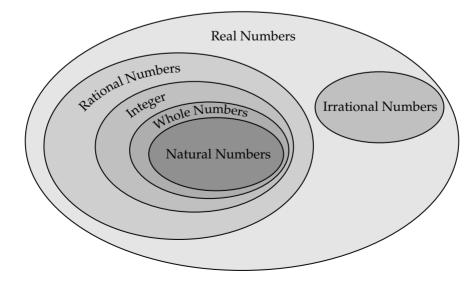# Contents

Numbers

Type of Numbers

Type of Number	Definition
Natural Number	The set of numbers, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, ..., that we see and use every day. The natural numbers are often referred to as the counting numbers and the positive integers.
Whole Numbers	The natural numbers plus the zero.
Integers	Positive and negative counting numbers, as well as zero. {..., −2, −1 , 0, 1, 2, ...}
Rational Number	Any number that is either an integer "a" or is expressible as the ratio of two integers, $\dfrac{a}{b}$. The numerator, "a", may be any whole number, and the denominator, "b", may be any positive whole number greater than zero. If the denominator happens to be unity, $b = 1$, the ratio is an integer. If "b" is other than 1, $\dfrac{a}{b}$ is a fraction.
Irrational Numbers	Any number that cannot be expressed by an integer or the ratio of two integers. Irrational numbers are expressible only as decimal fractions where the digits continue forever with no repeating pattern. Some examples of irrational numbers are $\sqrt{2}$ and $\sqrt{3}$.
Real Numbers	The set of real numbers including all the rational and irrational numbers.

Square Number	Is a number which is the square of an integer. For example: 1, 4, 9, 16…..
Cube Number	Is a number which is the cube of an integer. For example: 1, 8, 27, 64……
Factor	Those numbers that divide into it exactly. This includes 1 and the number itself. For example, the factors of 6 are 1, 2, 3 and 6.
Prime Numbers	Natural number that only has two factors which are itself and one. For example: 2, 3, 5, 7….
Composite Numbers	Natural number that has more than two factors. For example: 4, 6, 8, 9….

Note

➲ **1 is neither prime nor composite as it has only one factor.**

➲ **All even numbers are divisible by two and so all even numbers greater than two are composite numbers.**

➲ **All numbers that end in five are divisible by five. Therefore all numbers that end with five and are greater than five are composite numbers.**

➲ **The prime numbers between 2 and 100 are 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47, 53, 59, 61, 67, 71, 73, 79, 83, 89 and 97.**

Highest Common Factor (HCF)

The factors of 24 are 1, 2, 3, 4, 6, 8, 12 and 24 and that the factors of 40 are 1, 2, 4, 5, 8, 10, 20 and 40.

The numbers 1, 2, 4 and 8 appear in both lists, so they are known as the common factors of 24 and 40.

The number 8 is the highest of them, and it is called the highest common factor (HCF).

Least Common Multiples (LCM)

The multiples of 4 are 4, 8, 12, 16, 20, 24, 28, 32, 36, …

The multiples of 6 are 6, 12, 18, 24, 30, 36, 42, …

The numbers 12, 24 and 36 appear in both lists, so they are known as common multiples.

The number 12 is the least number to appear in both lists, and it is called the least common multiplex (LCM).

Exercise 3

1. Round off the following numbers:

Number	1 decimal place	2 decimal place	1 significant figure	2 significant figure	3 significant figure	Scientific Notation
987.87234						
0.3456983						
0.04567						
35.098						
0.00076543						
0.70342						
112.345						
809.345						
223.134						

2. Round of the following numbers and complete the table

Number	Hundred	Thousand	1 significant figure	2 significant figure	3 significant figure
987123					
567109876					
345567					
87943					
1264344					
231432					
7865					
24356					
65476					

Ratio

A "ratio" is a comparison between two different things. Suppose there are thirty-five people, fifteen of whom are men. Then the ratio of men to women is 15 to 20. We can express it in

odds notation: 15 : 20

fractional notation: $\dfrac{15}{20}$

Example 5

Divide $100 in the ratio 2 : 3

Solution:

1st Part $= \dfrac{2}{5} \times 100 = \$40$

2nd Part $= \dfrac{3}{5} \times 100 = \$60$

Proportion

When two ratios are equal then we say they are in proportion. Proportion is of two types:

Direct Proportion

Two quantities are in **direct proportion** when they increase or decrease in the same ratio.

If a and b are in direct proportion then we can write this as $a \propto b$.

$\dfrac{a}{b} = k$ (constant)

➲ two equal fractions, $\dfrac{a}{b} = \dfrac{c}{d}$

➲ using a colon, $a : b = c : d$

When two ratios are equal, then the cross products of the ratios are equal.

That is, for the proportion, $a : b = c : d$, $a \times d = b \times c$ **(Product of extreme is equal to product of mean)**

Inverse Proportion

Two quantities are in inverse proportion if one quantity increases then the other decreases in the same ratio.

If a and b are in indirect proportion then $a \propto \dfrac{1}{b}$.

If a and b are in inverse proportion their product is constant. ($a \times b$ = constant)

Example 6

It takes 4 people 6 hours to paint the wall, how much time 8 people will take to do the same task.

Solution:

The time taken to paint a wall is indirectly proportional to the number of people doing the painting.

$4 \times 6 = 8 \times$ No. of hours

Time taken by 8 people needed to paint the wall $= \dfrac{4 \times 6}{8} = 3$ hrs

Exercise 5

1. Divide £7400 among three people A, B and C in the ratio $3 : 5 : 12$.

2. Roze lost her weight in the ratio $5 : 3$. Her original weight was 80 kg. What is her new weight?

3. The ratio of the expenditure to the saving of a family is $6 : 3$. Find the income if expenditure is $6300.

4. Adam can type 3600 words in one hour. How many words can he type in 15 minutes?