St. Andrews Scots Sr. Sec. School

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Session: 2025-2026 - Notes

Class: VI	Subject: Mathematics	Topic: Prime Time	Notes

Factors and Multiples

A factor of a number is an exact divisor of that number. In turn, a number is a multiple of each of its factors. Some interesting facts about factors and multiples are as follows:

- 1 is a factor of every number.
- Every number is a factor of itself.
- Every factor of a number is an exact divisor of that number.
- Every factor of a number is less than or equal to that number.
- The factors of a given number are finite in number.
- Every multiple of a number is greater than or equal to that number.
- The multiples of a given number are infinite in number.
- Every number is a multiple of itself.

Perfect number: If the sum of all the factors of a number is equal to twice the number, then that number is called a perfect number.
For example: 28 is a perfect number because all the factors of 28 are 1,2,4,7,14 and 28 whose sum = $1 + 2 + 4 + 7 + 14 + 28 = 56 = 2 \times 28$, whereas 10 is not a perfect number because all the factors of 10 are 1, 2, 5 and 10 whose sum = $1 + 2 + 5 + 10 = 18 \neq 2 \times 10$.

Prime and Composite Numbers

Prime numbers: The numbers having exactly two factors 1 and the number itself are called prime numbers.
For example, 2, 3, 5, 7, 11, etc. are prime numbers.

Composite Numbers

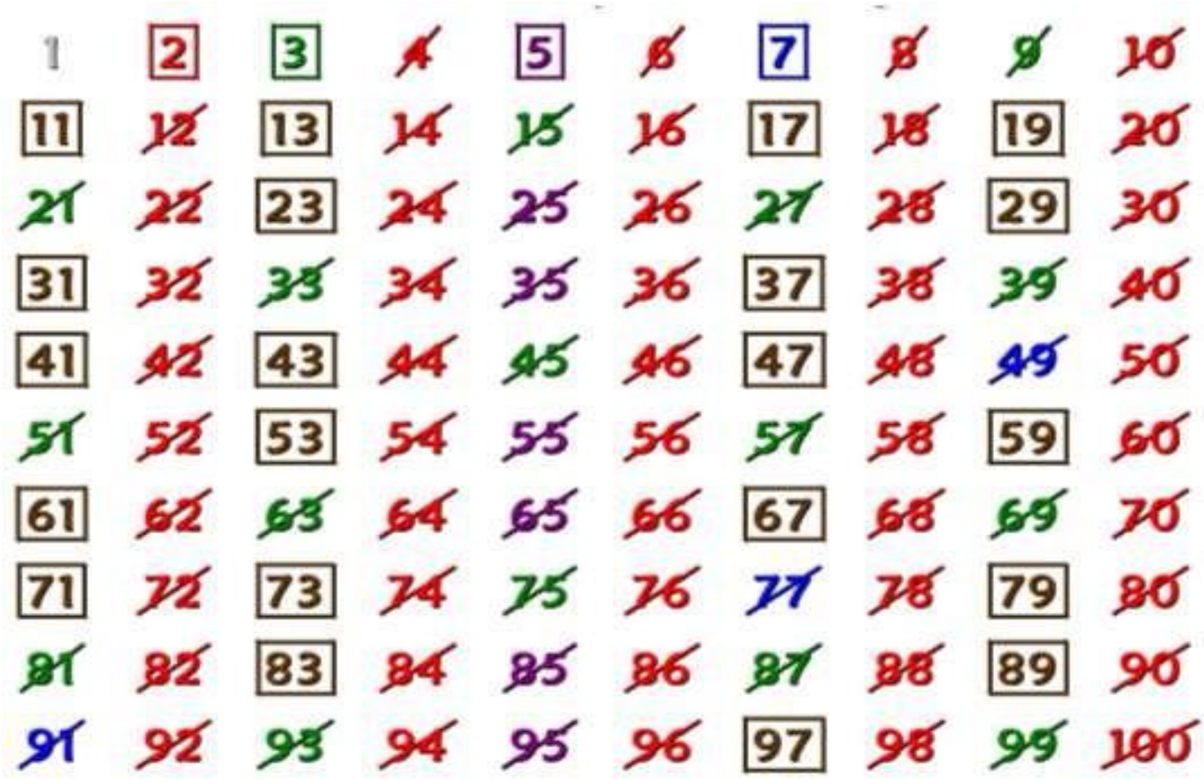
All the numbers with more than 2 factors are called composite numbers or you can say that the numbers which are not prime numbers are called **Composite Numbers**.

Like 4, 6, 8, 10, 12 etc.

Remark: 1 is neither a prime nor a composite number.

Sieve of Eratosthenes Method

This is the method to find all the prime numbers from 1 to 100.



Step 1: First of all cross 1, as it is neither prime nor composite.
Step 2: Now mark 2 and cross all the multiples of 2 except 2.
Step 3: Mark 3 and cross all the multiples of 3 except 3.
Step 4: 4 is already crossed so mark 5 and cross all the multiples of 5 except 5.
Step 5: Continue this process until all the numbers are marked square or crossed.

This shows that all the covered numbers are prime numbers and all the crossed numbers are composite numbers except 1.

Tests for Divisibility of Numbers

There are certain tests of divisibility that can help us to decide whether a given number is divisible by another number without actual division.

Divisibility by 2

A number is divisible by 2 if it has any of the digits 0, 2, 4, 6 or 8 in its ones place.

Example:

Is 3110, 2222, 5974, 4356 and 1468 divisible by 2?

Numbers 311**0**, 222**2**, 597**4**, 435**6** and 146**8** are divisible by 2 as these numbers have only the digits **0**, **2**, **4**, **6**, **8** in the ones place.

Divisibility by 3

If the sum of the digits of the given number is divisible by 3, then the given number is also divisible by 3.

Example:

Is 7221 divisible by 3?

Sum of the digits of 7221 = 7 + 2+ 2 + 1 = 12

Number ‘12’ is divisible by 3 (12 , 3 = 4). So, 7221 is also divisible by

Divisibility by 4

A number with 3 or more digits is divisible by 4 if the number formed by its last two digits (i.e. ones and tens) is divisible by 4.

Example:

Is 46**24** divisible by 4?

The last two digit of the given number is **24**.

24 ÷ 4 = 6 (**24** is divisible by 4)

So, 14624 is divisible by 4

Divisibility by 5

A number which has either 0 or 5 in its ones place is divisible by 5.

Example:

Is 510**5** divisible by 5?

Here last digit is **5**. So, 5105 is divisible by 5.

Divisibility by 6

If a number is divisible by 2 and 3 both then it is divisible by 6 also.

Example:

Is 433**5** divisible by 6?

Step 1: Test of divisibility by 2.

Number 4335 end in odd number (i.e. **5**). So, 4335 is not divisible by 2.

Step 2: Test of divisibility by 3.

Sum of the digit of the given number 4335 = 4 + 3 + 3 + 5 = 15

Number ‘15’ is divisible by 3. So, 4335 is divisible by 3.

Given number 4335 is divisible by 3 but not by 2. So, 4335 is not divisible by 6.

Divisibility by 8

A number is divisible by 8, if the number formed by its last three digits is also divisible by 8.

Example:

Is the number 73**512** divisible by 8?

Here last three digits are **512**.

512 ÷ 8 = 64

As **512** is completely divisible by 8. So, the given 73512 is also divisible by 8.

Divisibility by 9

Given number is divisible by 9, if the sum of the all the digits of given number is divisible by 9.

Example:

Is 6687 divisible by 9?

Sum of the digit = 6 + 6 + 8 + 7 = 27

Number '27' is divisible by 9. So, the given number 6687 is divisible by 9.

Divisibility by 10

Any number that ends in 0 is divisible by 10.

Example:

Is 367**0** divisible by 10?

As number ends in **0**.So, 3670 is divisible by 10.

Divisibility by 11

Starting from left add all the number on odd positions and add all the number on even positions. Then subtract the two results. If the resultant number is divisible by 11 or is equal to 0, then the given number is divisible by 11.

Example:

Is **3**7**2**9 divisible by 11?

Sum of odd positions = **3** + **2** = **5**

Sum of even positions = 7 + 9 = 16

Subtract the two results, 16 – **5** = 11. As the resultant number 11 is divisible by 11, so 3729 is divisible by 11.

Some More Divisibility Rules

1. If a number is divisible by another number then it is divisible by each of the factors of that number.

Example:

Is 1488 divisible 12?

1488 ÷ 12 = 124

Yes, 1488 is divisible by 12. Therefore, number 1488 is also divisible by factors of 12 (i.e. 1, 2, 3, 4, 6 and 12).

2. If a number is divisible by two co-prime numbers then it is divisible by their product also.

Example:

1365 ÷ 3 = 455

1365 ÷ 5 = 273

Here, divisor 3 and 5 are co-prime numbers. Therefore, given number 1365 is also divisible by the product of 3 and 5.

1365 ÷ 15 (3x5=15) = 91

3. If two given numbers are divisible by a number, then their sum is also divisible by that

Example:

245 ÷ 5 = 49

405 ÷ 5 = 81

The numbers 245 and 405 are both divisible by 5. Therefore, sum of 245 and 405 is also divisible by 5.

650 ÷ 5 = 130 (Note: 245 + 405 = 650)

4. If two given numbers are divisible by a number; then their difference is also divisible by that number.

Example:

1722 ÷ 7 = 246

875 ÷ 7 = 125

The numbers 1722 and 875 are both divisible by 7. Therefore, difference of 1722 and 875 is also divisible by 7.

847 ÷ 7 = 121 (Note: 1722 - 875 = 847)

Highest Common Factor (HCF)

The highest common factor (HCF) of two or more given numbers is the greatest of their common factors.The greatest of the common factors of the given numbers is called their highest common factor (HCF). It is also known as the greatest common divisor. The HCF of the given numbers is equal to the product of common factors in their prime factorisation.

Example
Factors of 16 = 1, 2, 4, 8, 16
Factors of 40 = 1,2,4,5,8,10,20,40
Common Factors = 1,2,4,8
HCF of 16 and 40 = 8

1. **HCF with Prime Factorization Method**

HCF of numbers can also be found by prime factorization of the numbers.

Example: Find the HCF of 30 and 42.

Prime factors of 30	
2	30
3	15
5	5
	1

Prime factors of 42	
2	42
3	21
7	7
	1

Prime factors of 30 = 2 x 3 x 5
Prime factors of 42 = 2 x 3 x 7

Highest Common factor of 30 and 42 = 2 x 3 = 6

2. **HCF by Long Division Method**

The method of long division is more useful for large numbers.

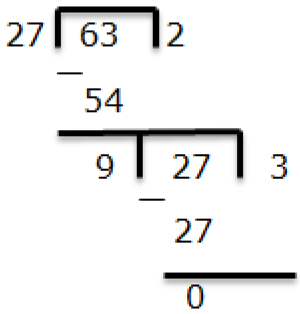
Step1: Identify the larger number from the given two numbers and divide the larger number by the smaller number.

Step2: Now remainder become divisor and the previous divisor become the dividend. Divide the new dividend with new divisor.

Step3: Continue this process till we get remainder as 0.

Step4: The last divisor in this process is the H.C.F of the two numbers

Example: Find HCF of 27 and 63



Explanation

Step1: Start dividing 63 by 27

Step2: Now, remainder 9 becomes the divisor and previous divisor 27 has become the dividend. Divide 27 by 9.

Step 3: Now remainder is 0. So, further division is not possible and the last divisor 9 becomes the HCF of 27 and 63.

Least Common Multiple (LCM)

The smallest common multiple of the given numbers is called their least common multiple (LCM). The product of the prime factors that occur the maximum number of times in the prime factorisation of the given numbers is their LCM.
Example

1. The LCM of given numbers using their Prime Factorisation:
Prime factorisation of 4 = 2 x 2
Prime factorisation of 6 = 2 x 3
LCM of 4 and 6 = 2 x 2 x 3 =12

2. To find the LCM of the given numbers using the Division Method:

- Write the given numbers in a row.
- Divide the numbers by the smallest prime number that divides one or more of the given numbers.
- Write the number that is not divisible, in the second row.
- Write the new dividends in the second row.
- Divide the new dividends by another smallest prime number.
- Continue dividing till the dividends are all prime numbers or 1.
- Stop the process when all the new dividends are prime numbers or 1.
- The product of all the divisors and the remaining prime dividends is the LCM of the given numbers.

Example

Find the LCM of 105, 216 and 314.

Solution:

Use the repeated division method on all the numbers together and divide until we get 1 in the last row.

2	105	216	314
2	105	108	157
2	105	54	157
3	105	27	157
3	35	9	157
3	35	3	157
5	35	1	157
7	7	1	157
157	1	1	157
	1	1	1

LCM of 105,216 and 314 is $2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 5 \times 7 \times 157 = 1186920$