



Problem of the Week

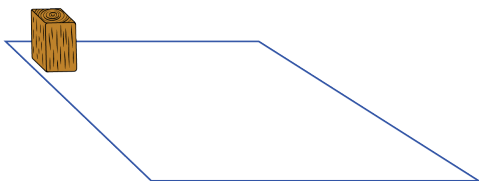
Problem B and Solution

Stamp it Out

Problem

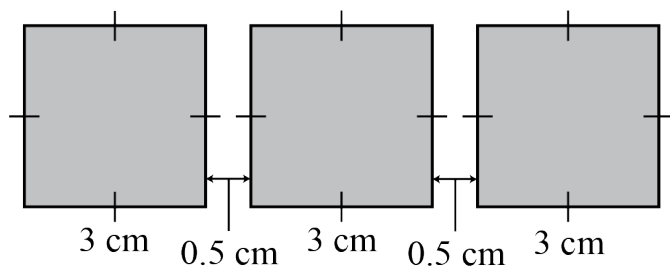
Evelina is using a wooden block as a stamp to make decorative wrapping paper. The wooden block measures 3 cm by 3 cm by 4 cm and Evelina is stamping with one of the 3 cm by 3 cm square faces of the block.

- (a) Evelina creates a row of 10 stamped squares with a gap of 0.5 cm in between each square. Determine the length of this row.
- (b) Evelina has a square piece of wrapping paper with side length 77.5 cm. She leaves a gap of 0.5 cm around each edge and then creates rows of stamped squares with a gap of 0.5 cm in between each square as well as between each row. How many stamped squares in total will be on this piece of wrapping paper?



Solution

- (a) We start by drawing a diagram of the first three stamped squares in the row.



From here we show two different ways to solve the problem.

Solution 1

In this solution we use a table to help us determine the length of the row. The first stamped square has a length of 3 cm, and each square after that adds $3 + 0.5 = 3.5$ cm to the length.



Number of Stamped Squares	Length of Row (cm)
1	3
2	$3 + 3.5 = 6.5$
3	$6.5 + 3.5 = 10$
4	$10 + 3.5 = 13.5$
5	$13.5 + 3.5 = 17$
6	$17 + 3.5 = 20.5$
7	$20.5 + 3.5 = 24$
8	$24 + 3.5 = 27.5$
9	$27.5 + 3.5 = 31$
10	$31 + 3.5 = 34.5$

Thus, the length of the row is 34.5 cm.

Solution 2

In this solution we use an algebraic expression help us determine the length of the row. This solution is more efficient, especially as the row gets longer. We know the length of each stamped square is 3 cm and the length of each gap between the squares is 0.5 cm. If we let s represent the total number of squares and g represent the total number of gaps between the squares, then the length of the row, in cm, is $3 \times s + 0.5 \times g$.

If there are 10 squares in the row then there are 9 gaps between them. Then we can use our equation to determine the length of the row.

$$\begin{aligned}3 \times s + 0.5 \times g &= 3 \times 10 + 0.5 \times 9 \\&= 30 + 4.5 \\&= 34.5\end{aligned}$$

Thus, the length of the row is 34.5 cm.

- (b) We will start by determining the number of stamped squares in each row. Since the piece of wrapping paper is a square, this will also be the number of rows of stamped squares.

If we subtract the gap at the start of the row, then the length of the row will be $77.5 - 0.5 = 77$ cm. This is helpful because each square is followed by a gap, so the total length of the square and its gap is $3 + 0.5 = 3.5$ cm. Then we can divide to determine the number of squares in the row. Since $77 \div 3.5 = 22$, it follows that there are 22 squares in the row.

Since there are also 22 rows of squares, the total number of squares is $22 \times 22 = 484$.