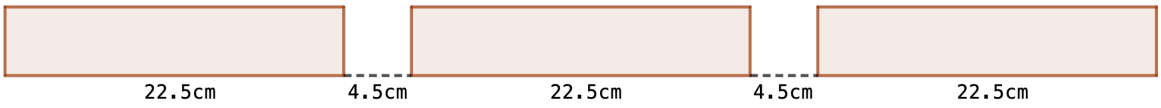
Problem of the Week
Problem B and Solution
Wall Construction

Problem

Moyo wants to build a wall in her backyard. She will build the wall out of bricks, and her measurements show that each brick is 22.5 cm long and 5.7 cm high. Moyo's bricks on the bottom layer of the wall are to be placed lengthwise and spaced 4.5 cm apart. For example, here is the bottom layer of a wall with three bricks.



(a) If she builds a wall with nine layers of bricks, what will the height of the wall be?

(b) If Moyo builds a wall with six bricks on the bottom layer, how long will this bottom layer be?

(c) If Moyo wanted the wall to be 130.5 cm long, how many bricks will Moyo use in the bottom layer of the wall?

Solution

(a) The total height of the nine layers will be $9 \times 5.7 = 51.3$ cm.

(b) The bottom layer, which consists of six bricks, will have six bricks and five spaces. Thus the total length will be $(6 \times 22.5) + (5 \times 4.5) = 135 + 22.5 = 157.5$ cm or 1.575 m.

(c) One brick plus one space is $22.5 + 4.5 = 27$ cm long. Since $27 \times 5 = 135$, and 135 is close to 130.5, we guess that Moyo would use about five bricks, with four spaces between them. Indeed, this gives $(5 \times 22.5) + (4 \times 4.5) = 112.5 + 18 = 130.5$ cm, the required length.

NOTE: Another possible way to solve this is to notice that 130.5 cm is 27 cm less than 157.5 cm. Now, 27 cm is the length of one brick plus one space. Therefore, the bottom layer has the 6 bricks in part (b) minus 1 brick. Therefore, Moyo will have 5 bricks on the bottom layer.