MATHEMATICS

TYPE OF NUMBER and FACTOR

Arranged by :

SHOFWAH KANAKA EBSA ANARGYA	**2241720254**	**/**	**24**
MALIK ABDUL AZIS	**2241720240**	**/**	**14**

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CHAPTER I

TYPE OF NUMBER

A. Definition of Numbers

Number is a mathematical concept used for enumeration and measurement. The symbol used to represent a number is called a number or number symbol.

In mathematics, the concept of number has been expanded over the years to include zero, negative numbers, rational numbers, irrational numbers, and complex numbers.

Certain procedures that take a number as input and produce another number as output are called numerical operations.

The more commonly found operation is the binary operation, which takes two numbers as input and produces one number as output.

Examples of binary operations are addition, subtraction, multiplication, division, multiplication, and rooting. The field of math that studies numerical operations is called arithmetic.

B. Types of Numbers

1. Natural Numbers

In mathematics, there are two agreements regarding the set of natural numbers. The first definition by traditional mathematicians, is the set of non-zero positive integers {1, 2, 3, 4, ...}. While the second definition by logicians and computer scientists, is the set of zero and positive integers {0, 1, 2, 3, ...}.

Original/Sail is the set of non-zero positive integers. Another name for these numbers is counting numbers or positive integers.

Example: 1,2,3,4,5,6,7,8,....

2. Prime Numbers

In mathematics, a prime number is a natural number greater than 1, whose divisors are 1 and itself. 2 and 3 are prime numbers. 4 is not a prime number because 4 is divisible by 2. The first ten prime numbers are 2, 3, 5, 7, 11, 13, 17, 19, 23 and 29. If a number greater than one is not prime, it is called a composite number. So prime numbers are the original numbers that are only divisible by themselves and one, or numbers that have 2 factors, and the number one is not a prime number.

Example:2,3,5,7,11,13,17,....

3. Whole Numbers

An integer is the set of non-negative whole numbers, i.e. {0, 1, 2, 3 ...}. In other words, it is

the set of natural numbers plus 0. So, an integer must have a positive sign. Integers are also

positive integers combined with zero. Example: 0,1,2,3,4,5,6,7,....

4. Integers

1. Integers consist of negative integers, zero, and positive integers.
2. Properties of addition in whole numbers:
   a. Closed nature

      For every integers a and b, a + b = c with c also being an integer.

   b. Commutative properties

      For every integers a and b, a + b = b + a always holds.

   c. Associative properties

      For every integer a, b, and c, (a + b) + c = a + (b + c) always holds.

   d. Has an identity element

      For any integer a, a + 0 = 0 + a. Zero (0) is the identity element in addition.

   e. Has an inverse

      For every integer a, it always holds that a + (-a) = (-a) + a = 0. The inverse of a is -.

      a, while the inverse of -a is a.
3. If a and b are integers then a - b = a + (-b).
4. The closed nature of subtraction operations on integers applies.
5. If p and q are integers then
   a. p x q = pq;

   b. (-p) x q = -(p x q) = -pq;

   c. p x (-q) = -(p x q) = -pq;

   d. (-p) x (-q) = p x q = pq.
6. For every p, q, and r integers, the following properties apply
   a. is closed to the multiplication operation;

b. commutative: p x q = q x p;

c. Associative: (p x q) x r = p x (q x r);

d. Distributive multiplication over addition: p x (q + r) = (p x q) + (p x r);

e. Distributive multiplication to subtraction: p x (q - r) = (p x q) - (p x r).

7. The identity element of multiplication is 1, so for every integer p, p x holds.

1 = 1 x p = p.

8. Division is the inverse operation of multiplication.

9. The integer division operation is not closed.

10. If there are no parentheses in a mixed integer calculation operation, the operation is based on the following properties of calculation operations.

a. Addition (+) and subtraction (-) operations are equally strong, meaning that the

operation on the left is done first.

b. The operations of multiplication ( ) and division (:) are equally strong, meaning that

the operation on the left is done first.

c. The multiplication ( ) and division (:) operations are stronger than the addition (+) and

subtraction (-) operations, meaning that the multiplication ( ) and division (:)

operations are done first than the addition (+) and subtraction (-) operations.

So a whole number is a number that consists of all negative, zero and positive numbers.

Example: -3,-2,-1,0,1,2,3,....

5. Rational Numbers

A rational number is a number that can be expressed as p/q where p, q are integers and $q \neq 0$ or can be expressed as a decimal number repeatedly. Rational numbers are also numbers that can be expressed as a/b where a, b are integers and b is not equal to 0. where the boundaries of rational numbers are starting from the range $(-\infty, \infty)$.

Numbers can be said to be divided into 2 major scopes, namely rational numbers and irrational numbers. When we say rational numbers, it means that it includes other numbers such as: integers, natural numbers, counting numbers, prime numbers and other numbers that are subsets of rational numbers. Examples of rational numbers: If a/b = c/d then, ad = bc.

Rational numbers are also numbers that are the ratio (division) of two numbers (integers) or can be expressed as a/b, where a is the set of integers and b is the set of integers but not equal to zero.

Example: {½, ⅓, ⅔, ⅛, ⅜, ⅝, ⅞, ...}

Fractions include a set of rational numbers. Decimal fractions are fractions with denominators of 10, 100, etc. { 1/10, 1/100, 1/1000 }, allthese numbers can be found on number lines. A natural number can be expressed as a rational number. For example, the natural number 2 can be expressed as 12/6 or 30/15 and so on. Rational numbers are given the symbol Q (derived from the English "quotient").

Example: -2,2/7,5,2/11,....

6. Irrational Numbers

In mathematics, irrational numbers are real numbers that cannot be divided (the quotient never stops). In this case, irrational numbers cannot be expressed as a/b, with a and b being integers and b not equal to zero. So irrational numbers are not rational numbers. The most popular example of These irrational numbers are the numbers π and e. The number π is actually not exact, which is approximately 3.14, but

= 3.1415926535. or

= 3,14159 26535 89793 23846 26433 83279 50288 41971 69399 37510...

For numbers :

= 1.4142135623730950488016887242096. or

= 1,41421 35623 73095 04880 16887 24209 69807 85696 71875 37694 80731 76679 73798..

and for the number e:

= 2,7182818....

CHAPTER II

FACTORIAL

A. Definition of Factorial

In mathematics, factorials are consecutive multiplications starting from the number 1 up to the number in question. In other words, the factorial of a natural number n is the product of positive integers less than or equal to n.

So the example above can also be written as 3!

The form of the n factorial can also be written as follows

n! = 1 x 2 x ... x (n-2) x(n-1) x n

The following are factorial 0 to factorial 10

- 0! = 1
- 1! = 1
- 2! = 1 × 2 = 2
- 3! = 1 × 2 × 3 = 6
- 4! = 1 × 2 × 3 × 4 = 24
- 5! = 1 × 2 × 3 × 4 × 5 = 120
- 6! = 1 × 2 × 3 × 4 × 5 × 6 = 720
- 7! = 1 × 2 × 3 × 4 × 5 × 6 × 7 = 5040
- 8! = 1 × 2 × 3 × 4 × 5 × 6 × 7 × 8 = 40320
- 9! = 1 × 2 × 3 × 4 × 5 × 6 × 7 × 8 × 9 = 362880
- 10! = 1 × 2 × 3 × 4 × 5 × 6 × 7 × 8 × 9 × 10 = 3628800

By looking at the example above, it can be concluded that the value of the factorial is very large so to make it easier to find the value, you can use a calculator.

B. Factorial functions in everyday life

In mathematics, factorial is used to calculate the number of arrays of objects that can be formed from a set regardless of their order.

CHAPTER III

PRACTICE QUESTION

1. The number of even numbers between 1 and 30 is ...
2. The following are not irrational numbers: $\sqrt{2}$, $\sqrt{3}$, $\sqrt{4}$, $\sqrt{5}$, and $\sqrt{9}$.
3. Which of the following are prime numbers? 100, 101, 102, 103, 104, 105.
4. There are 4 digit numbers namely 1, 2, 3, 4. Of the four numbers, what is the number of arrangements that can be formed from the four digit numbers?