



Problem of the Week

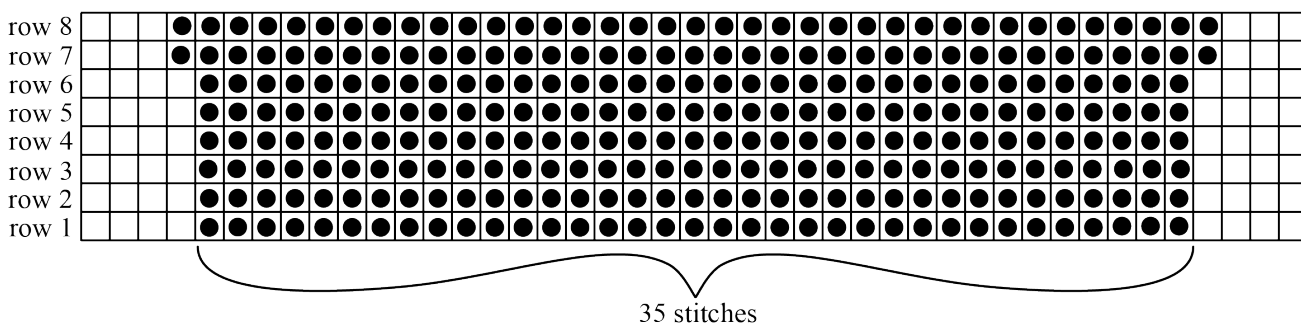
Problem A and Solution

Knitting Patterns

Problem

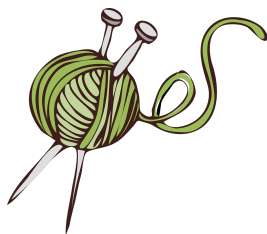
Knitting is a process of making rows of stitches out of yarn. To knit a rectangular shape, the number of stitches in each row is always the same. However, to knit different shapes, the number of stitches in each row can be increased or decreased as you work through the pattern.

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 7th row would have 37 stitches, and the 13th 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 20th 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)?





Solution

- (a) We can make a table showing the number of stitches in each row as we follow the pattern.

| Rows | Number of Stitches |
|---------|--------------------|
| 1 – 6 | 35 |
| 7 – 12 | 37 |
| 13 – 18 | 39 |
| 19 – 24 | 41 |

Since 20 is between 19 and 24, there will be 41 stitches in the 20th row.

- (b) We can make a table showing the row number and the length of the item after that row has been knitted. Here we will use skip counting and look at the length after every 6th row.

| Row | Length (in cm) |
|-----|----------------|
| 6 | 3 |
| 12 | 6 |
| 18 | 9 |
| 24 | 12 |
| 30 | 15 |
| 36 | 18 |
| 42 | 21 |
| 48 | 24 |
| 54 | 27 |
| 60 | 30 |

After 60 rows, our finished item will have a length of 30 cm.

- (c) We can make another table showing the number of stitches in each row, again using skip counting and looking at every 6th row up to row 60.

| Row | Number of Stitches |
|-----|--------------------|
| 6 | 35 |
| 12 | 37 |
| 18 | 39 |
| 24 | 41 |
| 30 | 43 |
| 36 | 45 |
| 42 | 47 |
| 48 | 49 |
| 54 | 51 |
| 60 | 53 |

The 60th row will have 53 stitches.