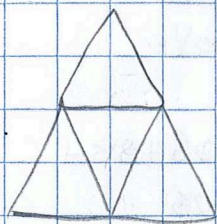


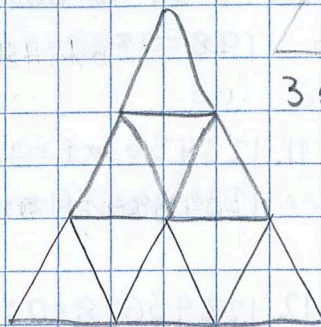
10th of June 2022

NRich - Sticky Triangles

Charmaine



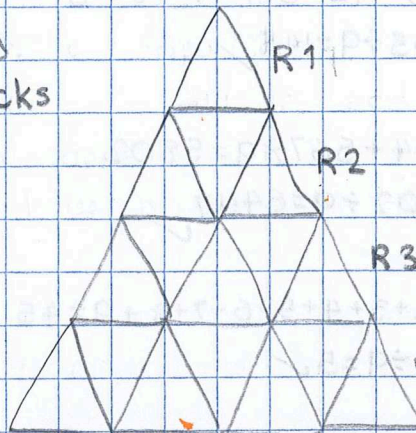
9 sticks



18 sticks



3 sticks



30 sticks

$$+6 +9 +12 +15 +18 +21 \dots$$

a) Can you describe any patterns that you find?

Every time we add a new row of small triangles we add 2 more small triangles than the previous row.

For example, on the first row we have 1 small triangle and the 2nd row has 3, the 3rd row has 5.

Another pattern is the total amount of small triangles in a whole triangle. When we create

1 triangle with 3 sticks there is only 1 small triangle, when we add another row, there will be 2 rows and

4 small triangles. The pattern is that the total number of small triangles in a whole triangle are the

square numbers of the number of rows in the triangle. Also, the difference of the numbers of sticks used in each

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row is 3. In the 1st row we used 3 sticks, in the 2nd row we used 6 and in the 3rd row we used 9 sticks. We always add 3 sticks to the previous row to find out the next row. The pattern for the total amount of sticks used in the whole triangle is to multiply the amount of rows of the triangle by 3 and add the previous triangle.

b) Can you predict how the pattern will carry on?

Yes, I can predict how the pattern will continue if I follow the pattern.

Row	small Δ in each row	Total Δ	Sticks in each row	Total of sticks
1	1	1	3	3
2	3	4	6	9
3	5	9	9	18
4	7	16	12	30
5	9	25	15	45
6	11	36	18	63
7	13	49	21	84

Square numbers

c) Why does the pattern occur?

This pattern occurs because the shape of the resulting triangle is always an equilateral triangle and it is maintained. Its size increases when a row of triangles are added.

d) Will the pattern continue forever? How do you know?

Yes, it will continue forever. I know this because every time we add a row it will increase and the larger the triangle will become and ^{the} larger the number of matchsticks will be needed to form it. Since numbers don't have an end and they can keep increasing and the triangle will keep growing. The triangle will always increase and it won't decrease.