

# Items for Assessment of Learning Outcomes

## Mathematics

## Class 8



राज्य शैक्षिक अनुसंधान और प्रशिक्षण परिषद्  
STATE COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING  
SECTOR-32 UT CHANDIGARH



**CHAPTER: 1**  
**TOPIC: Rational Numbers**

**LEARNING OBJECTIVES:**

**Introduction to Rational Numbers:**

- Define rational number in order to identify whether the given number is a rational number or not
- Apply the properties of natural numbers, whole numbers and integers with respect to all the arithmetic operations and extend them for rational numbers
- Define the additive and multiplicative identity of rational numbers using prior knowledge.
- Define the additive and multiplicative inverse of rational numbers using prior knowledge of integers and fractions
- Apply Distributive property of multiplication over addition for rational numbers and simplify a given expression

**Representation of Rational Numbers on the Number Line:**

- Extend the concepts of number line and represent rational number on the number line

**Rational Numbers between Two Rational Numbers:**

- Calculate and find rational numbers between any two rational numbers and prove that there are infinite rational numbers between any two given rational numbers.

**Learning Outcome:**

- Explores patterns in arithmetic operations in order to generalize properties of addition, subtraction, multiplication and division for rational numbers.
- Calculate rational numbers between any two given rational numbers in order to prove that there are infinite rational numbers between two rational numbers

**QUESTIONS:**

**1. For any rational number  $a$ ,  $a$  divided by zero is \_\_\_\_\_**

- A. Zero
- B.  $a$
- C. not defined
- D. 1

**2. Which number has no reciprocal?**

- A. One
- B. Zero
- C. -1
- D. 2

**3. \_\_\_\_\_ is neither a positive nor a negative rational number.**

- A. Zero
- B. One
- C. -1
- D. 2

**4. Which of the following lies between -1 and 0?**

- A.  $\frac{1}{2}$
- B.  $-\frac{1}{2}$
- C.  $\frac{3}{2}$
- D.  $\frac{2}{5}$

**5. The multiplicative inverse of  $-\frac{3}{5}$  is \_\_\_\_\_.**

- A.  $\frac{3}{5}$
- B.  $-\frac{3}{5}$
- C.  $-\frac{5}{3}$
- D.  $\frac{5}{3}$

**6. What should be subtracted from  $-\frac{5}{4}$  to get -1?**

- A.  $-\frac{1}{4}$
- B.  $\frac{1}{4}$
- C. 1
- D.  $-\frac{3}{4}$

**7. What should be added to  $-\frac{3}{4}$  to get -2**

- A.  $\frac{11}{4}$
- B.  $\frac{10}{3}$
- C. -2
- D.  $\frac{3}{5}$

**8. Which of the following is the product of  $\frac{7}{8}$  and  $-\frac{4}{21}$**

A.  $-\frac{1}{6}$

B.  $\frac{1}{12}$

C.  $\frac{3}{4}$

D.  $\frac{1}{2}$

**9. Which number is in the middle if  $-\frac{1}{6}$ ,  $\frac{4}{9}$ ,  $\frac{6}{-7}$ ,  $\frac{2}{5}$  and  $-\frac{3}{4}$  arranged in descending order?**

A.  $\frac{2}{5}$

B.  $\frac{4}{9}$

C.  $-\frac{1}{6}$

D.  $-\frac{6}{7}$

**10. 0.3 is equivalent to the following on the number line.**

A.  $\frac{1}{3}$

B. 0

C.  $\frac{2}{3}$

D.  $-\frac{1}{3}$

**ANSWERS:**

1. C    2. B    3. A    4. B    5. C

6. C    7. A    8. A    9. D    10. A

## CHAPTER: 2

### TOPIC: Linear Equations in one variable

#### **LEARNING OBJECTIVES:**

##### **Meaning of Linear Equation in one variable and its solution:**

- Identify the variable(s) and the highest power of the variable in a given algebraic equation and distinguish whether it is a linear equation in one variable or not.
- Substitute the given values of variable and verify whether it is the solution of the equation or not.

##### **Solving Equations which have Linear Expressions on one Side and Numbers on the other Side:**

- Transpose terms to the other side and solve linear equations which have linear expression on one side and numbers on the other side.

##### **Applications of Linear Equations with one variable:**

- Write simple contextual problems as linear equations in one variable and find its solution

##### **Solving Equations having the Variable on both Sides:**

- Transpose terms to the other side and solve linear equations in one variable which have

##### **Reducing Equations to Simpler Form:**

- Simplify the given linear equation in one variable and solve them.

##### **Equations Reducible to the Linear Form:**

- Use cross multiplication and reduce certain equations into their linear form

#### **Learning Outcome:**

- Use variables in order to solve puzzles and daily life problems

#### **QUESTIONS:**

1. The solution of the equation  $2x - 3 = 7$  is \_\_\_\_\_

- A. 5
- B. 10
- C. 20
- D. 30

- 2. Sum of two numbers is 74. One of the numbers is 10 more than the other. Then the numbers are --- and -----**
- A. 30, 40
  - B. 32, 42
  - C. 34, 44
  - D. 32, 40
- 3. If half of half of a number is 20, then the number is -----**
- A. 60
  - B. 40
  - C. 80
  - D. 50
- 4. The coefficient of  $x^3 - 3x^2 + x - 8$  is**
- A. 0
  - B. 2
  - C. 3
  - D. 1
- 5. Which of the following is not a linear equation in one variable?**
- A.  $4x + 5 = 0$
  - B.  $2x + 3y = 5$
  - C.  $y = 0$
  - D.  $X = 0$
- 6. The solution of  $3y + 2 = 2y + 8$  is -----**
- A. 4
  - B. 6
  - C. 8
  - D. 5
- 7. The value of the variable for which the equation is satisfied is called the ----- of the equation.**
- A. Solution
  - B. Transposition
  - C. Identity
  - D. Equal
- 8. Taking away 5 from x gives 9 is -----**
- A.  $x - 5 = 9$
  - B.  $x - 9 = 5$
  - C.  $5 - x = 9$
  - D.  $2 - x = 3$

**9. In an equation there is always an \_\_\_\_\_ sign.**

- A. Inequality
- B. Equality
- C. Not equal to
- D. Greater than

**10. The sum of three times of a number and 6 is 30. Then the number is \_\_\_\_\_**

- A. 8
- B. 10
- C. 12
- D. 11

**11. A number when divided by 5 gives 6. This statement in the form of an equation is**

- A.  $x-5 = 6$
- B.  $x+5 = 6$
- C.  $x/5 = 6$
- D.  $5x=6$

**12. The roots of the equation  $3x= 20/7 -x$**

- A. 10
- B.  $20/21$
- C.  $-5/7$
- D.  $5/7$

**13. The largest number of the three consecutive numbers is  $x+1$ , then the smallest number is**

- A.  $x+2$
- B.  $x+1$
- C.  $x$
- D.  $x-1$

**14. In an equation there is always an ..... sign**

- A. Inequality
- B. Equality
- C. Not equal
- D. Less than

**ANSWERS:**

1. A    2. B    3. C    4. D    5. B    6. B    7. A  
8. A    9. B    10. A    11. C    12. D    13. D    14. B

## CHAPTER: 3

### TOPIC: Understanding Quadrilaterals

#### LEARNING OBJECTIVES:

Angle sum property of polygons	Recall the angle sum property of triangle and extend it for quadrilateral
	Relate the angle sum property of triangle and quadrilateral and extend it for an n-sided polygon
	Apply angle sum property of a quadrilateral and find the measure of the unknown angle in a given quadrilateral
Sum of the Measures of the Exterior Angles of a Polygon	Apply exterior angle property of a polygon and find the measure of the unknown angle in a given figure
Kind of Quadrilateral	List the properties of quadrilaterals and classify them as trapezium, kite and parallelogram
Some special Parallelograms	Discuss the properties of a parallelogram in order describe the relation between its opposite sides, angles and diagonals.
	Discuss the properties of a rhombus and classify it as special case of kite and parallelogram
	Discuss the properties of a rectangle and show that it is a special case of parallelogram
	Discuss the properties of a square and show it as special case of parallelogram, rhombus and rectangle



### **Learning Outcome:**

- Apply reasoning through activities such as constructing parallelograms, drawing their diagonals and measuring their sides and angles in order to verify properties of parallelograms

### **QUESTIONS:**

**1. Each of the angles of a square is:**

- a) Acute angle
- b) Right angle
- c) Obtuse angle
- d) 180 degrees

**2. ABCD is a rectangle and AC & BD are its diagonals. If AC = 10cm, then BD is:**

- a) 10 cm
- b) 5 cm
- c) 15 cm
- d) 20 cm

**3. Which of the following is not a quadrilateral?**

- a) Square
- b) Rectangle
- c) Triangle
- d) Parallelogram

**4. Which of the following quadrilaterals have two pairs of adjacent sides equal and its diagonals intersect at 90 degrees?**

- a) Square
- b) Kite
- c) Rhombus
- d) Rectangle

**5. In an isosceles trapezium, we have:**

- A. pair of parallel sides as equal
- B. pair of non-parallel sides as equal
- C. pair of non-parallel sides as perpendicular
- D. not parallel

**6. The sides of a pentagon are produced in order. Which of the following is the sum of its exterior angles?**

- A.  $540^\circ$
- B.  $180^\circ$
- C.  $720^\circ$
- D.  $360^\circ$

**7. Which of the following is a formula to find the sum of interior angles of a quadrilateral of n-sides?**

- A.  $\frac{n}{2} \times 180^\circ$
- B.  $\left(\frac{n+1}{2}\right) \times 180^\circ$
- C.  $\left(\frac{n-1}{2}\right) \times 180^\circ$
- D.  $(n-2) \times 180^\circ$

**8. Which of the following is true for the adjacent angles of a parallelogram?**

- A. they are equal to each other
- B. they are complementary angles
- C. they are supplementary angles
- D. not equal

**Answers:**

1. B    2. A    3. C    4. B  
5. B    6. D    7. D    8. C

**CHAPTER: 4**  
**TOPIC: Practical Geometry**

**LEARNING OBJECTIVES:**

Constructing a Quadrilateral	Discuss and list the minimum number of elements required and construct a unique quadrilateral
	List and execute steps of construction and construct a quadrilateral length if its four sides and a diagonal are given
	List and execute steps of construction and construct a quadrilateral given the length of its three sides and two diagonals
	List and execute steps of construction and construct a quadrilateral if length of two adjacent sides and measures of three angles are known
	List and execute steps of construction and construct a quadrilateral given the length of three sides and measures of two included angles are known
Some Special Cases	Identify the minimum number of elements required and construct special cases of quadrilaterals

**Learning Outcome:**

- Use compasses and straight edge in order to construct a given quadrilateral

**QUESTIONS:**

**1. What is the appropriate condition to construct a quadrilateral?**

- a) When four sides and one diagonal are given
- b) When three sides and one diagonal are given
- c) When two sides and one diagonal are given
- d) When no sides and one diagonal are given

**2. If two diagonals are given, then we can construct a:**

- a) Rhombus
- b) Rectangle
- c) Kite
- d) Parallelogram

**3. If two diagonals and three sides are given, then:**

- a) A quadrilateral cannot be constructed
- b) A quadrilateral can be constructed
- c) Insufficient information
- d) Any polygon can be constructed

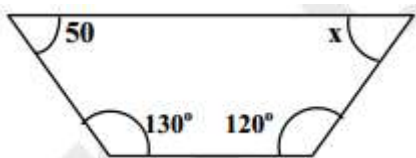
**4. To construct a quadrilateral, we need to know three sides and \_\_\_\_\_ included angles.**

- a) One
- b) Two
- c) Three
- d) All four angles

**5. To construct a quadrilateral, we need to know two adjacent side and \_\_\_\_\_ angles.**

- a) One
- b) Two
- c) Three
- d) All four angles

**6 The value of (x) in the following figure is** L  
SEP

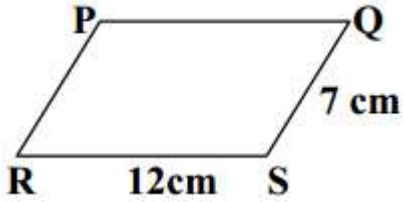


- (a) 120°
- (b) 80°
- (c) 100°
- (d) 60°

**7. To construct a quadrilateral uniquely if it is necessary to know at least ..... of its parts**

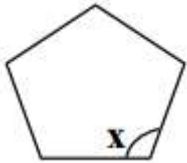
- A. 5
- B. 4
- C. 3
- D. 2

8. The perimeter of parallelogram PQRS is: LSEP



- (a) 12 cm
- (b) 7 cm
- (c) 38 cm
- (d) 19 cm

9. The value of x in the following figure is: LSEP



- (a) 100
- (b)  $90^\circ$
- (c)  $108^\circ$
- (d)  $120^\circ$

10. The value of x in the following figure is: LSEP



- (a)  $120^\circ$
- (b)  $180^\circ$
- (c)  $60^\circ$
- (d)  $100^\circ$

**ANSWERS:**

1. A 2. A 3. B 4. B 5. C  
6. C 7. A 8. C 9. C 10. A

**CHAPTER: 5**  
**TOPIC : Data Handling**

**LEARNING OBJECTIVES:**

Looking for Information	Represent the given data using the most suitable representation and interpret them applying the knowledge of different types of graphical representation (name pictograph, bar graph and double bar graph) of data
Organizing raw data	Use tally marks and organize the given raw data in a frequency distribution table
Grouping data	Use tally marks and prepare a grouped frequency distribution table for large ungrouped data
	Construct histogram and represent the given grouped data
	Explain the elements of the given histogram and interpret it
Circle graph or Pie Chart	Construct a circle graph with the given data
	Infer a variety of information from a given circle graph
Chance and Probability	List all the possible outcomes of an experiment and define the equally likely outcomes

**Learning Outcome:**

- Draw and interpret bar graphs and pie charts in order to answer a variety of questions based on them.
- Conduct activities in order to make hypotheses on chances of future events on the basis of its earlier occurrences or available data like, after repeated throws of dice and coins

**QUESTIONS:**

**1. The difference between the upper-class limit and the lower class limit is called the \_\_\_\_\_ of the class interval.**

- A. Difference
- B. Width
- C. Gap
- D. Distance

**2. A \_\_\_\_\_ shows the relationship between a whole and its parts.**

- A. Bar graph
- B. Circle graph
- C. Histogram
- D. Pie chart

**3. Each outcome of an experiment or a collection of outcomes make an \_\_\_\_\_**

- A. Event
- B. Probability
- C. Data
- D. Frequency

**4. Data mostly available to us in an unorganized form is called \_\_\_\_\_**

- A. Data
- B. Raw data
- C. Event
- D. Compound events

**6. A \_\_\_\_\_ is one whose outcome cannot be predicted exactly in advance.**

- A. Random experiment
- B. Probability
- C. Trial
- D. Outcome

**7. Outcomes of an experiment are \_\_\_\_\_ if each has the same chance of occurring.**

- A. Equally likely
- B. Mutually exclusive events
- C. Compound events
- D. Not Mutually exclusive events

**8. When a die is thrown, the probability of getting a prime number is \_\_\_\_\_**

- A.  $\frac{1}{4}$
- B.  $\frac{1}{2}$
- C.  $\frac{1}{3}$
- D. 1

**9. When a die is thrown the probability of getting a number not greater than 5 is \_\_\_\_\_**

- A.  $\frac{1}{6}$
- B.  $\frac{5}{6}$
- C.  $\frac{1}{2}$
- D.  $\frac{1}{3}$

**10. If you have a spinning wheel with 3 green sectors, 1 blue sector and 1 red sector. What is the probability of getting a green sector?**

- A.  $1/5$
- B.  $2/5$
- C.  $3/5$
- D.  $1/2$

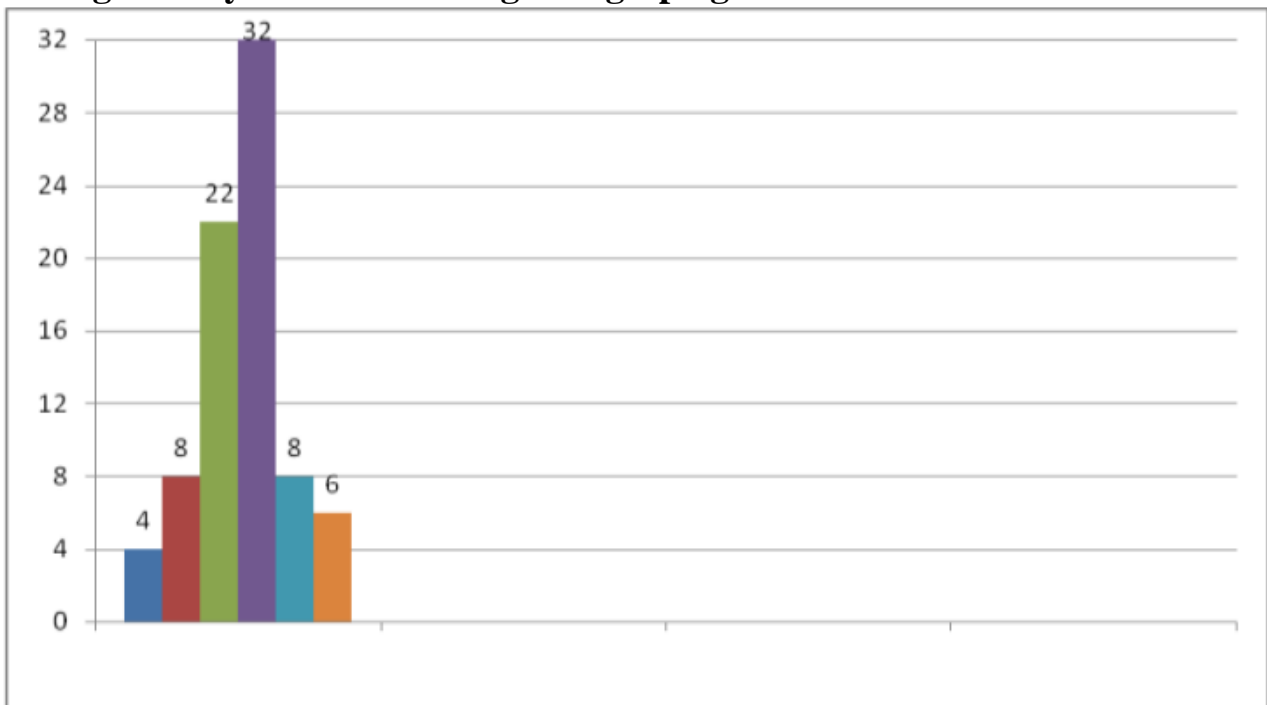
**11. A circle graph is also called a \_\_\_\_\_**

- A. Pie chart
- B. Line graph
- C. Tree diagram
- D. Bar graph

**12. When a coin is tossed, the probability of getting head is \_\_\_\_\_.**

- A.  $1/2$
- B. 1
- C. 2
- D. 3

**The number of hours for which students of particular class watched television during holidays is shown through the graph given below:**



**13. For how many hours did the maximum number of students watch TV?**

- (a) 4-5 hrs
- (b) 6-7 hrs
- (c) 3-4 hrs
- (d) 2-3hrs



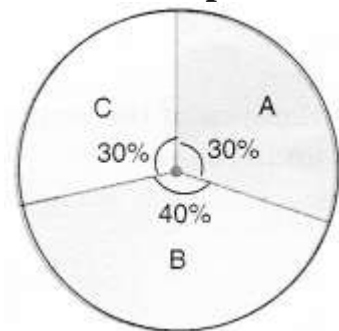
**14. How many students watched TV for less than 4 hrs?**

- (a) 12
- (b) 34
- (c) 4
- (d) 8

**15. How many students spent more than 5 hrs in TV watching?**

- (a) 14
- (b) 0
- (c) 6
- (d) 8

**Observe the pie chart given below and answer the following questions:**



**16. The central angle for sector A is**

- (a)  $108^\circ$
- (b)  $144^\circ$
- (c)  $72^\circ$
- (d)  $150^\circ$

**17. Which sector has the greatest angle?**

- (a) A
- (b) B
- (c) C
- (d) None of these.

**18. The central angle for sector B is**

- (a)  $108^\circ$
- (b)  $144^\circ$
- (c)  $72^\circ$
- (d)  $120^\circ$

**19. What is the difference between the central angles for sector B and sector C?**

- (a)  $36^\circ$
- (b)  $72^\circ$
- (c)  $9^\circ$
- (d)  $81^\circ$

**ANSWERS:**

1. B    2. B    3. A    4. B    5. A    6. A    7. A    8. B    9. B    10. C  
11. A    12. A    13. A    14. B    15. A    16. A    17. D    18. B    19. A

## CHAPTER: 6

### TOPIC: Squares and Square roots

#### **LEARNING OBJECTIVES:**

##### **Properties of Square Numbers:**

- Define perfect squares and classify the given numbers as perfect squares or non-perfect squares
- Observe the number and find the unit place of its square
- Observe different number pattern and deduce square numbers
- Use the rule that there are exactly  $2n$  non-perfect square numbers between the squares of the number  $n$  and  $(n+1)$  and find how many numbers, lie between the squares of the given two consecutive numbers

##### **Finding the Square of a Number:**

- Use the rule that a perfect square number ( $n^2$ ) can be written as the sum of odd natural numbers and distinguish between square and non-square numbers
- Use Pythagoras theorem and find the Pythagorean triplet

##### **Square Roots:**

- Apply inverse operations on a given perfect square and deduce square root of this number
- Use method of repeated subtraction and find the square root of the given square number
- Use prime factorization method and find the square root of the given perfect square
- Use prime factorization method and find the smallest number to be operated (all the four arithmetic operations) on given number to get a perfect square and then find the square root of the new number
- Use long division method and find the smallest number to be operated (all the four arithmetic operations) on given number to get a perfect square and then find the square root of the new number

##### **Square Roots of Decimals:**

- Use long division method and find the square root of the given decimal number

##### **Estimating Square Root:**

- Use estimation and approximate the value of the square root of the given number to the nearest whole

## **Learning Outcome:**

- Apply different methods in order to find the squares, cubes, square roots and cube roots of a given number

## **QUESTIONS:**

**1. Which of the following is a perfect square?**

- a) 1057
- b) 625
- c) 7928
- d) 64000

**2. How many natural numbers lie between 92 and 102?**

- a) 17
- b) 18
- c) 19
- d) 20

**3. The square of which of the following would be odd number?**

- (a) 431
- (b) 272
- (c) 1234
- (d) 7928

**4. What will be the number of zeros in the square of 400?**

- (a) 5
- (b) 1
- (c) 3
- (d) 4

**5. Which of the following number would have digit 5 at units place:**

- (a) 952
- (b) 592
- (c) 242
- (d) 422

**6 The perfect square number between 30 and 40 is**

- (a) 35
- (b) 39
- (c) 36
- (d) 32

**7. By which smallest number 90 must be multiplied so as to make it a perfect square?**

- (a) 10
- (b) 2
- (c) 5
- (d) 3

**8. which smallest number should be added to 80 so as to make it a perfect square?**

- (a) 2
- (b) 3
- (c) 1
- (d) 4

**9. Sum of squares of two numbers is 145. if square root of one number is 3, find the other number.**

- (a) 136
- (b) 8
- (c) 9
- (d) 64

**10. What will be the number of zeros in the squares of 400**

- (a) 2
- (b) 3
- (c) 1
- (d) 4

**ANSWERS:**

1)B 2)B 3)A 4)D 5)A 6)C 7)A 8)C 9)B 10)C

## CHAPTER: 7

### TOPIC : Cubes and cube roots

#### LEARNING OBJECTIVES:

Cubes	Define perfect cube /cube number and classify the given numbers as cube numbers or non-cube numbers
	Observe the pattern of cube of even numbers and generalize that cubes of even numbers are even
	Observe the pattern of cube of numbers with one's digit as 1, 2, 3, 4... etc. and explore the one's digit of their perfect cubes and comment on it
	Add n consecutive odd numbers and get the sum equal to $n^3$
	Use prime factorization and rule out a number as a perfect cube
	Use prime factorization on the given number and find the smallest number to be operated (all the four arithmetic operations) on given number to get a perfect Cube
Cube Roots	Use prime factorization and find the cube root of agiven number Use estimation and find the cube root of a given perfect Cube

#### Learning Outcome:

- Apply different methods in order to find the squares, cubes, square roots and cube roots of a given number

#### QUESTIONS:

**1. Which of the following is not a perfect cube?**

- (a) 1
- (b) 9
- (c) 8
- (d) 27

**2. The cube of 4 is \_\_\_\_\_ .**

- (a) 12
- (b) 8
- (c) 4
- (d) 64

**3. The value of  $5^3$  is \_\_\_\_\_ .**

- (a) 125
- (b) 15
- (c) 10
- (d) 75

**4. The cube of an even number is always \_\_\_\_\_ .**

- (a) odd number
- (b) even number
- (c) prime number
- (d) composite numbers

**5. The cube of an odd number is always \_\_\_\_\_ .**

- (a) odd number
- (b) even number
- (c) prime number
- (d) composite numbers

**6. Each prime factor appears \_\_\_\_\_ times in its cube?**

- (a) 2
- (b) 3
- (c) 1
- (d) 4

**7. Which of the following is Hardy-Ramanujan Number?**

- (a) 1724
- (b) 1725
- (c) 1727
- (d) 1729

**8. By which smallest natural number 392 must be multiplied so as to make the product a perfect cube?**

- (a) 2
- (b) 14
- (c) 7
- (d) 49

**9. The smallest natural number by which 243 must be multiplied to make the product a perfect cube is \_\_\_\_\_ .**

- (a) 3
- (b) 9
- (c) 8
- (d) 7

**10. The smallest natural number by which 704 must be divided to obtain a perfect cube is**

- (a) 22
- (b) 12
- (c) 11
- (d) 13

**11. The smallest natural number by which 135 must be divided to obtain a perfect cube is**

- (a) 5
- (b) 3
- (c) 15
- (d) 9

**12. Which of the following is not a perfect cube?**

- (a) 216
- (b) 343
- (c) 125
- (d) 108

**13. The expansion of  $a^3$  is \_\_\_\_\_ .**

- (a)  $3 \times a$
- (b)  $a+a+a$
- (c)  $3 \times 3 \times 3$
- (d)  $a \times a \times a$

**Answers:**

1. (b) 2. (d) 3. (d) 4. (a) 5. (a) 6. (b) 7. (d) 8. (c) 9. (a)  
10. (c) 11. (a) 12. (d) 13. (d)

**CHAPTER: 8**  
**TOPIC : Comparing Quantities**

**LEARNING OBJECTIVES:**

Recalling Ratios and Percentages	Convert ratios to percentage and solve the given Questions
Discount, Profit, Loss	Apply the formula for discount and discount percentage and solve the given problem on discount
	Calculate the discount in given situations and comment whether the seller has made a profit /loss in the given transaction
Simple Interest and Compound Interest	Define and compare simple interest and compound interest and comment on the situations where either of the two are applied
	Calculate the simple interest and find the total amount to be paid by the debtor
Deducing a Formula for Compound Interest	Use formula of simple interest and deduce the formula to calculate the compound interest
	Calculate the compound interest and find the total amount to be paid by the debtor
Rate Compounded Annually or Half Yearly (Semi Annually)	Define the terms 'compounded annually', 'compounded half yearly' and 'compounded quarterly' and give examples and differentiate between the three
Applications of Compound Interest Formula	Use formula of compound interest and solve problems related to increase (or decrease) in population
	Use formula of compound interest and solve problems related to increase (or decrease) in the price of an item in intermediate years

**Learning Outcome:**

- Observe a given context in order to apply the concepts of profit and loss, discount, VAT, simple and compound interest



**QUESTIONS:**

**1. If 50% of students are good at science out of 20 students. Then the number of students good at science is:**

- a) 10
- b) 15
- c) 5
- d) 11

**2. The price of a motorcycle was Rs. 34,000 last year. It has increased by 20% this year. The price of motorcycle now is:**

- a) Rs. 36,000
- b) Rs. 38,800
- c) Rs. 40,800
- d) Rs. 32,000

**3. An item marked at Rs. 840 is sold for Rs. 714. The discount % is:**

- a) 10%
- b) 15%
- c) 20%
- d) 25%

**4. The ratio of 10m to 10km is equal to**

- a) 1/10
- b) 1/100
- c) 1/1000
- d) 1000

**5. The percentage of 3:4 is**

- a) 75%
- b) 50%
- c) 25%
- d) 100%

**6. Waheeda bought an air cooler for Rs. 3300 including a tax of 10%. The price of the air cooler before VAT was added is:**

- a) Rs. 2000
- b) Rs. 3000
- c) Rs. 2500
- d) Rs. 2800

**7. Reena has Rs.100 in a saving account that earns 10% interest per year. The interest is not compounded. How much will she have in 3 years?**

- a) Rs. 70
- b) Rs. 230
- c) Rs. 130
- d) Rs. 160

**8. At what rate percent per annum simple interest will a sum of money double itself in 6 years?**

- a) 20%
- b) 14.6%
- c) 16.6%
- d) 17.9%

**ANSWERS:**

1. A   2. C   3. B   4. C  
5. A   6. B   7. D   8. C

## CHAPTER: 9

### TOPIC: Algebraic Expressions and Identities

#### LEARNING OBJECTIVES:

Monomials, Binomials and Polynomials	Count the number of terms in an algebraic expression and classify them as monomial, binomial, trinomial or polynomial in general
Addition and Subtraction	Identify like and unlike terms in algebraic expressions and add or subtract the given algebraic expressions
Multiplying a Monomial by a Monomial	Use rules of exponents and powers and multiply a monomial by a monomial
	Extend the multiplication of monomial by a monomial and obtain the product of any number of monomials
Multiplying a Monomial by a Polynomial	Use distributive property of multiplication over addition and subtraction and obtain the product of a monomial and a binomial
	Use distributive property of multiplication over addition and subtraction and obtain the product of a monomial and a trinomial
Multiplying a Polynomial by a Polynomial	Simplify the algebraic expressions and find the value of expression for the given value of the variable
	Use distributive law of multiplication and obtain the product of two binomials
	Use distributive law of multiplication and obtain the product of a binomial and a trinomial
What is an Identity?	Define and compare equation and identity and classify a given question into either of the two
Standard Identities	Use multiplication of binomials and explore and verify the standard identities for squares of binomials

#### Learning Outcome:

- Apply distributive property in order to multiply two algebraic expressions
- Use various algebraic identities in order to solve problems of daily life

## **QUESTIONS:**

**1. Which of the following is a monomial?**

- (a)  $3a + 4b + 5$
- (b)  $2x + 7$
- (c)  $3x$
- (d)  $4x + y$

**2. What degree does  $x^3 - x^2y^2 - 8y^2 + 2$  have?**

- (a) 2
- (b) 3
- (c) 4
- (d) 7

**3. Simplify:  $(xy + yz)^2 - (xy - yz)^2$**

- (a)  $4xy^2$
- (b)  $4xy^2z$
- (c)  $4xz$
- (d)  $2xy$

**4. The number of terms in the expression  $2x^2 + 3x + 5$  is**

- (a) 1
- (b) 2
- (c) 3
- (d) 5

**5. '2' is common factor of the expressions**

- (a)  $12a^2b, 15ab^2$
- (b)  $5xy, 10x$
- (c)  $10x^2, -18x^3, 14x^4$
- (d)  $33y, -22z$

**6. One of the example of binomial is**

- (a)  $3xyz$
- (b)  $3xy + z$
- (c)  $3x + y + z$
- (d)  $3 + x + y + z$

**7. Which of the following is like term as  $3xy^2$**

- (a)  $7xy$
- (b)  $7xy^2$
- (c)  $7x$
- (d)  $7y^2$

**8. Add:  $7xy + 5yz - 3zx$ ,  $4yz + 9zx - 4y$ ,  $-3xz + 5x - 2xy$ .**

- (a)  $5xy + 3zx + 5x - 4y$
- (b)  $5xy + 9yz + 2zx + 5x - 4y$
- (c)  $5xy + 9yz + 3zx + 5x - 4y$
- (d)  $5xy + 9yz + 3zx + 4y$

**9. The volume of rectangular box whose length, breadth and height is  $2p, 4q, 8r$  respectively is**

- (a)  $14pqr$
- (b)  $2p+4q+8r$
- (c)  $64pqr$
- (d)  $64$

**10. The expression  $7xy$  has the factors**

- (a)  $7, x, y$
- (b)  $x, y$
- (c)  $7, x$
- (d)  $7, y$

**11. If  $(x+1/x) = 6$ , find  $x^2+1/x^2$**

- (a) 39
- (b) 32
- (c) 34
- (d) 38**

**12.  $n(4 + m) = 4n +$  \_\_\_\_**

- (a)  $4m$
- (b)  $4n$
- (c)  $4mn$
- (d)  $nm$

**ANSWERS:**

1. C    2. C    3. B    4. C    5. C    6. B  
7. B    8. C    9. C    10. A    11. C    12. D

## CHAPTER: 10

### TOPIC: Visualizing solid shapes

#### **LEARNING OBJECTIVES:**

Views of 3D-Shapes	Compare 2D shapes and 3D shapes and classify a given shape into either
	Identify different shapes in nested objects and match the object with its shape
	Visualize 3D objects and draw them from different Perspectives
	Discuss the given front, top and side view of an object and identify the object
Mapping Space Around Us	Discuss the elements in a map and differentiate between a map and a picture
	Read and interpret simple map and answer questions based on them
	Choose appropriate scale and use symbols to denote landmarks and draw a simple map
Faces, Edges and Vertices	Identify faces, edges and vertices in a given solid and classify it as a polyhedron or a non-polyhedron
	Count vertices, edges and faces in 3D figures with flat faces and verify Euler's formula

#### **Learning Outcome:**

- Visualise 3-D shapes in order to represent them in a plane surface such as sheet of paper, black board, etc.
- Analyze patterns in order to verify Euler's relation.

#### **QUESTIONS:**

**1. What do you call solid figures with line segments as their edges?**

- (a) Polygons
- (b) Squares
- (c) Cylinders
- (d) Polyhedrons

**2. Which of the following can be calculated only for a cone but not for a cylinder?**

- (a) base area
- (b) curved surface area
- (c) slant height
- (d) volume

**3. The lateral faces of a pyramid are\_\_\_\_\_.**

- (a) triangles
- (b) pentagons
- (c) rectangles
- (d) squares

**4. A three-dimensional shape is \_\_\_\_\_ object.**

- (a) solid
- (b) 2d
- (c) plane
- (d) 3d

**5. The faces of a cube consist of**

- (a) 8 squares
- (b) 4 squares and 2 rectangles
- (c) 2 squares and 4 rectangle
- (d) 6 squares

**6. A three-dimensional shape is ..... Object.**

- (a) solid
- (b) 2d
- (c) plane
- (d) 3d

**7. What is the number of flat surfaces of a cone?**

- (a) 1
- (b) 2
- (c) 3
- (d) 0

**8. Of which shape are the faces of a cuboid?**

- (a) Square
- (b) Rectangle
- (c) Circle
- (d) Triangle

**9. Which of the statements is true?**

- (a) The triangular prism has 3 triangular faces and 2 square bases.
- (b) The square pyramid has 4 triangular faces and 1 square base.
- (c) The square pyramid has 4 triangular faces and 2 square bases.
- (d) The triangular prism has 4 triangular faces and 1 square base.

**10. How many edges does a cuboid have?**

- (a) 6
- (b) 12
- (c) 8
- (d) 16

**11. Find the side of a cube whose surface area is  $2400 \text{ cm}^2$ .**

- (a) 20 cm
- (b) 15 cm
- (c) 10 cm
- (d) 25 cm

**12. Which of the following is the number of vertices of sphere?**

- (a) 0
- (b) 1
- (c) 2
- (d) 4

**13. Which of the following statements is true?**

- (a) The lateral faces of a square prism are triangles.
- (b) The lateral faces of a triangular prism can be squares or rectangles.
- (c) The lateral faces of a square pyramid can be squares.
- (d) The lateral faces of a triangular pyramid can be squares or rectangles.

**14. A cylinder has \_\_\_\_\_.**

- (a) two bases which are congruent triangles.
- (b) two bases which may or may not be congruent.
- (c) one base which is a circle.
- (d) two bases which are congruent circles.

**ANSWERS:**

1. D    2. C    3. A    4. A    5. D    6. A    7. A  
8. B    9. B    10. B    11. A    12. B    13. A    14. D



**CHAPTER: 11**  
**TOPIC: Mensuration**

**LEARNING OBJECTIVES:**

Ad joint figures	Calculate area and perimeter of circle, square, rectangle, triangle and calculate area and perimeter of adjacent shapes
Area of Trapezium	Breakdown a given trapezium into known figures (triangles, squares, rectangles) and derive the formula for the area of a trapezium
Area of a Polygon	Calculate the area of a given polygon after breaking down the polygon in multiple ways and compare the values and comment on it
Surface Area of Cube, Cuboid and Cylinder	Illustrate 2-D representation of a cuboid, cube and cylinder and compute the surface areas by breaking them into areas of known figures
	Calculate the surface area of a cube, cuboid and cylinder To determine the cost of painting/covering their surface
Volume of Cube, Cuboid and Cylinder	Calculate the volume of a given cube, cuboid, cylinder and infer the quantity of any substance it can hold
	Modify the values of l, b, h and examine the effect it has on the value of the surface area /volume of a cuboid
	Modify the values of r, h and examine the effect it has on the value of the surface area /volume of a cylinder
	Calculate the volume of a given cuboid, cylinder and Determine the time taken to fill it with a liquid at a given rate

**Learning Outcome:**

- Use square grid /graph sheet in order to estimate the areas of various polygons
- Uses appropriate methods to find the area of a polygon
- Use appropriate formulae in order to find surface area and volume of cuboidal and cylindrical object

## QUESTIONS:

**1. If the edge of a cube is 1 cm then which of the following is its volume?**

- A.  $6 \text{ m}^3$
- A.  $3 \text{ m}^3$
- B.  $1 \text{ m}^3$
- C. none of these

**2. If the parallel sides of a parallelogram are 2 cm apart and their sum is 10 cm then its area is:**

- A.  $20 \text{ cm}^2$
- B.  $5 \text{ cm}^2$
- C.  $10 \text{ cm}^2$
- D. none of these

**3. Which of the following has its area and perimeter numerically equal?**

- A. an equilateral triangle of side 1 cm
- B. a square of side 1 cm
- C. a square of side 1 cm
- D. a regular pentagon of side 1 cm.

**4. If the edge of a cube is 1 cm then which of the following is its total surface area?**

- A.  $1 \text{ cm}^2$
- B.  $4 \text{ cm}^2$
- C.  $6 \text{ cm}^2$
- D.  $5 \text{ cm}^2$

**5. Which of the following is equal to 1 kiloliter?**

- A. 1000 milliliters
- B.  $100 \text{ dm}^3$
- C.  $1 \text{ dm}^3$
- D.  $1000 \text{ dm}^3$

**6. If the dimensions of a room are  $l$ ,  $b$  and  $h$ , ( $\therefore l \rightarrow$ length,  $b \rightarrow$ breadth and  $h \rightarrow$ height) then which of the following is the area of its four walls?**

- A.  $2 h(1 + b)$
- B.  $2 h (1 + h)$
- C.  $2 l(h + h)$
- D.  $2 h + 1 + b$

7. If the dimensions of a room are 2 m, 3 and 4 m then which of the following is

the number of cubes of size  $\frac{1}{2}\text{m} \times \frac{1}{3}\text{m} \times \frac{1}{4}\text{m}$  which can be placed in the room?

- A. 960
- B. 672
- C. 676
- D. 576

8. If base area of a room  $12\text{ m}^2$  and height is 3 m then its volume is:

- A.  $4\text{ m}^3$
- B.  $36\text{ m}^3$
- C.  $12\text{ m}^3$
- D.  $18\text{ m}^3$

9. Two identical cubes each of total surface area of  $6\text{ cm}^2$  are joined end to end.

Which of the following is the total surface area of the cuboid so formed?

- A.  $12\text{ cm}^2$
- B.  $18\text{ cm}^2$
- C.  $10\text{ cm}^2$
- D. 8 cm

10. Which of the following is equal to 100 kl?

- A. 100000000 ml
- B.  $100\text{ dm}^3$
- C.  $1\text{ dm}^3$
- D.  $1000\text{ dm}^3$

**ANSWERS:**

1. C   2. B   3. C   4. C   5. D  
6. A   7. D   8. B   9. C   10. A

**CHAPTER: 12**  
**TOPIC: Exponents and Powers**

**LEARNING OBJECTIVES:**

Powers with Negative Exponents	Simplify powers with negative exponents and calculate the multiplicative inverse of a number
Laws of Exponents	Apply the first law of exponents and principles of negative exponents and derive the rest of the laws of exponents
	Apply laws of exponents and simplify a given expression. Give different examples of application of the laws.
Use of Exponents to Express Small Numbers in Standard Form	Express very large and very small numbers in the standard form and compare and estimate quantities

**Learning Outcome:**

- Apply rules of exponents in order to solve problems with integral exponents

**QUESTIONS:**

1. What is the value of  $(-1)^{-1}$ ?

- (a). 0
- (b). -1
- (c). 1
- (d). None of these

2. Which of the following =  $(100 - 99^0) * 100$ ?

- (a). 10000
- (b). 100
- (c). 9900
- (d). 99000

3. Which of the following is the value of  $(4/5)^{-9} / (4/5)^{-9}$ ?

- (a).  $(4/5)^{18}$
- (b).  $4/5$
- (c). 1
- (d).  $(5/4)^9$

4. what is the value of  $7^{\frac{1}{2}} \cdot 8^{\frac{1}{2}}$

- (a)  $7^{1/4}$
- (b).  $4/5$
- (c).  $(8)^{1/2}$
- (d).  $(56)^{1/2}$

5. What is the reciprocal of  $(-3/4)^0$ ?

- (a) -1
- (b) 1
- (c)  $-4/3$
- (d)  $4/3$

6.  $5^3 \times 5^{-1}$  is equal to

- (a) 5
- (b)  $5^3$
- (c)  $5^{-1}$
- (d)  $5^2$

7.  $(-2)^{-5} \times (-2)^6$  is equal to

- (a) 2
- (b) -2
- (c) -5
- (d) 6.

8.  $3^2 \times 3^{-4} \times 3^5$  is equal to

- (a) 3
- (b)  $3^2$
- (c)  $3^3$
- (d)  $3^5$

9.  $(2^{-1} + 3^{-1} + 5^{-1})^0$  is equal to

- (a) 2
- (b) 3
- (c) 5
- (d) 1.

10.  $3^m + 3^{-3} = 3^5 \Rightarrow m$  is equal to

- (a) 1
- (b) 8
- (c) 3
- (d) 4.

**Answers:**

1. B   2. C   3. C   4. D   5. B  
6. D   7. B   8. C   9. D   10. B

## CHAPTER: 13

### TOPIC: Direct and Inverse proportions

#### LEARNING OBJECTIVES:

Direct proportion and Inverse proportion	Observe the relationship between the given two quantities and solve to find constant of proportionality
	Examine situations and decide whether two quantities are proportional to each other or not
	Complete a given table showing two proportional quantities and answer questions based on them
	Convert the given statement on relationship (directly or inversely proportional) between two quantities into a table and identify the missing quantity and solve for its Value
	Observe the table and determine which pair of variables are inversely proportional
	Create a scale using a suitable proportionality constant and draw a given figure with large dimensions

#### Learning Outcome:

- Solve problems based on direct or inverse proportions in order to establish how one quantity depends on other

#### QUESTIONS:

**Question 1. 10 metres of cloth cost Rs 1000. What will 4 metres cost?**

- (a) Rs 400
- (b) Rs 800
- (c) Rs 200
- (d) Rs 100.

**Question 2. 15 books weigh 6 kg. What will 6 books weigh?**

- (a) 1.2 kg
- (b) 2.4 kg
- (c) 3.8 kg
- (d) 3 kg.

**Question 3. A horse eats 18 kg of com in 12 days? How much does he eat in 9 days?**

- (a) 11.5 kg
- (b) 12.5 kg
- (c) 13.5 kg
- (d) 14.5 kg.

**Question 4. 8 g of sandal wood cost Rs 40. What will 10 g cost?**

- (a) Rs 30
- (b) Rs 36
- (c) Rs 48
- (d) Rs 50.

**Question 5. 20 trucks can hold 150 metric tonnes. How much will 12 trucks hold?**

- (a) 80 metric tonnes
- (b) 90 metric tonnes
- (c) 60 metric tonnes
- (d) 40 metric tonnes.

**Question 6. 120 copies of a book cost Rs 600. What will 400 copies cost?**

- (a) Rs 1000
- (b) Rs 2000
- (c) Rs 3000
- (d) Rs 2400.

**Question 7. The rent of 7 hectares is Rs 875. What is the rent of 16 hectares?**

- (a) Rs 2000
- (b) Rs 1500
- (c) Rs 1600
- (d) Rs 1200.

**Question 8. A boy runs 1 km in 10 minutes. How long will he take to ran 600 m?**

- (a) 2 minutes
- (b) 3 minutes
- (c) 4 minutes
- (d) 6 minutes.

**Question 9. A shot travels 90 m in 1 second. How long will it take to go 225 m?**

- (a) 2 seconds
- (b) 2.5 seconds
- (c) 4 seconds
- (d) 3.5 seconds.

**Question 10. 3 knives cost Rs 63. What will 17 knives cost?**

- (a) Rs 357
- (b) Rs 375
- (c) Rs 537
- (d) Rs 573.

**ANSWERS:**

1)A 2) B 3)C 4)D 5)B 6)B 7)D 8)D 9)B 10)A



**CHAPTER: 14**  
**TOPIC: Factorization**

**LEARNING OBJECTIVES:**

Factors of algebraic expressions	Express each term as a product of irreducible factors and find the common factors of the given terms
Method of common factors	Use the method of common factors and factorize the given algebraic expression
Factorization by regrouping terms	Regroup the terms and factorize the given algebraic Expressions
Factorization using identities	Apply the standard algebraic identities and factorize the given algebraic expressions (for perfect squares)
Factors of the form	Factorize algebraic expressions in the form and express it as a product of its irreducible factors of the form
Division of Algebraic Expressions	Use the common factor method and divide a monomial by a monomial
	Use the common factor method and divide a polynomial by a monomial
	Divide each term in the numerator by the denominator and divide a polynomial by a monomial
	Use the common factor method and divide polynomial by a polynomial
Find the Error	Check the given mathematical statements and find and give reasons for the possible errors in them

**QUESTIONS:**

**1. Solve:  $-20(x)^4 \div 10(x)^2$**

- (a)  $1/2x$
- (b)  $x$
- (c)  $1/2$
- (d)  $-2x^2$

**2. Divide as directed:  $5(2x + 1)(3x + 5) \div (2x + 1)$**

(a)  $(3x + 5)$

(b) 5

(c)  $5(3x + 5)$

(d) 4

**3 Factorise:  $x^2 + xy + 8x + 8y$**

(a)  $(x + 8)(x + y)$

(b)  $(x + y)$

(c)  $(x + 8)$

(d)  $(x + 9)(x - y)$

**4. What are the factors of  $x^2 + xy - 2xz - 2yz$ ?**

(a)  $(x - y)$  and  $(x + 2z)$

(b)  $(x + y)$  and  $(x - 2z)$

(c)  $(x - y)$  and  $(x - 2z)$

(d)  $(x + y)$  and  $(x + 2z)$

**5. The value of  $0.645 \times 0.645 + 2 \times 0.645 \times 0.355 + 0.355 \times 0.355$  is**

(a) 1

(b) 0

(c) -1

(d) 2.

**6. Which of the following statements is correct?**

(a)  $(a - 4)(a - 2) = a^2 + 8 - 6a$

(b)  $(2p + 3q)(p - q) = 2p^2 - 3q^2$

(c)  $3p^2 / 3p^2 = 0$

(d)  $4(m - 5) = 4m - 5$

**7. Choose the factors of  $15x^2-26x+8$  from the following.**

(a)  $(3x-4), (5x+2)$

(b)  $(3x-4), (5x-2)$

(c)  $(3x+4), (5x-2)$

(d)  $(3x+4), (5x+2)$

**8. How many factors does  $(x^9-x)$  have?**

(a) 5

(b) 4

(c) 2

(d) 9

**9. Which of the following is quotient obtained on dividing  $-18xyz^2$  by  $-3xz$ ?**

(a)  $6yz$

(b)  $-6yz$

(c)  $6xy^2$

(d)  $6xy$

**10. Which of the following is one of the factors of  $x^4+4$ ?**

(a)  $x^2+2$

(b)  $(x^2 + 2 + 2x)(x^2 + 2 - 2x)$

(c)  $x^2-2$

(d)  $x^2+2x-2$

**ANSWERS:**

1. D    2. C    3. A    4. B    5. A

6. A    7. B    8. A    9. A    10. B

## CHAPTER: 15

### TOPIC: Playing with numbers

#### LEARNING OBJECTIVES:

Numbers in General Form	Use the concepts of place value and express the given numbers in their generalized form
Games with Numbers	Apply the divisibility rule of 11 and check whether a given number is divisible by 11 or not
	Add or subtract a two-digit number and its reverse and check whether it is divisible by 9 or not
	Subtract a three-digit number and its reverse and verify that it is divisible by 99
	Form all possible three-digit numbers using the given 3 digits and verify that the sum of these numbers will be divisible by 37
Letters for Digits	Use addition and multiplication and find the values of the letters in the given puzzles
Tests of Divisibility	Apply the divisibility rule of 10 and check whether a given number is divisible by 10 or not
	Apply the divisibility rule of 5 and check whether a given number is divisible by 5 or not
	Apply the divisibility rule of 2 and check whether a given number is divisible by 2 or not
	Apply the divisibility rule of 3 and 9 and check whether a given number is divisible by them
	Apply the divisibility rule of 2, 5 and 10 and check whether a given number is divisible by all of them or no

#### **LEARNING OUTCOME:**

- Observe patterns using algebraic operations in order to derive the divisibility rules of 2, 3, 4, 5, 6, 9 & 11

**QUESTIONS:**

**1. The generalized form of the number 123 is**

- (a)  $1 \times 100 + 2 \times 10 + 3$
- (b)  $2 \times 100 + 3 \times 10 + 1$
- (c)  $3 \times 100 + 1 \times 10 + 2$
- (d) none of these.

**2. The generalized form of the number 234 is**

- (a)  $2 \times 100 + 3 \times 10 + 4$
- (b)  $3 \times 100 + 4 \times 10 + 2$
- (c)  $4 \times 100 + 2 \times 10 + 3$
- (d) none of these.

**3. The number  $5 \times 100 + 7 \times 10 + 9$  in usual form is**

- (a) 795
- (b) 759
- (c) 579
- (d) 597.

**4. Find the value of A in the following:**

$$\begin{array}{r} 1A \\ \times A \\ \hline A9 \\ \hline \end{array}$$

- (a) 1
- (b) 2
- (c) 3
- (d) 4.

**5. Find the value of A, B in the following:**

$$\begin{array}{r} AB \\ + 62 \\ \hline 9A \\ \hline \end{array}$$

- (a) 3, 1
- (b) 1, 1
- (c) 3, 3
- (d) 1, 3.

**6. Which of the following numbers is divisible by 2 ?**

- (a) 179
- (b) 235
- (c) 500
- (d) 673.

**7. Which of the following numbers is not divisible by 2?**

- (a) 54
- (b) 37
- (c) 60
- (d) 98.

**8. If the number  $1x8$  is divisible by 3, then  $x$  is equal to**

- (a) 0 or 3 or 6 or 9
- (b) 4
- (c) 5
- (d) 7.

**9. If the three-digit number  $43x$  is divisible by 9, what is the value of  $x$ ?**

- (a) 1
- (b) 2
- (c) 3
- (d) 4.

**10. If the three-digit number  $24x$  is divisible by 9, the value of  $x$  is:**

- (a) 3
- (b) 7
- (c) 1
- (d) None of the above

**ANSWERS:**

1. A   2. B   3. C   4. C   5. A  
6. C   7. B   8. A   9. B   10. A

## **Contributor**

- **Mr. Ravinder Kumar (ARP, Maths)**  
**Education Department**  
**UT Chandigarh**

## **Reviewer**

- **Ms. Shelly (PGT)**  
**SCERT UT Chandigarh**

## **Co-ordinator**

- **Dr. Deepika Gupta**  
**Assistant Professor**  
**SCERT UT Chandigarh**

*“Live as if you were to die  
tomorrow. Learn as if you were  
to live forever”*

*- Mahatma Gandhi*

**2021**



**राज्य शैक्षिक अनुसंधान और प्रशिक्षण परिषद्**  
**STATE COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING**

**SECTOR-32 UT CHANDIGARH**

