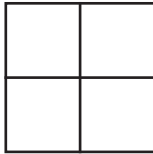


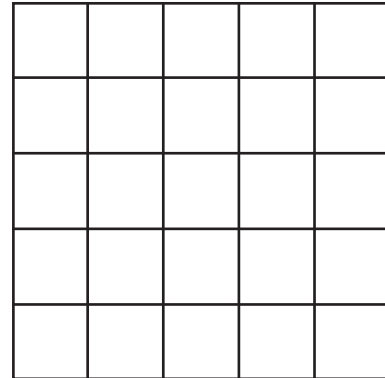
5. Paving stones

Square lawns are made up of square pieces of turf, for example:

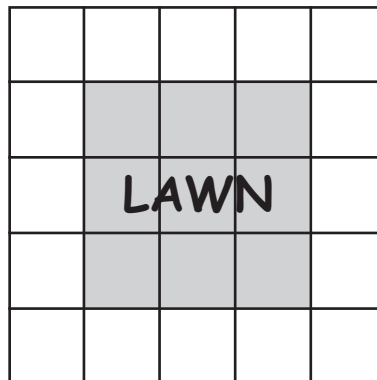
This is a 2×2 lawn



This is a 5×5 lawn



A lawn is surrounded by paving stones the same size as a piece of turf so a 3×3 lawn, for example, would need 16 paving stones to surround it:



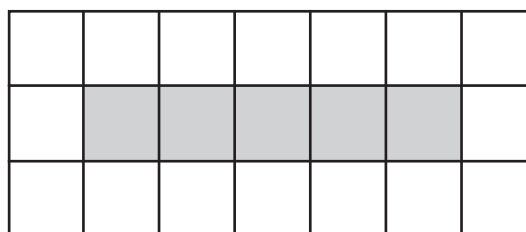
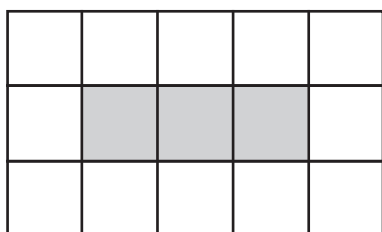
Investigate the relationship between the size of a lawn and the number of paving stones needed to surround it. (Keep your lawns quite small, no more than 8×8 .)

Record your results systematically in a table.
Explain what you find out.

5. Paving stones

Challenges for pupils

- Use your table of results to work out how many paving stones would be needed to surround a lawn measuring 12×12 .
- How many stones would be needed to surround a lawn measuring 50×50 ? Or 100×100 ?
- Generalise your findings by showing how you would work out how many paving stones (N) would be needed to surround a lawn measuring $L \times L$.
- Investigate lawns having different lengths but always measuring one unit wide, for example:



How would you calculate the number of paving stones needed for lawns of this shape? (The general rule is $N = 2L + 6$ or, alternatively, the general rule for any rectangular lawn is below.)

- Investigate other rectangular lawns in the same way so that you would be able to work out the number of stones needed to surround any lawn measuring $L \times B$. (The general rule for rectangular lawns is $N = 2(L + B) + 4$, which would also be correct for lawns of unit width as above.)

5. Paving stones

Solutions

Pupils should be encouraged to display their findings as a table:

Side length of lawn (L)	No. of paving stones (N)
1	8
2	12
3	16
4	20
5	24
etc.	etc.

By doing this they will more readily see the relationship which is:

$$N = 4L + 4$$

and can be explained in this way:

To completely surround it, a lawn needs one paving stone for each unit of its perimeter (in the case of a square lawn that is equal to four times its side length). Plus four more stones for the corners. For example:

