



Mathematical Sciences: MMSC4
Unit Standard: 7448

LESSON 1

TOPIC: WORKING WITH NUMBERS AND PATTERNS

By the end of this lesson, you should be able:

- To recognize, identify and describe patterns in rational numbers
- To Complete, extend and generate number patterns

1. Introduction

When we work with number, we frequently come across patterns which we call **number patterns**.

Number patterns are series or sequences that repeat

We are always on the look-out for patterns in Mathematics, because the recognition of such patterns help us to:

- get a better understanding of Mathematics
- remember facts and
- check our work

2. Number patterns are made up of numbers that are placed in a logical sequence. What numbers would follow in this sequence? 3, 6, 9, 12..... They would be 15, 18, 21, 24, 27, 30 and so on. How can we tell what the sequence should be? We need to look at the pattern, at the difference between the numbers. We can see that in this case, we are counting on in threes. If were to count backwards from three, what would the sequence then be? 3, 0, -3, -6, -9, -12 and so on.

2.1. Complete the following patterns

_____ ; _____ ; -5; 0; 5; _____ ; _____

_____ ; _____ ; - 2; 3; _____ ; _____

_____ ; _____ ; 685; 690; 695; _____ ; _____

_____ ; _____ ; 95; 90; 85; _____ ; _____

You should be able to see the differences and similarities and describe the patterns.



2.2. Complete the following patterns

_____ ; 12; 9; 6; 3; _____ ; _____

_____ ; _____ ; 7; 10; 13; _____

_____ ; _____ ; -7; -4; -1; _____ ; _____ ;

_____ ; $\frac{1}{3}$; $3\frac{1}{3}$; $6\frac{1}{3}$; _____ ; _____

You should be able to see the differences and similarities and describe the patterns.

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2.3. The next sequence is different

_____ ; _____ ; $1\frac{1}{2}$; 2 ; $2\frac{2}{3}$; $3\frac{1}{2}$

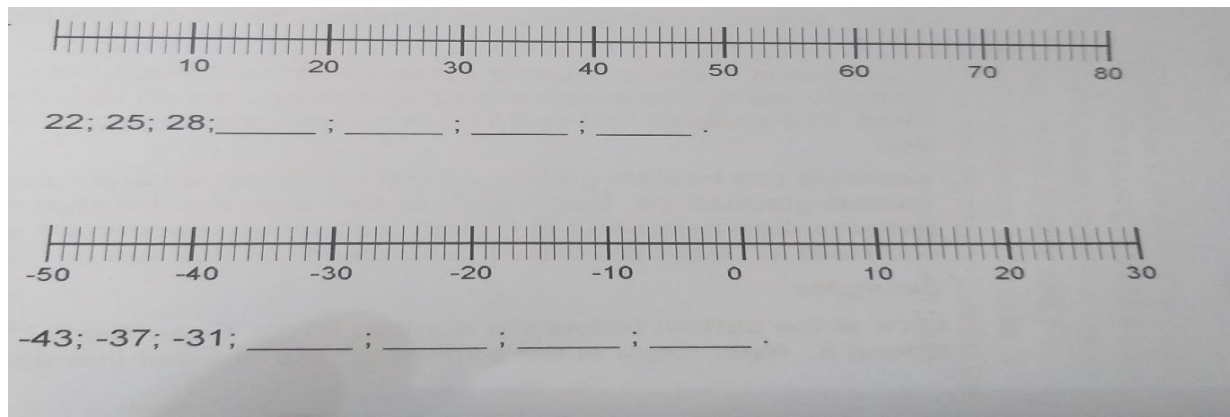
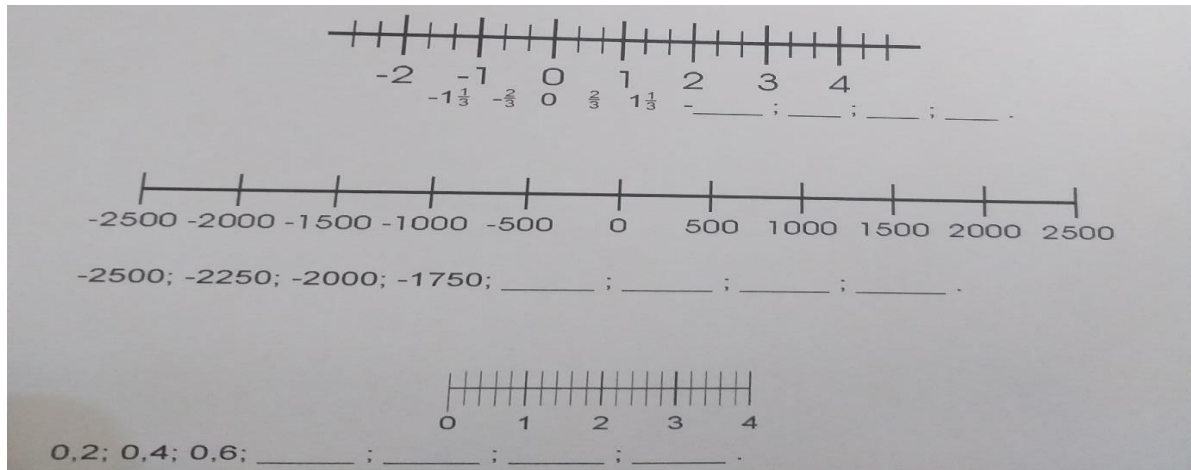
_____ ; _____ ; $-\frac{2}{5}$; 0 ; $\frac{2}{5}$; _____ ; _____

_____ ; 0,4 ; 1,6 ; 6 . 4 _____ ; _____

_____ ; 50 ; 10 ; 2 ; _____ ; _____

You should be able to see the differences and similarities and describe the patterns.

3. Look at the pattern below the number line and describe it. Redraw the number line in your answer book and extend it. Next, draw in the pattern on the number line.





4. The generalization and description of number patterns

4.1. Number sequences

The whole numbers 0; 1; 2; 3; . . . and the natural numbers 1; 2; 3; . . . are sequences of numbers or number sequences

A number sequence is formed when numbers follow one another according to a fixed rule.

The numbers in a sequence of number is therefore form a pattern, which we can refer to as a **number pattern**. A number sequence is sometimes simply called a sequence.

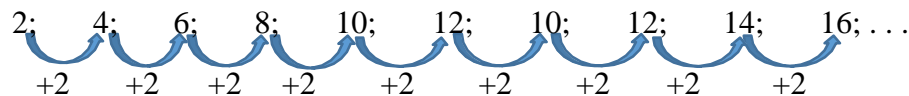
Example1

Consider the number sequence 2; 4; 6; 8; 10; . . .

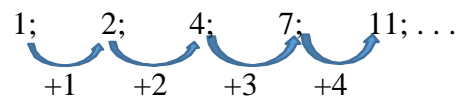
Let us describe the pattern **in words**:

The difference between two successive numbers in the number sequence is always 2.

Therefore, we can extend the sequence as follows:



Example2



The difference between the second number and the first number is 1 The difference between the third number and the second number is 2 The difference between the fourth number and the third number is 3 The sequence can be extended as follows:

$$1; 2; 4; 7; 11; 11+5; 16+6; . . .$$

We obtain 1; 2; 4; 7; 11; 11; 16; 22; 29; . . .





Example 3

1; 1; 2; 3; 5; 8; . . .

This sequence of numbers is known as the **Fibonacci sequence** after the mathematician Leonardo of Pisa, also known as Fibonacci. The numbers in the sequence are called Fibonacci numbers

In a Fibonacci sequence, the first two numbers are 1, and thereafter each successive number is obtained by finding the sum of the preceding two numbers.

Fibonacci number

1; 1; 1+1; 2+1; 3+2; . . .

The Fibonacci sequence can be extended as follows:

1; 1; 2; 5; 8; 13; 21; 34