GANITAM

WORLD OF MATHEMATICS

CLASS V
PART 1

Name: _____

School: _____

Ganitam

The World of Mathematics

5

Part I

Ganitam

The World of Mathematics

First Edition published in 2023
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Preface

'Ganitam' – The World of Mathematics

Mathematics builds hope. It helps us believe that every problem has a solution.

Education imparted in classrooms should be linked to life outside school. Hence the knowledge and skills acquired in school should help children understand the world around them better, and thereby contribute towards its betterment. This series of books on Mathematics titled "Ganitam-The World of Mathematics", has been prepared with that thought on our minds. The book has been designed in such a way that it enhances inquisitiveness in children by encouraging them to ask questions and seek answers rather than just learn what is listed in the books.

The content has been carefully curated, so that it reflects the rich cultural diversity of our motherland Bharat, enabling the child to intuitively understand the unifying values that bond the citizens of this great country together. Thus, the book will help a child gain various skills required for the 21st century and be a universal citizen with a passion for following Indian values.

The core content of the book originates from the Vedas which provide the key concepts of Mathematics. For example, the sutra एकाधिकेन पूर्वेण (Ekaadhikena Purvena) indicates an interesting mathematical application. Great ancient Indian scholars like Acharya Aryabhatta, Brahmagupta, Bhaskaracharya, Pingala, Mahavira, and more contemporary ones like Srinivasa Ramanujan along with their counterparts from other parts of the world, have further developed this body of knowledge. Numerous teachers from the DAV Group of Schools, with their decades of rich experience, have compiled the existing knowledge in a child-friendly form.

Therefore, there is no copyright on the content of this book. One can seek permission and print all or only certain chapters of the book. However, no unauthorized modification is permitted in any chapter. Considering the social orientation of the organization, we have consciously ensured that the cost of the textbook is affordable without

compromising on the quality of paper/print. Also, the e-copy of the entire book will always be downloadable for free from our website – davchennai.org/publications.

This is the first version of the book and could contain not only omissions, but also areas of improvement. We request the reader to excuse us for the omissions, but please do bring to our notice any feedback for correction and improvement in subsequent versions. We will remain grateful to you for your support and feedback.

Lastly, before signing off, we would like to express our profound gratitude to Almighty for guidance and encouragement in this endeavour. As the great mathematician, Srinivasa Ramanujan, rightly said - **"An equation for me has no meaning unless it expresses a thought of God."**

Chennai | May 2024

Secretary
TN Arya Samaj Edu. Society

Acknowledgements

The Learning Tree

Contents

LARGE NUMBERS

Learning outcomes

At the end of this lesson, children will be able to:
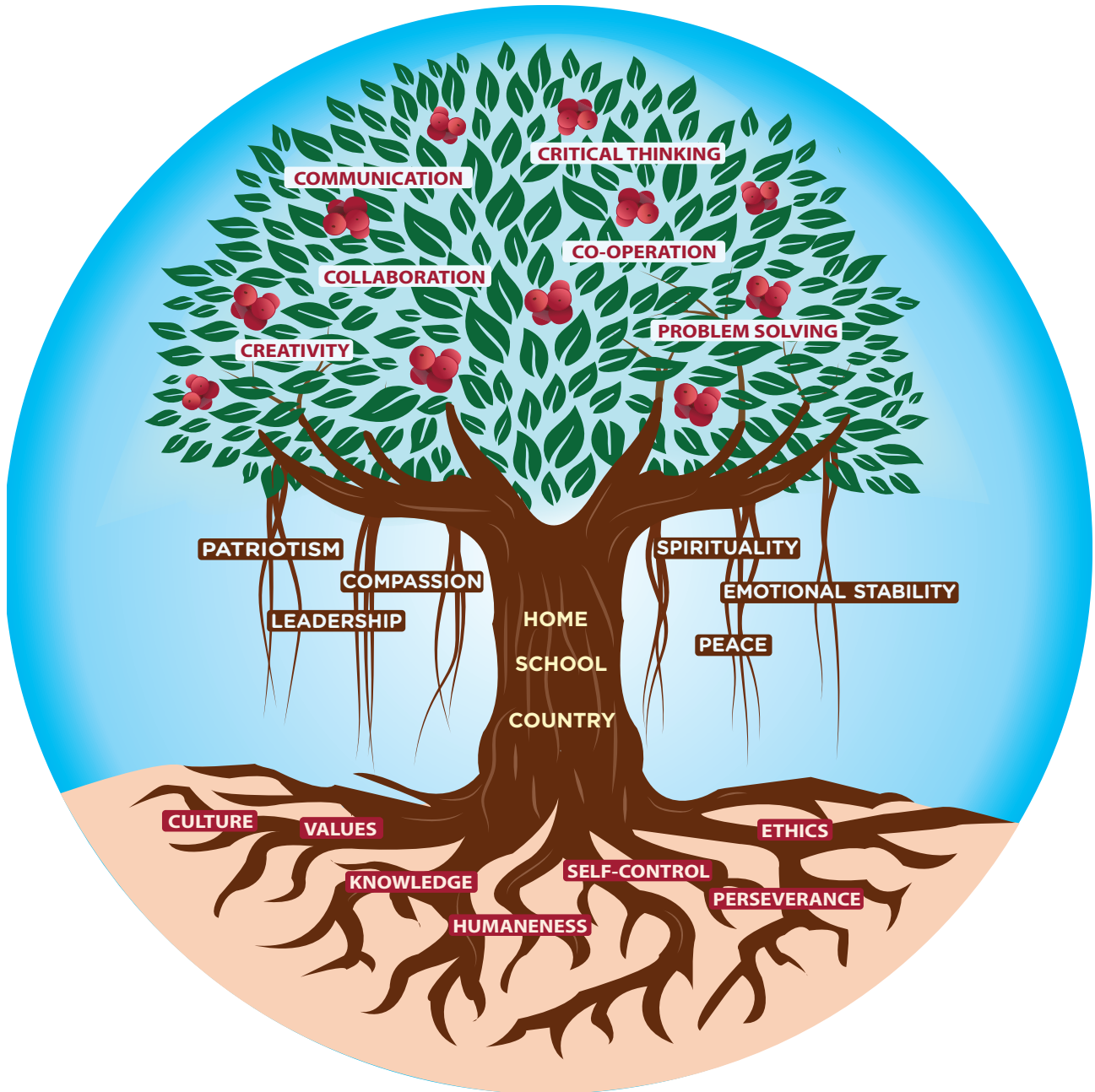
Read and write 7 and 8-digit numbers in Indian and International system

Identify place, place value and face value of numbers

Write 7 and 8-digit numbers in expanded form and standard form

Find the successor and predecessor of large numbers

Compare large numbers and arrange them in ascending and descending order

Build the greatest and the smallest 7 and 8-digit number (with and without repeating digits)

Rounding numbers to the nearest 10, 100, 1000.

Recapitulate :-

1) Write the expanded form of 7,40,054.

   _____

2) In the numeral 4,59,512, the digit 1 is in the _____ period.

3) Match the following:

(a) 50,000 + 900 + 60 + 5   50923   ( )

(b) 5,00,000 + 900 + 60+5   50965   ( )

(c) 50,000+ 9000 + 900 + 20+3   500965   ( )

(d) 50,000+ 20 + 900+3   50293   ( )

(e) 50,000+200+90+3   59923   ( )

4) Arrange in ascending order: 9,09,782 / 9,87,652 / 9,90,341 / 9,09,872

   _____

5) Using the digits 1,6,7,8,9 and 0, form the greatest and the smallest 6-digit number and write their number names.

   _____

INTRODUCTION TO LARGE NUMBERS

Large numbers are used to represent the population of a country , express large amounts of money, cost of land, vehicles, area of a city etc.,

1 more than 99,999 is 1,00,000

1 more than 9,99,999 is 10,00,000

1 more than 99,99,999 is 1,00,00,000

? DO YOU KNOW India is one of the oldest civilizations in the world with rich cultural heritage. It covers an area of 32,87,263 sq.km. extending from the snow covered Himalayas to the tropical rain forests of the south.

What is the Indian Number System?

The Indian number system is based on the nomenclature followed for different place values. According to the place value system, when a number is written in the standard form, each group of digits is separated by a comma called a period. In the Indian system, the ones period consists of the first three digits, starting from the right. The thousands period consists of the next two digits. The lakhs period consists of the next two digits and so on .

Vanmathi along with her mother and her younger brother Varunan visited their chithi's (mother's younger sister in Tamil) house in Sivakasi during summer vacation. Her chithi works for a small match works in Sivakasi that can produce 6000 matchboxes every day.

Vanmathi expressed her wish to visit the same. Her chithi got permission from the owner and took her to the factory the next day. She was excited to see how the match sticks were made and was wondering how many would be made if they worked 300 days a year. She asked her mother how big the number would be and how it can be read.

Let's calculate

6000 x 300 = 18,00,000

It is a 7-digit number. It is read as eighteen lakhs

The industries in Sivakasi employ over **2,50,000** people with an estimated turn over of **₹20,000,000,000**

Can you read the number?

Ten Lakhs	Lakhs	Ten Thousands	Thousands	Hundreds	Tens	Ones
1	8	0	0	0	0	0

2

Bhopal is a city in the central Indian state of Madhya Pradesh. Its one of India's greenest cities. There are two main lakes, the Upper Lake and the Lower Lake. On the banks of the Upper Lake is Van Vihar National Park, home to tigers, lions and leopards. The State Museum has fossils, paintings and rare Jain sculptures

The population of Bhopal in 2022 was 17,98,218.

Let us represent it in a place value chart

Lakhs period		Thousands period		Ones period		
Ten Lakhs	Lakhs	Ten Thousands	Thousands	Hundreds	Tens	Ones
1	7	9	8	2	1	8

The new place added is Ten Lakhs and it is in the Lakhs period.

17,98,218 is read as **Seventeen lakh ninety eight thousand two hundred eighteen**

It is written in the expanded form as:

10,00,000+7,00,000+90,000+8,000+200+10+8

Examples : **Write the number with appropriate periods :**

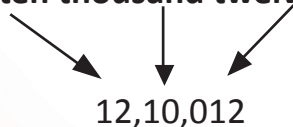**Fifty nine lakh two thousand seventy seven -** 59,02,077

59,02,077

Sixty lakh fifty three thousand nine hundred forty nine - 60,53,949

60,53,949

Twelve lakh ten thousand twelve - 12,10,012

12,10,012

3

EXERCISE 1.1

1) Write the number name and the expanded form.

    a)   28,35,098   b)   36,54,153   c)   81,02,678   d) 70,01,215

2) Write the numerals

    a) Ninety-six lakh forty-five thousand six hundred fifty nine

    b) Forty-two lakh fifty thousand seventy four

    c) Thirteen lakh thirteen

    d) Seventy seven lakh seven thousand seventy seven.

3) Write in standard form

    a) 5,00,000 + 7,000 + 70

    b) 90,00,000+500+8,000+60,000+3

    c) 10,00,000+3,00,000+ 3+70,000+6

    d) 60,00,000+6,00,000+100

4) Draw the place value chart for:

    a)   25,66,108   b)   18,55,786   c)   12,80,763   d) 49,09,991

Planet Facts

There are 8 planets in our solar system. They are Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune.
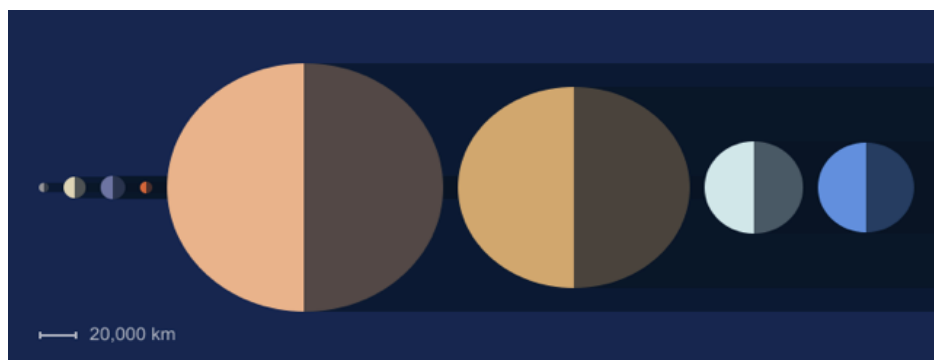
20,000 km

From	To	Distance in kilometres	Distance in miles
Earth	Mercury	9,16,91,000	5,69,74,146
Earth	Venus	4,14,00,000	2,57,24,767
Earth	Mars	7,83,40,000	4,86,78,219

The distance from Earth to Mars is 7,83,40,000 km . It is an 8-digit number. Let us learn how to read and write an 8- digit number in the Indian system of numeration using the place value chart.

Place value chart:

Crores Period	Lakhs period		Thousands period		Ones period		
Crores	Ten Lakhs	Lakhs	Ten Thousands	Thousands	Hundreds	Tens	Ones
4	8	6	7	8	2	1	9

The new place added is Crore and it is in the Crores period.

4,86,78,219 is read as **Four crore eighty six lakh seventy eight thousand two hundred nineteen.**

The expanded form is 4,00,00,000+80,00,000+6,00,000+70,000+8000+200+10+9

1,00,00,000 is the smallest 8- digit number. It is read as 1 crore.

E X E R C I S E 1 . 2

1) Write the number name and the expanded form
    a) 2,82,53,601   b) 3,96,54,852   c) 8,04,20,511   d) 1,93,05,748

2)   Write the numerals
    a)   Eighty nine lakh forty thousand six.
    b)   Seven crore fifty-six lakh forty thousand eight hundred nine.
    c)   Four crore two lakh fifty nine thousand seventy-four.
    d)   Five crore ten thousand one.
    e)   One crore one thousand one.

3)   Write the standard form
    a)   2,00,00,000 + 20,00,000 + 2,00,000 + 90,000 = _____
    b)   5,00,00,000 + 7,000 + 70 + 10,00,000 = _____ .
    c)   8,00,00,000 + 50,00,000 + 6,000 + 80,000 + 5 = _____.
    d)   90,00,000 + 3,00,000 + 3 + 70,000 + 60 = _____ .

4)   Draw the place value chart for :
    a) 6,22,86,960   b) 8,45,50,753   c) the greatest 8-digit number

5)   Write the period, place and place value of the highlighted digit.
    a) 8,23,**47**,882   b) 3**2**,58,742   c) 4,**53**,20,126   d) 1,**0**6,66,444
    e) 39,72,00**9**   f) **2**,65,00,002   g) 27,27,27,2**7**2   h) 5,00,50,**5**00

Predecessor and successor

The number that comes just before a given number is called its predecessor.

The predecessor of 11,72,000 is 11,71,999

The number that comes just after a given number is called its successor.

The successor of 45,57,590 is 45,57,591.

Comparing Numbers

Numbers can be compared by the place values of the digits in the numbers. We shall follow the same rules for the comparison of bigger numbers.

Rules for Comparison of Numbers:

Rule I: A number with more digits is always greater than the number with less number of digits.

Rule II: If two numbers have the same number of digits, we start comparing the digits from left most place until we come across unequal digits.

Example: Compare 14, 52,096 and 14, 52,187

Both the numbers have 7 digits. So, we start comparing the digits from the left-most end.

Hence 14,52,096 < 14,52,187

Forming numbers

To form the greatest and the smallest number we arrange the digits in ascending and descending order respectively.

To form the smallest number, 0 should be in the second highest place.

Example 1: Form the greatest and the smallest 7- digit number using the digits

5, 6, 2, 0, 9, 1 and 3 without repeating the digits.

Write the digits in descending order to get the greatest number. The required greatest number is 96,53,210.

Write the digits in ascending order (0123569), but this becomes a 6-digit number. So place the zero after the smallest digit followed by the rest of the digits in the ascending order. The smallest number is 10,23,569.

> **Get it right !**
>
> The smallest 5-digit number using the digits 3,1,0,2,7
>
> We cannot write it as 01237, because it is still a 4-digit number. So the smallest number is 10,237

Example 2: Form the greatest and the smallest 7- digit number using the digits

6, 2, 0 and 9 by repeating the digits.

Greatest Number: Write the digits in descending order (9620 which will be a 4- digit number)

To get the greatest 7 – digit number, repeat the greatest digit 9, three more times before 9. The required greatest number is 9999620.

Smallest Number: Write the digits in ascending order (0269), but this becomes a 3-digit number. So place the zero after the smallest digit followed by the rest of the digits in the ascending order (2069). Now repeat the smallest digit zero after zero three more times. The required smallest number is 2000069

EXERCISE 1.3

1) Complete the following table

S.no	Predecessor	Number	Successor
(a)		28,710	
(b)			1,29,966
(c)	84,04,999		
(d)	6,19,99,999		

2) Compare the numbers using   >,   <,   =

   a) 81,36,002 _____ 81,34,002   b) 1,00,001 _____ 1,01,001

   c) 58,85,558 _____ 5,58,85,558   d) 64 lakhs _____ 640 thousands

3) Rewrite the numbers using periods and arrange them in ascending order.

   a)   2696547   / 479825   / 3698751   / 11109754

   b) 76094521   / 45784572   / 16873976   / 56234089

   c) 79582601   / 79528561   / 79852650   / 792842605

   d) 30303030   / 30330330   / 3303303   / 30303333

4) Rewrite the numbers using periods and arrange them in descending order.

a) 6965472   / 79825   / 3698751   / 11109754

b) 60945217   / 57845724   / 19673976   / 23408956

c) 95782601   / 95728561   / 98572650   / 928742605

d) 10321032   / 10232310   / 10231032   / 10231023

5) Form the greatest and smallest numbers using the given digits only once.

a) 2, 8, 6,4,9,7   b) 7,3,4,1,8,9,2 ,6   c) 3, 5, 8, 2, 0, 6,1 ,4   d) 6,4,3,9,0,5

6) Write the greatest and the smallest 8- digit numbers using the digits

a) 8,6,7,5,2,3   b) 5,0,9,1,4   c) 0,3,8,6   d) 2,9,1

International place-value system

The system of representing numbers across many nations is known as the International system.

In this system, the first three periods are ones, thousands and millions for the nine places from right to left. Ones period has three places - ones, tens, and hundreds. The thousands period consists of thousands, ten-thousands and hundred-thousands. The next three places make the millions period. The places are millions, ten millions, and hundred millions. So, writing a number in international place-value system, we insert commas after every three digits from the right.

The place-value chart for the International system of numeration is given below:

Millions			Thousands			Ones		
Hundred Millions	Ten Millions	Millions	Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Ones
HM	TM	M	H Th	T Th	Th	H	T	O

Example: The population of Chennai was 11,503,293 (As per 2022 census). It is read as **Eleven million five hundred three thousand two hundred ninety three.**

EXERCISE 1.4

1. Rewrite the number using periods and write the number name in the International system.

a) 625098412   b) 712983410   c) 60053471   d) 43219560

2. Write the numeral (Remember to mark the periods)

a.   Three million forty five thousand six hundred fourteen

b.   Twenty two million three hundred eighty two thousand five hundred six

c. Nine hundred four million five hundred twelve thousand six hundred forty

d. Nine hundred ninety nine million four hundred seventy nine thousand three hundred ninety two

e. Ten million two thousand thirty

Comparing the two numeral systems we observe that:

- 100 thousand = 1 lakh

- 1 million = 10 lakhs

- 10 millions = 1 crore

- 100 millions= 10 crores

Numbers	10000000	1000000	100000	10000	1000	100	10	1
Indian Numeration	Crores	Ten Lakhs	Lakhs	Ten Thousands	Thousands	Hundreds	Tens	Ones
International Numeration	Ten Millions	Millions	Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Ones

Rounding numbers

Vedanthangal Bird Sanctuary is a 30-hectare (74 acre) protected area located in the Madurantakam taluk of the Chengalpattu District in the state of Tamil Nadu, India. The sanctuary is about 75 kilometres from Chennai on National Highway 45 [NH45]. About **40,000** birds (including 26 rare species), from various parts of the world visit the sanctuary during the migratory season every year.

The number of birds that visit Vedanthangal is not exactly **40,000**. The approximate number gives us an idea of the number of birds migrating to Vedanthangal Bird Sanctuary. Such numbers are called **rounded numbers.** A rounded number is closest to the actual value. It is easier to remember the number, but is not accurate.

Rounding off to the nearest 10

Example 1: 73 lies between 70 and 80. It is closer to **70**, hence rounded to 70.

Example 2: 76 also lies between 70 and 80, but, it is closer to **80**, hence rounded to 80.

Rounding off to the nearest 100

Example 3: 3420 lies between 3400 and 3500. It is closer to **3400,** hence rounded to 3400.

Rounding off to the nearest 1000

Example 4: 2540 lies between 2000 and 3000. It is closer to **3000,** hence rounded to 3000.

The **4/5 rule** for rounding numbers is

- 4 or less, leave alone
- 5 or more, round up

The golden rule with rounding is that if a **number is exactly halfway between two multiples of 10**, you always round up. It is also called as **Midway Point Rule**.

General rule for rounding of numbers:

- Circle the place value of the digit to be rounded.
- Look at the neighbouring digit on the right.
- If the neighbouring digit is

Less than 5 (0-4) - keep the rounding digit the **same** and the **rest of the digits** to the **right** of the rounding digit **will become 0.**	5 and above - Add 1 to the **rounding digit** and the **rest of the digits** to the **right** of the rounding digit **will become 0**
Th H T O 3 2 8 4 4 < 5 ∴ 3284 ≈ 3280	Th H T O 3 2 5 7 7 > 5 ∴ 3257 ≈ 3260

Let us look at an example illustrating the above steps in order

Round **4935** to the nearest **1000:**

4 9 3 5

- The neighbouring digit is **9**
- 9 is **greater** than **5**
- Adding 1 to the rounding digit: **4 + 1 = 5**
- All the other digits to the right of the rounding digit become 0, hence the rounded number is **5000**

Round **542** to the nearest **100**:

5 4 2

- 4 < 5   -   The rounded number is **500**

EXERCISE 1.5

1. Round off to the nearest 10

   a. 93   b. 741   c. 2865   d. 1279   e. 15672   f. 528690

2. Round off to the nearest 100

   a. 587   b. 2146   c. 9875   d. 1234   e. 9999   f. 8375811

3. Round off to the nearest 1000

   a. 1875   b. 653   c. 24312   d. 5920   e. 8888   f. 9352000

4. Round the answers to their nearest 10, 100 or 1000 appropriately.

   a. There are about 310 passengers in each car of the city train. As there are 8 cars for each train, there are about _____ passengers on each train.

   (i)   240   (ii)   2,500   (iii) 2,004   iv)   2488

   b. The first bus had 96 passengers and the second bus had 107 passengers. There are about _____ passengers in total.

   (i) 100   (ii)   150   (iii)   200   iv)   203

   c. In a city, there are 45,960 electric cars and 96,113 gas cars. There are about _____ more gas cars than electric cars.

   (i) 5,000   (ii)   50,000   (iii) 5,100   iv)   50,153

   d. A pilot flies 5 trips totalling 7,531 miles in a day. Each trip is about _____ miles.

   (i)   1,500   (ii)   2,500   (iii) 150   iv)   1506

Subject Integration – Cross Curricular Activity

Vinay's father donates a part of his yearly profit generously to a charitable organization every year. He asks Vinay to fill a cheque for ₹9,75,400. Help Vinay to fill the cheque by writing the correct amount in words and figures.

```
BANK NAME                                    ┌─┬─┬─┬─┬─┬─┬─┐
                                             └─┴─┴─┴─┴─┴─┴─┘
                                             D D M M Y Y Y Y

PAY _____  OR BEARER

Rupees _____
                                                    ┌───┬──────────┐
       _____│ ₹ │          │
                                                    └───┴──────────┘
ACC NO│_____│   Valid for 10,00,000 and under

Valid for three months only from the date of instrument   RTGS/NEFT IFSC Code : 1234        Please sign above

        ⑈50⑈500⑈  6⑋50⑈500⑈:        ⑈0
```

Important points to note while writing a cheque

- Write the name of the person or organization to whom you are paying the money legible against 'Pay'.

- Write the amount in words against 'Rupees' with proper spacing.

- Do not forget to write 'Only' after the amount in words.

- Note that you are not permitted to fold, staple or pin the cheque leaf.

- Avoid using erasable pen or any other technique that could permit anyone to write over on the cheque.

1) Expansion of IFSC is _____

2) Why is IFSC important?_____

Worksheet

I. Find the given numbers:

1. The greatest possible number formed using each of the digits 0-7 once.

2. One less than 4 million.

3. How many lakhs make a million?

4. How many thousands make a crore?

5. The smallest possible 6-digit number formed by using odd digits and a zero only once.

6. One more than 48 crore.

7. The place value of 7 in 33,987,259.

8. The distance between two countries is 222,759,910 km. If the number is rounded to nearest thousands it is_____

9. The cost of House A is ₹ 3,40,59,000 and that of house B is ₹ 3,45,07,999. Which house is costlier?

10. The predecessor of thirty-five million four hundred seventy-two thousand, six hundred ninety.

II. Given below is the readership of some newspapers.

Newspaper Name	Readership	Number Name
Time to Read	7,590,000	
Reader's Time	8,803,000	
The Weekly	13,830,000	
Happy Reading	16,631,000	
The World Daily	6,020,000	

1. Arrange the newspapers in descending order of their readership. _____ _____

2. Round off the readership of Reader's Time to the nearest 1000. _____

3. Give the place value of digit 8 in readership of The Weekly. _____

4. Which newspaper do you buy? Which is your favourite column in the newspaper? _____

5. Write the expanded form for the readership of Happy Reading. _____ _____

III. Find the number:

1. The successor of 22,368,089: _____

2. 10 thousand more than 35 thousand: _____

3. 3367821 rounded to nearest 1000: _____

4. Complete the sequence

   27,000,000; 28,003,000; 29,006,000 _____ ; _____

5. 1 lakh less than 2,43,18,000: _____

IV. Fill in the blanks

1. 5 crore = _____ millions

2. The smallest 7- digit number using 3,0,8,1 by repeating the digits will be _____ (greater than/ lesser than) 1,000,000

3. 75295 will become 75300 when rounded off to the nearest _____.

   a) 10   b) 100   c) 1000   d) Both a and b

4. The predecessor of one million will have _____ digits.

5. The numeral for seven hundred fifteen million ten thousand eleven is

   _____.

6. Which amongst the following is true?

   a) 10 lakhs = 1000 thousand   c) 1 crore= 1 million

   b) 100 lakhs = 1 crore   d) 100 thousand = 1 million

Logical Reasoning

Observe the set of numbers and answer the questions given below

462	737	548	229	474

1. Which of the following numbers will be obtained if the tens digit of the smallest number is subtracted from the ones digit of the greatest number?

   a) 5   b) 0   c) 2   d) 1

2. If the digits in each of the numbers are arranged in descending order, which will be the greatest number?

   a) 737   b) 773   c) 229   d) 548

2 ADDITION, SUBTRACTION AND THEIR APPLICATIONS

Learning Outcomes

Add and subtract 7 and 8-digit numbers

Apply addition and subtraction skills to solve real life problems

Understand what overhead charges are and calculate

Calculate profit and loss including overhead charges.

Recapitulate:

1. In 2011, the temple town of Palani had 35,640 men and 24,827 women. The government wanted to administer vaccines to all the residents of Palani.

DO YOU KNOW Tamilnadu is called as the 'Land of temples'.
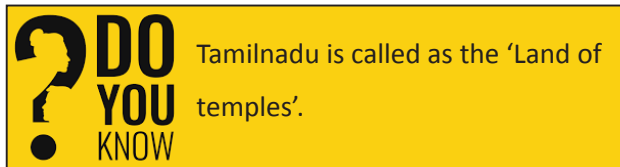
a) How many doses of vaccine would be required?

b) How many more men are there in Palani than women?

2. Vimal spent ₹ 3,450 on electricity bill, ₹ 678 on vegetables and ₹ 945 on fuel this month.

   a) Find his total expenditure for this month.

   b) If Vimal's monthly salary is ₹ 9000, what is his savings for this month?

Addition:

In 9034 + 2345,

Addend =

Addend =

Sum   =

Subtraction:

In 7456 – 3785,

Minuend   =

Subtrahend =

Difference =

Solve:

a) 6,789 +27,543   b) 34,598 + 25,672   c) 17,669 + 30,573

d) 64,089 + 29,115   e) 23,890+789+3,462   f) ₹ 8,76,535+ ₹6,790+₹563

Solve:

a) 36,142– 29,895   b) 80,000 – 15,689   c) ₹ 55,000 – ₹ 45,665

d) 1,00,000 – 77,777   e) 2,54,040 – 43,860   f) 9,01,010 – 2,65,388

Subtract and check your answer by addition:

a) 71,456 – 32,680	b) 45,000 - 3,897

Subject Integration – Cross Curricular Activity

The word addition originates from the Latin word 'Addere' which means to join, attach, increase or augment.

The word subtraction originates from the Latin word 'Subtrahere' which means to take away, remove, withdraw, pull or drag from beneath or under.

Can you spot any similarity in the above meaning and the operation of addition and subtraction? Discuss

Addition of Large numbers:

Addition of large numbers uses the same concept as addition of smaller numbers.

Sequence of addition: Start with ones and move to tens, hundreds, thousands, ten thousands, lakhs.

Remember to regroup wherever necessary.

Example: Add 6,14,567 and 1,67,283							Try yourself: 5,67,823 + 1,94,985

		1		1	1	
	6	1	4	5	6	7
+	1	6	7	2	8	3
	7	8	1	8	5	0

Subtraction of Large numbers:

Subtraction of large numbers uses the same concept as subtraction of smaller numbers.

Sequence of subtraction: Start with ones and move to tens, hundreds, thousands, ten thousands, lakhs.

Remember to regroup wherever necessary.

Subtract: 5,40,982 − 3,90,998 — Try yourself: 76,50,123 − 29,80,758

	4	13	9	18	17	12
	5	4	0	9	8	2
−	3	9	0	9	9	8
	1	4	9	9	8	4

EXERCISE 2.1

1. Solve:

a) 23,456 + 56,782

b) 14,56,897 + 5,64,789

c) 18,934 + 6,90,467 + 8,976

d) 77,78,234 − 4,32,768

e) 9,16,36,015 − 28,90,059

f) 345,765 + 435,980 − 4,729

g) Increase the greatest 7 digit even number by 389,675

h) Decrease the smallest 8 digit even number by 89,674

i) Find the missing addend: 6,16,328 + _____ + 98,675 = 98,80,325

j) 82,348 less than 13,69,564

2. Subtract and check your answer by addition:

a) 3,45,673 – 26,782

b) 8,57,001 – 6,37,896

c) 8,645,667 – 9,864

d) 7,00,000 – 86,371

e) 3,55,05,050 – 70,77,500

f) 2,222,222 - 99,999

3. Fill in the box

Minuend	Subtrahend	Difference
a)	9,08,765	46,789
b) 500 thousands		73,782 ones
c) 96,83,104	predecessor of 4 lakh	
d)	39 millions	647 thousands
e) 12 millions		1,506,666

4. The daily milk production in the district of Krishnagiri is 80,897 litres and 1,21,324 litres in the district of Coimbatore.

a) What is the total milk production in the two districts?

b) Which district produces more milk? By how much more?

5. Kavin invested ₹ 2,76,783 and Pavithra invested ₹ 4,73,597 in a business.

a) What was their total investment?

b) How much more money do they need to invest if they need 9 lakhs to run the business?
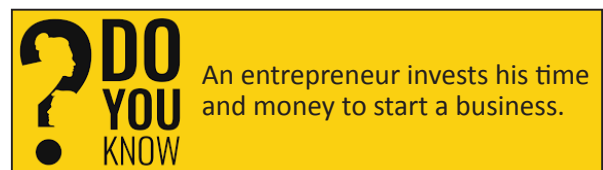
6. Applications in real life

a) The population of Ukraine in Jan 2022 was 41,167,336. In 2023 January it decreased to 36,744,364. By how much was the population reduced in a year? What do you think would be the reason?

b) The sum of two numbers is 4,14,82,308. If one number is 39,18,695, find the other number.

c) There are 1,15,200 sacks of wheat, 7,56,100 sacks of pulses, and 60,000 sacks of rice in a godown for sale. Find the total number of sacks in the godown.

d) Subtract the sum of 85,030 and 3,32,100 from the sum of 5,52,000 and 85,410.

e) 50,00,000 apples were harvested from an orchard. Out of those 65,452 apples were exported and 85,659 apples were sold in the local market. The rest of the apples were sold to the schools. Find the number of apples available for sale to schools.

f) A bus travelled 1,250 km in 2020, 56,500 km in 2021 and 123,500 km in 2022. Find the total distance covered by it in 3 years?

g) Akshit was 'Man of the Match' in a cricket tournament and received a cash prize of Rs.357,867 for it. He deposited the amount in his bank account. If he had Rs.2,45,675 in his account already, what would be his current balance?

Subject Integration – Cross Curricular Activity

Football also called as soccer, is a game in which two teams of 11 players each, play using any part of their body except their hands and arms, try to manoeuvre the ball into the opposing team's goal post. Only the goal keeper is permitted to handle the ball and may do so only within the penalty area surrounding the goal. The team that scores more goals wins.

Federation International of Football Association (FIFA) estimated that at the start of the century there were approximately 250 million football players.

a) Which country hosted the last football world cup? _____

b) How many countries participated in the last FIFA world cup? _____ (find out)

c) 250 million = _____ crores

The Rungrado stadium opened in Pyongyang, North Korea is the largest football stadium in the world. It has a seating capacity of 114,000.

The Michigan stadium in Michigan, U.S.A is the second largest football stadium with a seating capacity of 107,601.

a) Pick the number from the above passage and write them in words in Indian system.

_____

_____

b) Both the stadiums together can hold _____ spectators.

c) The Rungrado stadium can hold _____ spectators more than the Michigan Stadium.

d) Write the number names of the seating capacities of both the stadiums in Indian system

e) Estimate 107,601 to the nearest thousand.

Profit and Loss:

When you go to the market, you might have noticed the shopkeeper selling a lot of articles. To sell these articles, they either have to buy or make the articles. The money that a shopkeeper spends to buy or make an article is called the Cost Price (C.P). The money that he gets by selling it is called the Selling Price (S.P) of that article.

Vishnu is an entrepreneur who runs a shop for sports goods.

On Monday he bought a football for ₹ 500. He mentioned the price as ₹ 600 on the price tag and exhibited it for sale.

A boy walked into the shop and bought the ball. Did Vishnu profit from the sale? Let us explore.

Vishnu noted this in his diary:	Fill in the selling price of the ball in the price tag.
Selling price of one ball = ₹ 600 Cost price of one ball = ₹ 500 My profit = ₹ 100	

Cost Price (C.P.) is the price at which the shopkeeper buys an article for his shop. Selling price (S.P.) is the price at which the shopkeeper sells an article.

If S.P is greater than the C.P, then the shopkeeper makes a profit.

Profit = S.P − C.P.

On Tuesday Vishnu bought a pair of cricket gloves for ₹ 400 each.

A girl walked into the shop, bargained and bought a pair of gloves for ₹ 300.	Fill in the selling price of the gloves in the price tag.
Vishnu noted this in his diary: Cost price of a pair of gloves = ₹ 400 Selling price of a pair of gloves = ₹ 300 My Loss = ₹ 100.	

If C.P. is greater than the S.P, then the shopkeeper makes a loss.

Loss = C.P. – S.P.

On Wednesday Vishnu bought a shot put for ₹ 700.

He got it to the shop in an autorickshaw. He paid ₹ 100 for the auto ride. A woman walked into the shop and bought the shotput for ₹ 800.

Vishnu noted this in his diary:

Cost price of the shotput   =   ₹ 700
Overhead cost for the shotput =   ₹ 100
Total Cost price   =   ₹ 800
Selling price of the shotput   =   ₹ 800
My Profit/Loss   =   ₹ 0 (₹ 800 - ₹ 800)

Note: If **C.P = S.P**, then it is **neither Profit nor Loss.**

Example:

Mr. X bought an old car for ₹ 2,10,000 from the nearby car care. Because he did not like the colour, he sold it for ₹ 1,65,000. He has sold the car for a price lesser than ₹ 2,10,000.

So, he would incur a _____.

Mr. Y bought an old car for ₹ 2,10,000, spent ₹10,000 on repairs and painting. He sold the car for ₹ 2,52,000. He has sold the car for a price more than the _____.

So, he would earn a _____.

Mr. Z bought an old car for ₹ 2,10,000, spent ₹ 10,000 on repairs and painting. He sold the car for ₹ 2,20,000.

His profit/loss would be _____.

Overhead Costs or overheads are additional expenses like transport, painting, packing, repairs etc., incurred on goods.

When there are overheads, they are added to the cost price (C.P) to get the total cost price (Total C.P.)

Total Cost Price (Total C.P) = Cost Price (C.P) + Overheads

Total C.P. = C.P. + Overheads

Total C.P is then compared to the S.P to find if the shopkeeper had a profit or loss.

If S.P > Total C.P, Profit = S.P – Total C.P.

If Total C.P. > S.P, Loss = Total C.P. – S.P.

EXERCISE 2.2

1. Find the profit or loss on the goods given below:

Item	C.P.	S.P.	Which is greater? C.P. or S.P?	Profit or Loss?	Amount gained/lost
	₹ 300	₹ 400	S.P. > C.P.	Profit = S.P. − C.P. = ₹ 400 - ₹ 300	Profit = ₹ 100
	₹ 900	₹ 700			
	₹ 200	₹ 600			
	₹ 800	₹ 1600			
	₹ 2000	₹ 3000			
	₹ 5000	₹ 7500			
	₹ 9000	₹ 6000			

2. Complete the table:

C.P.	Overheads	Total C.P. = C.P. + Overheads	S.P.	Which is greater? Total C.P. or S.P?	Amount gained/lost
₹ 10.50	Nil		₹ 30		
₹ 856.50	₹ 56		₹ 910		
₹ 8,455	₹ 1575		₹ 9500		
₹ 13,645	₹ 285		₹ 12,485		
₹ 15,345	₹ 1674		₹ 14,780		
₹ 20,945	Nil		₹ 25,600		
₹ 35,650	₹ 1,750		₹ 40,000		

3. Kala bought a sofa set for ₹2,420. She sold it for ₹ 3,085. How much profit or loss did she make?

4. Ram purchased a computer for ₹ 35,765 and sold it for ₹ 23,006. How much was his profit or loss?

5. Find the profit or loss if Gowri bought a painting for ₹ 3,450, spent ₹ 850 on framing and sold it for ₹ 5280.

6. Kumar spent ₹ 2,250 on polishing a bike that he got for ₹ 87,750 and sold it for ₹ 90,000. Find his profit or loss.

7. Chitra bought a table for ₹ 45,855. She spent ₹ 6,700 on painting it and sold it for ₹ 51,500. Find her profit or loss.

Do you know?	
What is the full form of MRP?	
Think: Can a shopkeeper sell a product for a price that is more than the marked MRP? Discuss.	

Higher order thinking skills:

1) Kumar bought a house and spent ₹50,000 on furnishing it. He then sold it for a loss of ₹ 1,00,000 at ₹ 12,00,000. Find the cost at which Kumar bought the house.

2) Ganesh bought pens at ₹120 a dozen. He sold it for ₹15 each. What is his profit or loss?

3) A shopkeeper bought 20 m of cloth for ₹ 660.00. If he sold the entire cloth at the rate of ₹ 35.00 per metre, find his profit or loss.

4) If a florist sold a rose garland at ₹ 95.00 more than its cost price, find his profit or loss.

5) A fruitseller bought one dozen bananas at ₹ 30.00. He sold each banana at ₹ 3.00. Find his profit or loss for a dozen bananas.

6) An item was sold for ₹ 540 at a loss of ₹ 42. What was its cost price?

7) An article was sold for ₹ 205 with a profit of ₹ 15. Find the cost of the article.

Worksheet - A

1. Solve:

    a) 3,76,845 + 4, 34,786   b) 6,34,673 − 4,83,038

    c) 4,843 + 23, 062 + 5,23,672   d) 6,34,568 − 3,98,739 + 1,24,657

    e) 3,56,754 + 5,78,373 − 47,873   f) 4,50,000 − 56,674

    g) Decrease 5,76,890 by 2,38,948   h) Double 3,56,736

    i) Increase 67,845 by 4,67,489   j) Find the difference between 68,349 and 5,00,000

2. Fill in the boxes:

a)

	5		0		6	7
+		7		3	7	
	9	5	3	8		0

b)

				0	6	
+	2	3		6	4	8
		2	9		0	3

c)

	8	4	7		9	2
-			1	4		8
	3	0		8	8	

d)

			5	4		2	1
-	2		5	1		7	
	4	4		1	5		

3. Find the profit or loss:

C.P.	Overheads	Total C.P.	S.P.	Which is greater? Total C.P. or S.P? Profit or Loss?	Amount gained/lost
₹ 235	Nil		₹ 45		
₹ 75,650	Nil		₹ 54,575		
₹ 6,745	₹ 155		₹ 5,000		
₹ 23,765	₹ 345		₹ 39,999		
₹ 12,570	₹ 780		₹ 12,500		

4. Applying profit and loss:

a) Ganga bought a generator for ₹20,000 and sold it ₹17,737. Find the profit or loss.

b) Anand sold his scooter for ₹18,678. He had bought it for ₹15,000. Find the profit or loss.

c) Aman purchased a music system for ₹6,375 and spent ₹75.00 on its transportation. He sold it for ₹6,500.00. Find his profit or loss.

d) Sasi ordered a study table for ₹9,000 and spent ₹ 385 for painting it. She sold it for ₹9,500. Did she make a profit? How much was it?

e) Kamal bought a second-hand mobile for ₹15,050. He spent ₹1,200 on repairs. He then sold it for ₹10,900. How much did he gain or lose?

f) A tailor spent ₹480 to stitch a shirt and ₹1,450 to stitch a pant. He sold them together for ₹3,575. Find his profit or loss.

g) Ritu bought a painting for ₹2,340. She spent ₹450 to attach a wooden frame around it. It was sold in an exhibition for ₹2,070. How much did she gain or lose?

Worksheet - B

1. The sum of 3,58,752 and a number is 12,00,000. Find the number.

2. The difference of two numbers is 3,25,066. If the smaller number is 98,437, find the larger number.

3. How much is 6,24,804 short of 11 lakh?

4. What number must be subtracted from the sum of 8,94,645 and 6,35,498 to get 10 lakhs?

5. Find the sum of the largest and smallest number formed using the digits 8,3,5,9,2,1,0,4.

6. Uma had eighty thousand in her bank account. She spent ₹ 12,456 to buy a mobile and ₹ 27,870 to buy a laptop. How much money is left with her?

7. The population of a country was 356,723 in the year 2021. It increased to 403,200 in the year 2022. What was the increase in population?

8. A village has 8,34,491 male voters and 7,45,883 female voters. In an election 67,849 voters did not vote. How many people cast their vote in the election?

9. Banu bought a piece of land for ₹ 1,45,345. She spent ₹ 9,345 to build a compound wall around it. After that she sold the land for 2 lakh. How much money did she gain?

10. Raja bought a washing machine for ₹ 31,587 and a cover for the machine for ₹ 2,890. He then sold the machine for ₹ 30,050. Find his loss.

11. Rani bought two necklaces for ₹ 56,780. She sold one for ₹ 28,560 and the other one for ₹25,700. Find her profit or loss.

12. Krish had two motorcycles. Each motorcycle costs ₹ 72,000. He sold them together for ₹ 1,50,000. Find his profit or loss.

Logical Reasoning
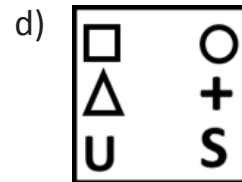
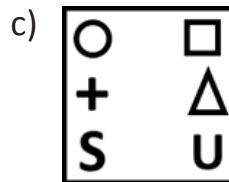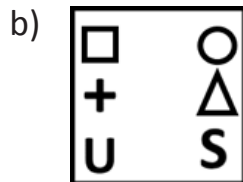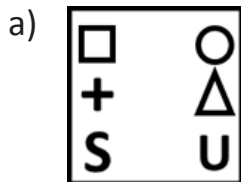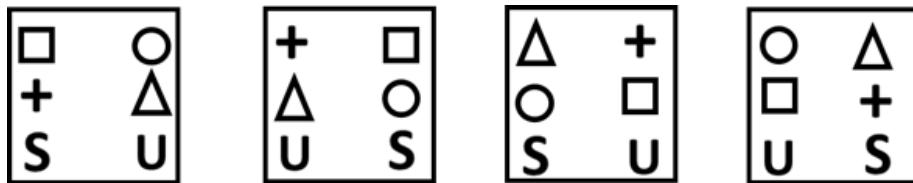1) Guess the missing number :
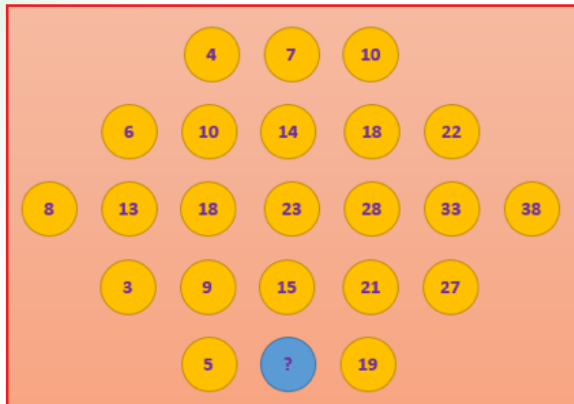
a) 7

b) 12

c) 14

d) 25

2. In a certain code language, if 'PROFIT' is coded 'NPMDGR', then how will 'PRICE' be coded in the same language?

a) NPHAC   b) NPGBC   c) NPGAC   d) NPKAC

3. Observe the pattern and find the next figure in the sequence

a)   b)   c)   d)

4. Solve the sudoku

		1		6	8	5		
5	6		9		7			
	9	3		1		2		
4	3			7		9		1
	2						4	
9		6		4			2	7
		5		3		4	8	
			1		6		5	9
		9	4	5		6		

26

3

MULTIPLICATION, DIVISION AND THEIR APPLICATIONS
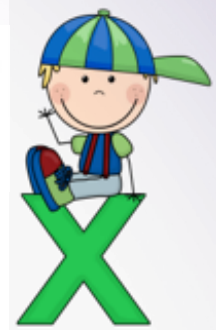
Learning Outcomes

At the end of this lesson, children will be able to

Recall and apply properties of multiplication

Multiply 4-digit number by 2 and 3-digit numbers

Divide up to 5-digit numbers by a 2-digit number

Find the average of a set of numbers.

Use the unitary method to solve problems.

Apply the skills of multiplication and division to solve real life problems.

Recapitulate…

The numbers that are being multiplied are called factors and the answer is called the product.

Trains are the pride of India! The country is the home to the fourth largest national railway system in the world, coming after USA, China and Russia.

$$5 \quad X \quad 6 \quad = \quad 30$$

FACTORS   PRODUCT

? DO YOU KNOW

Vande Bharat Express is the country's first engine less, semi-high-speed train manufactured by the Integral Coach Factory in Chennai. It has a seating capacity of 78 in a chair car coach. How many people can be seated in the train, if it has 16 such coaches?

Nishant quickly calculated the number of seats in the train

He worked it out

```
        7  8
  x     1  6
  _____
     4  6  8
     7  8  0
  _____
  1  2  4  8   seats
```

Nishant and his family of 5 members were travelling to Mysuru from Chennai on a vacation. His father asked him to calculate the amount spent on tickets if each executive class ticket cost ₹ 1880.

Nishant's younger sister calculated it has

₹ 1880 + ₹ 1880 + ₹ 1880 + ₹ 1880 + ₹ 1880 = ₹ 9,400

Nishant said , "Rekha, we can calculate the amount as ₹ 1880 x 5 = ₹ 9,400"

Multiplication is repeated addition

EXERCISE 3.1

Multiply

a) 2 4	b) 7 5	c) 4 2 6	d) 3 8 4	e) 2 4 5 6
x 5	x 9	x 7	x 8	x 4

(f) 1038 x7   (g) 4128 x 8   (h) 67 x15   (i) 468 x 19   (j) 504 x 12

Multiplication by 10 ,100, 1000 and its multiples.

Examples

a) 632 x 100 = 63200 → Add 2 zeroes on the right

b) 814 x 1000 = 814000 → Add 3 zeroes on the right

c) 170 x 400 = 68000 → Multiply 17 by 4 and add 3 zeroes on the right

d) 6600 x 2000 = 13200000 → Multiply 66 by 2 and add 5 zeroes on the right

EXERCISE 3.2

Find the product:

(a) 72 x100   (b) 463 x 1000   (c) 360 x 50   (d) 180 x 40

(e) 328 x20   (f) 450 X 300   (g) If 7 x 40=280, then 14 x 20=_____

(h) 7800 x 400   (i) 90 X 500   (j) 90 x 250

(k) If 9 x 80 =720, then 18 x 40 =_____

Properties of multiplication

❖ The product of any number and 1 is the number itself.

746 x 1 = 746

❖ The product of any number by 0 is 0.

7,965 x 0 = 0

❖ A change in the order of multiplying numbers does not change the product.

512 x20 = 10,240 = 20 x 512

Think (even/odd)
1) The product of two even numbers will always be an _____ number.
2) The product of two odd numbers will always be an _____ number.

EXERCISE 3.3

Fill in the blanks:

a) 208 x _____ = 208

b) 7,849 x _____ x 0 = _____

c) _____ x 68,350 = 68,350 x 20

d) 346 x 75 = ___ x 346

e) (12 x 5) x 6 = 12 x (__ x 6)

f) _____ x 1 = 1,989

g) 34 x ___ x 7 = 0

h) 4,783 x _____=4,783 x 10 x 10

Multiplying by a 2-digit Number

Selvam and Kairi work in a factory. The manager of the factory pays ₹1,265 to Selvam, who works for 8 hours a day, and ₹1,008 to Kairi, who works 7 hours a day as daily wages.

How much will we earn for 24 working days?

You will earn ₹ 30,360 and Kairi will earn ₹ 24192.
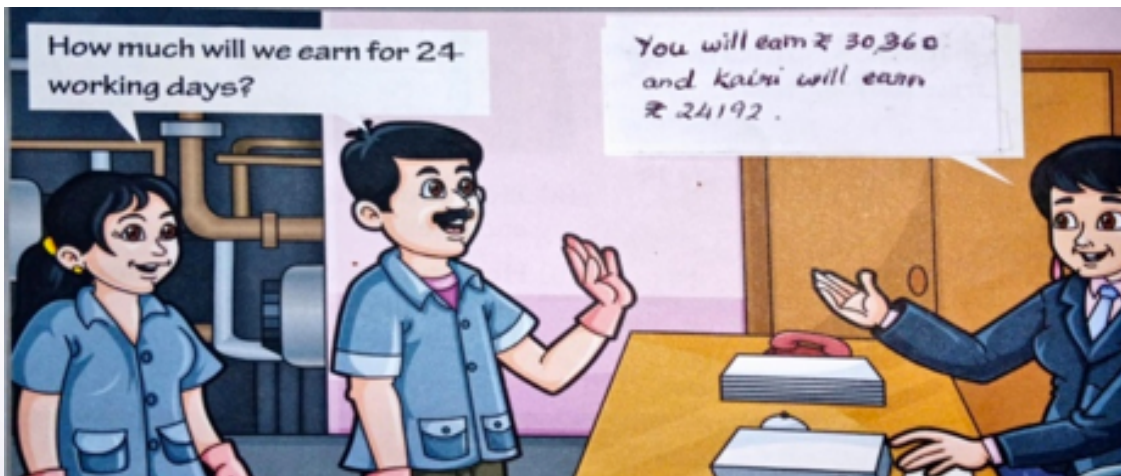
T TH	TH	H	T	O
	1	2	6	5
	X		2	4
	5	0	6	0
2	5	3	0	0
3	0	3	6	0

(+)

Amount Selvam earns
= ₹1265 x 24 = ₹ 30,360.

T TH	TH	H	T	O
	1	0	0	8
	X		2	4
	4	0	3	2
2	0	1	6	0
2	4	1	9	2

(+)

Amount Kairi earns
= ₹1008 x 24 = ₹ 24,192.

Multiplying by a 3-digit Number

Kairi's brother Kishan also joined the factory. The manager decides to pay him ₹ 2475 per day. How much would he earn if he worked for 315 days in a year?

L	T TH	TH	H	T	O
		2	4	7	5
		X	3	1	5
	1	2	3	7	5
	2	4	7	5	0
7	4	2	5	0	0
7	7	9	6	2	5

(+)

TL	L	T TH	TH	H	T	O
			5	3	4	6
			X	4	0	9
		4	8	1	1	4
2	1	3	8	4	0	0
2	1	8	6	5	1	4

(+)

You don't need to show multiplication by 0 (tens)

EXERCISE 3.4

Multiply:

1. 3789 x 54
2. 2408 x89
3. 4567 x 294
4. 3157 x 308
5. 457 x607
6. 6452 x 506

7. A farmer packs 248 apples in each carton. He loads 127 cartons in a lorry. How many apples were loaded in the lorry?

8. The cost of a bicycle is ₹2,795. The cost of a basket that is attached to it is ₹450. What is the cost of 205 bicycles with baskets? (Hint:Find the cost of a bicycle with basket)

9. As a part of the vaccination programme for COVID-19, 5,280 students were vaccinated in each of the 63 towns across Tamil Nadu. How many students were vaccinated in all?

10. The UN International Day of Yoga is celebrated the world over on June 21st every year. One particular year 2,590 yoga mats were distributed in 23 yoga centres each across India. How many yoga mats were distributed during that year?

Experiential learning

To celebrate Vanmahotsav day, 2,650 students of various schools of Chennai planted saplings in and around Chennai.

If each student planted 125 saplings, how many saplings were planted?

Value based question

One block in a gated community bought 250 flags to hoist in their apartments on 15th August to celebrate the 76th Independence day of our country. If there are 24 such blocks in the community, how many flags were bought?

Mental Maths

1. Multiply:

    a) 23 x 102   b) 40 x 101   c) 45 x 103   d) 8 x304

2. Multiply

    a) 6 x 19   b) 7 x 49

    c) 8 x29   d) 9 x 39

> **Example 1:** 34 x 102
> Break up 102 =100 + 2
> 34 x 100 = 3400   34 x2 = 68
> 34 x 102 = 3400 + 68 = 3468

3. a) If 20 x 25 = 500 , what is 20 x 26?

    b) If 20 x 25 = 500, what is 21 x 26?

    c) If 16 x 22 = 352, what is 8 x 22?

> **Example 2:** 7 x 29
> 29 = 30 - 1
> 7 x 30 = 210   7 x1 = 7
> 7 x 29 = 210 - 7 = 203

Higher Order Thinking Skills

1. A toy store has 45 boxes of soft toys and 60 boxes of toy cars. If each box has 12 toys, how many toys are there in all?

2. Find the product of the place values of 8 and 5 in the number 26,38,504 .

3. There are 40 participants in annual day programme. If there are 3 times as many girls as the boys in the play, how many girls and boys are there in the play?

Number sense

1) Fill in the box with the same numeral to make the statement true.

    9 ☐ 2 x 2 = 1 ☐ 84

2) Find the product of 9 and the smallest 8-digit number formed using that digits 1 to 7 and 9. Comment on the product.

Worksheet 1

1) Find the product:

   a)   1356 x987   b)   2073 x 250   c)   106 x 980   d)   763 x 305

   e)   5678 x56   f)   8107 x900   g)   620 x 800   h)   3300 x700

2) When you multiply a 2-digit number by a 3-digit number, the product is a

   a) 4-digit number   b) 5-digit number

   c) 6- digit number   d) either (a) or (b)

3) The product of two numbers is 45,000.If one of the numbers is 450, what is the other number? (Find without actual calculation)

4) Suraj saved ₹550 a month. How much does he save in 5 years?

5) Rakesh reads 12 pages of a book in an hour. How many pages are there in the book , if he reads 4 hours in a day and finishes the book in 24 days?

6) The next three numbers in the pattern are

   (a) 4,9,19,39,_____,_____,_____.   (b) 0,2,6,14 ,____,____,_____.

7) The cost of 1kg of potatoes and 1 kg of onions are ₹ 25.20 and ₹ 35.70 respectively. If Rakesh bought 3kg potatoes and 5kg onions, then find the total amount to be paid by him.

8) Find the product of all the odd numbers between 20 and 26?_____

9) Find the product of 2623 × 3000 = _____.

10) (12 × 11) − (11 × 11) = _____.

11) How much less is 1200 × 5 than 15 × 400?

Art Integrated Activity

Join three dots which are not in a straight line, without leaving any space in between to form a pattern. Count how many dots in threes you needed to get the pattern.

Division

Mr. Ramesh is a building contractor. He decided to a fix solar water heaters in his 5 different construction sites. He spent ₹ 36,720 on 5 solar water heaters. What is the cost of each solar water heater?

```
          7  3  4  4
    5 | 3  6  7  2  0
      − 3  5 ↓
          1  7
        − 1  5 ↓
            2  2
          − 2  0 ↓
              2  0
            − 2  0
                 0
```

Solar water heater

Solar water heater, sometimes called solar domestic hot water systems is a cost-effective way to generate hot water for your home. They can be used in any climate. The fuel, sunshine is absolutely free.

The cost of a solar water heater is ₹ 7,344

Recapitulate :

Properties of division

Property 1: If a number is divided by itself, then the quotient is always 1.

Example: 45,962 ÷ 45,962 = 1   77,070 ÷ 77,070 = 1

Property 2: If a number is divided by 1, then the quotient is the number itself.

Example: 83,216 ÷ 1 = 83,216   17,453 ÷ 1 = 17,453

Property 3: If zero is divided by a number other than zero, then the quotient is always zero.

Example: 0 ÷ 69345 = 0   0 ÷ 64320 = 0.

Property 4: Division by zero is not defined.

Dividing 5 - digit number by 1 – digit number :

Example 1: 75,348 ÷ 4

```
      1  8  8  3  7
   4 │ 7  5  3  4  8
   =   4  ↓
       3  5
   −   3  2  ↓
       3  3
   −   3  2  ↓
          1  4
       −  1  2  ↓
             2  8
          −  2  8
                0
```

Dividend → 75,348

Divisor → 4

Quotient → 18837

Remainder → 0

Example 2: 24,790 ÷ 7

```
         3  5  0  1
   7 │ 2  4  5  1  0
   =   2  1  ↓
         3  5
       − 3  5  ↓
            0  1  0
          − 0  7
            0  3
```

Dividend → 24,510

Divisor → 7

Quotient → 3501

Remainder → 3

EXERCISE 3.5

1. Fill in the blanks using the properties.

   a) 15,782 ÷ 1 = _____   b) 0 ÷ 21,643 = _____

   c) _____ ÷ 41,052 = 0   d) 74,125 ÷ _____ = 1

   e) _____ ÷ 9,74,125 = 1   f) 8,83,219 ÷ _____ = 8,83,219

   g) _____ ÷ 1,00,00 = 0   h) 10,83,219 ÷ 10,83,219 = _____

2. Find the quotient and remainder for the following sums.

   a) 79,845 ÷ 2   b) 83,245 ÷ 8   c) 25,179 ÷ 6   d) 20,512 ÷ 3

   e) 12,580 ÷ 5   f) 33,701 ÷ 4   g) 81,279 ÷ 7   h) 45,879 ÷ 9

   i) 30,000 ÷ 7   j) 91,011 ÷ 9   k) 46,203 ÷ 3   l) 59,595 ÷ 5

Dividing 5 - digit number by 2 – digit number :

Example 1: $54{,}633 \div 15$

```
           3  6  4  2
    15 | 5  4  6  3  3
       = 4  5
          ─────
          9  6
       −  9  0
          ─────
             6  3
          −  6  0
             ─────
                3  3
             −  3  0
                ─────
                   3
```

Dividend → 54,633

Divisor → 15

Quotient → 3642

Remainder → 3

Check your answer:

Dividend = Quotient × Divisor + Remainder

= 3642 × 15 + 3

= 54,630 + 3

Dividend = 54,633

EXERCISE 3.6

1. Divide the following and check your answer.
   a) $13{,}452 \div 12$ b) $77{,}832 \div 28$ c) $42{,}031 \div 36$ d) $68{,}452 \div 23$
   e) $51{,}355 \div 32$ f) $10{,}427 \div 42$ g) $81{,}279 \div 17$ h) $49{,}306 \div 19$

2. Riya has 78,920 chikkies and needs to pack them equally in 36 boxes. How many chikkies go in each box and how many will remain unpacked ?

3. A factory produced 95,449 toys in the month of May. If it produced equal number of toys every day, how many toys did it produce in a day?

4. The product of two numbers is 45,900. If one of the numbers is 45, what is the other number?

5. In a library, there are 10,675 books. As a part of school activity, students are asked to arrange the books. They can arrange 85 books in a rack. How many racks are needed to arrange these books? (Do you think we need one more rack for the books left).

Value Based Question :

6) Ananya and her 4 friends decided to contribute equally to donate a blanket worth ₹ 1000 to an old woman whom they used to see every day near a park.

    a) How much money did each contribute?

    b) Express the amount in words

7) The students of class V participated in a campaign on non usage of plastic. They made 2500 paper bags altogether. If each student made 20 bags, find the number of students who participated in the campaign.

Dividing by 10, 100 and 1000 :
Observe the following :

    a) $868 \div 10$ Q = 86,   R = 8

    b) $152 \div 10$ Q = 15,   R = 2

    c) $215 \div 100$ Q = 2,   R = 15

    d) $58106 \div 1000$ Q = 58 ,   R = 106

```
         8  6
  10 |  8  6  8
     -  8  0  ↓
     ──────────
           6  8
        -  6  0
        ──────────
              8
```

Dividend → 868
Divisor → 10
Quotient → 86
Remainder → 8

EXERCISE 3.7

I. Write the quotient under Q and remainder under R for each.

Number	Divide by 10		Divide by 100		Divide by 1000		Divide by 10000	
	Q	R	Q	R	Q	R	Q	R
a) 42,825	4282	5	428	25	42	825	4	2825
b) 57,199								
c) 81,488								
d) 67,890								
e) 23,789								
f) 61,000								
g) 23,417								
h) 54,386								

Average

Average is a representative value for a group of values.

Here are the marks in mathematics of top 5 students in section A and section B of class V Which group has performed better?

V A	100	99	98	97	91
V B	99	99	98	98	91

Sum of the toppers marks in sec A is 485 and Sum of the toppers marks in sec B is 485.

Average marks of top 5 in Section A = $\dfrac{\text{Sum of the marks}}{\text{number of students}} = \dfrac{485}{5} = 97$

Average marks of top 5 in Section B = $\dfrac{\text{Sum of the marks}}{\text{number of students}} = \dfrac{485}{5} = 97$

What do you observe?

Average marks of students in both sections = 97

Thus by calculating and comparing average marks we find that students from both the sections have performed equally well.
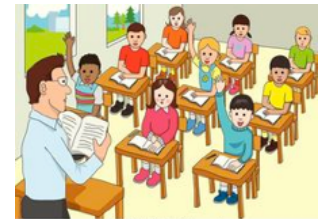
Average = sum of the quantities ÷ number of quantities.

1. Average $= \dfrac{\text{Sum of the items}}{\text{number of items}}$

2. Sum of the items $=$ Average x Number of items

3. Number of items $=$ Total ÷ Average

Example 1: The run scored by a cricketer in 11 matches are as follows

111, 98, 42, 79, 101, 89, 97, 82, 89, 67, 58. Find his average score?

Solution :

Total runs scored by the cricketer

111 + 98+ 42+ 79+ 101 +89+97+82+89+67+58 = 913

Average score $= \dfrac{\text{Total runs}}{\text{No. of matches played}} = \dfrac{913}{11} = 83$

Example 2: A train travels 15 km in the first hour, 25 km in the second hour, 35 km in the third hour and 45 km in the fourth hour. Find the average speed of the train per hour.

Solution :

Total distance travelled by the train = 15 Km + 25 Km + 35 Km + 45Km

= 120 Km

Time taken to travel 120 Km   = 4 hours

Average speed = $\dfrac{120 \text{ Km}}{4}$ = 30 Km

EXERCISE 3.8

1. Find the average of the following.
   a)   10, 20, 30, 40, 50.
   b)   52, 58, 55, 60, 68, 87, 54 , 46
   c)   ₹ 100, ₹ 120, ₹ 150, ₹ 155, ₹ 175 , ₹ 164
   d)   21 cm, 15 cm, 23 cm, 14 cm, 27 cm, 19 cm, 14 cm.

2. Find the average of the first four multiples of 6.

3. The monthly income of Mr.Rahul, a labourer, are given below

Months	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
₹	480	430	350	420	480	480	520	500	498

Find his average monthly income

Applications in Real Life :

4. A group of students are taken to a farm to understand how crops are harvested. They travelled by bus. They covered a distance of 42km during the first hour, 50 km in the second hour, 55 km in the third hour and 44 km in the fourth hour. Find the average distance covered in one hour.

5. Neha reads 72 pages of a story book in 12 days. Find the average number of pages she reads in a day.

Higher Order Thinking Skills

➢ The average marks scored by a class of 25 students in English exam is 82. What is the total marks scored by them?

(Total marks = Average × number of students.)

Unitary Method

If you are given the cost of one object, how do you find the cost of many objects?

We do this by multiplying the cost of one object with the number of objects.

Example 1 : The cost of 1 book is ₹ 50. What is the cost of 4 books?

$$\text{Cost of 4 books} = \text{Cost of 1 book} \times 4$$
$$= ₹ \ 50 \times 4$$
$$= ₹ \ 200$$

If you are given the cost of several objects how do you find the cost of a different number of the same object?

Cost of many ÷ → Cost of one

Unitary method

Cost of one × → Cost of many
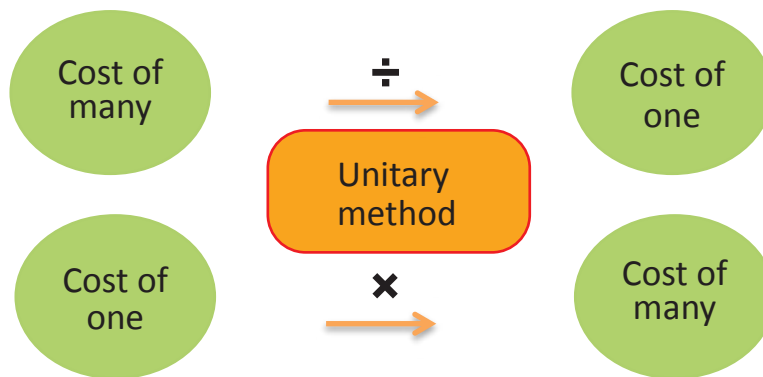
Example 2 : A box of 12 pencils cost ₹ 60. Dora would like to buy 5 pencils. How much will she have to pay?

Step 1 : Find the cost of 1 pencil.

$$\text{Cost of 1 pencil} = \text{Cost of 12 pencils} \div 12$$
$$= ₹ \ 60 \div 12$$
$$= ₹ \ 5$$

Step 2 : Find the cost of 5 pencils.

$$\text{Cost of 5 pencils} = \text{Cost of 1 pencils} \times 5$$
$$= ₹ \ 5 \times 5$$
$$= ₹ \ 25$$

EXERCISE 3.9

1. The cost of 7 bowls of vegetable salad is Rs.210. Find the cost of 3 bowls of vegetable salad.

2. A school compound wall that is 48m long was painted beautifully by students in 6 days. If they painted the same length of wall every day, find the length of the wall painted in the first 4 days.

3. In a factory, 30 workers make 360 pillows a day, if all of them make the same number of pillows find the number of pillows made in a day if 5 workers are on leave.

4. The rent of a house is ₹ 36,000 per year. What is the rent for 8 months?

5. If 8kg of mangoes cost ₹ 256, what is the price of 6kg of mangoes?

6. A question paper has 10 questions without any choice. Each question carries equal marks. The maximum marks that could be scored is 50. If you get 6 questions right in the test, what would be your test score?

7. The distance covered by a car in 13 hours is 663 Km. If the car had maintained the same speed throughout the travel, what would have been the distance covered by the car in 5 hours?

8. The train fare from Mumbai to Chandigarh for 6 persons is ₹ 3582. What is the fare for 10 persons?

Subject Integration – Cross Curricular Activity

1) If 1,440, 000 trees are planted each hour, how many trees would be planted in 30 minutes? _____

2) As a part of afforestation drive , an organization distributed 480 saplings. They wanted to plant them equally in 10 rows. How many saplings would be planted in 7 rows? _____ .
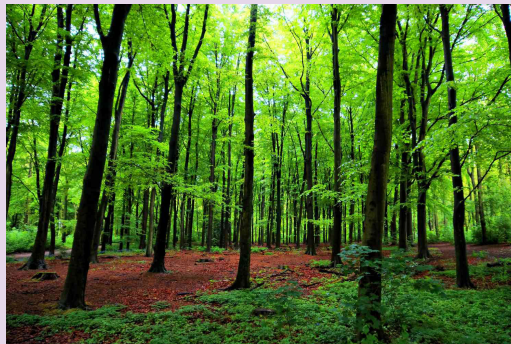
Worksheet

1) How many sets of 9 can you make in 819?

2) If we divide 147630 by 100, the quotient is
   a) 14763   b) 1476   c) 630   d) 30

3) Shiva baked 2000 cookies. He sold 800 of them and gave the rest equally to 20 of his friends. How many cookies did each friend get?
   a) 1200   b) 600   c) 30   d) 60

4) A residential complex has 25 buildings with 12 floors in each building. If each floor has to be fitted with 20 doors, how many doors need to be fitted?

   a) 2400   b) 3000   c) 5000   d) 6000

5) If the quotient is 0, divisor is 59, then the dividend is _____.

6) 14 dozen ÷ 7 = _____.

7) If ₹ 2100 is distributed equally among 30 children, each one will get _____.

8) The average of first 5 odd numbers is _____.

9) If the average expense of a family per week is ₹ 1330, the daily expense is _____.

10) The cost of 100 plastic buckets is ₹ 2600. The cost of 30 such buckets would be ₹ _____.

11) 1 leap year = _____ weeks + _____ days.

12) In a chocolate factory there are 2 machines. The first machine produces 85 chocolates per day and the second one produces 90 chocolates per day. How many chocolates will be produced in February 2024?
    (Hint : Find out the number of days in February 2024)

13) Rita had ₹ 500. She bought 8 dozen bangles at the cost of ₹ 30 a dozen, 6 dozen bindhi packets for ₹ 5 a dozen. How much would be left with her after the purchase?

14) The cost of 2 tables and 6 chairs together is ₹ 2,400. Find the cost of each table if the cost of a table is equal to that of the a chair.

15) Divide the greatest 4-digit number by the product of 13 and 7.

Logical Reasoning

1) M is older than R. Q is younger than R and N. N is not as old as M. who is the eldest amongst all?

   a) M   b) R   c) M or R   d) none of the above

2) If Sneha goes for guitar classes only on even number of dates in August 20XX, then how many days she does not go for guitar classes? (Assume that the 4th Saturday and all Sundays are holidays.)

August 20XX						
Sun	Mon	Tue	Wed	Thu	Fri	Sat
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

   a) 18   b) 19   c) 21   d) 12

3) If P = 12, Q = 13 and R = 6 then find the value of (P X Q) ÷ R.

   a) 12   b) 6   c) 26   d) 11

4) If

   = 1176

   = 784

   = ?

   a)1658   b) 1568   c) 2568   d) 2658

5) Find the mirror image of the word NATIONAL

   a) ⅃ANOITAN   b) ⅃ANOITAN   c) ⅃AN OITAN   d) ⅃ANOITAN

FACTORS AND MULTIPLES

Learning outcomes

List the multiples and factors of a number.

Check divisibility of a number by 2,3,4,5,6,9 and 10

Differentiate between prime and composite numbers.

Find the prime factors of a number.

Find the HCF and LCM of two or more numbers.

Multiples in real life.

Govindamma a small florist, sells flowers near the temple every day in the morning and evening. She gets flowers from the wholesale flower market. She usually sells the remaining roses and marigolds in numbers after making garlands. One particular day she found a few roses remaining after making the garlands.

She preferred to make 6 groups of 5 each. How many roses did she use for grouping?

6 x 5 = 30

No. of groups (Multiplicand)   No. of roses in each group (Multiplier)   Total (Multiple)

The multiplicand and the multiplier are the factors of the multiple. (OR)

A multiple is the product of two or more factors.

For example,

1 x 4 = 4   4 is a multiple of 1 and 4

2 x 4 = 8   8 is a multiple of 2 and 4
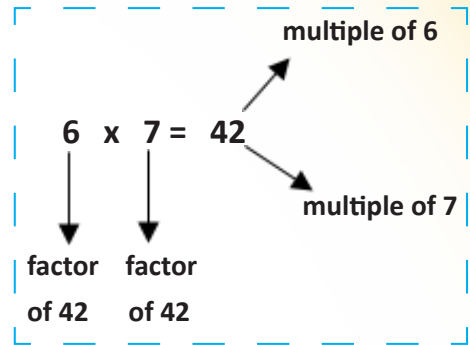
3 x 4 = 12   12 is a multiple of 3 and 4

4 x 4 = 16   16 is a multiple of 4

A multiple of a number is exactly divisible by the number. It is obtained by multiplying the number by **1, 2 , 3 ,4 , 5 , ….etc.**

In 4 x 5 = 20, 20 is a _____ of 4 and 5.

In 3 x 9 = 27, 27 is a _____ of 3 and _____.

6 x 7 = 42 → multiple of 6

6 x 7 = 42 → multiple of 7

factor of 42   factor of 42

Properties of Multiples

PROPERTIES OF MULTIPLES

1. Every number is a multiple of 1.

2. Every number is a multiple of itself.

3. Multiple of a number is always greater than or equal to the number.

4. A number has an infinite number of multiples. Hence we cannot find the largest multiple of a number.

Note:

Multiple of an even number is always even.

Multiple of an odd number can be odd or even.

Common Multiples

The first 10 multiples of 2 - 2, 4, **6,** 8, 10, **12,** 14, 16, **18,** 20

The first 10 multiples of 6 – **6, 12, 18,** 24, 30, 36, 42, 48, 54, 60

Common multiples   - 6, 12, 18

EXERCISE 4.1

1. Write the first 10 multiples for each of the following numbers.

   a) 5   b) 7   c) 9   d) 10   e) 15   f) 20   g) 50   h) 19

2. Find the first 10 multiples of each of the following pairs of numbers. Then list the common multiples.

   a) 3, 7   b) 12, 15   c) 10, 25   d) 16, 8   e) 11, 9   f) 12, 8

   g) 6, 21   h) 3, 6, 9   i) 4, 5, 2   j) 6, 5, 10   k) 4, 7, 14

3. The smallest even multiple of 4136 is _____.

4. The third odd multiple of 107 is _____.

5. Find the sum of the first 5 even multiples of 23.

6. Find the sum of the 6th multiple of 12 and 10th multiple of 59

7. Narumugai was curious to know the password of her mother's mobile. When she asked her mother, she got a clue. Help her find the password.
'It is the difference between the 57th multiple of 146 and 19th multiple of 238'

8. The product of 11th multiple of 6 and 50th multiple of 50 is _____.

Rules of divisibility

The rules of divisibility will help you find quickly whether a number is divisible by another.

A number is divisible by

If the ones digit is 0 , 2, 4 ,6 or 8

Examples: 368, 7270

> The rules of divisibility also help us to the find factors easily

If the ones digit is 0 or 5

Examples: 6985, 84000

If the ones digit is 0

Examples: 69870, 15300

A number is divisible by

If the sum of the digits is divisible by 3

Example: 8412 ➡ 8 + 4 + 1 + 2 = 15 ; 15 is a multiple of 3

Hence 8412 is a multiple of 3.

If the sum of the digits is divisible by 9

Example: 6759 ➡ 6 + 7 + 5 + 9 = 27; 27 is a multiple of 9

Hence 6759 is a multiple of 9

A number is divisible by

If the number formed by the last 2 digits is divisible by 4 or if the ones and tens digits are zero

Examples: 92**36** ➡ 9236 is divisible by 4 because 36 is a multiple of 4

81**00** ➡ 8100 is divisible by 4 because ones and tens digits are zeroes

```
          2 0 2 5
  4  | 8 1 0 0
       - 8 ↓ ↓
       ---------
         0 1 0
          -  8
       ---------
             2 0
           - 2 0
       ---------
               0
       ---------
```

If it is divisible by both 2 and 3

Example: 185**4**

a) Ones digit is an even number and hence it is divisible by 2

b) Sum of the digits is 1 + 8 + 5 + 4 = 18. Hence, it is divisible by 3

c) Since 1854 is divisible by both 2 and 3, it is also divisible by 6

EXERCISE 4.2

1) Circle the numbers that are divisible by 2
   a) 98,936 b) 28,71,209 c) 7,80,198 d) 4,30,50,000 e) 345,022

2) Circle the numbers that are divisible by 5
   a) 406,785 b) 10,15,785 c) 9,60,199 d) 3,10,422 e) 6,00,000

3) Circle the numbers that are divisible by 10
   a) 34,975 b) 23,180 c) 7,25,611 d) 4,960 e) 50,005

4) Circle the numbers that are divisible by 3
   a) 13,629 b) 85,472 c) 11,901 d) 5,22,184 e) 33,549

5) Circle the numbers that are divisible by 9
   a) 74,448 b) 3,009 c) 8,71,677 d) 29,047 e) 2,43,887

6) Circle the numbers that are divisible by 4
   a) 35,016 b) 1,29,029 c) 15,044 d) 6,02,008 e) 73,058

7) Circle the numbers that are divisible by 6
   a) 81,00,429 b) 34,31,286 c) 15,47,708 d) 2,75,346 e) 2,00,000

8. Complete the table. Put ✓ if yes and ✗ if no.

Number	Divisible by						
	2	3	4	5	6	9	10
88							
100							
340							
603							
285							
1800							
207							

9. Find the smallest number that should be subtracted from 5001 to make it divisible by 4.

10. What should be added to 9,536 to make it divisible by both 3 and 10?

11. Fill in the box with the smallest possible number to make it divisible by 9.

a) 7 ☐ 521   b) ☐ 914   c) 170 ☐ 56

12. If a number ends in zero, it is divisible by ____, _____ and _____.

13. The smallest multiple of 3 that is divisible by 10 is _____.

14. Write true or false

a) If a number is divisible by 9, it is also divisible by 3 _____

b) If a number is divisible by 5, it is also divisible by 10 _____

c) If a number is divisible by 2, it is also divisible by 4 _____

15. Find the greatest 2-digit number divisible by both 5 and 3.

16. Find the 4-digit number between 5328 and 5347 which is divisible by both 2 and 9.

17. Find the smallest digit possible for P and Q so that the sum of 2P468 and 319Q is divisible by both 5 and 9.

18. Find the greatest 2-digit number divisible by 6.

19. Check whether 96 is divisible by both 4 and 3.

20. What is the least possible number by which 15 has to be multiplied to make it divisible by 9?

Prime and composite numbers

Prime numbers between 1 and 100 – The sieve of Eratosthenes

A Greek Mathematician, named Eratosthenes found a simple method of finding prime numbers from 1 to 100. This method is called the Sieve of Eratosthenes.

1	②	③	4̶	⑤	6̶	⑦	8̶	9̶	1̶0̶
⑪	1̶2̶	⑬	1̶4̶	1̶5̶	1̶6̶	⑰	1̶8̶	⑲	2̶0̶
2̶1̶	2̶2̶	㉓	2̶4̶	2̶5̶	2̶6̶	2̶7̶	2̶8̶	㉙	3̶0̶
㉛	3̶2̶	3̶3̶	3̶4̶	3̶5̶	3̶6̶	㊲	3̶8̶	3̶9̶	4̶0̶
㊶	4̶2̶	㊸	4̶4̶	4̶5̶	4̶6̶	㊼	4̶8̶	4̶9̶	5̶0̶
5̶1̶	5̶2̶	㊿	5̶4̶	5̶5̶	5̶6̶	5̶7̶	5̶8̶	�59㊿	6̶0̶
�61	6̶2̶	6̶3̶	6̶4̶	6̶5̶	6̶6̶	㊻67	6̶8̶	6̶9̶	7̶0̶
㉇71	7̶2̶	㉇73	7̶4̶	7̶5̶	7̶6̶	7̶7̶	7̶8̶	㊻79	8̶0̶
8̶1̶	8̶2̶	㊻83	8̶4̶	8̶5̶	8̶6̶	8̶7̶	8̶8̶	㊻89	9̶0̶
9̶1̶	9̶2̶	9̶3̶	9̶4̶	9̶5̶	9̶6̶	㊻97	9̶8̶	9̶9̶	1̶0̶0̶

- **Shade 1 as it is neither prime nor composite.**
- **Circle 2 as it is prime but cross out all the multiples of 2.**
- **Circle 3 as it is prime, but cross out all its multiples.**
- **Circle 5, but cross out all its multiples.**
- **Circle 7, but cross out all its multiples.**
- **Circle the numbers that are not crossed out.**
- **They are the prime numbers.**

* The numbers that are circled are divisible only by 1 and the number itself. These numbers are called **prime numbers.**

* The numbers that are crossed out are divisible by numbers other than 1 and the same number also. Such numbers are called **composite numbers.**

1 is neither a prime nor a composite number. It is a unique number.

Twin Prime Numbers
If the difference between two prime numbers is 2, they are called twin prime numbers
Examples: 3 and 5, 5 and 7
Can you find some more?

Use the Eratosthenes grid above to answer the following questions.

a. List all the prime numbers from 1 to 100.

b. Which is the only even prime number?

c. Which is the greatest prime number that is less than 50?

d. Which is the greatest prime number that is less than 100?

e. The smallest even composite number is _____.

Prime Triplet

A set of three consecutive prime numbers differing by 2 is called a prime triplet.

(3, 5, 7) is the only triplet.

f.   The sum of the prime numbers between 52 and 63 is _____.

g.   The product of the smallest and greatest prime number between 1 and 100 is ____.

h.   How many prime numbers are one digit numbers? _____.

i.   How many composite numbers are there between 1 and 100? _____.

j.   Write the 2-digit prime numbers which remain prime even when the digits are reversed.

> **Prime numbers have only 2 factors whereas composite numbers have more than 2 factors.**

Factors of a number

A factor of a number divides the number without leaving a remainder.

If 6 x 2 = 12, then 6 and 2 are the factors of 12.

If 7 x 8 = 56, then 7 and 8 are factors of 56.

> **PROPERTIES OF FACTORS**
>
> 1. 1 is a factor of every number.
>
> 2. Every number is a factor of itself.
>
> 3. The factor of a number is smaller than or equal to the number.
>
> 4. The smallest factor of a number is 1.
>
> 5. The greatest factor of a number is the number itself.
>
> 6. A number has finite number of factors. Every number (other than 1) has at least two factors, the number itself and 1

> **Note: Factors of an odd number are always odd.**
> **Factors of an even number can be both odd and even.**

Note – Factors of a number can be found by multiplication or division.

Finding factors by listing method.

Factors of 15 by multiplication   Factors of 15 by division

1 x 15 = 15   1 and 15 are factors   15 ÷ 1 = 15   15 and   1 are factors

3 x 5 =15   ____ and ____ are factors   15 ÷ 3 = 5   _____ and _____are factors

The factors of 15 are 1, 3, 5, and 15.

1. List the factors of each of the following numbers.

   a) 56   b) 24   c) 36   d) 78   e) 81   f) 100   g) 50

2. Find the factors of each of the following pairs of numbers and list their common factors.

   a) 18, 21   b) 14, 16   c) 65, 78   d) 35, 42   e) 26, 39

   f) 8, 16, 40   g) 10, 20, 50   h) 12, 36, 54

3. How many factors does 38 have? _____.

4. Find the sum of the odd factors of 27.

5. Find the number whose product of the factors is the number itself.

Prime factorisation

All numbers can be broken into their factors.

But prime numbers have only 2 factors-one and the number.

When all the factors of a composite number are prime, it is called prime factorisation of the number.

20   ←   **composite number**   →   20

10 x 2   4 x 5

2 x 5 x 2   ←   **prime numbers**   →   2 x 2 x 5

Prime factorisation of 20 = 2 x 2 x 5

81   70

9 x 9   7 x 10

3 x 3 3 x 3   2 x 5
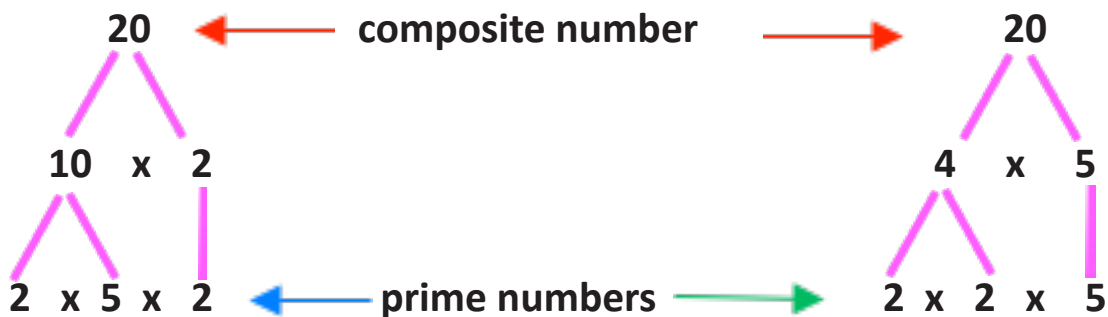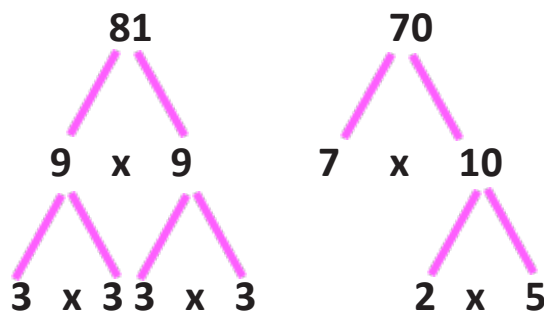
Prime factorisation of 81=3 x 3 x 3 x 3   Prime factorisation of 70=7 x 2 x 5

Finding the prime factors of a number

Factor tree method:

To find the prime factors of 24 we can use factor tree method and factorise until all factors are prime.

24

Start with the smallest prime factor of 24	→	(2) x 12

Circle all prime factors in the tree. Their product gives the prime factorisation of 24

Smallest prime factor of 12	→	(2) x 6

Smallest prime factor of 6	→	(2) x (3)

Stop when all the factors are prime
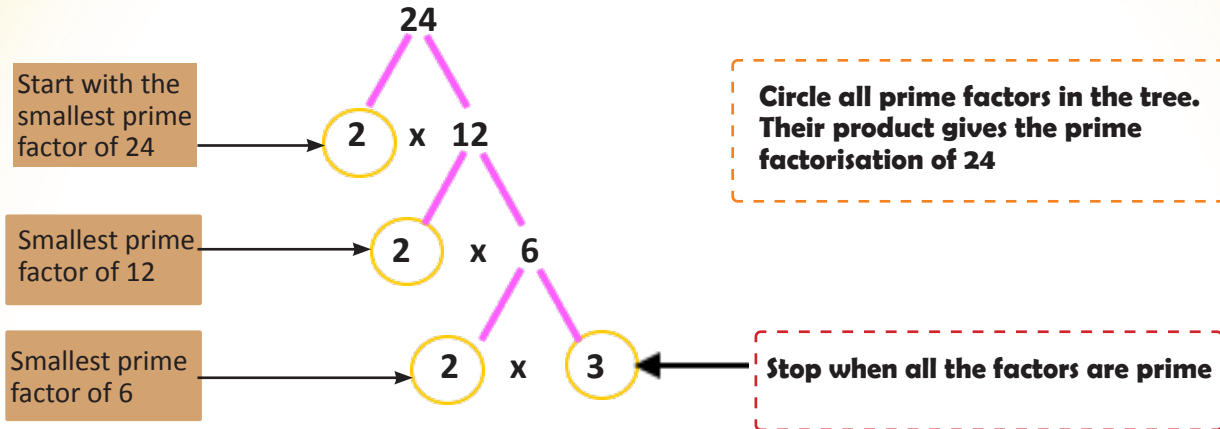
Prime factorisation of 24 = 2 x 2 x 2 x 3

Division method:

To find the prime factors of 24

* 24 is divisible by the prime numbers 2 and 3

* So divide the given composite number by the first prime number 2. Continue dividing by 2 until the quotient is not divisible by 2.

*Then proceed division by the next prime number 3 and so on.

*The process can be continued until the final quotient is a prime number.

```
2 | 24
2 | 12
2 | 6
    3
```

Prime factorisation of 24 = 2 x 2 x 2 x 3

EXERCISE 4.4

1. Find the prime factors by constructing factor trees.

   a) 25   b) 12   c) 48   d) 52   e) 40

   f) 32   g) 60   h) 57   i) 82   j) 78

2. Find the prime factors by division method.

    a) 56   b) 91   c) 50   d) 81   e) 63

    f) 34   g) 64   h) 85   i) 72   j) 100

Highest Common Factor (HCF)

Factors of 16 = 1, 2, 4, 8, 16

Factors of 24 = 1, 2, 3, 4, 6, 8, 12, 24

Factors of 16

Factors of 24

1   2

4 8 16

1 2 3

4   6 8
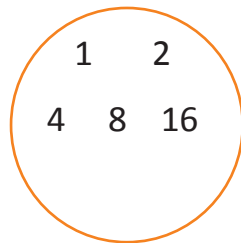
12 24
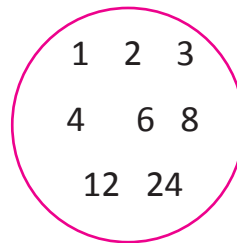
Common factors of 16 and 24

Factors of 16   Factors of 24

3

16   1   6

     2 8

     4   12

     24
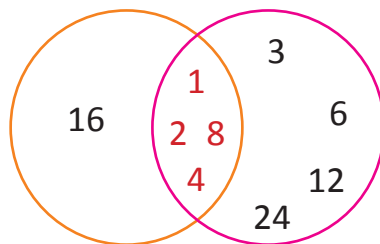
The HCF of two or more numbers is the greatest number that divides both the numbers without leaving any remainder

To find HCF using Prime Factorisation

Let us find HCF of 32 and 40 using prime factorisation

Step 1: Prime factorise the given numbers.

    $32 = 2 \times 2 \times 2 \times 2 \times 2$

    $40 = 2 \times 2 \times 2 \times 5$

Step 2: Find the common factors. The common factors are 2, 2, 2

Step 3: Multiply the common factors

    $2 \times 2 \times 2 = 8$

Step 4: HCF of 32 and 40 = 8

DO YOU KNOW All sets of prime numbers are co-prime. All co-prime numbers need not be prime numbers.

52

EXERCISE 4.5

1. Find the common factors of these numbers. Then find their HCF.

Numbers	Factors	Common Factors	HCF
3 12			
4 28			
9 27			
14 35			
20 50			

2. Find the H.C.F by listing method.
   a) 18 ,14   b) 16,10   c) 36, 42   d) 18,32   e) 14 ,42   f) 32, 36

3. Find the H.C.F by prime factorisation method.
   a) 28, 14   b) 49, 77   c) 15, 45   d) 16, 56   e) 33, 22
   f) 4, 16, 32   g) 48, 26, 64   h) 12, 36, 72   i) 13, 36, 52   j) 81, 93

4. Are 15 and 26 co-prime?

5. Two consecutive numbers are always co-prime. Yes/No

6. Write the composite number between the greatest 2-digit twin primes.

NOTE:

If one number is a multiple of another, then the greater number is the LCM and the smaller number is the HCF of the numbers.

7. Identify the co-primes
   a) 23, 46   b) 22, 23   c) 22, 24   d) 22, 46

8. Find the H.C.F and the L.C.M of the following (Hint: Refer the note given)
   a) 1,8   b) 24, 6   c) 17, 34   d) 25,5
   e) 22, 110   f) 18,72   g) 67,134   h) 91,182

Some numbers such as 7 and 9 have only 1 as their common factor,they are called co-prime numbers. The HCF of co-prime numbers is 1. Can you find some more co- prime numbers?

Least Common Multiple (LCM)

Let's take two numbers: say, 2 and 5. Each will have its own set of multiples.

- •Multiples of 2 are 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, …
- •Multiples of 5 are 5, 10, 15, 20, 25,30,35,40,45,50,…
- •Common multiples of 2 and 5 – 10 and 20

Finding common multiples on a number line
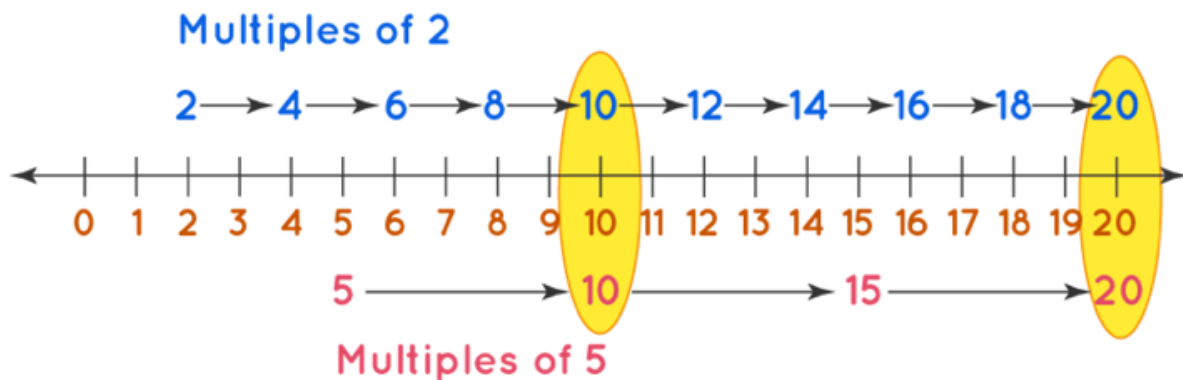
Thus, the common multiples of 2 and 5 are 10, 20,…

The least common multiple of 2 and 5 is 10. It can be written as LCM of 2 and 5 = 10

> **The LCM of two or more numbers is the smallest number that can divide them without leaving a remainder.**

LCM by division method

Example 1: Find the LCM of 12, 18 and 24

Step 1: Divide by a prime number that divides all the 3 numbers or at least two numbers exactly.

Step 2: Keep dividing by prime numbers until the last row becomes 1 or prime numbers.

Step 3: Multiply all the divisors.   LCM = 2 x 3 x 2 x 3 x 2 = 72

$$\begin{array}{c|ccc} 2 & 12, & 18, & 24 \\ 3 & 6, & 9, & 12 \\ 2 & 2, & 3, & 4 \\ \hline & 1, & 3, & 2 \end{array}$$

LCM = 2x3x2x3x2

= 72

Example 2: Find the LCM of 20,10, 30

Step 1: Divide by a prime number that divides all the 3 numbers or at least two numbers exactly.

Step 2: Keep dividing by prime numbers until the last row becomes 1 or prime numbers.

Step 3: Multiply all the divisors.   LCM = 2 x 5 x 2 x 3 = 60

$$\begin{array}{c|ccc} 2 & 20, & 10, & 30 \\ 5 & 10, & 5, & 15 \\ 2 & 2, & 1, & 3 \\ 3 & 1, & 1, & 3 \\ \hline & 1, & 1, & 1 \end{array}$$

LCM = 2x5x2x3

= 60

54

1. Find the multiples, common multiples and then the LCM.

	Numbers	First 10 multiples	common multiples	LCM
1	2	2,4,6,8,10,12,14,16,18,20	6,12,18	6
	3	3,6,9,12,15,18,21,24,27,30		
2	5			
	4			
3	10			
	20			
4	7			
	6			
5	6			
	8			
6	9			
	4			

2. Find the LCM by the division method.

a. 12,15   b. 21,14   c. 20,10   d. 32,36

e. 15,12   f. 99,81   g. 56,16,48   h. 35,42,49

i. 40,50,90   j. 22,44,66   k. 18,36, 90   l. 15,45,75

Higher Order Thinking Skills

1. A box had some pens in it. When the pens are distributed equally to 18 children, none remained but while distributing to 19 children, 5 children got 1 pen less than the others. How many pens were there in the box?

   a.70   b. 76   c. 85   d. 90

2. Two toy trains start at the same time. The first one stops after every 5 seconds and the second one stops after every 4 seconds. How many times do they stop together in 1 minute?

   a) 4   b) 2   c) 3   d) 5

3. Write the pair of prime numbers whose difference is 1.

4. Study the pattern given:

$$4 = 2 + 2$$
$$6 = 3 + 3$$
$$8 = 3 + 5$$
$$10 = 3 + 7$$

Here, a composite number is expressed as the sum of two prime numbers. Write each of the following composite number in the same manner:

a) 20　　　　　b) 38　　　　　c) 52　　　　　d) 74

Let's have fun! - Choose a number. Multiply it by itself. Subtract the number from the product. Add 11. Find what you get – a prime number or a composite number.

Worksheet

1. I am a factor of 96 and a common multiple of 4, 6 and 8. The sum of my digits is 12. What number am I?

　a) 24　　　　　b) 48　　　　　c) 66　　　　　d) 56

2. How many multiples of 13 are more than 25 and less than 100?

　a) 5　　　　　b) 6　　　　　c) 13　　　　　d) 10

3. Which among the following are multiples of 14?

　a) 488　　　　　b) 512　　　　　c) 708　　　　　d) 448

4. In an album stamps can be arranged exactly as 12 per page or 18 per page. What is the greatest number of stamps one can have, if they are fewer than 500 and if they have to be exactly fitted in the album?

　a) 468　　　　　b) 486　　　　　c) 492　　　　　d) 432

5. Write any 2 pairs of prime numbers whose sum is also a prime number.

6. When the second multiple of 19 is added to the third multiple of 14 we get _____.

7. When the greatest factor of 30 is divided by 6 we get _____.

8. Sheela has stickers of a certain number that she could arrange in rows of 4 or 6. What is the least number of stickers she has?

9. Two ropes 12m and 18m long are cut into small pieces of the same length. What can be maximum length of each piece?

10. Every weekend Rakesh, Vishvesh and Batra visit an old age home. The rooms there are numbered from 1 to 50. Rakesh visits rooms which have numbers that are multiples of 2. Vishvesh visits those rooms whose numbers are multiples of 4. Batra visits every room.

    a) In which room numbers do all the three friends meet ?

    b) What do you learn from their weekend activity?

    c) Do you help old people? If yes, in what way?

Logical Reasoning

1. How many different possible combinations of ice cream scoops and toppings can be formed from 5 different flavours and 6 different toppings?

Ice cream flavours   Toppings

   a) 11   b) 25   c) 36   d) 30

2.   The Vanilla cake is larger than a Coconut cake. The Chocolate cake is larger than the Vanilla cake but smaller than the Mango cake. Which of the following is the correct order of cakes from the largest to the smallest?

a) Vanilla, Coconut, Chocolate, Mango

b) Mango, Chocolate, Coconut, Vanilla

c) Mango, Vanilla, Chocolate, Coconut

d) Mango, Chocolate, Vanilla, Coconut

Subject Integration – Cross Curricular Activity

Paper can be made from different trees, but 85% of paper is produced from softwood trees. The cellulose of softwood trees are longer, making the paper stronger. Examples of softwood trees are spruce, fir and pine.

Scotch pine   Larch   Spruce   Nordmann fir   Mountain pine
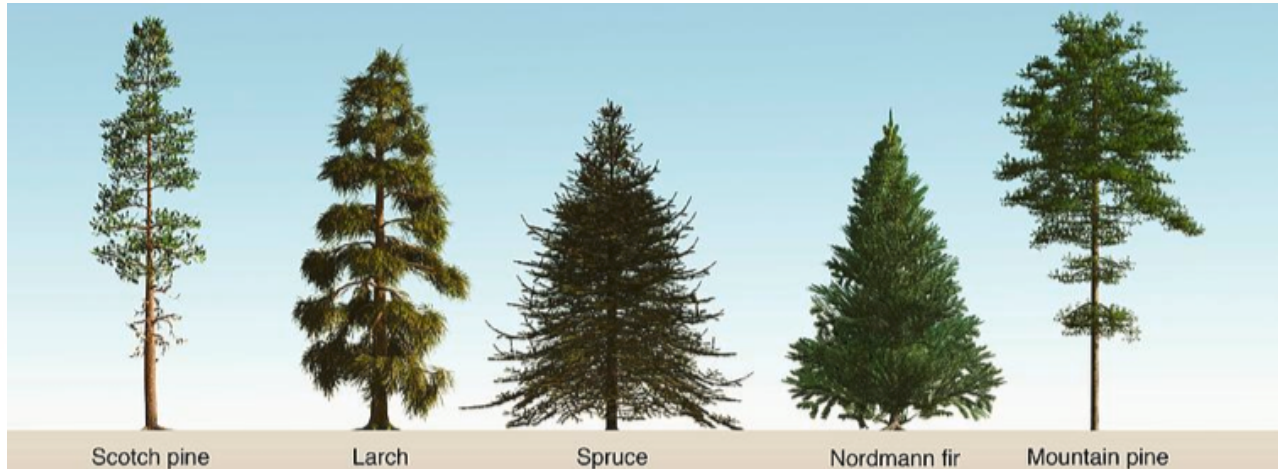
Did you know, one pine tree can produce around 80,500 sheets of paper?

80,500 sheets = _____ reams = _____ quires.

The art teacher of class 5 distributed 6 quires, 4 quires, 5 quires and 3 quires of colour papers to sections A, B, C and D respectively for making wall hangings as a part of children's day celebrations.

a) 6 quires + 4 quires = _____ sheets

b) 3000 sheets = _____ reams

c) What would be the minimum number of quires needed so that all classes get equal number of quires?

> **A quire of paper is a measure of paper quantity. The usual meaning is 25 sheets of the same size and quality: 1/20 of a ream of 500 sheets.**

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5 GEOMETRY
PART I

Learning Outcomes

Know the basics of geometry – Point, line, line segment and ray

Measuring and drawing line segments

Observe and appreciate the patterns and tessellations in nature

Geometry In Real Life

Geometry is used in different fields such as art, measurement and architecture. Glorious temples, grand palaces, huge dams, solid and broad bridges are a few examples of how geometry can helps us in our day to day life. In addition to construction and measurements, it has also influenced modern fileds like engineering, biochemical modelling, designing, computer graphics, and typography.
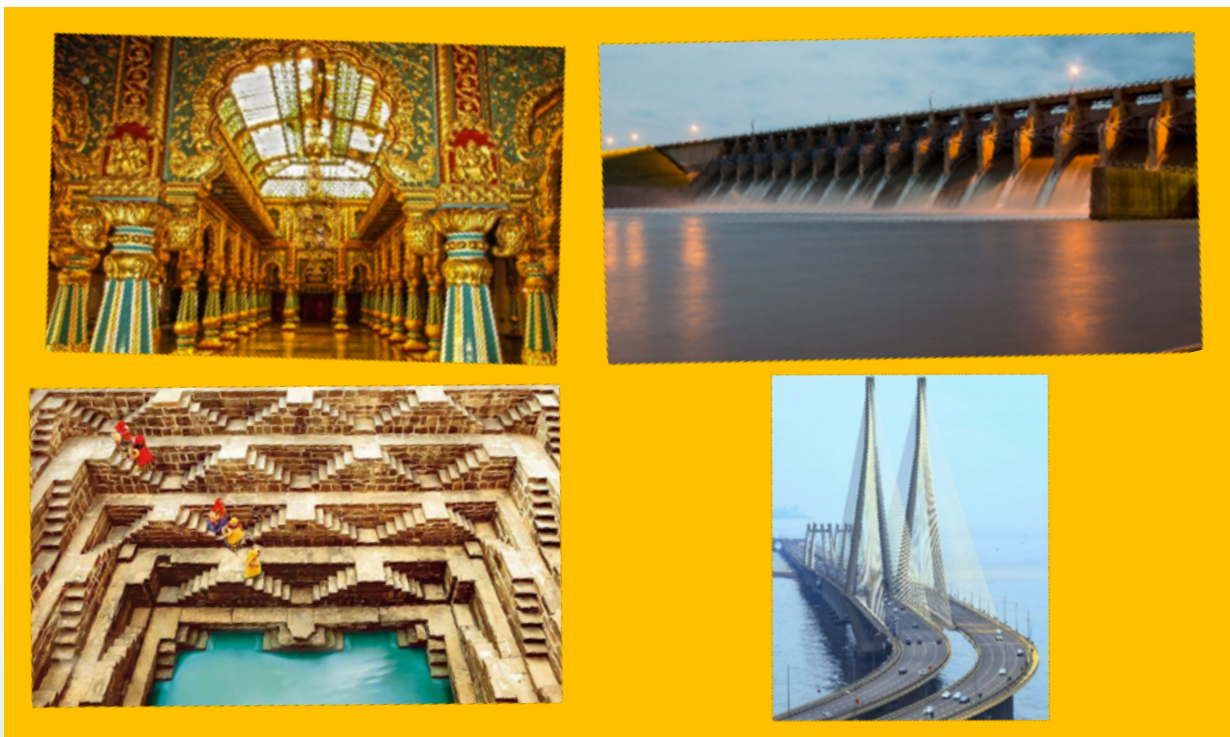
Principles of geometry influence the patterns on our dresses, the design on the carpets and a lot more too. Thus geometry is an integral part of our lives.

List a few things in your kitchen that are made using geometric shapes

_____

_____

Basic geometrical concepts

Point

A point is a basic unit of geometry. We represent a point by a dot and name it with a capital letter, say A.

• **A**

Some examples of point that you see in daily life are tip of a pencil lead, needle, pin etc.

Line

A line is a collection of points extending endlessly in both the directions along a straight path.

P   Q
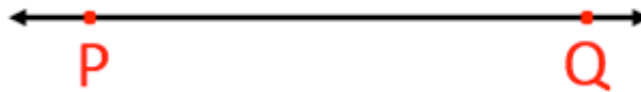
$\overleftrightarrow{PQ}$ is a straight line. The arrows in two directions indicate that it goes endlessly in both the directions. So, a line has no starting point and no end point.

Line segment

A part of a line is called a line segment. It has a starting point and an end point. We name it using start point and end point. Example line segment MN and write it as $\overline{MN}$ OR $\overline{NM}$.

M   N
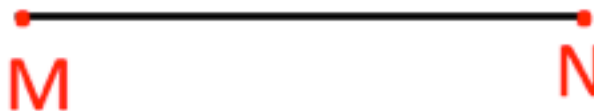
Ray

A ray is a part of a line which has a starting point but goes endlessly in the other direction. The direction in which the ray goes endlessly and the starting point are clearly indicated in the ray and is written as $\overrightarrow{CD}$.

C   D

Geometry was pursued in India in the context of construction of vedis for the yajnas of the Vedic period. The Sulvasutras contain elaborate descriptions of construction of vedis and enunciate various geometric principles. The earliest Baudhayana Sulvasutra dates back to about 800 BC. Baudhayana is known as the "Father of Geometry" for his contribution to science.
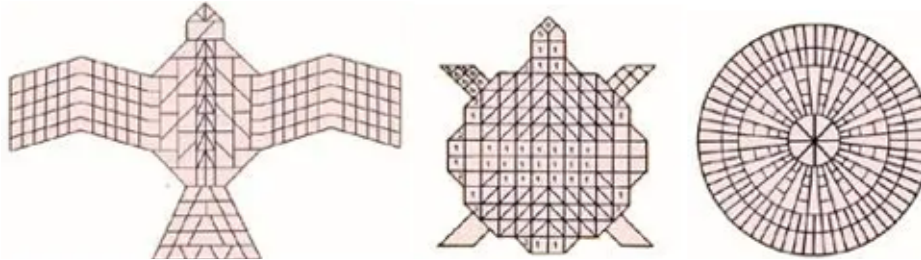
How do you measure a line segment?
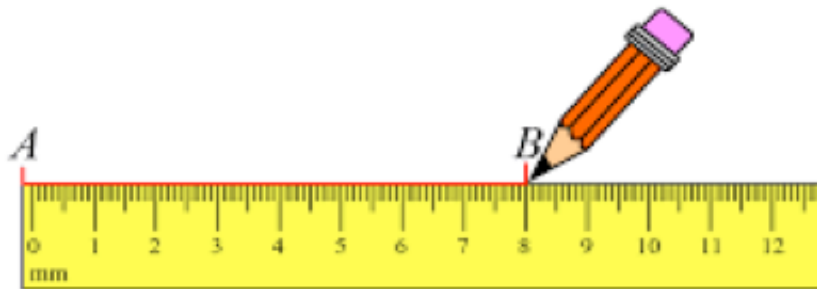
To measure a line segment AB, place the zero marking of the ruler along the beginning of the line. On the scale mark the point where it ends and note the reading. In the figure given above, the length of line segment AB is 8 cm.

Drawing a Line Segment Using Ruler

In order to draw a line segment of the required length, the simplest and the easiest method is to use a ruler.
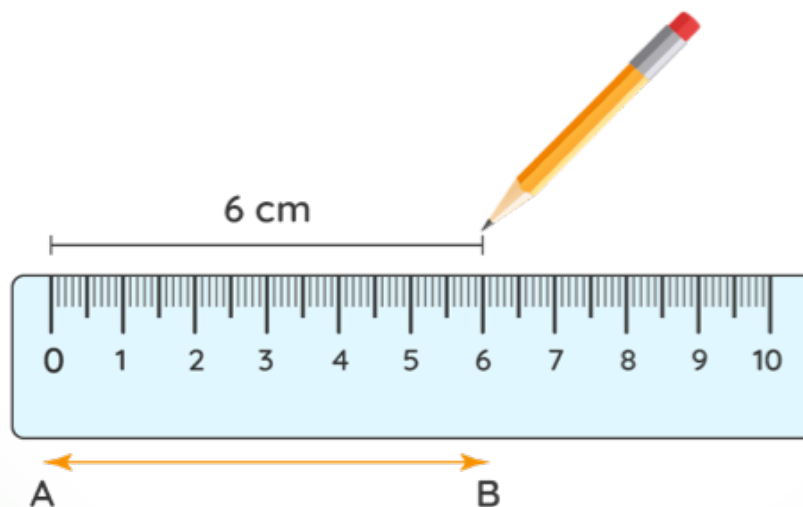
Step 1:   Take a scale and check for its start point, which is zero.

Step 2:   Place the scale on the sheet of paper and mark the starting point of the line segment with a dot on the paper. Mark it as A.

Step 3:   Mark the endpoint of the line segment, that is till the required length, say 6 cm. Mark it as B

Step 4:   Draw a straight line joining the two points. We will get a line segment AB of length 6 cm

EXERCISE 5.1

1. Identify the following as ray, line and line segment.

a)   b) ▬▬▬▬▬▬   c)

2. Draw line segments of the following lengths.

   a) 7 cm   b) 6 ½ cm   c) 8 cm   d) 9 ½ cm   e) 11 cm

3. Place the following objects on the paper. Mark the start and end points of each. Draw the line segment for the length of each object and find the measure.

   (i) A pencil   (ii) A book   (iii) A match stick   iv) Pencil box

4. Identify the lines, line segments and rays. Name them.
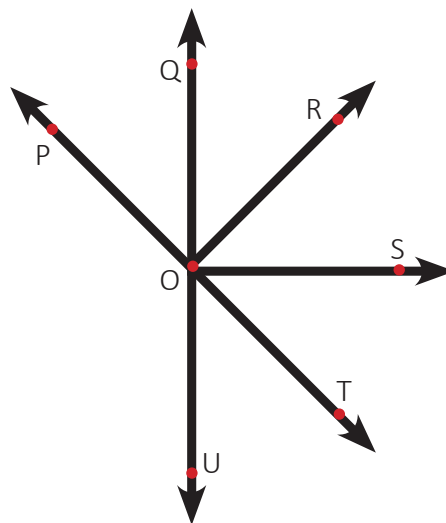
Patterns

Look at the patterns in nature.

A pattern is a sequence of repeated objects or numbers or designs. Patterns in nature are visible regularities of form found in the natural world. These patterns recur in different contexts and can many a times be modelled mathematically. Natural patterns include symmetries, trees, spirals, waves, tessellations, cracks and stripes

Tessellations

Look at the patterns given below and observe carefully
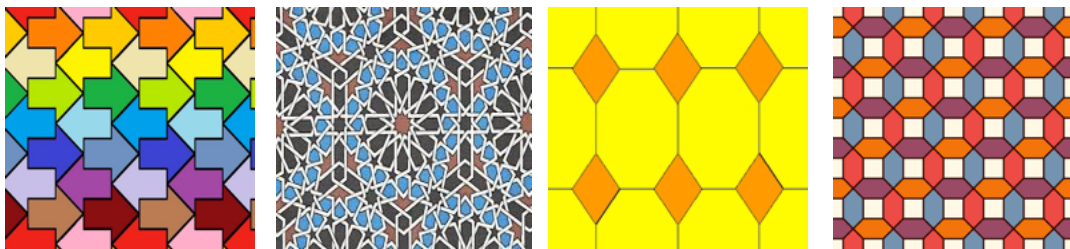
The shapes depicted in the tiles fit together exactly without leaving any gaps. Such patterns are called tilings or tessellations.

Tessellation is an arrangement of shapes closely fitted together, especially of polygons in a repeated pattern without gaps or overlapping. It is tiling over a plane with one or more figures.

> **? DO YOU KNOW**
> The word "tessellation" comes from the Latin term tessera meaning a small, tile-like stone. Tessera was used to make tessellata, meaning mosaics and tilings that decorate ancient Roman buildings.

A circle does not tessellate.

When you fit them together, they leave gaps.
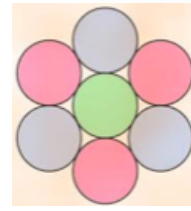
 EXERCISE 5.2

1. Which of the following shapes tessellate?

a)

b)

c)

d)

e)

f)
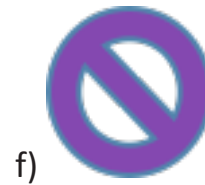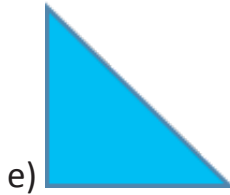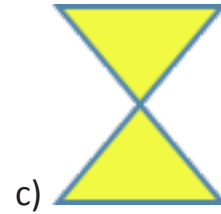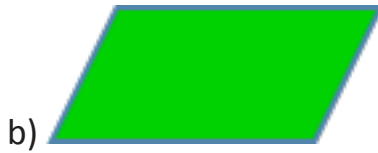
2. Identify the unit shapes in the following tessellation? First one is done for you.

a)

b)
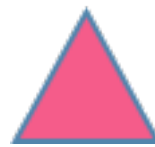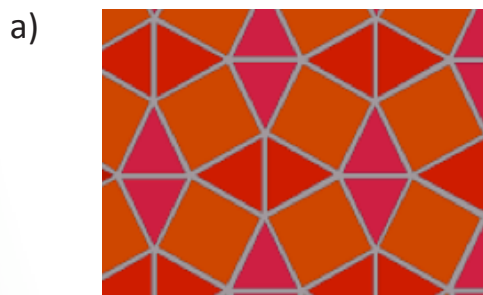
c) _____
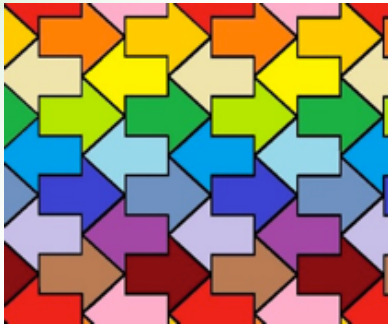
d) _____
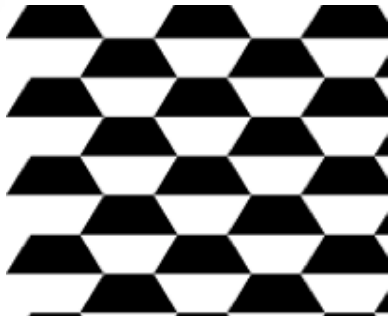
e) _____
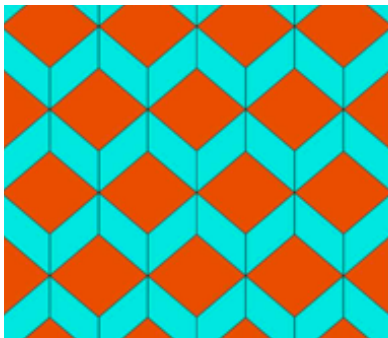
Higher Order Thinking Skills

I Choose the correct answer

1. Which of the following cannot be tessellated?

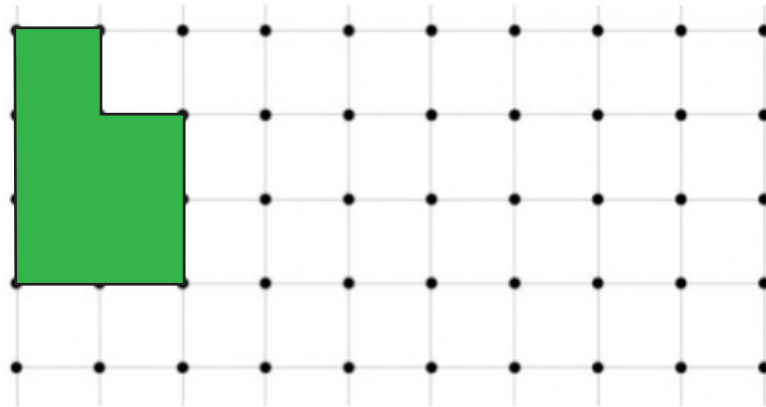a)   b)   c)   d)
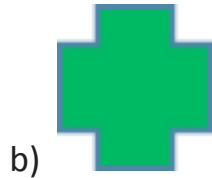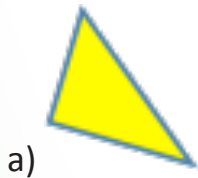
2. How many lines can be drawn through a given point?

   a) 2   b) 1   c) 0   d) many

3. How many squares form the given figure?

Logical Reasoning

1. Select the odd one out

a)   b   ) c)   d)
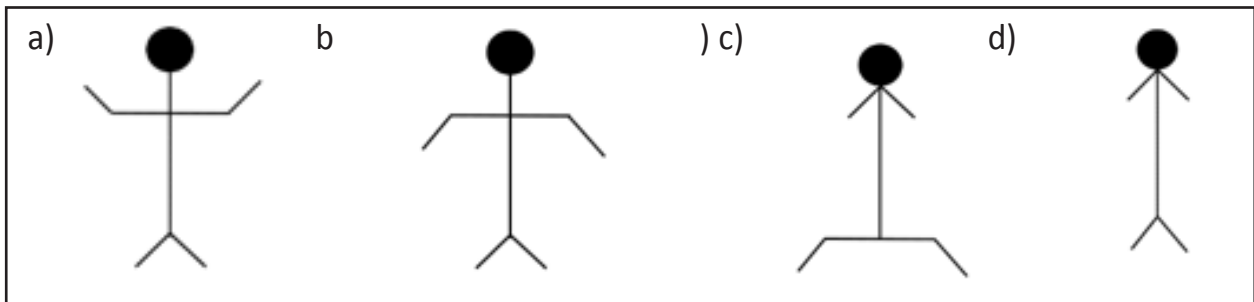
2. Which of the following figures will complete the given figure pattern?

?

a)   b)   c)   d)
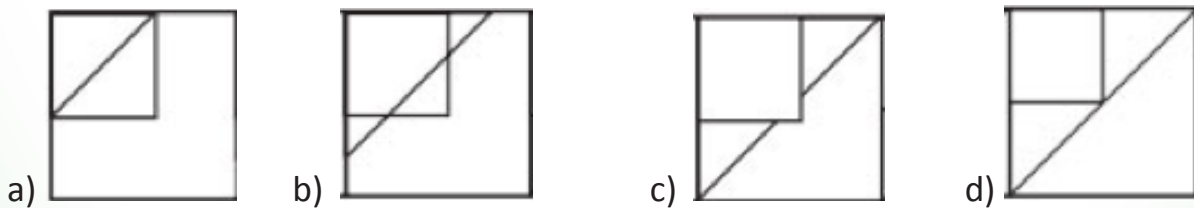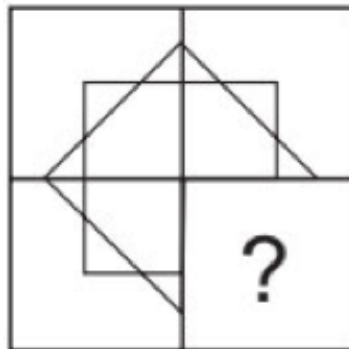
Subject Integration – Cross Curricular Activity

Rani Ki Vav is a step well situated at Patan in Gujarat, India. It has been listed as one of the UNESCO World Heritage Sites in India since 2014.

This step well is designed in such a way that it is divided into seven levels of stairs with sculptural panels. These panels have more than 500 principal sculptures and over a thousand minor ones that combine religious and symbolic imagery.

It was named India's "Cleanest Iconic Place" at the 2016 Indian Sanitation Conference.
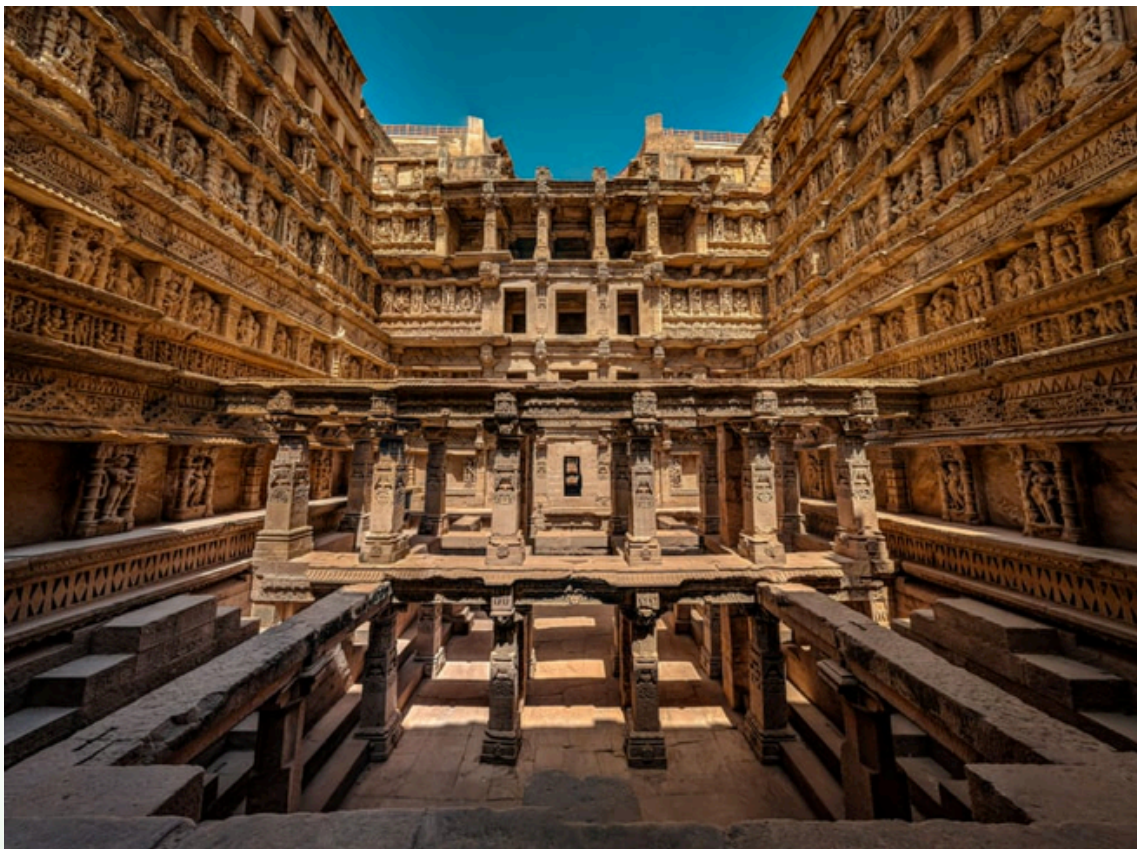
Discuss – The beauty of geometrical patterns of this ancient monument.

Vedic Mathematics

SUTRA: ऊर्ध्वतिर्यग्भ्याम् (URDHVATIRYAGBHYAM)
Meaning: Vertically and Crosswise

Application: To find the product of two numbers

Example : 12 x 33

Example : 26 x 21

12 x 33

3	3+6	6
3	9	2

Ans : 392

Step 1

2	6
2	1

6

Step 2

2	6
2	1

4	6

1 carry over

(2x1) + (2x6) = 2 + 12

= 14

[Retain the units place and carry the tens place]

Step 3

2	6
2	1

5	4	6

(2x2)+1 = 5

3.141592653597932384626433832795O

3.141592653597932384626433832795O