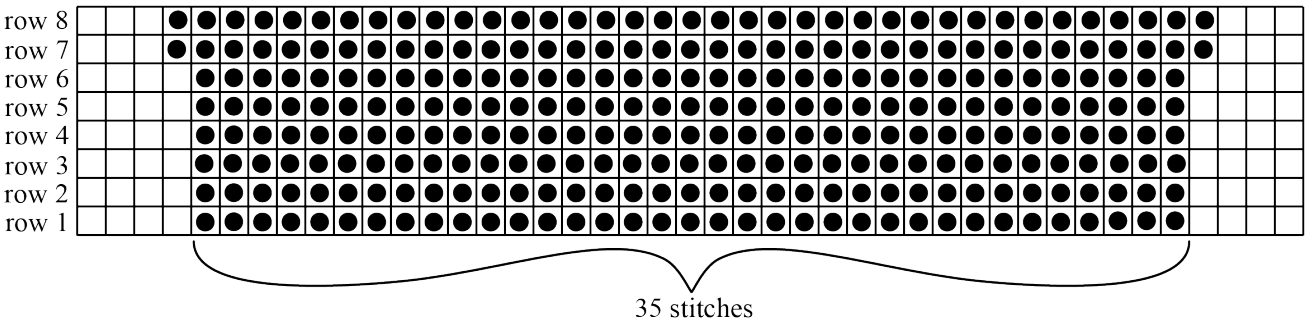
Problem of the Week

Problem A

Knitting Patterns

Knitting is a process of making rows of stitches out of yarn. To knit a rectangular shape, the number of stitches in each row is always the same. However, to knit different shapes, the number of stitches in each row can be increased or decreased as you work through the pattern.

A particular pattern starts with 35 stitches in the first row. After every 6 rows, 2 more stitches are added to the row; one at the beginning and one at the end. So, the 7^{th} row would have 37 stitches, and the 13^{th} row would have 39 stitches. The first 8 rows of the knitting pattern are shown below, with dots representing the stitches. Note that knitting patterns are read from the bottom to the top.

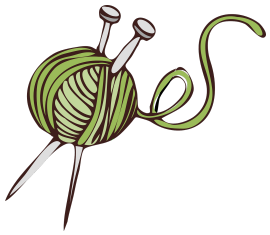


If we follow this pattern, we will create an item that resembles a trapezoid.

(a) How many stitches will be in the 20^{th} row of the pattern?

(b) The length of our finished item is the distance from the first row to the last row. Our finished item will have a length of 30 cm. If every 6 rows of knitting add 3 cm of length, how many rows will there be in total?

(c) How many stitches will be in the last row found in part (b)?



THEMES ALGEBRA, NUMBER SENSE