Rules for Number Sequences

Number sequences

1 Bob and Diana both have sequences that begin 3, 6, ... Bob says: 'The next numbers in my sequence are 12, 24, 48, ... You just double each time.' Diana says: 'My sequence starts 3, 6, ..., but the next numbers are 12, 21, 33, ...'

(a) What rule do you think Diana is using?

(b) Think of other ways to continue a sequence that begins 3, 6, ... Each time write down the next three terms and describe the rule you are using.

2 Another sequence starts 2, 4, 6, 10, 16, 26, 42, ... Explain how you think this sequence is generated and write down the next three terms.

3 For each of the following sequences find a simple rule to generate the sequence. Describe your rule in words. Then use it to write down the next three terms.

(a) 3, 6, 9, 3, 6, 9, ...

(b) 3, 6, 9, 12, 15, 18, ...

(c) 3, 6, 9, 6, 9, 12, ...

(d) 3, 6, 9, 18, 21, 42, ...

(e) 3, 6, 9, 13, 17, 22, ...

(f) 3, 6, 9, 14, 19, 26, ...

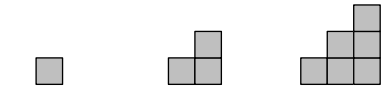
(g) 3, 6, 9, 13, 17, 21, ...

(h) 3, 6, 9, 15, 21, 30, ...

(i) 3, 6, 9, 15, 24, 39, ...

Counting sequences from pictures

4 You can use unit squares to make a sequence of staircases. The first three staircases are shown below.



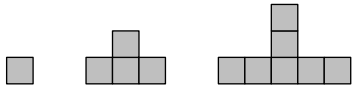
1 square 3 squares 6 squares

(a) How many squares will there be in the next staircase?

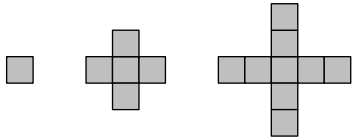
(b) How many squares will there be in the n^{th} staircase? Give your answer in words and in symbols. Explain why it is correct.

5 Each of these questions shows the first three terms of a **sequence of diagrams**. In each questions you have to find and **prove** a formula for the number of small shaded squares in the n^{th} diagram.

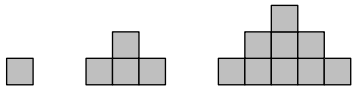
(a)



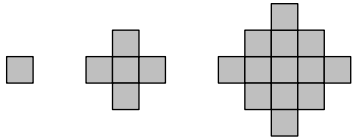
(b)



(c)



(d)



(e)