

ST. ANDREW'S CLASS 10 WEEK 1 MATHEMATIC NOTES.

TOPIC 1: NUMBERS

Numbers Concepts

Learning Outcomes:

- The number of tenths, tens, hundreds and thousands that are in whole numbers and their different forms of representation:
 - i. Write whole numbers in words. (1)
 - ii. Write whole numbers in numerals. (1)
 - iii. Place numbers in place value tables. (1)
 - iv. Determine place value of any digit in a rational number. (1)
 - v. Give value of each digit in a rational number. (1)
 - vi. Write number in compact or expanded form. (2)
- The relative size and place value structure of the rational number:
 - i. Comparing the sizes whole numbers up to 10 digits. (1)
 - ii. Comparing the sizes of decimals. (2)
 - iii. Rounding decimals. (1)

Introduction to numbers

The most basic of all numbers are the counting numbers. These were invented to count objects, e.g. the number of sheep in a shepherd's flock. Mathematicians now call them **natural numbers** (N). These numbers do not include zero because it is not used in the counting process.

$$N = \{1, 2, 3, 4, 5, \dots\}$$

To include zero, the set of natural numbers is renamed **whole numbers** (W).

$$W = \{0, 1, 2, 3, 4, 5, \dots\}$$

Numbers less than zero are called negative numbers. The set of positive and negative whole numbers, is called the **integers** (I).

$$I = \{\dots - 3, -2, -1, 0, 1, 2, 3, \dots\}$$



Integers are often represented as positions on a number line.

-5 -4 -3 -2 -1 0 +1 +2 +3 +4 +5

Zero is
neither
positive nor
negative

Note: Positive numbers usually have no sign with them, e.g. +3 is written as 3.

When integers are divided into parts, positive and negative

Fractions are formed

This set of numbers is called **rational numbers** (Q).

Recurring decimals,
like $\frac{1}{3}$ and $\frac{2}{3}$, are
included in Q because
they can be written
as fractions

Numbers in Q cannot be listed in full. Examples of rational numbers are given below:

$$-2, -1, -\frac{3}{5}, 0, +0.2, +\frac{5}{7}, +\frac{1}{12}, +3, +52$$

Some numbers cannot be expressed as fraction:

e.g. $\sqrt{2} = 1.414\ 213\ 56\dots$ is non - recurring and has an infinite number of decimal places; it is **not** a rational number.

Some constants in mathematics cannot be expressed as rational numbers:

e.g. $\pi = 3.14159264\dots$ (reading from the calculator) and has an infinite number of decimal places.

These numbers which cannot be expressed as fractions are called **irrational numbers** (Q').

All these sets of numbers come under the collective name of **real numbers** (R).

Activity 1.1

Introduction to Numbers

1. Answer True/False to the following questions.

- a. $\frac{3}{5}$ is a member of R
- b. $-\frac{1}{4}$ is a member of Q
- c. $\sqrt{2}$ is a member of R
- d. 1.5 is a member of W
- e. $\sqrt{3}$ is a member of Q
- f. $\sqrt{7}$ is a member of Q'
- g. π is a member of Q
- h. π is a member of R
- i. -2 is a member of I
- j. 3 is a member of R
- k. 0 is a member of N

2. Select one number from the pair of numbers. Which of the two numbers:

- a. 2, -1, is in W?
- b. $-2, \sqrt{3}$ is in Q'?
- c. $0, \pi$, is in Q?
- d. 3, 1.7, is in I?