

# SHARP

## Number Patterns Investigation Memo

### Grade 8 Maths

1. Give some examples of patterns that you see in everyday life.

*This answer can be anything, but must be logical. Some examples include: the tile patterns on the floor, the way sales cycle through different seasons, adding a certain amount of money to an investment each month.*

2. What are some of the ways we can use patterns to plan for the future?

*These answers will be the students own, but should be logical and have a good explanation. Examples could include: We can predict how much money we can save, so that we know when we can retire. We can predict sales, so we know how much stock to order. Etc.*

3. Given below are some patterns in diagram form. For each pattern explain how the pattern is changing from one picture to the next.

a)



*In this pattern, a new little girl is added to each consecutive picture.*

b)



*In this pattern, the number of fence posts doubles.*

*Alternatively, we are adding one more than the previous number added to each consecutive picture.*

c)



*In each picture we add another 2 ants.*

d)



In each picture we add another 3 cash bundles.



In each picture we increase the number of branches by 1, and the number of leaves by 7

4. Using the table on your calculator complete the table given below:

X	Ans
1	4
2	5
3	6
5	8
10	13
$x$	$x + 3$

a) What does the  $x$  stand for?

*The  $x$  is the independent variable. It causes the changes in the Ans column.*

b) What happens to the ANS column as the X changes?

*The ANS column changes as the X changes. When X increases by 1, so does the answer column. The ANS column is always 3 more than the value of X.*

c) What is the pattern?

*We are starting at 4 and adding 1 each time.*

d) Can you write this pattern algebraically? (Use  $x$  for X and  $y$  for ANS).

$$y = x + 3$$

5. Using the table on your calculator complete the table given below:

<b>X</b>	<b>Ans</b>
1	3
2	6
3	9
5	15
10	30
$x$	$3x$

a) What does the  $x$  stand for?

*The  $x$  is the independent variable. It causes the changes in the Ans column.*

b) What happens to the ANS column as the X changes?

*The answer column is the value of X times 3.*

c) What is the pattern?

*We are starting at 3, and adding 3 everytime.*

d) Can you write this pattern algebraically? (Use  $x$  for X and  $y$  for ANS).

$$y = 3x$$

6. Using the table on your calculator complete the table given below:

<b>X</b>	<b>Ans</b>
1	7
2	10
3	13
5	19
10	34
$x$	$3x + 4$

a) What does the  $x$  stand for?

*The  $x$  is the independent variable. It causes the changes in the Ans column.*

b) What happens to the ANS column as the X changes?

*The ANS column increases by 3 each time.*

c) What is the pattern?

*Starting at 7 we add 3 each time*

d) Why do we only add 4, if we want to start with a first term of 7?

*Because we add 3 to the first term of the pattern.*

e) Can you write this pattern algebraically? (Use  $x$  for X and  $y$  for ANS).

$$y = 4 + 3x$$

7. a) When we want to add the same number to the previous value in the pattern, how do we write this algebraically?

*We write the number in front of the  $x$  as a coefficient.*

b) What do we use to represent the term position algebraically?

$x$

c) What do we use to represent the term value algebraically?

$y$

d) Can we start counting patterns from position 0?

*No, we always start counting patterns from position 1*

e) Which position should we start our patterns from?

*From 1.*

8. Complete the table below:

X	Ans
1	3
2	9
3	27
5	243
7	2 187
10	59 049
$x$	$3^x$

a) What can we about the relationship between the X and the Ans?

*ANS is the value of 3 to the power of  $x$ , in other words, each consecutive term is multiplied by 3.*

b) Write an algebraic equation to describe this relationship.

$$y = 3^x$$

9. Using the strategies above, create your own pattern

a) with a common difference

*For this pattern, they need to have a pattern that shows a constant that is either added or subtracted. They should have a table to display the first couple of values in the pattern, as well as the formula for the pattern.*

b) with a common multiplicand.

*For this pattern, they need to have a pattern that shows a constant that is either multiplied or divided. They should have a table to display the first couple of values in the pattern, as well as the formula for the pattern.*