Extending a straightforward number or diagrammatic pattern and determining its formula.
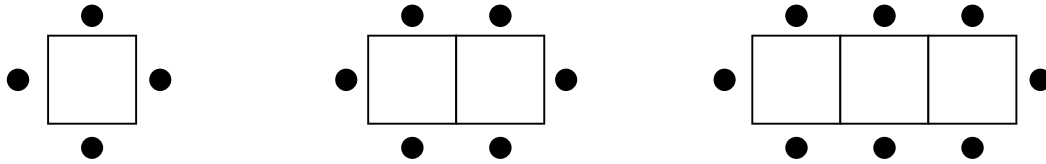
Two step patterns

1.   The squares in the diagram represent tables and the dots represent people sitting at them.

      (a)   Draw diagrams to show the number of people who could sit at 4 tables and 5 tables.

      (b)   Copy and complete this table for the number of tables and the number of people.

Number of tables	1	2	3	4	5		10	14
Number of people								

      (c)   Write down a rule in words for the finding the number of people if you know how many tables there are.

      (d)   Write the formula in symbols using T for the number of tables and P for the number of people.

      (d)   Use your formula to find how many people would be able to sit at 20 tables.

      (e)   There are 44 people at a gathering. How many tables would be needed to seat them?

2. Mr Wright wants to build a fence round his garden and draws some diagrams so that he can work out how many posts and how many link pieces he will need.
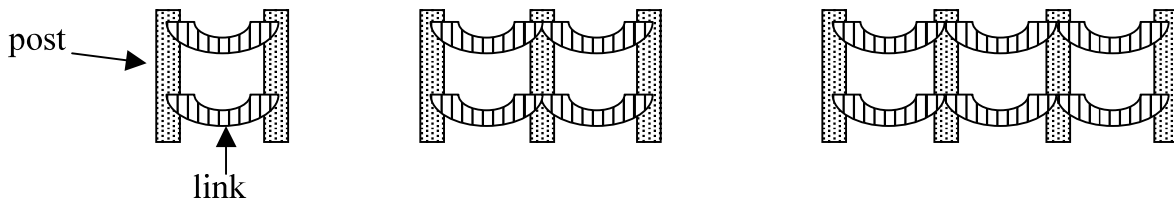
post ———→

link

(a) Draw diagrams with 5 and 6 posts.

(b) Copy and complete this table to show the number of posts and the number of links required for different lengths of fencing.

Number of posts	1	2	3	4	5		20	25
Number of links								

(c) Write down a rule in words for the finding the number of links needed if you know how many posts there are.

(d) Write the formula in symbols using L for the number of links and P for the number of posts.

(e) Use your formula to find how many links would be needed for 50 posts.

(f) Mr Wright has 100 links. How many posts would he need to use them all up?

3. Plain and patterned tiles are laid in a strip.
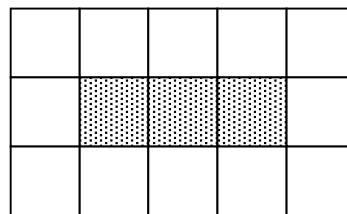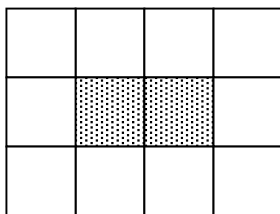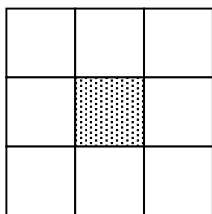
(a) Draw the next two patterns of tiles.

(b) How many plain tiles would there be in a strip with 7 patterned tiles?

(c) If there are 9 patterned tiles, how many plain tiles will these be?

(d) Copy and complete the following table:

Number of patterned tiles	4	5	6	7	8	9	10		20
Number of plain tiles									

(e) Write down a formula for finding the number of plain tiles (P) when you know the number of patterned tiles (R).

(f) If there are 152 plain tiles, how many patterned tiles would there be?

4. **(a)** Complete the table below for this tile pattern made from coloured and white tiles.
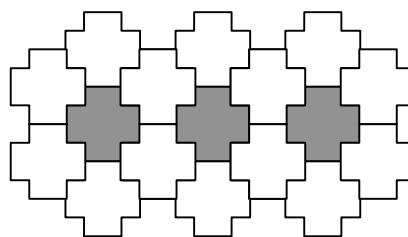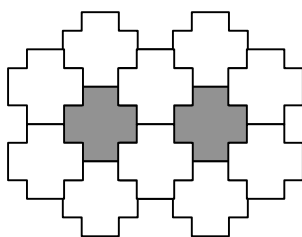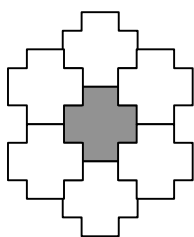
Number of coloured tiles	1	2	3	4		10	20		50
Number of white tiles									

(b) Write down a formula for finding the number of white tiles (W) when you know the number of coloured tiles (C).

(c) If there are 86 white tiles, how many coloured tiles would there be?

5.   For their barbeque Mr and Mrs Goldie allowed 3 burgers for each person attending and an extra 10 to be on the safe side.

(a)   Complete this table for the numbers of burgers they would need:

Number of people	1	2	3	4	5	6
Number of burgers						

(b)   Find a formula for the number of burgers needed when you know the number of people.

(c)   Use your formula to find out how many burgers would be needed for 18 people.

(d)   If you have 100 burgers how many people could you invite to the barbeque?

6.   These patterns are made up from a number of rhombuses.
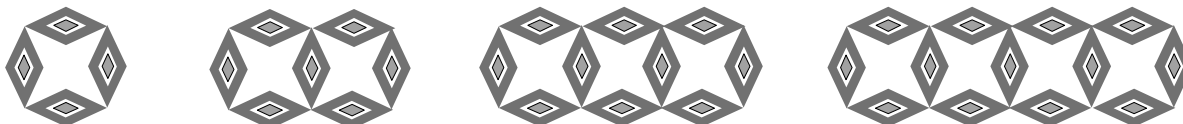
(a)   Complete the table to show the number of rhombuses used in each.

Pattern number	1	2	3	4	5	6
Number of rhombuses						

(b)   How many rhombuses would be needed for the 10th pattern?

(b)   How many rhombuses would be needed for the 10th pattern?

(c)   How many rhombuses would be in the 24th pattern?

(d)   Write down a rule for finding the number of rhombuses (R) in any pattern number (P).

(e)   What pattern number would have 34 rhombuses in it?

(f)   What pattern number would have 46 rhombuses in it?

7. **(i)** Find a formula for each of the following.

(a)

P	1	2	3	4	5	6		12		
Q	3	6	9	12	15	18			48	90

(b)

M	1	2	3	4	5	6		11		
N	3	5	7	9	11	13			33	57

(c)

R	1	2	3	4	5	6		14		
T	2	5	8	11	14	17			26	47

(d)

D	5	6	7	8	9	10		20		
K	4	5	6	7	8	9			31	68

(e)

V	2	3	4	5	6	7		15		
A	3	6	9	12	15	18			57	72

(ii) Use your formulae to complete the missing entries in the tables.