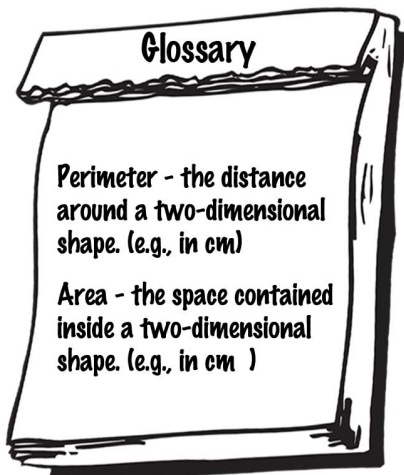## Problem

The perimeter of a square is measured in units of length (e.g., mm, cm, m, km, ...), and the area of a square is measured in square units of area (e.g., mm^2, cm^2, m^2, km^2).

Glossary

Perimeter - the distance around a two-dimensional shape. (e.g., in cm)

Area - the space contained inside a two-dimensional shape. (e.g., in cm)

a) Using the grid paper on the following page, draw three squares. The side length of each square should be a whole number.

   i) For the first square, the number of units of perimeter is greater than the number of units of area;

   ii) For the second square, the number of units of perimeter is less than the number of units of area;

   iii) For the third square, the number of units of perimeter is equal to the number of units of area.

b) How many different squares can be drawn for part a)(i)?

$$P = 4s$$
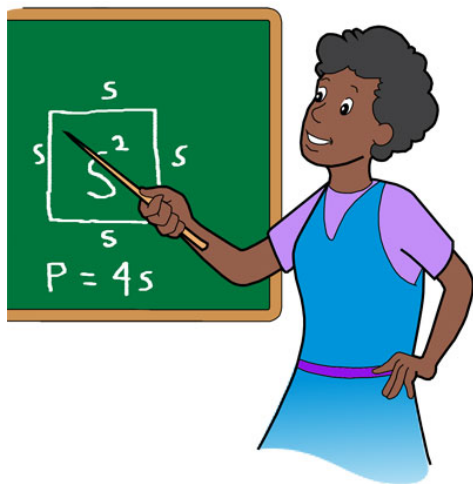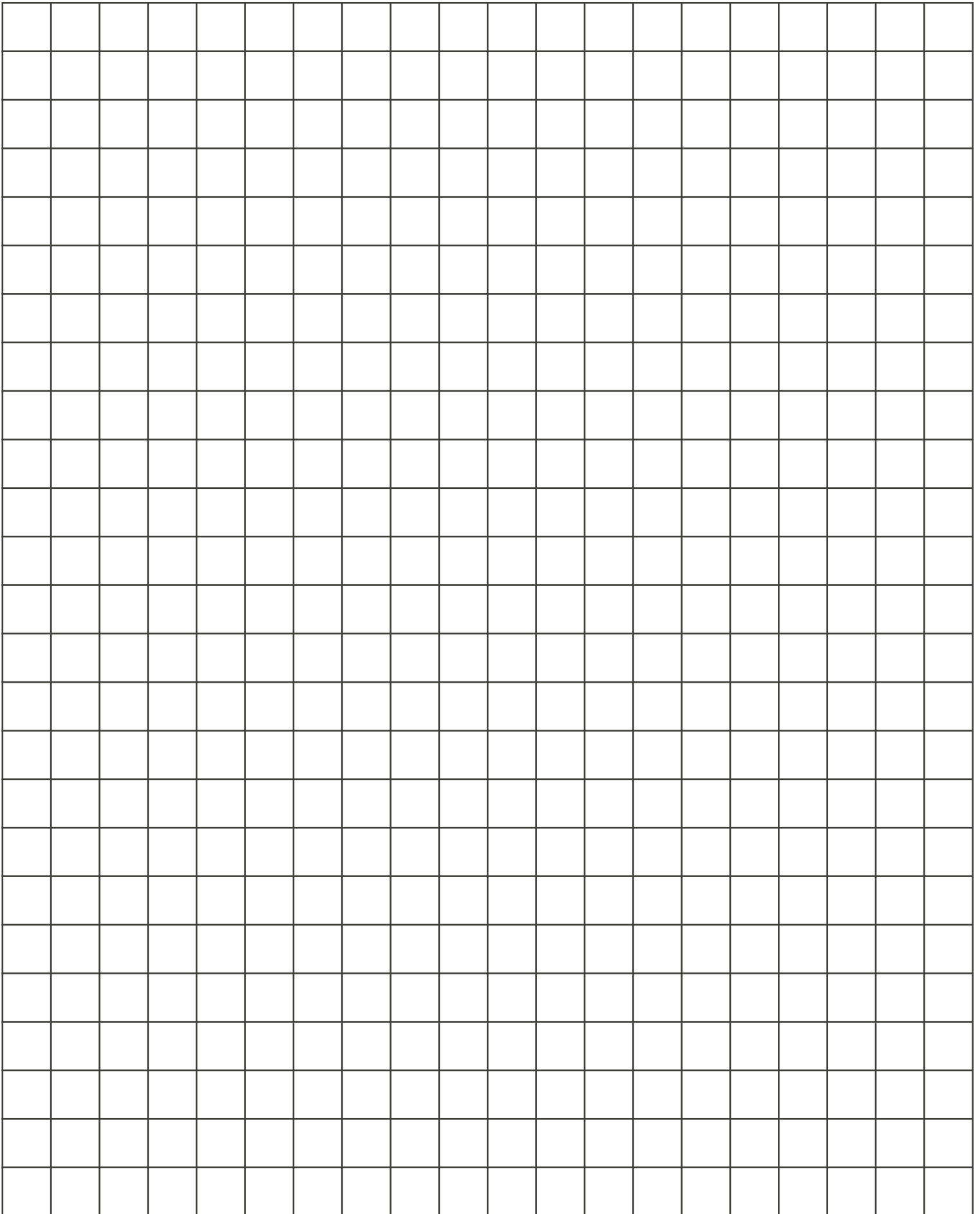
Hints

Suggestion: Teachers may wish to suggest students make a chart in order to record the perimeter and area of squares with side 1, 2, 3, etc.

Solution

a) Here is a chart for squares of side length 1, 2, 3, 4, 5, 6, 7, 8.

Square Side	1	2	3	4	5	6	7	8
Perimeter	4	8	12	16	20	24	28	32
Area	1	4	9	16	25	36	49	64

Notice that the perimeter increases by 4 units of length for an increase of 1 unit in side length, but the area increases as the square numbers.

  (i) From the chart, any of the squares with the side length 1, 2, or 3 has units of perimeter greater than units of area.

  (ii) Any square with side 5 units or greater has units of perimeter less than units of area. Thus there is an infinite number of such squares.

  (iii) A square of side 4 has perimeter 16 units, and area 16 units. It is the only such square.

b) The squares in a)(i) are the only possible such squares, so there are three of them.