

4.5

Using a Scatter Plot to Represent a Sequence

You will need

- grid paper
- a ruler
- coloured pencils
- toothpicks
- a calculator

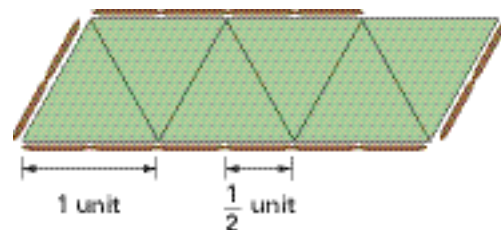
GOAL

Use scatter plots to represent number sequences.

Learn about the Math

Omar is designing a path for the school garden.

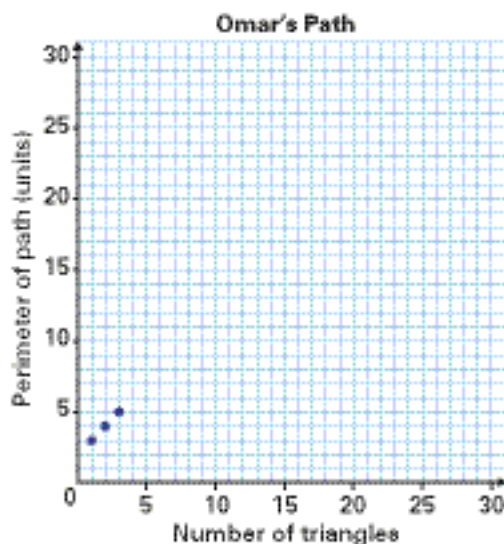
- The path will have 30 equilateral triangle paving stones, which line up to form a straight path.
- On each side of the path there will be border pieces. Each border piece is half as long as one side of a triangle stone.



? How many border pieces will Omar need for the path?

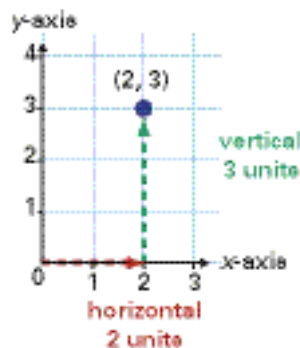
- The table of values below shows how the perimeter of the path increases as triangle stones are added. Copy and complete the table of values.
- Draw the scatter plot using the data in your table of values. Use values from “Number of triangles” and the corresponding “Perimeter of path (units)” as the **coordinates** for each point.

Number of triangles	Perimeter of path (units)
1	3
2	4
3	5
4	
5	
6	
7	
8	



coordinates

an ordered pair, used to describe a location on a grid labelled with an x-axis and a y-axis; for example, the coordinates (2, 3) describe this location:

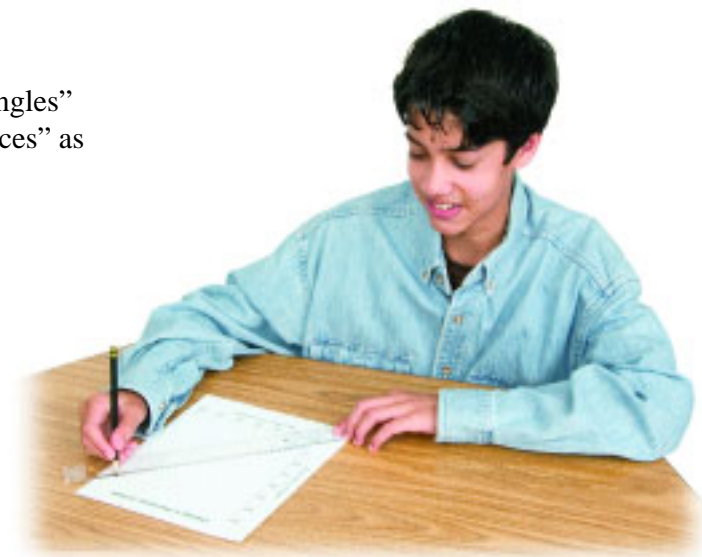
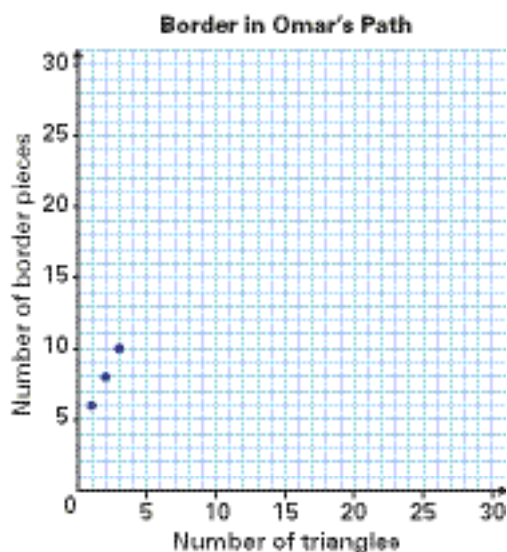


- Use the pattern of the points on the scatter plot to predict the perimeter of the path using 30 triangle stones.

- D. Add a third column on the right side of your table of values. Label it “Number of border pieces.” Record the data.

Number of triangles	Perimeter of path (units)	Number of border pieces
1	3	
2	4	
3	5	

- E. Draw a new scatter plot. Use “Number of triangles” and the corresponding “Number of border pieces” as the coordinates for each point.



- F. Use the scatter plot you drew in step E to determine how many border pieces are needed for 30 triangle stones.

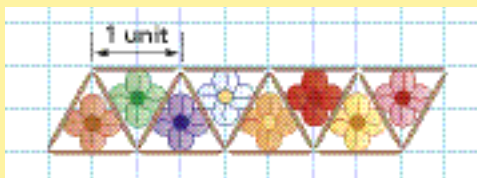
Reflecting

1. How are your two scatter plots the same? How are they different?
2. Explain how you can use a scatter plot to determine the number of border pieces needed for any number of triangle stones.
3. How is using a scatter plot like using a table of values to predict the perimeter and the number of border pieces?
4. Why is using a scatter plot not as accurate as using a pattern rule from a table of values to make predictions about a sequence?

Work with the Math

Example: Using a table of values to make a scatter plot for a sequence

This flowerbed will be 10 triangles long. Each triangle will contain one type of flower. Use a scatter plot to predict the total number of border pieces needed to make the flowerbed.



Kaitlyn's Solution

I made a table of values for the first five terms in the sequence.

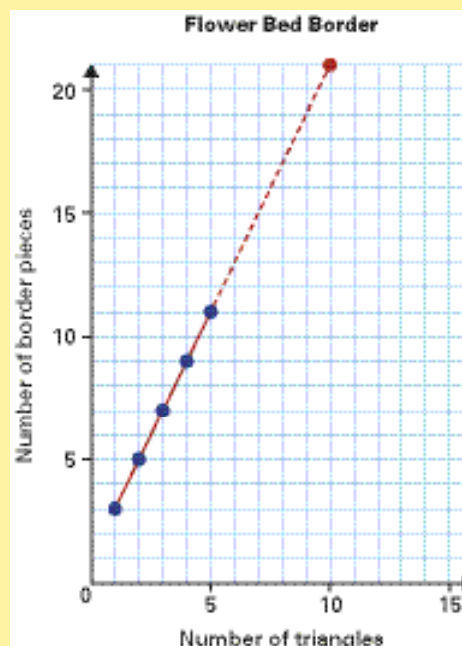
Number of triangles	Number of border pieces
1	3
2	5
3	7
4	9
5	11

I used the coordinates to draw a scatter plot.

The points all go in a straight line.

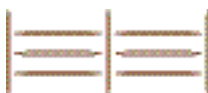
This makes me think that the values follow a pattern rule. The values increase by the same amount for each term.

If I follow the line past (5, 11), I can see that I will need 21 border pieces for 10 triangles.



A Checking

5. Mohammed is designing fences for a summer job. One kind of rail fence has three rails and one post in each section. Use a scatter plot to predict how many posts and rails Mohammed will need for a fence that is 12 sections long. Explain what you did.



6. a) Make a scatter plot to represent this toothpick pattern.



- b) How many toothpicks would you need to make the 9th figure in the sequence?
- c) Which figure in the sequence could you make with 22 toothpicks?

B Practising

7. Create a scatter plot for the table of values. Use your scatter plot to find the missing values in the table.

Term number	Term value
4	8
6	10
8	12
?	14
?	16
14	?

8. Mohammed is building another rail fence that has sections like this.



Use a scatter plot to determine the number of posts and rails Mohammed will need to build each fence.

- a) 8 sections long b) 14 sections long
9. a) How many squares of each colour would you need to build each of the first four figures? Make a table of values to record your answers.
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- b) Draw a scatter plot to show how many squares of each colour you would need to make the 10th figure. Use different colours and a legend to show the different colours of squares.
10. Create a toothpick pattern of your own, and draw the first four figures in your sequence. Then make a table of values or draw a scatter plot for the first 10 figures.



11. There are two triangular patterns in the marching band shown above. In the inner triangle, there is one person at the tip (in front of the conductor), then three people, and so on. Use a table of values or a scatter plot to answer parts (b), (c), and (d).
- a) Describe the pattern of the inner triangle.
- b) What is the total number of band members in the inner triangle?
- c) How many more players would be needed to increase the total number of rows in the inner triangle to 15?
- d) How many more band members would be needed to have 17 players in the longest row?
- e) Write your own math question about this photograph. Explain how to solve it.

C Extending

12. Omar has \$350 to spend on the garden he is designing. The triangle stones cost \$20 each, and the border pieces cost \$5 each. How long a path can Omar afford to make?