Class @ = VII 'A'

 Name @ = Shreyash Singh R= 36

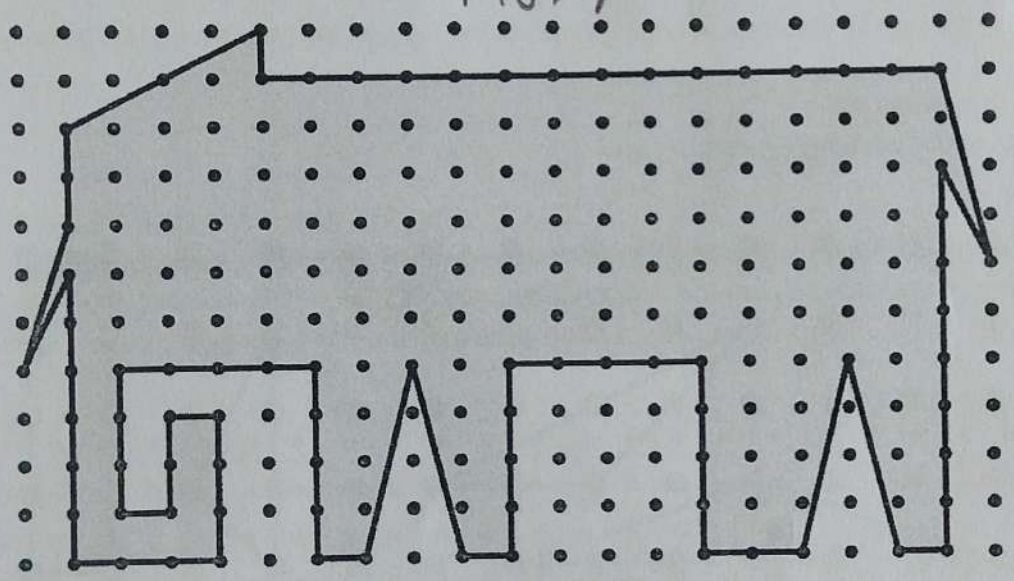
Counting Areas

Task 1:

King Bahubali loved elephants so much that he kept a herd of them. In fact, he planted his coconut garden in such a way that it looked like an elephant when viewed from his terrace!
But the elephants would walk around the garden and destroy it. So, the king put a fence around the garden to keep the elephants away as seen in the figure given below. The trees were planted on a square grid, with one tree at each grid point, to provide sufficient space for each tree. If the king's grounds were 20 units long and 11 units wide, can you find the area available for the elephants to roam, by just counting the coconut trees?

If you cannot solve it now, go ahead with the remaining tasks, and you will be able to do this at the end of the tasks!!

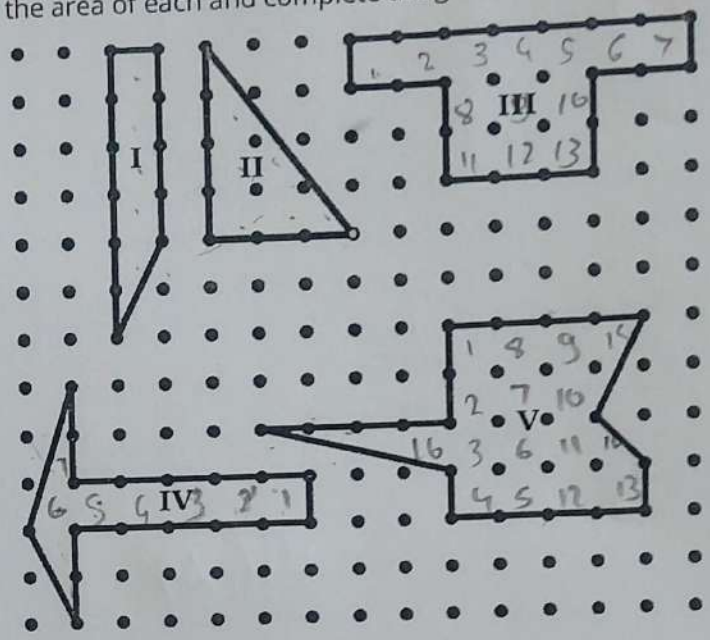
146 sq



Task 2:

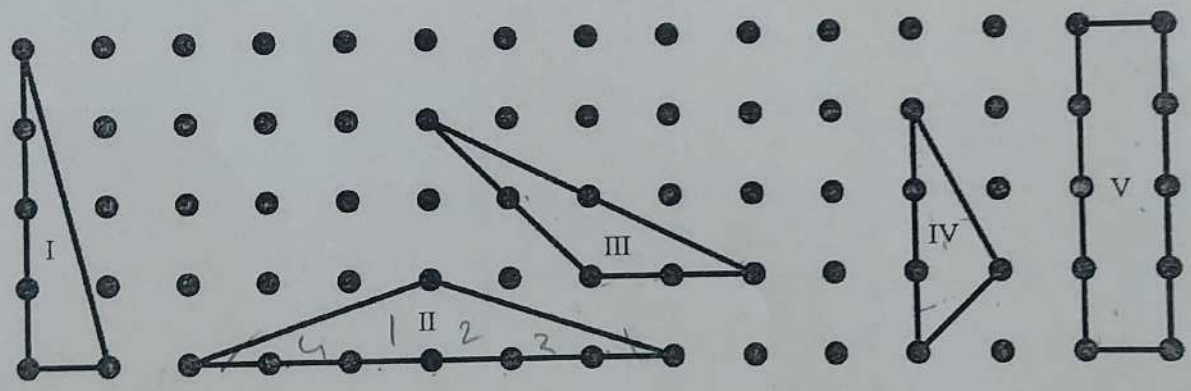
Given below are some figures. Find the area of each and complete the given table.

Figure	Area in Sq Units
I	5 sq
II	6 sq
III	13 sq
IV	7.5 sq
V	15.5 sq



Task 3: Some more figures!

a) Find the area of the following figures.



Also count the number of grid-points on the boundary of each figure, and fill the table below.

Figures	Area in Square Units	Number of grid-points on the boundary (B)
I	2 sq	6 grid point
II	3 sq	8 grid point
III	2 sq	6 grid point
IV	2 sq	5 grid point
V	4 sq	10 grid point

b) Do you see any relation between the area of the triangle and the number of grid-points on its boundary? No

c) Does the same relation hold for figures I to V in Task 2? If not, for which ones does the relation hold?

i) The relation holds for figures _____. (Write the number of the figure.)

ii) The relation does not hold for figures _____. (Write the number of the figure.)

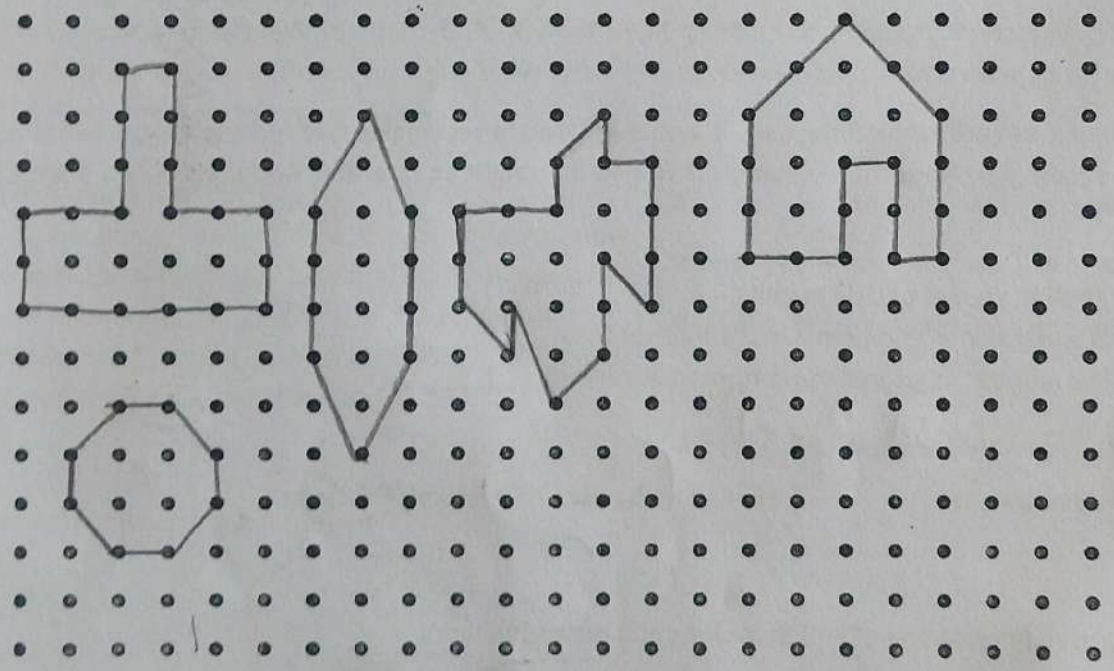
Task 4: Finding the expression!

a) In Task 3c), how are the figures in i) different from the figures in ii) ? What property distinguishes figures in i) from figures in ii)?

b) How would you modify the relation in Task 3b) such that it holds for all figures?

Task 5: Making some more figures

Draw five more figures on the grid provided below and check if the relation holds for these figures as well. Are you sure that it will hold for any figure that you may draw? What are the properties common to the figures for which this relation holds?



Did your relation hold for the figures you drew on the above grid?

We have looked at some polygons and found an expression for their area by just counting the boundary and the interior points.

Now let us look at some special polygons and prove that this expression holds for them too.

Task 6: Special cases!

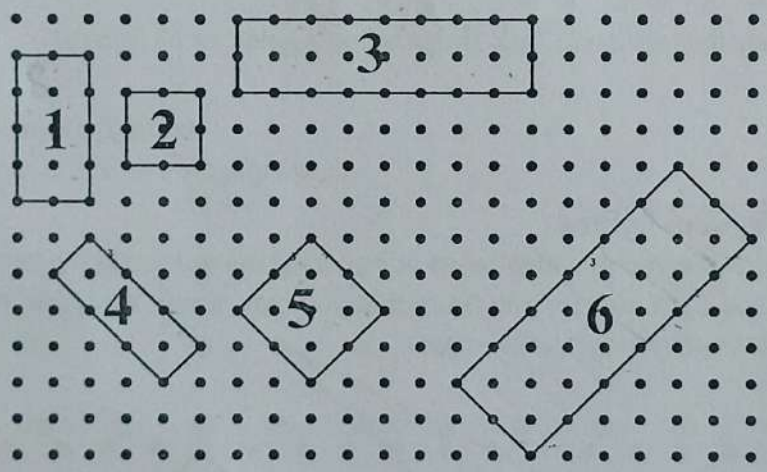
Some special polygons:

In the upcoming calculations, we are going to look at some very special type of quadrilaterals, namely straight squares, and rectangles.

What do we mean by straight squares or rectangles?

Look at the rectangles given below:

3=16 sq
1=8 sq
2=4 sq
4=6 sq
5=8 sq
6=24 sq



In the figure: We will call rectangles 1, 2, and 3 as straight rectangles and rectangles 4, 5 and 6 as slanted rectangles. Note that Rectangle 2 is also a straight square and Rectangle 5 is a slanted square.

a) For a straight square of side *m* units

The number of grid-points in the interior (*I*) is 3

The number of grid-points on the boundary (*B*)is 12.

$I + \frac{B}{2} - 1 = 3 + \frac{12}{2} - 1$

How is the expression $I + \frac{B}{2} - 1$ related to the area of the straight square?

b) For a straight rectangle of length *m* units and breadth *n* units,