Expanding Pattern

The diagram shows the first three figures in a pattern.

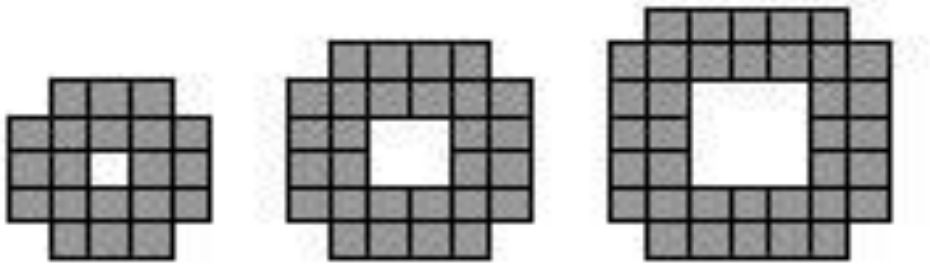
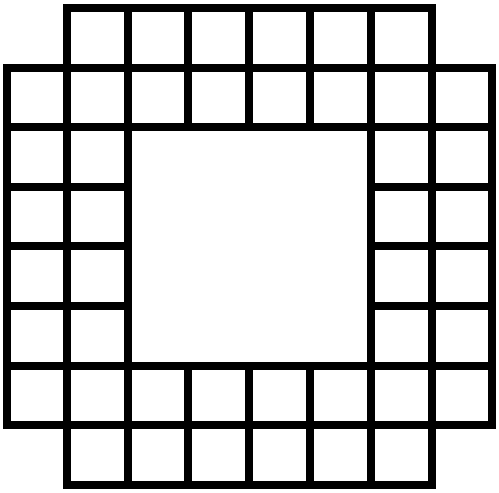


Figure 1 Figure 2 Figure 3

a) Figure 1 has 20 small (grey) squares.
Count and record the squares (grey) in Figure 2 and Figure 3.
What is happening?
How is the pattern growing?

Figure 1 – 20 grey squares
Figure 2 – 28 grey squares (+ 8 (an increase of 8 squares))
Figure 3 – 36 grey squares (+ 8)
Figure 2 has 8 more squares than figure 1.
Each figure has 8 more squares than the previous one.

b) Draw Figure 4.



c) If you continue this pattern, how many small (grey) squares are there in Figure 10?

Give your answer with an explanation.

From figure 1 up to figure 10, there is an increase of 8 squares which we will call 'change'.

20 (+ 8), 28 (+ 8), 36, 44, 52, 60, 68, 76, 84, **92.**

Or

From Figure 1 to Figure 10 there are 9 adds

8 x 9 = 72

(do not forget the cubes in Figure 1) so 20 + 72 = **92**

20 (1st change) 28 (2nd change) 36 (3rd change) 44

c) Extension (Challenge).

How many small (grey) squares will there be in Figure 98?

Work it out and explain.

From Figure 1 to figure 11 there are 10 changes (8 x 10 = 80)

Figure 1 (20)

Figure 11 (20 + 80 = 100)

Figure 21 (100 + 80 = 180)

Figure 31 (180 + 80 = 260)

Figure 41 (260 + 80 = 340 …

Figure 91 is 740

91 to 98 there are 7 more changes (8 x 7 = 56)

740 + 56 = 796 grey squares

Or

From Figure 1 to Figure 98 there are 97 changes.
8 x 97 = 97 x 8 = 776
20 + 776 = **796 grey squares**

Or

From 1 to 100 there are 99 changes, so 99 x 8 = 792
Start from 20 squares (figure 1)
792 + 20 = 812.
812 is the 100^{th} figure.
98^{th} figure is 2 less figures than 100 which are (2x8) 16 less squares.
812 - 16 = **796 grey squares**

d) Create.

Create another diagram showing a growing pattern.

Draw the first 3 and the 19th one.

Label and explain.

Various answers

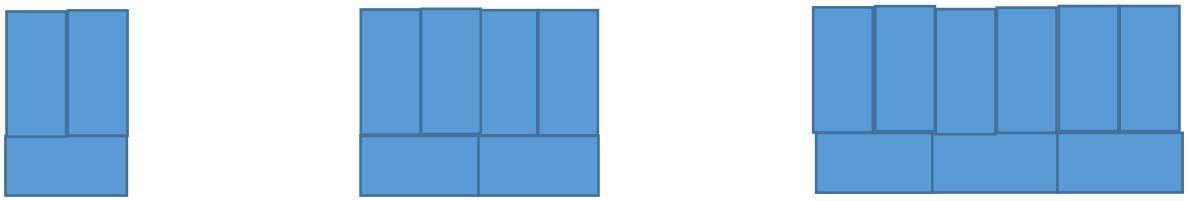


Fig 1

3 block

Figure 2

6 blocks

Figure 3

9 blocks

+ 3

+ 3

Figure 19

I need (3 x 18 = 54)

54 + 3 = 57 blocks for the 19th Figure.

19 horizontal blocks and 38 vertical blocks.