Old Nelson Math

4.1 Exploring Relationships in the Fibonacci Sequence

Text page 124

You will need
- a calculator
- a highlighter pen

▶ **GOAL** **Identify relationships within a number pattern.**

This number pattern is called the Fibonacci sequence:

1, 1, 2, 3, 5, 8, 13, 21, ___, ___, ...

2 3 5 ☐ ☐ ☐ ☐ ☐

MATH TERM

term
each number in a sequence; for example, in the sequence 1, 3, 5, 7, ..., the 3rd term is 5

A. Add the **terms** joined by arrows to complete the pattern in the bottom row. What pattern do you notice in the two rows?

_____

_____

B. Use the pattern to write the next two terms of the Fibonacci sequence in the top row.

C. Every 3rd term of the sequence below is highlighted.

1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, ...

The greatest common factor of these terms is 2.

Highlight every 4th term in the sequence.

1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, ...

What is the greatest common factor of these terms?

_____

Hint

Remember, the greatest common factor (GCF) is the greatest whole number that divides into two or more other whole numbers with no remainder.

D. Highlight every 5th term of the sequence.

1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, ...

What is the greatest common factor of these terms?

_____

E. What conclusions can you make from your results in steps C and D?

_____

_____

MATH TERM

consecutive
following one after the other in order

F. Three **consecutive** terms in the Fibonacci sequence are 3, 5, and 8.

Square the middle term: $5^2 =$ _____

Calculate the product of the other two: $3 \times 8 =$ _____

What is the relationship between these two values?

_____

_____

G. Choose three different consecutive terms in the Fibonacci sequence.

_____, _____, _____

Square the middle term: (_____)^2 = _____

Calculate the product of the other two terms:

_____ × _____ = _____

H. Check another set of three consecutive terms.

_____, _____, _____

Square the middle term: (_____)^2 = _____

Calculate the product of the other two terms:

_____ × _____ = _____

Reflecting

▶ Describe the pattern rule you discovered in steps F to H.

_____

_____

END

4.2 Creating Pattern Rules from Models

Text page 126

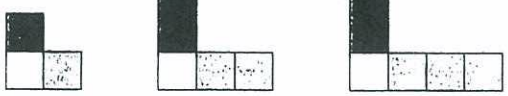
You will need
- coloured square tiles (optional)
- toothpicks (optional)

▶ **GOAL** **Use algebraic expressions to describe patterns.**

Pattern 1

MATH TERM

algebraic expression
a combination of one or more variables; it may include numbers and operation signs



1 + 1 + 1
Figure 1

1 + 2 + 2
Figure 2

1 + 3 + 3
Figure 3

Algebraic expression:

$1 + n + n$

In the pattern above, what stays the same?

_____

What changes?

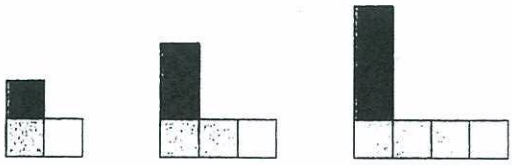
_____

MATH TERM

variable
a letter or symbol, such as *a*, *b*, or *n*, that represents a number

In the algebraic expression for the pattern above, $1 + n + n$, the 1 represents the white square and the two **variables**, *n*, represent the grey squares.

Pattern 2



2 × 1 + 1
Figure 1

2 × 2 + 1
Figure 2

2 × 3 + 1
Figure 3

Algebraic expression:

$2n + 1$

In the pattern above, what stays the same?

_____

What changes?

_____

Hint

$2n$ is the same as $2 \times n$.

Circle the part of the algebraic expression for Pattern 2 that represents the white square.

$2n + 1$

Circle the part of the algebraic expression for Pattern 2 that represents the grey squares.

$2n + 1$

Reflecting

▶ How do you know that the algebraic expressions for Pattern 1 and Pattern 2 are equivalent?

Practising

Text page 128

3.

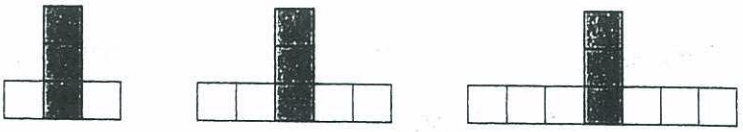


Figure 1 Figure 2 Figure 3

a) Which part of the pattern above stays the same?

Which part changes?

b) Circle the algebraic expression that describes the pattern.
The variable n represents the figure number.

$3 + n$ $3 + 2n$ $2 + 3n$ $2 + n$

TURN

Text page 128 **4.**

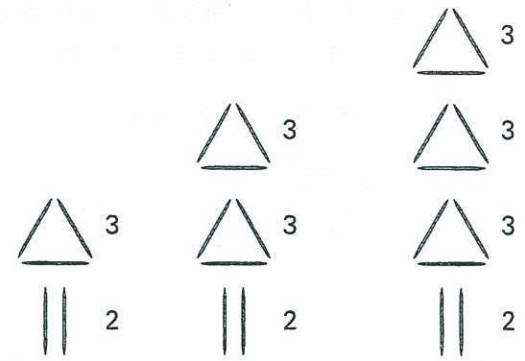


Figure 1 Figure 2 Figure 3

a) Describe the pattern rule for the pattern above using words.

_____

_____

_____

b) (Circle) the algebraic expression that describes the pattern rule for the toothpicks.

$3 + n$ $3 + 2n$ $2 + 3n$ $2 + n$

Hint

Remember, n represents the figure number.

5.

Figure 1 Figure 2 Figure 3

a) Which part of the pattern above stays the same?

_____

Which part changes?

_____

b) (Circle) the algebraic expression that describes the pattern rule.

$3 + n$ $3 + 2n$ $2 + 3n$ $2 + n$