10th MATHS PROGRESS CHECK SOLUTION BOOK NEW SYLLABUS EM (2024-2025)

CHAPTER – 1 (RELATIONS AND FUNCTIONS)

1. For any two non-empty sets A and B $A \times B$ is called as **Cartesian Product**.
2. If $n(A \times B) = 20$ and $n(A) = 5$, then $n(B)$ is **4**.
3. If $A = \{-1, 1\}$ *and* $B = \{-1,1\}$ then Geometrically describe the set of points of $A \times B$
   $\{(-1,-1),(-1,1),(1,-1),(1,1)\}$.
4. If A, B are the line Segments given by the intervals $\{-4, 3\}$ *and* $\{-2,3\}$ respectively, represent the cartesian product of A and B
   $\{(-4,-2),(-4,3),(3,-2),(3,3)\}$.
5. Let $A = \{1, 2, 3, 4\}$ and $B = \{a, b, c\}$.

1.Which of the following are relations from A to B?.	2.Which of the following are relations from B to A?.
(i) $\{(1,b),(1,c),(3,a),(4,b)\}$	$(i)\ \{(c,a),(c,b),(c,1)\}$
$(ii)\ \{(1,a),(b,4),(c,3)\}$	**(ii)** $\{(c,1),(c,2),(c,3),(c,4)\}$
$(iii)\ \{(1,a),(a,1),(2,b),(b,2)\}$	**(iii)** $\{(a,4),(b,3),(c,2)\}$

6. Relations are subsets of **Cartesian Product** Functions are Subsets of **Relations**.
7. True or False: All the elements of a relation should have images. **False**
8. True or False: All the elements of a Function should have images. **True**
9. True or False: If $R: A \to B$ is a relation then the domain of R = A. **False**
10. If $f: \mathbb{N} \to \mathbb{N}$ is defined as $f(x) = x^2$ the image of 1 and 2 are **1** and **No Pre image**.
11. What is the difference between relation and function?. **When every input has unique output is Function, otherwise Relation.**
12. Let A and B be two non-empty finite sets. Then which one among the following two collection is large?.
    (i)The number of relation between A and B.
    Large
    (ii)The number of Function between A and B.
    Small
13. **State True or False:**
    (i) All one-one function are onto function. **False**
    (ii) There will be no one-one function from A to B when $n(A) = 4, n(B) = 3$. **True**
    (iii) All onto Functions are one-one function. **False**
    (iv) There will be no onto function from A to B when $n(A) = 4, n(B) = 5$. **True**
    (v) If f is a bijection from A to B, then $n(A) = n(B)$. **True**
    (vi) If $n(A) = n(B)$, then f is a bijection from A to B. **False**
    (vii) All constant functions are bijections. **False**
14. Composition of functions is commutative.
    (a) Always True (b) Never true
    (c) Sometimes true
15. Composition of function is Associative.
    (a) Always True (b) Never true
    (c) Sometimes true
16. Is a constant function a linear Function?. **Yes**
17. Is quadratic function a one-one Function?. **No**
18. Is Cubic Function a one-one Function?. **Yes**
19. Is the reciprocal Function a Bijection?. **Yes**
20. If $f: A \to B$ is a constant function, then the range of f will have **Only One** element.

CHAPTER – 2 (NUMBERS AND SEQUENCES)

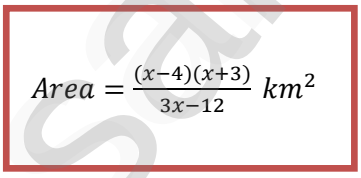
1. Find q and r for the following pairs of integers a and b satisfying $a = bq + r$.

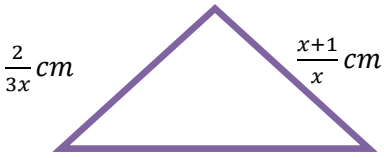
$a = 13, \quad b = 3$	**$q = 4, \quad r = 1$**
$a = 18, \quad b = 4$	**$q = 4, \quad r = 2$**
$a = 21, \quad b = -4$	**$q = -5, \quad r = 1$**
$a = -32, \quad b = -12$	**$q = 3, \quad r = 4$**
$a = -31, \quad b = 7$	**$q = -5, \quad r = 4$**

2. Euclid's division algorithm is a repeated application lemma until we get remainder as **Zero**.
3. The HCF of two equal positive integer k, k is **K(Same integer)**.
4. Every natural number except **One** can be expressed as **Prime Factors**.
5. In how many ways a composite number can be written as product of power of primes?. **Only One way**
6. The number of divisors of any prime number is **Only 2**.
7. Let m divides n. Then GCD and LCM of m, n are $\boldsymbol{m}$ and $\boldsymbol{n}$.
8. The HCF of numbers of the form 2^m and 3^n is **1**.
9. Two integers a and b are Congruent modulo n if $\frac{(a-b)}{n}$.
10. The set of all positive integers which leave remainder 5 when divided by 7 are **5, 12, 19 ,…**.
11. The positive values of k such that $(k-3) \equiv 5(mod\ 11)$ are **8, 19, 30 ,…**
12. If $59 \equiv 3(mod\ 7), 49 \equiv 4(mod\ 7)$ then $105 \equiv \mathbf{0}(mod\ 7)$, $13 \equiv \mathbf{6}(mod\ 7)$, $413 \equiv \mathbf{0}(mod\ 7)$, $368 \equiv \mathbf{4}(mod\ 7)$.
13. The remainder when $7 \times 13 \times 19 \times 23 \times 29 \times 31$ is divided by 6 is **1**.
14. Fill in the blanks for the following sequences
    (i) $7, 13, 19, \mathbf{25}, \mathbf{31}$ … (ii)$2, \mathbf{5}10, 17, 26$, ...
    (iii) $1000, 100, 10, 1, \mathbf{0.1}, \mathbf{0.01}$ ...
15. A sequences is a function defined on the set of **Natural Numbers**.
16. The n^{th} term of the sequence 0,2,6,12,20, ... can be expressed as $\boldsymbol{n(n-1)}$.
17. **Say True or False:**
    (i) All sequences are functions. **True**
    (ii) All functions are sequences. **False**
18. The difference between any two consecutive terms of an A.P is **d – common difference**.
19. If a and d are the first term and common difference of an A.P, then the 8^{th} term is $\boldsymbol{t_8 = a + 7d}$..
20. If t_n is the n^{th} term of an A.P, then $t_{2n} - t_n$ is $\boldsymbol{nd}$.
21. The common difference of a constant A.P is **Zero**.
22. If a and l are first and last terms of an A.P then the number of terms is $\boldsymbol{n = \frac{(l-a)}{d} + 1}$..
23. If every terms of an A.P is multiplied by 3, then the common difference of the new A.P is $\mathbf{3}\boldsymbol{d}$.
24. Three numbers a, b and c will be in A.P If and only if $\boldsymbol{2b = a + c}$.
25. The sum of terms of a sequence is called **Series**.
26. If a series have finite number of terms then it is called **Finite Series**.
27. A series whose terms are in **A.P Sequence** is called Arithmetic Series.
28. If the first and last terms of an A.P are given then the formula to find the sum is $\boldsymbol{S_n = \frac{n}{2}(a + l)}$.
29. **State True or False:**
(i) The n^{th} term of any A.P is of the form $pn + q$ where p and q are some constants. **True**
(ii) The sum to n^{th}term of any A.P is of the form $pn^2 + qn + r$ where p, q, r are some constants. **True**
30. A G.P is obtained by multiplying **a fixed non – zero number** to the preceding term.
31. The ratio between any two consecutive terms of the G.P is **Always constant** and it is called **Common ratio**.
32. Fill in the blanks if the following are in G.P
$(i)\frac{1}{8}, \frac{3}{4}, \frac{9}{2}, \mathbf{27}$ $(ii)7, \frac{7}{2}, \frac{7}{4}$ $(iii)\ \mathbf{2}, 2\sqrt{2}, 4,..$
33. If first term $= a$, common ratio $= r$, then find the value of t_9 and t_{27}. $\boldsymbol{t_9 = ar^8,\ t_{27} = ar^{26}}$

34. In a G.P if $t_1 = \frac{1}{5}$ and $t_2 = \frac{1}{25}$ then the common ratio is $\frac{1}{5}$.
35. Three non-zero numbers a, b, c are in G.P if and only if $\boldsymbol{b^2 = ac}$. Or $\frac{b}{a} = \frac{c}{b}$
36. A series whose terms are in Geometric progression is called. **Geometric Series**
37. When $r = 1$ the formula for finding sum to n terms of a G.P is $\boldsymbol{na}$.
38. When $r \neq 1$ the formula for finding sum to n terms of a G.P is $\boldsymbol{S_n = \frac{a(r^n-1)}{r-1}, r > 1}$,
$\boldsymbol{S_n = \frac{a(1-r^n)}{1-r}, r < 1}$.
39. Sum to infinite number of terms of a G.P is $\frac{a}{1-r}$.
40. For what values of r does the formula for infinite G.P valid?. $\boldsymbol{r < 1}$
41. Is the series $3 + 33 + 333 + \cdots$ a Geometric series?. **No**
42. The value of r, such that $1 + r + r^2 + r^3 \ldots = \frac{3}{4}$ is $\boldsymbol{r = -\frac{1}{3}}$.
43. The sum of cubes of first n natural numbers is **Square** of the first n natural numbers.
44. The Average of first 100 natural numbers is **50.5**.
45. Say True or False:
    1. The sum of first n odd natural numbers is always an odd number. **False**
    2. The sum of consecutive even numbers is always an even number. **True**
    3. The difference between the sum of squares of first n natural numbers and the sum of first n natural numbers is always divisible by 2. **True**
    4. The sum of cubes of the first n natural numbers is always a square number. **True**

CHAPTER – 3 (ALGEBRA)

1. For a system of linear equations in three variables the minimum number of equations required to get unique solution is **Three**.
2. A system with **Infinitely Many Solution** will reduce to identity.
3. A system with **No Solution** will provide absurd equation.
4. When two polynomials of same degree has to be divided **Polynomial with Highest coefficient** should be considered to fix the dividend and divisor.
5. If $r(x) = 0$ when $f(x)$ is divided by $g(x)$ is called **divisor** of the polynomials.
6. If $f(x) = g(x)q(x) + r(x)$ $\quad -\boldsymbol{r(x)}$ must be added to $f(x)$ completely divisible by $g(x)$.
7. If $f(x) = g(x)q(x) + r(x)$ $\quad \boldsymbol{r(x)}$ must be subtracted to $f(x)$ completely divisible by $g(x)$.
8. Find the unknown expression in the following figures.
   1.
   

   $breadth = \frac{(x+3)}{x-3}$ **km**
   2.
   
   $Altitude = \frac{2(x+y)}{x-y}$ m
   $Area = \frac{(x+y)^3}{x-y}$ **km**
   $base = (x + y)(x + y)m$
9. Write an expression that represents the perimeter of the figure and simplify.
   

   Ans: $\frac{3x^2+5x+6}{3x^2}$
10. Find the base of the given parallelogram whose perimeter is $\frac{4x^2+10x-50}{(x-3)(x+5)}$.
    

    Ans : $\frac{2(x-5)}{x-3}$

11. Is $x^2 + 4x + 4$ a perfect square?. **Yes**

12. What is the value of x in $3\sqrt{x} = 9$?. $\boldsymbol{x = 9}$.

13. The square root of $361x^4y^2$ is $\boldsymbol{19x^2y}$.

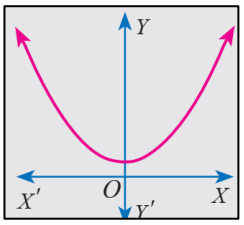
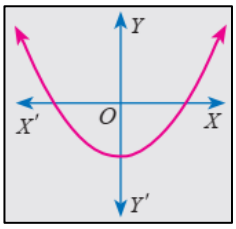
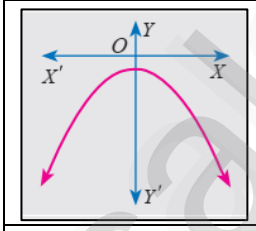
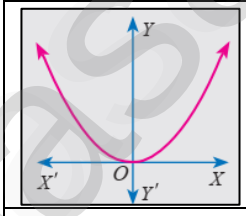
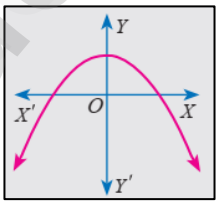
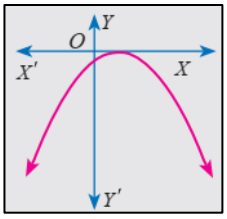
14. $\sqrt{a^2x^2 + 2abx + b^2} = \boldsymbol{|ax + b|}$.

15. If a polynomial is a perfect square then its factors will be repeated **Even** number of times (odd/even).

16.

Conclusion	Sum $= -\frac{b}{a}$ Product $= \frac{c}{a}$	Sum $= -\frac{b}{a}$ Product $= \frac{c}{a}$	Sum $= -\frac{b}{a}$ Product $= \frac{c}{a}$
$\frac{c}{a}$	$\frac{1}{2}$	$\frac{16}{25}$	$\frac{-27}{2}$
$-\frac{b}{a}$	$\frac{9}{4}$	$\frac{8}{5}$	$\frac{15}{2}$
Product of roots $\alpha\beta$	$\frac{1}{2}$	$\frac{16}{25}$	$\frac{-27}{2}$
Sum of Roots $\alpha + \beta$	$\frac{9}{4}$	$\frac{8}{5}$	$\frac{15}{2}$
Co-efficient of x^2, x and constant	$4, -9, 2$	$25, -40, 16$	$2, -15, -27$
Roots of quadratic equation α and β	$(2, \frac{1}{4})$	$(\frac{4}{5}, \frac{4}{5})$	$(9, -\frac{3}{2})$
Quadratic Equation	$4x^2 - 9x + 2 = 0$	$\left(x - \frac{4}{5}\right)^2 = 0$	$2x^2 - 15x - 27 = 0$

17.

Graphs	No. of Points of Intersection with X-axis	No. of Solution
	**0**	**No real roots**
	**2**	**Real and unequal roots**
	**0**	**No real roots**
	**1**	**Real and equal roots**
	**2**	**Real and unequal roots**
	**1**	**Real and equal roots**

18. Find the element second row and third column of the matrix $\begin{pmatrix} 1 & -2 & 3 \\ 2 & 1 & 5 \end{pmatrix}$. **5**

19. Find the order of the matrix. $\begin{pmatrix} \sin\theta \\ \cos\theta \\ \tan\theta \end{pmatrix}$. $\boldsymbol{3 \times 1}$

20. Determine the entries denoted by $a_{11}, a_{22}, a_{33}, a_{44}$ from the matrix $\begin{pmatrix} \mathbf{2} & \mathbf{1} & \mathbf{3} & \mathbf{4} \\ \mathbf{5} & \mathbf{0} & \mathbf{-4} & \sqrt{\mathbf{7}} \\ \mathbf{3} & \frac{\mathbf{5}}{\mathbf{2}} & \mathbf{8} & \mathbf{9} \\ \mathbf{7} & \mathbf{0} & \mathbf{1} & \mathbf{4} \end{pmatrix}$. **2, 9, 8, 4**

21. The number of column(s) in a column matrix are **One**.
22. The number of row(s) in a row matrix are **One**.
23. The non-diagonal elements in any unit matrix are **Zero**.
24. Does there exist a square matrix with 32 elements?.

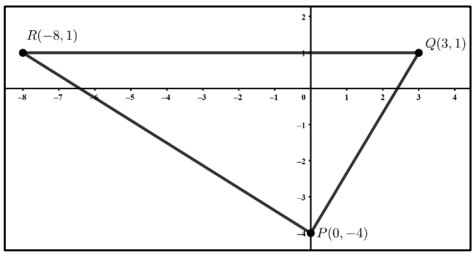
Not Possible $m \times n$ must be Square number

CHAPTER – 4 (GEOMETRY)

1. All circles are **Similar** (congruent/similar).
2. All squares are **Similar** (Similar/Congruent).
3. Two triangles are similar, if their corresponding angles are **Equal** and their corresponding sides are **Proportional**.
4. **Say True or False:**
   (i) All similar triangles are congruent. **False**
   (ii) All congruent triangles are similar. **True**
5. Give two different examples of pair of non-similar figures?. **Square – Rhombus , Rectangle - Parallelogram**
6. A straight line drawn **Parallel** to a side of a triangle divides the other two sides Proportionally?.
7. Basic Proportionality Theorem is also known as **Thales Theorem**.
8. Let ΔABC be equilateral. If D is a point on BC and AD is the internal bisector of $\angle A$. Using Angle Bisector Theorem, $\frac{BD}{DC}$ is **1**.
9. The **Internal bisector** of an angle of a triangle divides the opposite side internally in the ratio of the corresponding sides containing the angle.
10. If the median AD to the side of a ΔABC is also an angle bisector of $\angle A$ then $\frac{AB}{AC}$ is **1**.
11. **Hypotenuse** is the longest side of the right angled triangle.
12. The first theorem in mathematics is **Pythagoras or Bhaudayana Theorem**.
13. If the square of the longest side of a triangle is equal to sums of squares of other two sides , then the triangle is **Right angled triangle**.
14. **State True or False:**
    (i) Pythagoras Theorem is applicable to all triangles. **False**
    (ii) One side of a right angled triangle must always be a multiple of 4. **True**
15. A straight line that touches a circle at a common point is called a **Tangent**.
16. A chord is a subsection of **Secant**.
17. The lengths of the two tangents drawn from **An Exterior** point to a circle are equal.
18. No tangent can be drawn from **Inside** of the circle.
19. **Angle bisector** is a cevian that divides the angle, into two equal halves.

CHAPTER – 5 (COORDINATE GEOMETRY)

1. The vertices of ΔPQR are $P(0,-4), Q(3,1)$ and $R(-8,1)$.
   (i) Draw ΔPQR on a graph paper.



   (ii) Check if ΔPQR is equilateral. **No**
   (iii) Find the area of ΔPQR. **27.5 sq.cm**
   (iv) Find the coordinates of M, the mid-point of QP. $\boldsymbol{M(\frac{3}{2},-\frac{3}{2})}$
   (v) Find the coordinates of N, the mid-point of QR. $\boldsymbol{N(-\frac{5}{2},1)}$
   (vi) Find the area of ΔMPN. **6.875 sq.cm**
   (vii) What is the ratio between the areas of ΔMPN and ΔPQR?. **1 : 4**
2. Given a quadrilateral ABCD with vertices $A(-3,-8), B(6,-6), C(4,2), D(-8,2)$

(i) Find the area of ΔABC. **38 sq.cm**

(ii) Find the area of ΔACD. **60 sq.cm**

(iii) Calculate area of ΔABC + area of ΔACD.

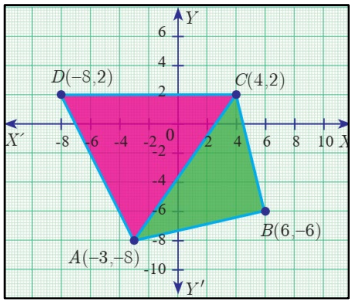
98 sq.cm

(iv) Find the area of quadrilateral ABCD.

98 sq.cm

(v) Compare the answers obtained in 3 and 4.

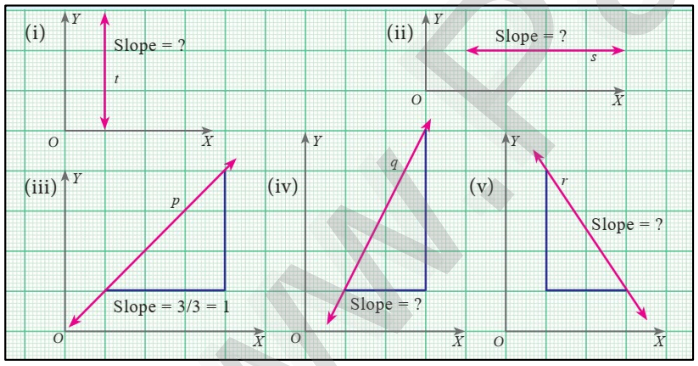
Both are Same



3. Fill in the missing boxes.

S. No	Points	Slope
1.	$A(-a,b), B(3a,-b)$	$-\frac{b}{2a}$
2.	$A(2,3), B(2,3)$	2
3.	**X axis parallel to X axis**	0
4.	**Y axis parallel to Y axis**	Undefined

4. Write down the slope of each of the lines shows on the grid below.



Ans: **(i) slope $m = \tan 90°$ (Undefined)**
(ii)slope $m = \tan 0° = 0$
(iii)slope $m = \frac{3}{3} = 1$
(iv)slope $m = \frac{4}{2} = 1$
(v)slope $m = -\frac{3}{2}$

5. Fill in the details in respective boxes.

Form	When to use?	Name
$y = mx + c$	m = slope, c = Intercept	**Slope - Intercept form**
$\frac{y-y_1}{y_2-y_1} = \frac{x-x_1}{x_2-x_1}$	**Two Points**	**Two Point form**
$\frac{x}{a}+\frac{y}{b}=1$	The intercept given	Intercept Form

6. $A(0,5), B(5,0)$ and $C(-4,-7)$ are vertices of a triangle then its centroid will be at $G\left(\frac{1}{3}, -\frac{2}{3}\right)$

7. Fill in the represent boxes

External	Ratio		2:3	**1:7**
	Point		$\left(\frac{1}{5}, \frac{-2}{5}\right)$	$(-13, 15)$
Internal	Ratio		2:3	**2:1**
	Point		$\left(\frac{19}{5}, \frac{22}{5}\right)$	$(-\frac{13}{3}, 5)$
Mid Point			$\left(4, \frac{9}{2}\right)$	$(-5, 7)$
Distance			$\sqrt{5}$ **Units**	$4\sqrt{10}$ **Units**
Points			$(3,4), (5,5)$	$(-7,13), (-3,1)$
S. No			1.	2.

8. Fill in the detail in respective boxes.

Equation	Slope	x intercept	y intercept
$3x - 4y + 2 = 0$	**0**	$-\frac{2}{3}$	$\frac{1}{2}$
$y = 14x$	**14**	**0**	0
$3x - 2y - 6 = 0$	$\frac{3}{2}$	2	-3

9. Fill in the detail in respective boxes.

Equation	Parallel or Perpendicular
$5x + 2y + 5 = 0$ $5x + 2y - 3 = 0$	**Parallel**
$3x - 7y - 6 = 0$ $7x + 3y + 8 = 0$	**Perpendicular**
$8x - 10y + 11 = 0$ $4x - 5y + 16 = 0$	**Parallel**
$2y - 9x - 7 = 0$ $27y + 6x - 21 = 0$	**Perpendicular**

CHAPTER – 6 (TRIGONOMETRY)

1. The number of trigonometric ratios is **Six**.
2. $1 - cos^2\theta$ is $\boldsymbol{sin^2\theta}$.
3. $(\sec\theta + \tan\theta)(\sec\theta - \tan\theta)$ is **1**.
4. $(\cot\theta + \operatorname{cosec}\theta)(\cot\theta - \operatorname{cosec}\theta)$ is $-$**1**.
5. $\cos 60^\circ \sin 30^\circ + \cos 30^\circ \sin 60^\circ$ is **1**.
6. $\tan 60^\circ \cos 60^\circ + \cot 60^\circ \sin 60^\circ$ is **1**.
7. $(\tan 45^\circ + \cot 45^\circ) + (\sec 45^\circ \operatorname{cosec}\ 45^\circ$ is **4**.
8. $\sec\theta = cosec\ \theta$ if θ is $\boldsymbol{45^\circ}$.
9. $\cot\theta = \tan\theta$ if θ is $\boldsymbol{45^\circ}$.
10. The line drawn from the eye of an observer to the point of object is **Line of sight**.
11. Which instrument is used in measuring the angle between an object and the eye of the observer ?.
    Clinometer
12. When the line of sight is above the horizontal level, the angle formed is **Angle of Elevation**.
13. The angle of elevation **Increases** as we move towards the foot of the vertical object (tower).
14. When the line of sight is below the horizontal level, the angle formed is **Angle of depression**.

CHAPTER – 7 (MENSURATION)

1. Right circular cylinder is a solid obtained by revolving **Rectangle** about **its sides**.
2. In a right circular cylinder the axis is **Perpendicular** to the diameter.
3. The difference between the C.S.A and T.S.A of a right circular cylinder is $\boldsymbol{2\pi r^2}$.
4. The C.S.A of a right circular cylinder of equal radius and height is **Twice** the area of its base.
5. Right circular cone is a solid obtained by revolving **Right angled triangle** about **Sides Containing $\boldsymbol{90^\circ}$**.
6. In a right circular cone the axis is **Perpendicular** to the diameter.
7. The difference between the C.S.A and T.S.A of a right circular cone is $\boldsymbol{\pi r^2}$.
8. When a sector of a circle is transformed to form a cone, then Match it: Sector and Cone

Sector	Cone
Radius	**Slant height**
Area	**C.S.A**
Arc Length	**Circumference of the base**

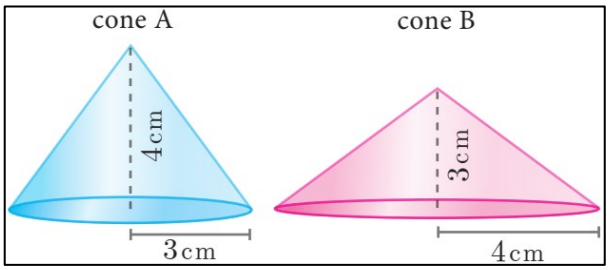
9. Every section of a sphere by a plane is a **Circle**.
10. The centre of a great circle is at the **Centre** of the sphere.
11. The difference between the T.S.A and C.S.A of hemisphere is $\boldsymbol{\pi r^2}$.
12. The ratio of surface area of a sphere and C.S.A of hemisphere is **2 : 1** .
13. A section of the sphere by a plane through any of its great circle is **Hemisphere**.
14. The portion of a right circular cone intersected between two parallel planes is **Frustum of a cone.**
15. How many frustrum can a right circular cone have? **Infinitely Many**.

16. Volume of a cone is the product of its base area and **One Third of its height**.
17. If the radius of the cone is doubled the new volume will be **Four** times the original Volume.
18. Consider the Cones given :

(i) Without doing any calculation find out whose volume is Grater?. **Cone B**

(ii) Verify whether the cone with greater volume has greater surface area. **Yes** (15π , 20π)

(iii) Volume of cone A : Volume of cone B = ?. **3 : 4**



19. What is the ratio of volume to surface area of a sphere?. $r : 3$
20. The relationship between the height and radius of the hemisphere is **Equal.**
21. The volume of a sphere is the product of its surface area and **One third of its radius**.

CHAPTER – 8 (STATISTICS AND PROBABILITY)

1. The sum of all the observations divided by number of observations is **Mean .**
2. If the sum of 10 data values is 265 then their mean is **26.5.**
3. If the sum and mean of a data are 407 and 11 respectively. Then the number of observations in the data are **37.**
4. The range of first 10 prime numbers is **27(29-2=27).**
5. If the variance is 0.49 then the standard deviation is **0.7**.
6. Coefficient of variation is a relative measure of **Standard deviation**.
7. When the standard deviation is divided by the mean we get **Coefficient of variation**.
8. The coefficient of variation depends upon **Mean** and **S.D**.
9. If the mean and standard deviation of a data are 8 and 2 respectively then the coefficient of variation is **25 %.**
10. When comparing two data, the data with **Larger** coefficient of variation is inconsistent.
11. An experiment in which a particular outcome cannot be predicted is called **Random**.
12. The set of all possible outcomes is called **Sample Space.**
13. Which of the following values cannot be a probability of an event?.

$(a) -0.0001$ (b) 0.5 (c) 1.001 (d) 1

(e) 20 % (f) 0.253 (g) $\frac{1-\sqrt{5}}{2}$ (h) $\frac{\sqrt{3}+1}{4}$

b), d), e), f), h) can be Probability of an Event.

14. P(only A) = $P(A \cap \bar{B})$ **or** $P(A) - P(A \cap B)$.
15. $P(\bar{A} \cap B)$ = **P (only B)**.
16. $A \cap B$ and $\bar{A} \cap B$ are **Mutually exclusive** events.
17. $P(\bar{A} \cap \bar{B}) = P(\overline{A \cup B})$. **De Margon's Law**
18. If A and B are mutually exclusive events then $P(A \cap B) = 0$.
19. If $P(A \cap B) = 0.3, P(\bar{A} \cap B) = 0.45$ then $P(B) = 0.75$.

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"BELIEVE IN YOURSELF
UNDERSTAND YOURSELF
DEVELOPE YOURSELF"

10th MATHS THINKING CORNER SOLUTION NEW SYLLABUS EM (2024-2025)

CHAPTER – 1 (RELATIONS AND FUNCTIONS)

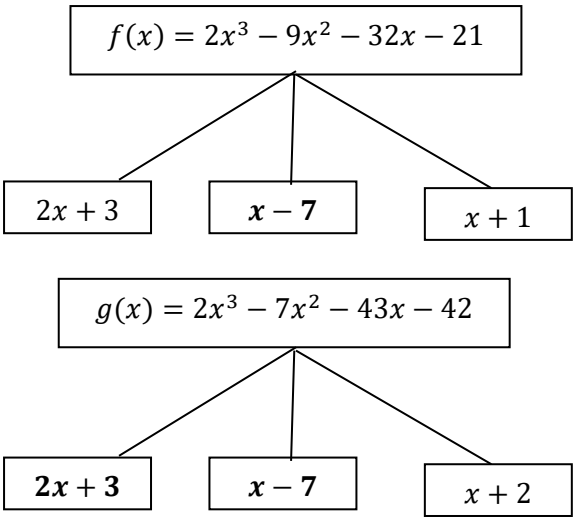
1. When will $A \times B$ be equal to $B \times A$.
   Ans: $A \times B = B \times A$ only when A and B are Equal.
2. Is relation representing the association between planets and their respective moons a function?.
   Ans: Not a function. Because some plants having more than moon. Planet like Saturn doesn't moon.
3. Can there be a one to many function?.
   Ans: **Not** possible. If so, then it can't be a function.
4. Is an identity function one to one function?.
   Ans: **Yes,** identity function is one - one function.
5. If $f(x) = x^m$ and $g(x) = x^n$ does $f \circ g = g \circ f$?.
   Ans: **True,** LHS $\Rightarrow f\big(g(x)\big) = f(x^n) = x^{mn}$
   RHS $\Rightarrow g\big(f(x)\big) = f(x^m) = x^{mn}$.

CHAPTER – 2 (NUMBERS AND SEQUENCES)

1. When a positive integer is divided by 3.
   (i) What are the possible remainders? **Ans: 0, 1, 2**
   (ii) In which form can it be written?
   Ans: $3k, 3k+1, 3k+2$
2. Is 1 a prime number?. **Ans:** Neither prime nor composite number
3. Can you think of positive integers a, b such that $a^b = b^a$. **Ans: True,** $a = 2, b = 4 \Rightarrow 2^4 = 4^2$
4. How many integers exist which leave a remainder of 2 when divided by 3? **Ans:** Infinity Many.
   $x \equiv 2\ (mod\ 3), x = \{\ldots -7, -4, -1, 2, 5, \ldots\}$
5. If t_n is the n^{th} term of an A.P then the value of $t_{n+1} - t_{n-1}$ is . **Ans:** $2d$,
   $t_{n+1} = a + nd \Rightarrow t_{n-1} = a + nd - 2d$.
6. The value of n must be positive. Why ?.
   Ans: n denotes number terms in a sequences. It can't negative
7. What is the sum of the first n odd natural numbers?.
   Ans: $1 + 3 + \cdots n\ terms = n^2$.
8. What is the sum of the first n even natural numbers?.
   Ans: $2 + 4 + \cdots n\ terms = n(n+1)$
9. Is the sequence $2, 2^2, 2^{2^2}, 2^{2^{2^2}}, \ldots$ is a G.P.
   Ans: Not G.P, Because not common ratio exist.
10. Split 64 into three parts such that the numbers are in G.P
    Ans: 1, 4, 16. $1 \times 4 \times 16 = 64$, G.P $r = 4$
11. If $a, b, c, \ldots$ are in G.P then $2a, 2b, 2c, \ldots$ are in
    Ans: G.P, 1, 2, 4,… G.P, also 2, 4, 8 …. G.P.
12. If $3, x, 6.75$ are in G.P then x is **. Ans: 4.5,** $r = 1.5$
13. How many squares are there in a standard chess board?. **Ans: 204**. $1^2 + 2^2 + \cdots + 8^2$.
14. How many rectangles are there in a standard chess board? **Ans: 1296.** $1^3 + 2^3 + \cdots + 8^3$.

CHAPTER – 3 (ALGEBRA)

1. The number of possible solutions when solving system of linear equations in three variables are.
   Ans: No, One, Infinity many Solution.
2. If three planes are parallel then the number of possible points of intersection is/are.
   Ans: 0 or Infinity many.
3. Complete the factor tree for given polynomial $f(x)$ and $g(x)$. Hence find the GCD and LCM.



GCD $[f(x)$ and $g(x)\ ] = (2x+3)(x-7)$.
LCM $[f(x)$ and $g(x)\ ] = (2x+3)(x-7)(x+2)(x+1)$.

4. Is $f(x) \times g(x) \times r(x) = LCM\,[f(x)g(x)r(x)] \times GCD[f(x)g(x)r(x)]$? **Ans: Not equal.**
5. Are $x^2 - 1$ and $\tan x = \frac{\sin x}{\cos x}$ rational expressions?.
   Ans: No.
6. The number of excluded values of $\frac{x^3+x^2-10x+8}{x^4+8x^2-9}$ is
   Ans: one namely $x = -1$.
7. The sum of two rational expressions is always a rational expression. **Ans: False.**
8. The product of two rational expressions is always a rational expression. **Ans: False.**
9. Fill in the empty box given expression quadratic polynomial becomes a perfect square
   (i) $x^2 + 14x + \mathbf{49}$.
   (ii) $x^2 - 24x + \mathbf{144}$.
   (iii) $p^2 + 2qp + \boldsymbol{q^2}$.
10. If the constant term of $ax^2 + bx + c = 0$ is zero, then the sum and product of roots are $-\frac{\boldsymbol{b}}{\boldsymbol{a}}$ and $\underline{\mathbf{0}}$.
11. What you can say if variables x and y are by the equation $3y - 7x = 0$?.it also indicates direct variation. How? Think about it. What is the constant of proportionality?. **Ans:** Yes, Direct variation. $3y = 7x \Rightarrow y = \frac{7}{3}x \Rightarrow \boldsymbol{k = \frac{7}{3}}$.

CHAPTER – 4 (GEOMETRY)

1. Are square and Rhombus similar or congruent. Discuss. **Ans: Neither** Similar **Nor** congruent.
2. Are a rectangle and parallelogram similar. Discuss.
   Ans: Neither Similar **Nor** congruent.
3. Are any two right angled triangles similar? If so why? **Ans: No,** Because, only one angle common between two right angled triangles. Not always true.
4. Write down any five Pythagorean triplets?
   Ans: $(\mathbf{3,4,5}), (\mathbf{5,12,13}), (\mathbf{7,24,25}),$ $(\mathbf{8,15,17}), (\mathbf{12,35,37})$
5. In a right angle triangle the sum of other two angle is
   Ans: 90°.
6. Can all the three sides of a right angles triangle be odd numbers? Why?.
   Ans: Not possible. In either case, one even number.
7. Can we draw two tangents parallel to each other on a circle?
   Ans: Yes, at extreme end of its diameter.
8. Can we draw two tangents perpendicular to each other on a circle?
   Ans: Yes, we can draw ⊥ line.

CHAPTER – 5 (COORDINATE GEOMETRY)

1. How many triangles exist, whose are is zero?
   Ans: Infinity many triangle. If area zero (collinear)
2. If the area of quadrilateral formed by the points $(a,a), (-a,a), (a,-a), (-a,-a)$, where $a \neq 0$ is 64 square units. Then Identify type of quadrilateral.
   Ans: Square.
3. Find all possible values of a.
   Ans: Area $= 64$ sq. units. $2a = \pm 8, \boldsymbol{a = \pm 4}$
4. The straight lines X axis and Y axis are perpendicular to each other. Is the condition $m_1 m_2 = -1$ true? **Ans:** $m_1 m_2 = -1$ is not true XOY plane. The slope of Y-axis is not defined.
   ($\boldsymbol{\theta = 90^\circ}$ is undefined)
5. Provide three examples of using the concept of slope in real life examples.
   Ans: 1. Climbing along staircase. 2. Trekking along mountain. 3. Walking on ramp.
6. Is it possible to express the equation of a straight line in slope-Intercept form. When it is parallel to Y axis? **Ans: Not** possible. The slope of straight line when parallel to Y axis is undefined. ($m = \tan 90°$)
7. How many straight lines do you have with slope 1?
   Ans: Infinitely many straight line when slope 1.
8. Find the number of point of intersection of two straight lines. **Ans:** None - if parallel. One - if non - parallel. Infinitely many - if lies on the same.
9. Find the number of straight lines perpendicular to the line $2x - 3y + 6 = 0$. **Ans: Infinitely** many.

CHAPTER – 6 (TRIGONOMETRY)

1. When will the values of $\sin\theta$ and $\cos\theta$ be equal?

Ans: $\sin\theta = \cos\theta = \frac{1}{\sqrt{2}} \Rightarrow \theta = 45°$

2. For what values of θ, $\sin\theta = 2$? **Ans: No** any value.

3. Among the six trigonometric quantities as the value of the angle θ increase from 0° to 90°, which of the six trigonometric quantities has undefined values?

Ans: $\tan 90°, \cot 0°, \sec 90°, \operatorname{cosec} 0°$,

4. Is it possible to have eight trigonometric ratios?

Ans: Not possible.

5. Let $0° \leq \theta \leq 90°$, for what values of θ does.

(i) $\sin\theta > \cos\theta$. $\boldsymbol{45° < \theta \leq 90°}$

(ii) $\cos\theta > \sin\theta$. $\boldsymbol{0° < \theta \leq 45°}$

(iii) $\sec\theta = 2\tan\theta$. $\boldsymbol{\theta = 30°}$

(iv) $\operatorname{cosec}\theta = 2\cot\theta$. $\boldsymbol{\theta = 60°}$

6. What type of triangle is used to calculate heights and distance? **Ans: Right** angle triangle.

7. When the height of the building and distance from the foot of the building is given, which trigonometric ratio is used to find the angle of elevation?

Ans: $\tan\theta$.

8. If the line of sight and angle of elevation is given, then which trigonometric ratio is used

(i)To find the height of the building. **Ans:** $\frac{\sin\theta}{\operatorname{cosec}\theta}$

(ii) To find the distance from the foot of the building.

Ans: $\frac{\cos\theta}{\sec\theta}$

9. What is the minimum number of measurements required to determine the height of distance or angle of elevation? **Ans: Atleast** two measurements.

CHAPTER – 7 (MENSURATION)

1. When h coins each of radius r units and thickness 1 unit is stacked one upon the other, what would be the solid object you get? Also find its C.S.A.

Ans: Cylinder, CSA= $2\pi rh$.

2. When the radius of a cylinder is double its height, find the relation between its C.S.A and base area.

Ans: CSA and base area equal. $r = 2h \Rightarrow 4\pi h^2$.

3. Two circular cylinder are formed by rolling two rectangular aluminium sheets each of dimensions 12 m length and 5 m breadth one by rolling along its length and the other along its width. Find the ratio of their curved surface areas.

Ans: $CSA1 : CSA2 = 60 : 60 \Rightarrow 1 : 1$.

4. Give two practical example of solid cone.

Ans: Cone ice, X-mas tree.

5. Find surface area of a cone in terms of its radius when height is equal to radius.

Ans: $l = \sqrt{2}r \Rightarrow CSA = \sqrt{2}\pi r^2$.

6. Compare the above surface area with the area of the base of the cone. **Ans: $CSA : base = \sqrt{2} : 1$**

7. Find the value of the radius of a sphere whose surface area is 36π sq.units. **Ans: $CSA = 36\pi$.**

Radius , $r = 3\ cm$.

8. How many great circles can be sphere have?

Ans: Infinitely many.

9. Find the surface area of the earth whose diameter is 12756 kms. **Ans: $CSA = 162715536\pi$.**

10. Shall we get a hemisphere when a sphere is cut along the small circle? **Ans: No** only at great circle.

11. T.S.A of a hemisphere is equal to how many times the area of its base? **Ans: Three.**

12. How many hemispheres can be obtained from a given sphere? **Ans: Two at a time.**

13. Give two real life examples for a frustrum of a cone? **Ans: Bucket, Tumbler.**

14. Can a hemisphere be considered as a frustrum of a sphere. **Ans: Yes.**

15. If the height is inversely proportional to the square of its radius, the volume of the cylinder is **Ans: π**

16. What happens in the volume of the cylinder with radius r and height h, when its

(a) Radius is halved $\boldsymbol{V = \frac{1}{4}}$ (b) height is halved.$\boldsymbol{V = \frac{1}{2}}$

17. Is it possible to find a right circular cone with equal

(a) height and slant height (b) radius and slant height **(c) height and radius** (Possible).

18. There are two cones with equal volumes. What will be the ratio of their radius and height? **Ans: 1: 1**

19. A cone, a hemisphere and a cylinder have equal bases. The heights of the cone and cylinder are equal and are same as the common radius. Are they equal in volume? **Ans:** $V_1 : V_2 : V_3 = \frac{1}{3} : \frac{2}{3} : 1 = 1 : 2 : 3$

20. Give any two real life examples of sphere and hemisphere. **Ans:** Sphere - Foot ball, orange.
Hemisphere - Bowl , Coconut shell.

21. A plane along a great circle will split the sphere into ____ parts. **Ans: Two**

22. If the volume and surface area of a sphere are numerically equal, then the radius of the sphere is_____. **Ans: 3 Units.**

23. Is it possible to obtain the volume of the full cone when the volume of the frustrum is known?
Ans: Not Possible, Atleast R, r, h of frustrum given.

CHAPTER – 8 (STATISTICS AND PROBABILITY)

1. Does the mean, median and mode are same for a given data? **Ans: No,** not necessary.

2. What is the difference between the arithmetic mean and average? **Ans: A.M** is one kind of average.

3. The mean of n observations is $\bar{x}$. If first term is increased by 1 second term is increased by 2 and so on. What will be the new mean?
Ans: New mean $= \bar{x} + \left(\frac{n+1}{2}\right)$

4. Can variance be negative? **Ans: No ,** Variance **is** $\boldsymbol{\sigma^2}$

5. Can the standard deviation be more than the variance? **Ans: Yes,** $\boldsymbol{\sigma}$ is between 0 to 1. $\boldsymbol{\sigma^2 < \sigma}$.

6. For any collection of n values can we find the value of (i) $\sum(x_i - \bar{x}) = \mathbf{0}$ (ii) $(\sum x_i) - \bar{x} = \sum \boldsymbol{x_i} \left(\frac{\boldsymbol{n-1}}{\boldsymbol{n}}\right)$

7. The standard deviation of a data is 2.8, if 5 is added to all the data values then the new standard deviation is____. **Ans: 2.8**

8. If S is the standard deviation of values p, q, r then standard deviation of $p-3, q-3, r-3$ is____.
Ans: S.

9. What will be the probability that a non-leap year will have 53 Saturdays? **Ans: Probability is** $\frac{1}{7}$

10. What is the complement event of an impossible event? **Ans: Sure event or certain event.**

11. $P(A \cup B) + P(A \cap B)$ is____.
Ans: $\boldsymbol{P(A) + P(B)}$.

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