Tender Heart High School, Sec-33B, Chandigarh

Class- VI
Date:- 03.07.24
Subject - Mathematics
Teacher:- Ms. Sushma

Chapter-6

Playing with Numbers.

Simplification

In order to simplify a given expression involving various operations, we strictly follow the order given below:-

BODMAS

i) Bracket ii) of iii) Division iv) Multiplication

v) Addition vi) Subtraction

Use of Brackets

There are four kinds of brackets

i) Bar or Vinculum —
ii) Round brackets or small brackets or parentheses ( )
iii) Curly brackets or braces { }
iv) Square brackets or Big Brackets [ ]

Exercise 6A

Simplify:-

1. $24 - 20 \div 5 \times 2$

$= 24 - 4 \times 2$

$= 24 - 8 = 16$

2. $19 + \underline{12 \div 6} - 2 \times 3$

$= 19 + 2 - \underline{2 \times 3}$

$= \underline{19 + 2} - 6$

$= 21 - 6$

$= 15$

3. $23 + \underline{18 \div 6} + 3 \times (-4)$

$= 23 + 3 + \underline{3 \times (-4)}$

$= 23 + 3 + (-12)$

$= \underline{23 + 3} - 12$

$= 26 - 12$

$= 14$

4. $9 - \{5 \times 3 + 12 \times \underline{16 \div (-8)}\}$

$= 9 - \{\underline{5 \times 3} + \underline{12 \times (-2)}\}$

$= 9 - \{15 - 24\}$

$= 9 - \{-9\}$

$= 9 + 9$

$= 18$

5. $12 - [13 - \{9 + 10 \div (7-2)\}]$

$= 12 - [13 - \{9 + 10 \div 5\}]$

$= 12 - [13 - \{9 + 2\}]$

$= 12 - [13 - 11]$

$= 12 - 2$

$= 10$

6. $28 - [15 - \{8 + 20 \div (7 - \overline{8-6})\}]$

$= 28 - [15 - \{8 + 20 \div (7 - 2)\}]$

$= 28 - [15 - \{8 + 20 \div 5\}]$

$= 28 - [15 - \{8 + 4\}]$

$= 28 - [15 - 12]$

$= 28 - 3$

$= 25$

Factors and Multiples

When a number divides another number exactly, then the divisor is called a factor of the divident. The divident is called a multiple of the divisor.

Properties of Factors:→

1. 1 is a factor of every number

ii) 1 is the only number having one factor, namely itself.

iii) Every number is a factor of itself.
iv) Every number other than 1 has at least two factors, namely 1 and itself.
v) A factor of a number is less than or equal to the number.

Properties of Multiples :→

i) Every number is a multiple of 1.

ii) Every number is a multiple of itself.

iii) Every number has infinitely many multiples.

iv) Every multiple of a number is greater than or equal to the number.

Even Numbers :→ Natural numbers which are exactly divisible by 2 are called even numbers. Thus, every even number has 0, 2, 4, 6 or 8 as its unit digit.

Odd Numbers :→ Natural numbers which are not exactly divisible by 2 are called odd numbers.
Thus, every odd number has 1, 3, 5, 7 or 9 as its unit digit.

Tests of Divisibility

Divisibility by 2 : A number is divisible by 2 if its unit digit is any one of 0, 2, 4, 6 and 8.

Divisibility by 3:→ A number is divisible by 3 only when the sum of its digits is divisible by 3.

Divisibility by 4:→ A number is divisible by 4 only when the number formed by its last 2 digits (ie tens and ones digits) is divisible by 4.

Divisibility by 5:→

A number is divisible by 5 only when its unit digit is 0 or 5.

Divisibility by 6:→

A number is divisible by 6 when it is divisible by both 2 and 3.

Divisibility by 7:→

A number is divisible by 7 if the difference between double the digit at ones place and the number formed by rest of its digits is divisible by 7.

Divisibility by 8:→

A number is divisible by 8 only when the number formed by its last 3 digits on its extreme right is divisible by 8.

Divisibility by 9:→

A number is divisible by 9 when the sum of its digits is divisible by 9.

Divisibility by 10:→

A number is divisible by 10 only when its unit digit is 0.

Divisibility by 11:→

A number is divisible by 11 if the

difference between the sum of digits at odd places and the sum of digits at even places from extreme right is either 0 or a multiple by 11.

Prime Numbers:→
The natural numbers having exactly two different factors namely 1 and itself, are known as prime numbers.
eg:- 2, 3, 5, 7, 11, 13, 17, 19, 23, ...

Composite Numbers:-
A natural number which has more than two factors, is called a composite number. eg:- 4, 6, 8, 9, 10, 12, 14, ...

* '1' is neither prime nor composite.
'2' is the only even prime number.

Turin-Primes:→
Pairs of prime numbers which differ by 2 are called turin-primes.
eg:- (3,5), (5,7), (11,13), (17,19) ...

Prime Factors:→ All the factors of a number which are prime numbers are called the prime factors of that number.
eg:- All prime factors of 12 = {2, 3}

Co-primes:→ Two natural numbers which donot have a common prime factor, are called co-primes:-
eg:- (2,3), (3,4), (4,9), (11,13), (16,25)

Prime Factorisation :→
The process of writing a composite number as the product of prime factors is called the prime factorisation of the given number.

Exercise 6B

1. Show that:

(i) 15 is a factor of 1065

Soln:- On dividing 1065 by 15, we get:

$$\begin{array}{r} 15 \overline{)1065}(71 \\ -105\downarrow \\ \hline 015 \\ -15 \\ \hline 0 \end{array}$$

Thus, on dividing 1065 by 15, the remainder is '0'.

∴ 1065 is exactly divisible by 15
Hence, 15 is a factor of 1065.

(ii) 17 is a factor of 1241.

Soln:- On dividing 1241 by 17, we get

$$\begin{array}{r} 17 \overline{)1241}(73 \\ -119\downarrow \\ \hline 051 \\ -51 \\ \hline 0 \end{array}$$

Thus, on dividing 1241 by 17, the remainder is '0'. ∴ 1241 is exactly divisible by 17
Hence, 17 is a factor of 1241.

Q 2. Write down all the factors of:

(i) 40

Soln:- We have
$40 = 1 \times 40$; $40 = 2 \times 20$; $40 = 4 \times 10$; $40 = 5 \times 8$

∴ All possible factors of 40 are:-
1, 2, 4, 5, 8, 10, 20, 40

Q 3. Write down:-

(i) First six multiples of 7.

Soln:- First six multiples of 7 are :- 7, 14, 21, 28, 35, 42

Q 4. Which of the following are prime numbers?
15, 19, 29, 37, 63, 91, 47, 51, 73, 87, 97

Soln:- 19, 29, 37, 47, 73, 97

Q5. (i) Write all prime numbers between 30 and 60.

Soln:- All prime numbers between 30 and 60 are 31, 37, 41, 43, 47, 53, 59.

(ii) Write all prime numbers between 70 and 100.

Soln:- All prime numbers between 70 and 100 are
71, 73, 79, 83, 89, 97.

Q6. Express each of the following as a product of prime factors.

(i) 105

$$\begin{array}{r|l} 3 & 105 \\ \hline 5 & 35 \\ \hline 7 & 7 \\ \hline & 1 \end{array}$$

$105 = 3 \times 5 \times 7$

(ii) 420

$$\begin{array}{r|l} 2 & 420 \\ \hline 2 & 210 \\ \hline 3 & 105 \\ \hline 5 & 35 \\ \hline 7 & 7 \\ \hline & 1 \end{array}$$

$420 = 2 \times 2 \times 3 \times 5 \times 7$

(iii) 2535

$$\begin{array}{r|l} 3 & 2535 \\ \hline 5 & 845 \\ \hline 13 & 169 \\ \hline 13 & 13 \\ \hline & 1 \end{array}$$

$2535 = 3 \times 5 \times 13 \times 13$

(iv) 4641

$$\begin{array}{r|l} 3 & 4641 \\ \hline 7 & 1547 \\ \hline 13 & 221 \\ \hline 17 & 17 \\ \hline & 1 \end{array}$$

$4641 = 3 \times 7 \times 13 \times 17$

Q-8 Which of the following numbers are divisible by 3?

(i) 57432

Soln:- Divisibility rule of 3: If sum of digits of given number is divisible by 3, then that number is divisible by 3.

$\therefore$ The sum of all the digits $= 5+7+4+3+2$
$= 21.$

Since 21 is divisible by 3,
$\therefore$ 57432 is divisible by 3.

(ii) 3002002.

Soln:- The sum of all the digits $= 3+0+0+2+0+0+2$
$= 7$

Since 7 is not divisible by 3.
$\therefore$ 3002002 is not divisible by 3.