.25 m^2.

3. What is the maximum area for a rectangle with each perimeter?
Explain your thinking.

a) 36 cm   b) 60 cm   c) 75 cm

4. **Assessment Focus**   Determine the dimensions of a rectangle
with perimeter 42 m whose area is as great as possible.
What is the maximum area? Justify your answer.

5. Joachim has been comparing rectangles that have the same perimeter.
He says that rectangles whose lengths and widths are close in value
have larger areas than rectangles whose lengths and widths are
very different. Do you agree with Joachim? Justify your answer.
Include diagrams and calculations.

6. In a banquet room, there are small square tables
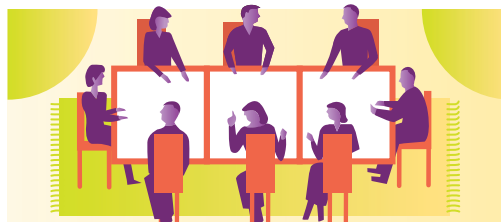that seat 1 person on each side.
These tables are pushed together to create
a rectangular table that seats 20 people.

a) Consider all possible arrangements of
square tables to seat 20 people.
Sketch each arrangement.

Three tables seat 8 people.

b) Which arrangement requires the most tables?
The fewest tables?

c) Explain why the arrangement with the fewest tables
might not be preferred in this situation.

7. **Take It Further** Lisa and her sister Bonnie are each given
8 m of plastic edging to create a flowerbed.
Lisa creates a square flowerbed.
Bonnie creates a circular flowerbed.

a) Calculate the area of each girl's flowerbed.

b) Which figure encloses the greater area?
Do you think the areas of all squares and circles with
the same perimeter are related this way?
Draw other squares and circles to find out.

In Your Own Words

Suppose your friend was absent during this lesson.
Describe what you learned.
Include diagrams and examples in your explanation.