15. The sum S of the cubes of the first n positive integers is given by the formula

$$S = \left[\frac{1}{2}n(n+1)\right]^2,$$

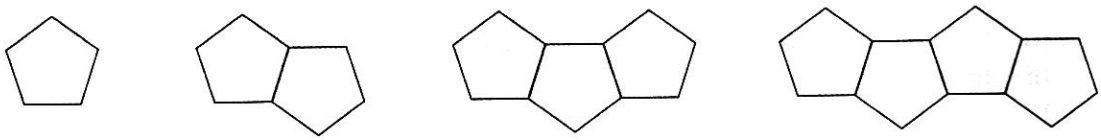
i.e. $1^3 + 2^3 + 3^3 + \ldots + n^3 = \left[\frac{1}{2}n(n+1)\right]^2$.

(a) Find the value of $1^3 + 2^3 + 3^3 + \ldots + 10^3$.

(b) Find the value of $11^3 + 12^3 + 13^3 + \ldots + 18^3$.

(c) Find the value of n if $S = 23\,409$.

16. Consider the patterns made from a row of pentagons as shown below.



$n = 1$ $n = 2$ $n = 3$ $n = 4$

(a) Draw the pattern for $n = 5$.

(b) Assume that each side of a pentagon is 1 cm long. Let P_n cm be the perimeter of the nth pattern. Copy and complete the table below.

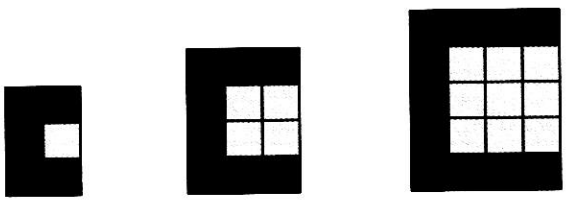
n	1	2	3	4	5	6
P_n						

(c) Express P_n in terms of n.

(d) Find the perimeter of the pattern for $n = 9$.

(e) If the perimeter of the nth pattern is 53 cm, find n.

17. The diagram shows some patterns formed by identical square tiles.



$n = 1$ $n = 2$ $n = 3$

Let G_n be the number of green tiles, R_n be the number of red tiles and T_n be the total number of tiles in the nth pattern.

(a) Draw the pattern for $n = 4$.