

Answer the following questions in your workshop groups. For question four you may find it helpful to draw diagrams to illustrate your answers.

1. Find the next term for these sequences. Then give a recursive formula for them.

(a) 24,12,6,3

(b) 10,7,4,1

(c) 1,2,4,7,11

(d) 2,3,5,9,17

2. Consider the following sequence of patterns.

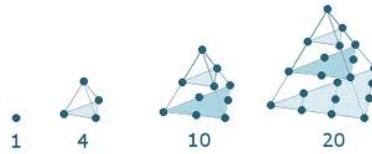


(a) Draw the next pattern and write down the number of hexagons in each pattern.

(b) Find a recursive formula for this sequence.

(c) Find a general formula for this sequence.

3. Oranges are stacked in the shape of a triangular pyramid (or tetrahedron). A pyramid with one level consists of a single orange, a pyramid with two levels consists of one orange on the top level and three oranges in the shape of a triangle on the next level for a total of four oranges. There is a similar arrangement at higher levels.



- (a) How many oranges do you need to make a tetrahedron with 5 levels?, 6 levels? The sequence of numbers you are generating are called tetrahedral numbers.
- (b) If you had 100 oranges, how many levels could you complete and how many oranges would you have left over?
4. A tree grows according to the following rule. It starts as a trunk with no branches and grows to a height of one foot in one year. At the start of the next year the trunk produces a branch, then over the course of the next year the new branch and the trunk each grow one foot. The year after a branch is formed it grows in exactly the same way as the original trunk (ie it produces a new one foot branch and grows one foot longer itself.)
- (a) How many branches does the tree have after 2, 3, 4, 5 years (count the end of the trunk as a branch.)? Find a formula for the sequence.
- (b) What is the total length of wood in the tree after 5 years of growth?