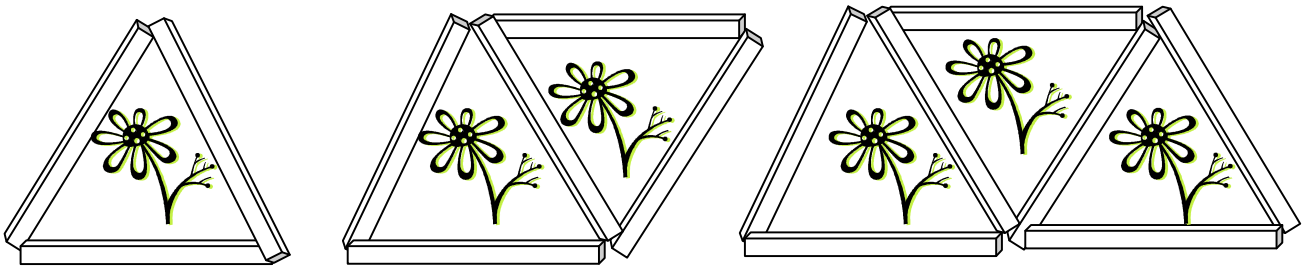
YEAR 9 Semester 2 APPLICATION TASK

Name: …….

Flower Beds

1. Luke is designing a network of flower beds for his garden. He decides that an interesting design would be to make the beds in a triangular pattern as shown in the diagrams below:



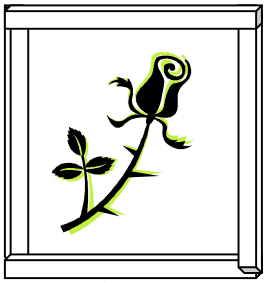
1 bed **2 beds** **3 beds**

The borders of the beds are made from old wooden railway sleepers as shown above.

If only **one** side of the previous triangle can be built onto to construct the next bed, complete the following table:

Number of Flower Beds (n)	**Number of Sleepers (s)**	**Perimeter of the Beds (p)** **(Measured in Sleepers)**
1	3	3
2	5	4
3		
4		
5		

2. Olivia is also designing a network of flower beds for her garden. She decides that an interesting design would be to make the beds in a square pattern as shown in the diagrams below:



1 bed

2 beds

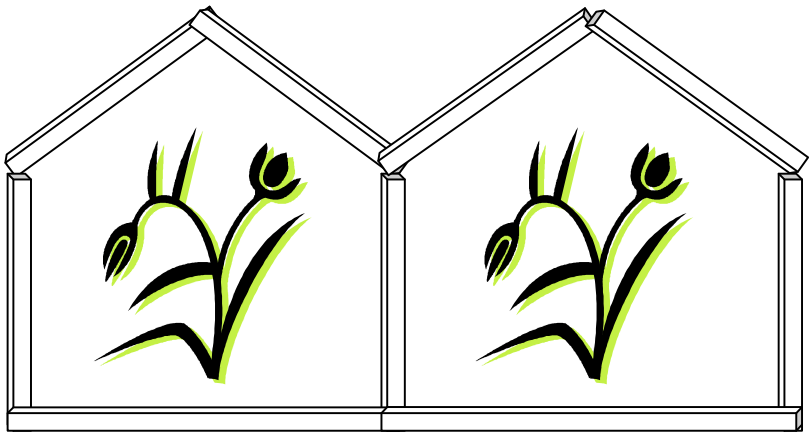
The borders of these beds are also made from old wooden railway sleepers as shown above.

If only **one** side of the previous square can be built onto to construct the next bed, complete the following table:

Number of Flower Beds (*n*)	**Number of Sleepers (*s*)**	**Perimeter of the Beds (*p*)** **(Measured in Sleepers)**
1	4	4
2	7	6
3		
4		
5		

3. Kevin is also designing a network of flower beds for his garden. He decides that an interesting design would be to make the beds in a pentagonal pattern as shown in the diagrams below:

1 bed



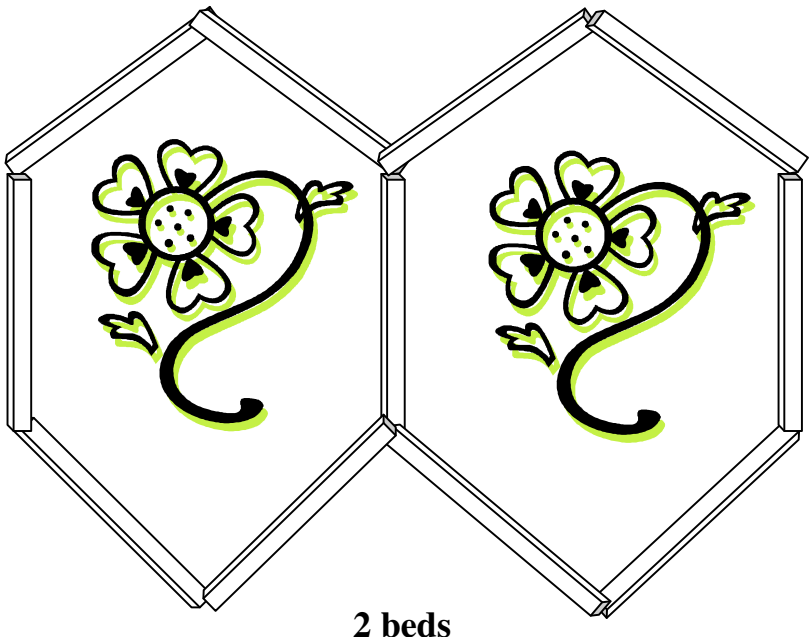
2 beds

The borders of these beds are also made from old wooden railway sleepers as shown above.

If only **one** side of the previous pentagon can be built onto to construct the next bed, complete the following table:

Number of Flower Beds (n)	**Number of Sleepers (s)**	**Perimeter of the Beds (p)** **(Measured in Sleepers)**
1	5	5
2	9	8
3		
4		
5		

4. Jessie is also designing a network of flower beds for her garden. She decides that an interesting design would be to make the beds in a hexagonal pattern as shown in the diagram below:



2 beds

The borders of these beds are also made from old wooden railway sleepers as shown above.

If only **one** side of the previous hexagon can be built onto to construct the next bed, complete the following table:

Number of Flower Beds (*n*)	**Number of Sleepers (*s*)**	**Perimeter of the Beds (*p*)** **(Measured in Sleepers)**
1		
2	11	10
3		
4		
5		

5. **(a)** On the **same** set of axes, plot graphs showing the relationship between the number of flower beds (n) and the perimeter of the flower beds (p) for Luke's, Olivia's, Kevin's and Jessie's designs.
Should your plotted points be joined by a continuous line? …….
Explain why or why not.

…….

(b) Which graph has the greatest gradient?

……

(c) What do the gradients of these graphs represent in the context of this problem?

……

…….

……..

6. **(a)** On the **same** set of axes, plot graphs showing the relationship between the number of flower beds (n) and the number of the sleepers (s) for Luke's, Olivia's, Kevin's and Jessie's designs.

(b) Which graph has the smallest gradient?

……

(c) What do the gradients of these graphs represent in the context of this problem?

……

…….

……..

7. Find the rules that describe the relationship between the number of flower beds (n) and the perimeter of the flower beds (p) for Luke's, Olivia's, Kevin's and Jessie's designs.

Rule for Luke's design (triangular pattern): ……..

Rule for Olivia's design (square pattern): ……..

Rule for Kevin's design (pentagonal pattern): ……

Rule for Jessie's design (hexagonal pattern): ……

8. Find the rules that describe the relationship between the number of flower beds (n) and the number of the sleepers (s) for Luke's, Olivia's, Kevin's and Jessie's designs.

Rule for Luke's design (triangular pattern): ……..

Rule for Olivia's design (square pattern): ……..

Rule for Kevin's design (pentagonal pattern): ……

Rule for Jessie's design (hexagonal pattern): ……

9. If 23 flower beds were to be constructed, how many sleepers would be needed for:

(a) Luke's design,

……..

(b) Olivia's design,

……...

(c) Kevin's design,

……...

(b) Jessie's design?

……...

10. If there were 61 sleepers available, how many flower beds could be constructed using:

(a) Luke's design,

……..

(b) Olivia's design,

……...

(c) Kevin's design,

……...

(b) Jessie's design?

……...

11. If the perimeter of a set of flower beds were to be 50 sleepers in length, how many sleepers would be needed ***altogether*** for:

(a) Luke's design,

……..

(b) Olivia's design,

……...

(c) Kevin's design,

……...

(b) Jessie's design?

……...

12. Daniel could not make up his mind as to what type of polygon to use in the design of his flower beds. Finally he decided that the polygons in his flower beds were to have k sides.

(a) Complete the following table:

Type of polygon used in the design of the flower beds.	**Rule connecting the perimeter (p) and the number of beds (n).**	**Rule connecting the number of sleepers (s) and the number of beds (n).**
Triangle	$p =$	$s =$
Square	$p =$	$s =$
Pentagon	$p =$	$s =$
Hexagon	$p =$	$s =$
Octagon	$p =$	$s =$
Decagon	$p =$	$s =$
k -agon	$p =$	$s =$

(b) Daniel decided that he wanted to construct 10 flower beds.

(i) How many sleepers would he need? Give your answer in terms of k .

(ii) What would be the perimeter of the 10 beds? Give your answer in terms of k .