Key Ideas

- An expression is a combination of operations involving one or more numbers and variables. An equation is a mathematical statement that equates two expressions.

You can use a table of values, an expression, or an equation to represent many pictorial or written patterns.

- The table of values, the expression, and the equation are related.
- To verify equations, substitute values.

Linear Patterns Hmwk #1

Practise

For help with #1 to #4, refer to Example 1.

1. Evaluate each expression.

a) $3x + 5$, when $x = 4$

b) $6y - 15$, when $y = 2$

c) $2w + 8$, when $w = -5$

d) $-3z - 7$, when $z = -6$

2. a) Describe how the pattern grows.

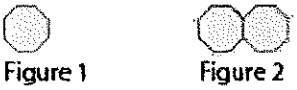

Figure 1 Figure 2

Figure 3 Figure 4

b) Make a table of values showing the number of sides for each figure in relation to the number of octagons.

c) Write an expression and an equation to model the number of sides of each shape. Explain what each part of the equation represents.

d) How many sides will a shape made up of 17 octagons have?

e) How many octagons will make a figure with 722 sides?

3. Laurie uses yellow and white tiles to create a pattern.

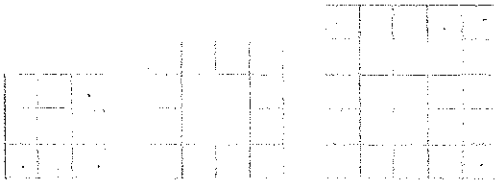

Figure 1 Figure 2 Figure 3

a) Make a table of values to show the number of yellow tiles in relation to the figure number.

b) Describe the relationship between the number of yellow tiles and the figure number.

c) Develop an expression and an equation to model the number of yellow tiles. Explain what each part of the equation represents.

d) How many yellow tiles are in Figure 24?

e) Which figure number has 176 yellow tiles? Verify your answer.

f) Is it possible to have a figure with 54 yellow tiles? Show how you know.

4. **a)** Make a table of values to show the number of circles in relation to the figure number.

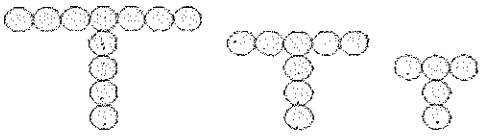

Figure 1 Figure 2 Figure 3

b) Describe the relationship between the number of circles and the figure number.

c) Develop an expression and an equation to determine the number of circles in each figure. Explain what each part of the equation represents.

d) How many circles are in Figure 17?

e) Which figure number has 110 circles?

f) Think about how you used the equation. What limitations does the pictorial model have that the equation does not?

5. *Eric creates the following number pattern:*

$-14, -8, -2, 4, \ldots$

a) Make a table of values for the first 5 terms.

b) Develop an equation to determine the value of each term in the number pattern.

c) What is the value of the 123rd term?

d) Which term has a value of 250?

6. Figure 2 of a pattern shows two heptagons connected along one side. Each additional figure has one additional heptagon. Each side length is 1 cm.

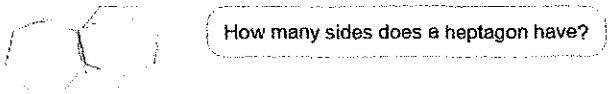

Figure 2

a) Draw the first 6 figures. Then, describe the pattern.

b) Make a table of values showing the perimeter for the first 6 figures.

c) What equation determines the perimeter of each figure? Identify each variable.

d) What is the perimeter of Figure 12?

e) How many heptagons are needed to create a figure with a perimeter of 117 cm?

f) Can a figure have a perimeter of 74 cm? How do you know?

7. Emma creates a number pattern that starts with the number -5. Each number that follows is 3 less than the previous number.

a) Make a table of values for the first 5 numbers in the pattern.

b) What equation determines each number in the sequence?

c) What is the value of the 49th term?

d) Which term in the sequence has a value of -119?

8. Write an equation that models the relationship between the two columns of numbers in each table.

a)

x	*y*
0	13
1	16
2	19
3	22