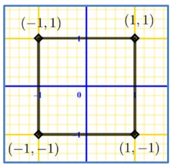
10th MATHS PROGRESS CHECK SOLUTION BOOK NEW SYLLABUS EM (2024-2025)

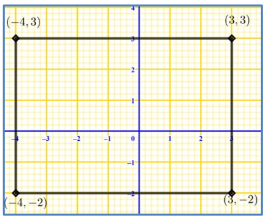
CHAPTER – 1 (RELATIONS AND FUNCTIONS)

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) $7, 13, 19, \mathbf{25}, \mathbf{31} \ldots$ (ii) $2, \mathbf{5}, 10, 17, 26, \ldots$
    (iii) $1000, 100, 10, 1, \mathbf{0.1}, \mathbf{0.01} \ldots$
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 $\boldsymbol{3d}$.
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
    $(i)\ \frac{1}{8}, \frac{3}{4}, \frac{9}{2}, \mathbf{27}$ $(ii)\ 7, \frac{7}{2}, \mathbf{\frac{7}{4}}$ $(iii)\ \mathbf{2}, 2\sqrt{2}, 4, ..$
33. If first term $= a$, common ratio $= r$, then find the value of t_9 and t_{27}. $\boldsymbol{t_9 = ar^8}$, $\boldsymbol{t_{27} = ar^{26}}$

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 $\underline{b^2 = ac}$. 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 $\underline{na}$.

38. When $r \neq 1$ the formula for finding sum to n terms of a G.P is $S_n = \frac{a(r^n-1)}{r-1}, r > 1$, $S_n = \frac{a(1-r^n)}{1-r}, r < 1$.

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?. $\underline{r < 1}$

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 $r = -\frac{1}{3}$.

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.

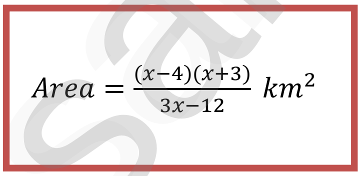
5. If $r(x) = 0$ when $f(x)$ is divided by $g(x)$ is called **divisor** of the polynomials.

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.

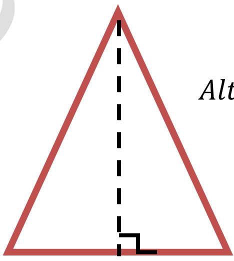
 1.



$breadth = \frac{(x+3)}{x-3}$ **km**

$length = \frac{(x-3)}{3} km$

 2.



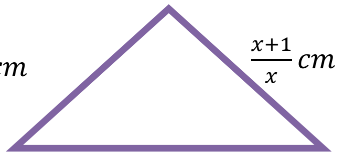
$Altitude = \frac{2(x+y)}{x-y} m$

$Area = \frac{(x+y)^3}{x-y}$ **km**

$base = (x+y)(x+y)m$

9. Write an expression that represents the perimeter of the figure and simplify.

$\frac{2}{3x} cm$



$\frac{x+1}{x} cm$

$\frac{6}{x^2} cm$ **Ans**: $\frac{3x^2+5x+6}{3x^2}$

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

$\frac{5}{x-3} cm$

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 $\boldsymbol{19x^2y}$.

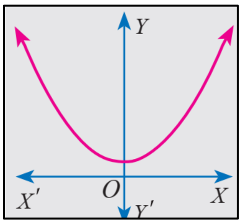
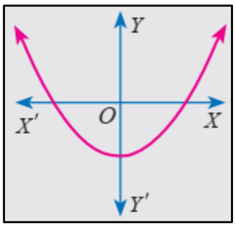
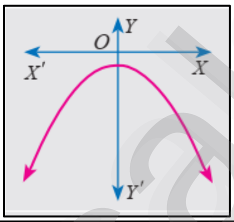
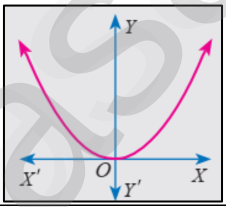
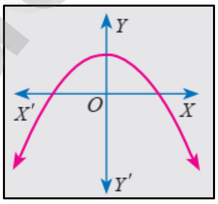
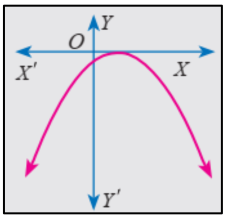
14. $\sqrt{a^2x^2 + 2abx + b^2} = |\boldsymbol{ax + b}|$.

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

16.

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

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. $\begin{pmatrix} \sin\theta \\ \cos\theta \\ \tan\theta \end{pmatrix}$. **3 × 1**

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

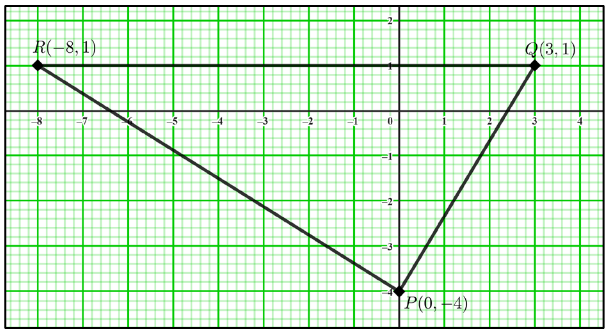
Not Possible $m \times n$ must be Square number

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 **Thales Theorem or BPT. (Pythagoras) doubt.**
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 page



   (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.

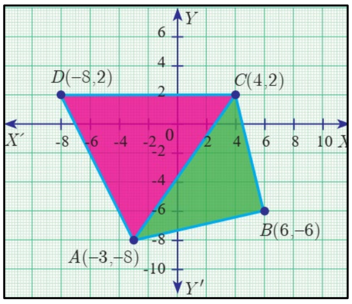
98 sq.cm

(iv) Find the area of quadrilateral ABCD.

98 sq.cm

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

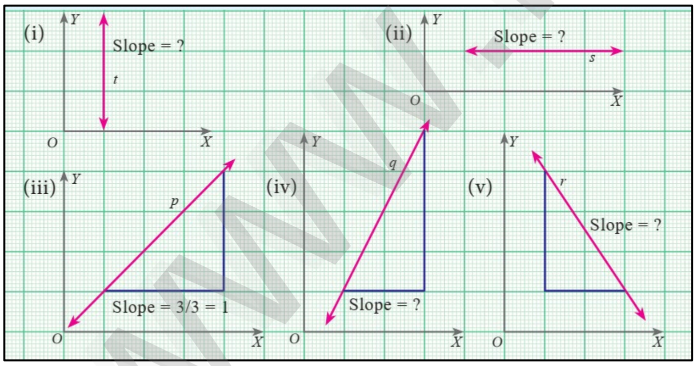
Both are Same



3. Fill in the missing boxes.

S. No	Points	Slope
1.	$A(-a,b), B(3a,-b)$	$-\frac{b}{2a}$
2.	$A(2,3), B(\mathbf{2,3})$	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 $\boldsymbol{G\left(\frac{1}{3},-\frac{2}{3}\right)}$

7. Fill in the represent boxes

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

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 $\sin^2\theta$.
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. $\sec\theta = \operatorname{cosec}\theta$ if θ is 45°.
9. $\cot\theta = \tan\theta$ if θ is 45°.
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 $2\pi r^2$.
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 90°**.
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 πr^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 πr^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**. $\frac{1}{3}$

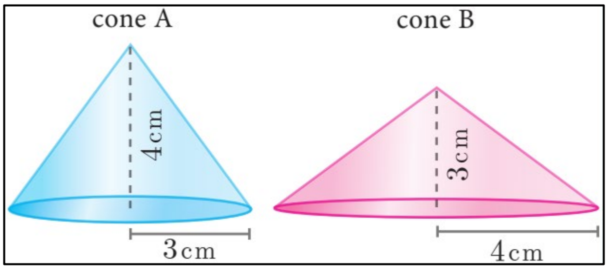
17. If the radius of the cone is doubled the new volume will be **Four** times the original Volume.

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** ($\mathbf{15\pi , 20\pi}$)

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



19. What is the ratio of volume to surface area of a sphere?. $\mathbf{r : 3}$

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

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?.

$\mathbf{(a)\ -0.0001}$ $(b)\ 0.5$ $\mathbf{(c)\ 1.001}$ $(d)\ 1$

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

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

14. P(only A) = $\mathbf{P(A \cap \bar{B})\ or\ P(A) - P(A \cap B)}$.

15. $P(\bar{A} \cap B) =$ **P (only B)**.

16. $A \cap B$ and $\bar{A} \cap B$ are **Mutually exclusive** events.

17. $P(\bar{A} \cap \bar{B}) = \mathbf{P(\overline{A \cup B})}$. **De Margon's Law**

18. If A and B are mutually exclusive events then $P(A \cap B) = \mathbf{0}$.

19. If $P(A \cap B) = 0.3, P(\bar{A} \cap B) = 0.45$ then $\mathbf{P(B) = 0.75}$ **.**

***

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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 $\Rightarrow f(g(x)) = f(x^n) = x^{mn}$ RHS $\Rightarrow g(f(x)) = f(x^m) = x^{mn}$.

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.

   $x \equiv 2 \ (mod\ 3), x = \{\dots -7, -4, -1, 2, 5, \dots\}$

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 $2, 2^2, 2^{2^2}, 2^{2^{2^2}}, \dots$ 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 $a, b, c, \dots$ are in G.P then $2a, 2b, 2c, \dots$ 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)

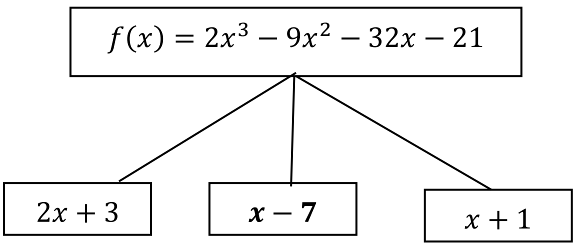
1. The number of possible solutions when solving system of linear equations in three variables are.

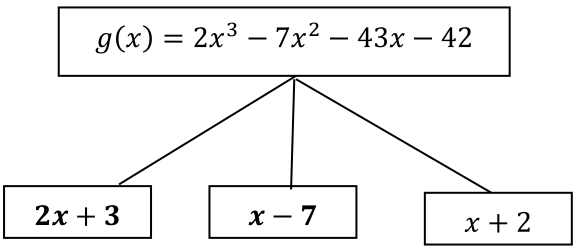
   Ans: No, One, Infinity many Solution.

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 $-\frac{b}{a}$ 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. $2a = \pm 8, \boldsymbol{a} = \pm\mathbf{4}$
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.
   ($\boldsymbol{\theta} = \mathbf{90^\circ}$ is undefined)
5. Provide three examples of using the concept of slope in real life examples.
   Ans: <u>1. Climbing along staircase. 2. Trekking along mountain. 3. Walking on ramp.</u>
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:** <u>None - if parallel. One - if non - parallel. Infinitely many - if lies on the same.</u>
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 $\theta, \sin\theta = 2$? **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: $\tan 90°, \cot 0°, \sec 90°, \text{cosec}\, 0°$,
4. Is it possible to have eight trigonometric ratios?
   Ans: Not possible.
5. Let $0° \le \theta \le 90°$, for what values of θ does.

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

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

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

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

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: $\boldsymbol{\tan\theta}$.
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:** $\frac{\sin\theta}{cosec\,\theta}$

(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= $\boldsymbol{2\pi rh}$.
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: $\boldsymbol{CSA1 : CSA2 = 60 : 60 \Rightarrow 1 : 1}$.
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: $\boldsymbol{l = \sqrt{2}r \Rightarrow CSA = \sqrt{2}\pi r^2}$.
6. Compare the above surface area with the area of the base of the cone. **Ans:** $\boldsymbol{CSA : base = \sqrt{2} : 1}$
7. Find the value of the radius of a sphere whose surface area is 36π sq.units. **Ans:** $\boldsymbol{CSA = 36\pi}$.
   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:** $\boldsymbol{CSA = 162715536\pi}$.
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:** $\boldsymbol{\pi}$
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** $\boldsymbol{\frac{1}{7}}$
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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10 TH MATHS ACTIVITY FULL

SOLUTION EM NEW 2024-2025

CHAPTER – 1 (RELATIONS AND FUNCTIONS)

1.

Activity 1

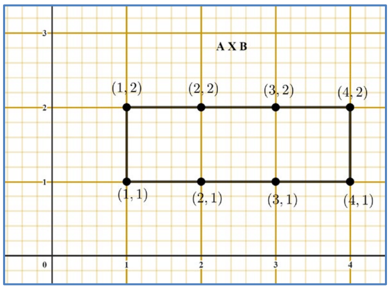
Let $A=\{x \mid x\in\mathbb{N}, x\le 4\}$, $B=\{y \mid y\in\mathbb{N}, y<3\}$

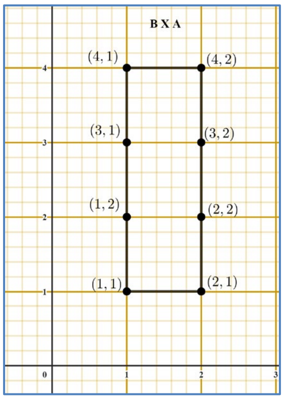
Represent $A\times B$ and $B\times A$ in a graph sheet. Can you see the difference between $A\times B$ and $B\times A$?

Ans: $A=\{1,2,3,4\}$ $B=\{1,2\}$

$A\times B=\{(1,1),(1,2),(2,1),(2,2),(3,1),(3,2),(4,1),(4,2)\}$

$B\times A=\{(1,1),(1,2),(1,3),(1,4),(2,1),(2,2),(2,3),(2,4)\}$





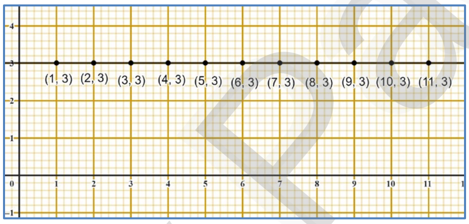
2.

Activity 2

Let A and B be the set of lines in xy-plane such that A consists of lines parallel to X-axis. For $x\in A$, $y\in B$, let R be a relation from A to B defined by $x\text{R}y$ if x is perpendicular to y. Find the elements of B using a graph sheet.

Ans:

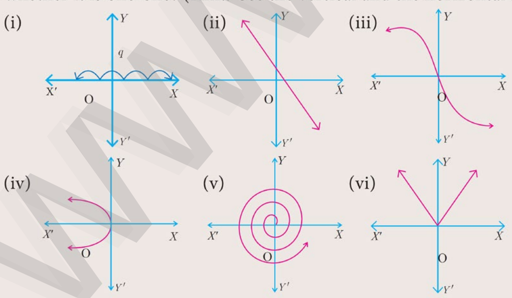
$B=\{9,8,7,6\}$



3.

Activity 3

Check whether the following curves represent a function. In the case of a function, check whether it is one-one? (Hint: Use the vertical and the horizontal line tests)



Ans: (i) It is a Function, but not One - one function. **(ii)** It is an One - one function. **(iii)** It is an One - one function. **(iv)** It is not at all a function. **(v)** It is not at all a function. **(vi)** It is a Function, but not One - one.

4.

Activity 4

Given that $h(x)=f\circ g(x)$, fill in the table for $h(x)$

x	$f(x)$	x	$g(x)$	x	$h(x)$
1	2	1	2	1	3
2	3	2	4	2	-
3	1	3	3	3	-
4	4	4	1	4	-

How to find $h(1)$?

$h(x)=f\circ g(x)$

$h(1)=f\circ g(1)$

$=f(2)=3$

$\therefore h(1)=3$

Ans: $h(2)=f\circ g(2)\Rightarrow f(4)=4\Rightarrow \boldsymbol{h(2)=4}$

$h(3)=f\circ g(3)\Rightarrow f(3)=1\Rightarrow \boldsymbol{h(3)=1}$

$h(4)=f\circ g(4)\Rightarrow f(1)=2\Rightarrow \boldsymbol{h(4)=2}$

CHAPTER – 2 (NUMBERS AND SEQUENCES)

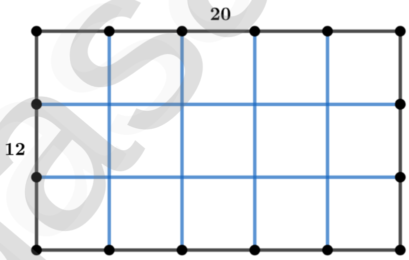
1.

Activity 1

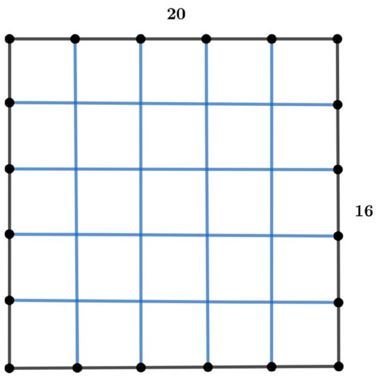
This activity helps you to find HCF of two positive numbers. We first observe the following instructions.

(i) Construct a rectangle whose length and breadth are the given numbers.
(ii) Try to fill the rectangle using small squares.
(iii) Try with 1×1 square; Try with 2×2 square; Try with 3×3 square and so on.
(iv) The side of the largest square that can fill the whole rectangle without any gap will be HCF of the given numbers.
(v) Find the HCF of (a) 12,20 (b) 16,24 (c) 11,9

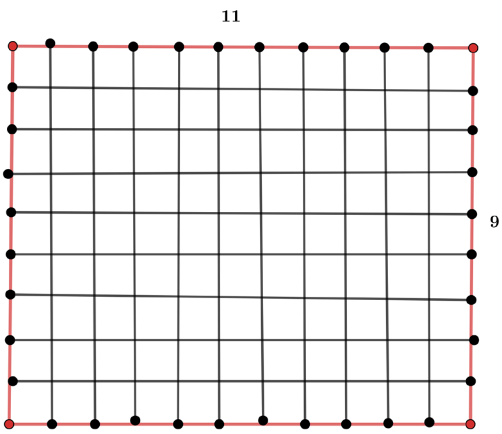
Ans:



4 X 4 square fill with rectangle HCF = 4.



4 X 4 square fill with rectangle HCF = 4.



1 X 1 square fill with rectangle HCF = 1

2.

Activity 2

This is another activity to determine HCF of two given positive integers.

(i) From the given numbers, subtract the smaller from the larger number.

(ii) From the remaining numbers, subtract smaller from the larger.

(iii) Repeat the subtraction process by subtracting smaller from the larger.

(iv) Stop the process, when the numbers become equal.

(v) The number representing equal numbers obtained in step (iv), will be the HCF of the given numbers.

Using this Activity, find the HCF of
(i) 90,15 (ii) 80,25 (iii) 40,16 (iv) 23,12 (v) 93,13

Ans: **Repeat subtraction method:**

(i) $90-15=75, 75-15=60, 60-15=45,$

$45-15=30, 30-15=15, 15-15=0, \boldsymbol{HCF}=\mathbf{15}$

(ii) $80-25=55, 55-25=30, 30-25=5,$

$25-5=15, 15-5=10, 10-5=5, 5-5=0,$

$\boldsymbol{HCF}=\mathbf{15}$

(iii) $40-16=24, 24-16=8, 16-8=8,$

$8-8=0, \boldsymbol{HCF}=\mathbf{8}.$

(iv) $23-12=11, 12-11=1, 1-1=0, \boldsymbol{HCF}=\mathbf{1}.$

(v) $93-13=80, 80-13=67, 67-13=43, 43-13=43, 43-13=30, 30-13=17, 17-13=4, 13-4=9, 9-4=5, 5-4=1, 1-1=0,$

$\boldsymbol{HCF}=\mathbf{1}.$

3.

Activity 3

Can you find the 4-digit pin number '*pqrs*' of an ATM card such that $p^2 \times q^1 \times r^4 \times s^3 = 3{,}15{,}000$?

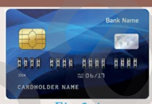


Fig.2.4

Ans:

5	3,15,000
5	63,000
5	12,600
5	2520
3	504
3	168
2	56
2	28
2	14
	7

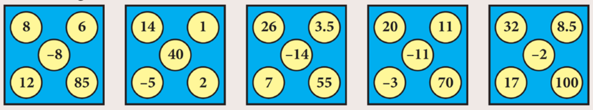
$315000 = 5^4 \times 3^2 \times 2^3 \times 7^1,$

$\boldsymbol{p=3, q=1, r=5, s=2}$

4.

Activity 4

There are five boxes here. You have to pick one number from each box and form five Arithmetic Progressions.



Ans: A.P : 1 box $= \mathbf{-2, -5, -8, -11, -14}.$

A.P : 2 box $= \mathbf{-3, 2, 7, 12, 17}.$

A.P : 3 box $= \mathbf{1, 3.5, 6, 8.5, 11}.$

A.P : 4 box $= \mathbf{8, 14, 20, 26, 32}.$

A.P : 5 box $= \mathbf{40, 55, 70, 85, 100}.$

5.

Activity 5

The sides of a given square is 10 cm. The mid points of its sides are joined to form a new square. Again, the mid points of the sides of this new square are joined to form another square. This process is continued indefinitely. Find the sum of the areas and the sum of the perimeters of the squares formed through this process.

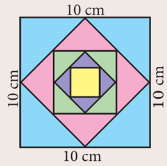


Fig.2.15

Ans:

Square	Area (cm^2)	Perimeter (cm)
1	100	40
2	50	$20\sqrt{2}$
3	25	20
4	12.5	$10\sqrt{2}$
5	6.25	10

6.

Activity 6

Take a triangle like this

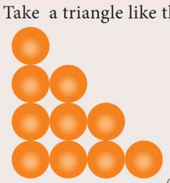


Fig.2.16 $(1+2+3+4)$

Make another triangle like this.

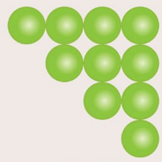


Fig.2.17 $(4+3+2+1)$

Join the second triangle with the first to get

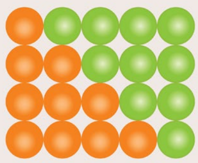


Fig.2.18

Thus, two copies of $1+2+3+4$ provide a rectangle of size 4×5.

We can write in numbers, what we did with pictures.

Let us write, $(4+3+2+1)+(1+2+3+4)=4\times5$

$2(1+2+3+4)=4\times5$

Therefore, $1+2+3+4=\frac{4\times5}{2}=10$

In a similar, fashion, try to find the sum of first 5 natural numbers. Can you relate these answers to any of the known formula?

Ans: Sum of n natural Number $=\frac{n(n+1)}{2}$.

$$1+2+3+4+5=\frac{5(5+1)}{2}$$

$$=\frac{5\times6}{2}$$

$$=15$$

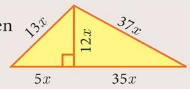
CHAPTER – 3 (ALGEBRA)

1.

Activity 1

(i) The length of a rectangular garden is the sum of a number and its reciprocal. The breadth is the difference of the square of the same number and its reciprocal. Find the length, breadth and the ratio of the length to the breadth of the rectangle.

(ii) Find the ratio of the perimeter to the area of the given triangle.



Ans: **(i) Length** $= x + \frac{1}{x} = \frac{x^2+1}{x}$.

Breadth $= x^2 - \frac{1}{x^2} = \frac{x^4-1}{x^2}$.

$$L:B = \frac{L}{B} = \frac{x^2+1}{x} \times \frac{x^2}{x^4-1} = \frac{x}{x^2-1} = x : x^2 - 1.$$

(ii) Perimeter $= 13x + 37x + 40x = 90x$

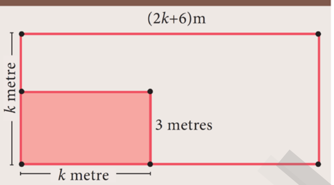
Area $= \frac{1}{2} \times 40x \times 12x = 240x^2$.

$$P : A = 90x : 240x^2 = 3 : 8x$$

2.

Activity 2

Consider a rectangular garden in front of a house, whose dimensions are $(2k+6)$ metre and k metre. A smaller rectangular portion of the garden of dimensions k metre and 3 metres is leveled. Find the area of the garden, not leveled.



Ans: Area of Garden $= k(2k+6) = 2k^2 + 6k$.

Area of levelled Portion $= 3k$.

Unlevelled Garden Area $= (2k^2 + 6k - 3k)$

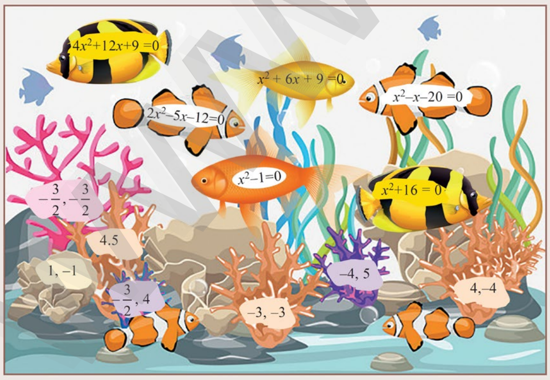
$= 2k^2 + 3k$

$= k(2k+3)$.

3.

Activity 3

Serve the fishes (Equations) with its appropriate food (roots). Identify a fish which cannot be served?



Ans: (i) $4x^2 + 12x + 9 = 0, (2x+3)^2, x = -\frac{3}{2}, -\frac{3}{2}$

It has solution.

(ii) $x^2 + 6x + 9 = 0, (x+3)^2, x = -3, -3.$

It has solution.

(iii) $x^2 - x - 20 = 0, (x-5)(x+4), x = 5, -4.$

It has solution.

(iv) $2x^2 - 5x - 12 = 0, (2x+3)(x-4), x = 4, -\frac{3}{2}.$

It has solution.

(v) $x^2 - 1 = 0, (x-1)(x+1), x = 1, -1.$

It has solution.

(vi) $x^2 + 16 = 0, x = -16$, x value not real.

It has no solution.

4.

Activity 4

(i) Take calendar sheets of a particular month in a particular year.
(ii) Construct matrices from the dates of the calendar sheet.
(iii) Write down the number of possible matrices of orders 2×2, 3×2, 2×3, 3×3, 4×3, etc.
(iv) Find the maximum possible order of a matrix that you can create from the given calendar sheet.
(v) Mention the use of matrices to organize information from daily life situations.

Ans:

DECEMBER - 2024						
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				

$$A_{2\times2} = \begin{vmatrix}1 & 2\\8 & 9\end{vmatrix}\begin{vmatrix}2 & 3\\9 & 10\end{vmatrix}\begin{vmatrix}3 & 4\\10 & 11\end{vmatrix}, \dots, \begin{vmatrix}23 & 24\\30 & 31\end{vmatrix}$$

$$B_{3\times2} = \begin{vmatrix}1 & 2\\8 & 9\\15 & 16\end{vmatrix}\begin{vmatrix}2 & 3\\10 & 11\\17 & 18\end{vmatrix}\begin{vmatrix}3 & 4\\11 & 12\\18 & 19\end{vmatrix}, \dots, \begin{vmatrix}16 & 17\\23 & 24\\30 & 31\end{vmatrix}$$

$$C_{2\times3} = \begin{vmatrix}1 & 2 & 3\\8 & 9 & 10\end{vmatrix}\begin{vmatrix}2 & 3 & 4\\9 & 10 & 11\end{vmatrix}, \dots, \begin{vmatrix}22 & 23 & 24\\29 & 30 & 31\end{vmatrix}$$

$$D_{3\times3} = \begin{vmatrix}1 & 2 & 3\\8 & 9 & 10\\15 & 16 & 17\end{vmatrix}\begin{vmatrix}2 & 3 & 4\\9 & 10 & 11\\16 & 17 & 18\end{vmatrix}, \dots, \begin{vmatrix}15 & 16 & 17\\22 & 23 & 24\\29 & 30 & 31\end{vmatrix}$$

$$E_{4\times3} = \begin{vmatrix}1 & 2 & 3\\8 & 9 & 10\\15 & 16 & 17\\22 & 23 & 24\end{vmatrix}, \dots, \begin{vmatrix}8 & 9 & 10\\15 & 16 & 17\\22 & 23 & 24\\29 & 30 & 31\end{vmatrix}$$

$$F_{3\times4} = \begin{vmatrix}1 & 2 & 3 & 4\\8 & 9 & 10 & 11\\15 & 16 & 17 & 18\end{vmatrix}, \dots, \begin{vmatrix}14 & 15 & 16 & 17\\21 & 22 & 23 & 24\\28 & 29 & 30 & 31\end{vmatrix}$$

$$G_{4\times4} = \begin{vmatrix}1 & 2 & 3 & 4\\8 & 9 & 10 & 11\\15 & 16 & 17 & 18\\22 & 23 & 24 & 25\end{vmatrix}, \dots, \begin{vmatrix}7 & 8 & 9 & 10\\14 & 15 & 16 & 17\\21 & 22 & 23 & 24\\28 & 29 & 30 & 31\end{vmatrix}$$

Similarly we make $2\times4, 2\times5, 2\times6, 3\times5, 3\times6, 3\times7, 4\times2, 4\times6, 5\times2, 5\times3$ matrices.

The Highest order of Matrix is

$$H_{4\times 6} = \begin{vmatrix} 1 & 2 & 3 & 4 & 5 & 6 \\ 8 & 9 & 10 & 11 & 12 & 13 \\ 15 & 16 & 17 & 18 & 19 & 20 \\ 22 & 23 & 24 & 25 & 26 & 27 \end{vmatrix}$$

5.

Activity 5

No.	Elements	Possible orders	Number of possible orders
1.	4		3
2.		1×9, 9×1, 3×3	
3.	20		
4.	8		4
5.	1		
6.	100		
7.		1×10, 10×1, 2×5, 5×2	

Do you find any relationship between number of elements (second column) and number of possible orders (fourth column)? If so, what is it?

Ans: Yes, No.of possible order is equal to the No.of Factors of elements number.

Elements	Possible orders	No. of Possible orders
4	$1\times 4, 2\times 2, 4\times 1$	3
9	$1\times 9, 3\times 3, 9\times 1$	3
20	$1\times 20, 2\times 10, 4\times 5, 5\times 4, 10\times 2, 20\times 1$	6
8	$1\times 8, 2\times 4, 4\times 2, 8\times 1$	4
1	1×1	1
100	$1\times 100, ,2\times 50, 5\times 20, 10\times 10, 20\times 5, 25\times 4, 4\times 25, 100\times 1, 50\times 2$	9
10	$1\times 10, 2\times 5, 5\times 2, 10\times 1$	4

CHAPTER – 4 (GEOMETRY)

1.

Activity 1

Let us try to construct a line segment of length $\sqrt{2}$.

For this, we consider the following steps.

Step1: Take a line segment of length 3 units. Call it as AB.

Step2: Take a point C on AB such that $AC=2$, $CB=1$.

Step3: Draw a semi-circle with AB as diameter as shown in the diagram

Step4: Take a point 'P' on the semi-circle such that CP is perpendicular to AB.

Step5: Join P to A and B. We will get two right triangles ACP and BCP.

Step6: Verify that the triangles ACP and BCP are similar.

Step7: Let $CP = h$ be the common altitude. Using similarity, find h.

Step8: What do you get upon finding h?

Repeating the same process, can you construct a line segment of lengths $\sqrt{3}$, $\sqrt{5}$, $\sqrt{8}$.

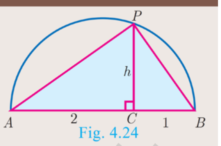


Fig. 4.24

Ans:

Step -6: $\angle ACP = \angle PCB = 90°$. Since $\angle C$ is common. $\angle PAC = \angle BPC, \angle CPA = \angle CPB$.

By AA Similarity Triangles are similar $\Delta\, ACP \sim \Delta PCB$

Let $CP = h$. $\frac{AC}{PC} = \frac{CP}{CB} \rightarrow \frac{2}{h} = \frac{h}{1} \rightarrow h^2 = 2 \rightarrow \boldsymbol{h = \sqrt{2}}$.

Step-8: $\boldsymbol{h = \sqrt{AC \times CB}}$.

Yes we can construct a line segments of lengths $\sqrt{3}, \sqrt{5}, \sqrt{8}$ by taking a line segment of length $3+1, 5+1, 8+1$ units respectively.

2.

Activity 2

Take any ruled paper and draw a triangle ABC with its base on one of the lines. Several parallel lines will cut the triangle ABC.

Select any one line among them and name the points where it meets the sides AB and AC as P and Q.

Can we find the ratio of $\frac{AP}{PB}$ and $\frac{AQ}{QC}$. By measuring AP, PB, AQ and QC through a scale, verify whether the ratios are equal or not? Try for different parallel lines, say MN and RS.

Now find the ratios $\frac{AM}{MB}, \frac{AN}{NC}$ and $\frac{AR}{RB}, \frac{AS}{SC}$.

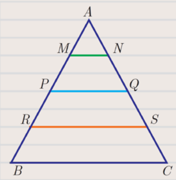


Fig. 4.28

Check if they are equal? The conclusion will lead us to one of the most important theorem in Geometry, which we will discuss below.

Ans: Yes, Equal . By BPT or Thales Theorem. The Parallel line divides the sides in the Same Ratio.

$$\frac{AP}{PB} = 2, \frac{AQ}{QC} = 2 \rightarrow 2:2 = \mathbf{1:1}$$

$$\frac{AM}{MB} = \frac{AN}{NC} \rightarrow \frac{AR}{RB} = \frac{AS}{SC}$$

3.

Activity 3

Step 1: Take a chart and cut it like a triangle as shown in Fig.4.34(a).

Step 2: Then fold it along the symmetric line AD. Then C and B will be one upon the other.

Step 3: Similarly fold it along CE, then B and A will be one upon the other.

Step 4: Similarly fold it along BF, then A and C will be one upon the other.

Find AB, AC, BD, DC using a scale.

Find $\frac{AB}{AC}, \frac{BD}{DC}$ check if they are equal?

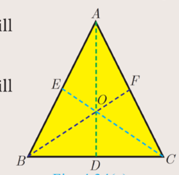


Fig. 4.34(a)

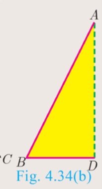


Fig. 4.34(b)

In the three cases, the internal bisector of an angle of a triangle divides the opposite side internally in the ratio of the corresponding sides containing the angle.

What do you conclude from this activity?

Ans:

$$AB = 3.8, AC = 3.8, BD = 1.7, DC = 1.7.$$

$$\frac{AB}{AC} = \frac{BD}{DC} \rightarrow \frac{3.8}{3.8} = \frac{1.7}{1.7} = 1.$$

Yes, Equal. By **ABT .**

4.

Activity 4

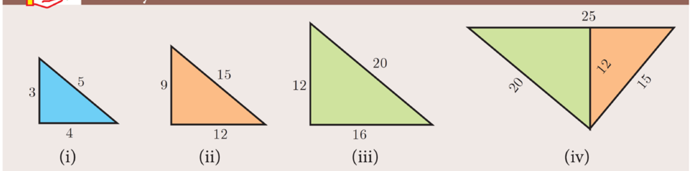


Fig. 4.45

Step 1: Take a chart paper, cut out a right angled triangle of measurement as given in triangle (i) .

Step 2: Take three more different colour chart papers and cut out three triangles such that the sides of triangle (ii) is three times of the triangle (i), the sides of triangle (iii) is four times of the triangle (i), the sides of triangle (iv) is five times of triangle (i).

Step 3: Now keeping the common side length 12 place the triangle (ii) and (iii) over the triangle (iv) such that the sides of these two triangles [(ii) and (iii)] coincide with the triangle (iv).

Observe the hypotenuse side and write down the equation. What do you conclude?

Ans: From (ii) $15^2 = 9^2 + 12^2$. From (iii) $20^2 = 12^2 + 16^2$. From (iv) $\mathbf{25^2 = 20^2 + 15^2}$.

Sub in (iii) $\mathbf{(16+9)^2 = 12^2 + 16^2 + 9^2 + 12^2}$.

$$16^2 + 9^2 + 2 \times 16 \times 9 = 12^2 + 16^2 + 9^2 + 12^2.$$

$$2 \times 16 \times 9 = 2 \times 12^2. \rightarrow \mathbf{144 = 144}.$$

$$\boxed{BD^2 = AD \times DC}$$

5.

Activity 5

(i) Take two consecutive odd numbers.

(ii) Write the reciprocals of the above numbers and add them. You will get a number of the form $\frac{p}{q}$.

(iii) Add 2 to the denominator of $\frac{p}{q}$ to get $q+2$.

(iv) Now consider the numbers $p, q, q+2$. What relation you get between these three numbers? Try for three pairs of consecutive odd numbers and conclude your answer.

Ans:

Let Taking Two odd numbers. 5 and 7. Reciprocal are $\frac{1}{5}$ and $\frac{1}{7}$. $\frac{1}{5} + \frac{1}{7} = \frac{7+5}{35} = \frac{12}{35} \rightarrow \mathbf{p = 12, q = 35}$.

$\mathbf{q + 2 = 37}$. The relation is

$$12^2 + 35^2 = 37^2.$$

$$\mathbf{144 + 1225 = 1369}$$

$1369 = 1369$. $\mathbf{P, q, q+2}$ are Pythagorean triplet.

CHAPTER – 5 (COORDINATE GEOMETRY)

1.

Activity 1

(i) Take a graph sheet.

(ii) Consider a triangle whose base is the line joining the points (0,0) and (6,0)

(iii) Take the third vertex as (1,1), (2,2), (3,3), (4,4), (5,5) and find their areas. Fill in the details given.

(iv) Do you see any pattern with A_1, A_2, A_3, A_4, A_5 ? If so mention it.

(v) Repeat the same process by taking third vertex in step (iii) as (1,2), (2,4), (3,8), (4,16), (5,32).

(vi) Fill the table with these new vertices.

(vii) What pattern do you observe now with A_1, A_2, A_3, A_4, A_5?

Third vertex	Area of Triangle
(1,1)	$A_1 =$
(2,2)	$A_2 =$
(3,3)	$A_3 =$
(4,4)	$A_4 =$
(5,5)	$A_5 =$

Third vertex	Area of Triangle
(1,2)	$A_1 =$
(2,4)	$A_2 =$
(3,8)	$A_3 =$
(4,16)	$A_4 =$
(5,32)	$A_5 =$

Ans:

(iv) It is an **A.P** Sequence.(vii) It is an **G.P** Sequence.

Third vertex	Area of Triangle (Sq.Units)	Third vertex	Area of Triangle (Sq.Units)
(1,1)	3	**(1,2)**	6
(2,2)	6	**(2,4)**	12
(3,3)	9	**(3,8)**	24
(4,4)	12	**(4,16)**	48
(5,5)	15	**(5,32)**	96

2.

Activity 2

Find the area of the shaded region

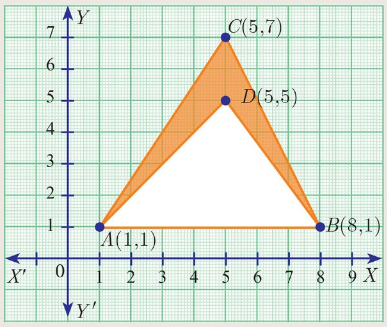


Fig. 5.15

Ans:

Let take a Points A(1,1), B(8,1), C(5,7).

Area of $\Delta ABC = \frac{1}{2}\begin{vmatrix} x_1 & x_2 & x_3 & x_1 \\ y_1 & y_2 & y_3 & y_1 \end{vmatrix}$

$$= \frac{1}{2}\begin{vmatrix} 1 & 8 & 5 & 1 \\ 1 & 1 & 7 & 1 \end{vmatrix}$$

$$= \frac{1}{2}\{(1 + 56 + 5) - (8 + 5 + 7)\}$$

$$= \frac{1}{2}\{62 - 20\} = \frac{1}{2}\{42\} = \mathbf{21\ sq.units}.$$

Let take a Points A(1,1), B(8,1), D(5,5).

Area of $\Delta ABC = \frac{1}{2}\begin{vmatrix} x_1 & x_2 & x_3 & x_1 \\ y_1 & y_2 & y_3 & y_1 \end{vmatrix}$

$$=\frac{1}{2}\begin{vmatrix}1 & 8 & 5 & 1\\ 1 & 1 & 5 & 1\end{vmatrix}$$

$$=\frac{1}{2}\{(1+40+5)-(8+5+5)\}$$

$$=\frac{1}{2}\{46-18\}=\frac{1}{2}\{28\}=\mathbf{12\ sq.units.}$$

Area of Unshaded region $= 21 - 12 = \mathbf{7\ sq.units}$

Aliter:

By Using Quadrilateral Area Formula

Let Take Shaded Region Points in Counter clockwise

A(1,1), D(5,5), B(8,1), C(5,7).

Area of ADBC$=\frac{1}{2}\begin{vmatrix}x_1 & x_2 & x_3 & x_4 & x_1\\ y_1 & y_2 & y_3 & y_4 & y_1\end{vmatrix}$

$$=\frac{1}{2}\begin{vmatrix}1 & 5 & 8 & 5 & 1\\ 1 & 5 & 1 & 7 & 1\end{vmatrix}$$

$$=\frac{1}{2}\{(5+5+56+5)-(5+40+5+7)\}$$

$$=\frac{1}{2}\{71-57\}=\frac{1}{2}\{14\}=\mathbf{7\ sq.units.}$$

3.

Activity 3

The diagram contain four lines l_1, l_2, l_3 and l_4.

(i) Which lines have positive slope?

(ii) Which lines have negative slope?

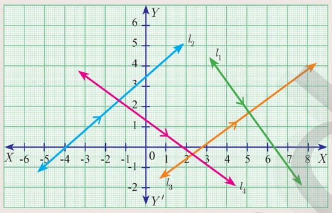


Fig. 5.19

Ans:

(i) l_2, l_3 have positive slopes, because they make acute angles with X -axis.

(ii) l_1, l_4 have negative slopes, because they make obtuse angles with X- axis.

4.

Activity 4

If line l_1 is perpendicular to line l_2 and line l_3 has slope 3 then

(i) find the equation of line l_1

(ii) find the equation of line l_2

(iii) find the equation of line l_3

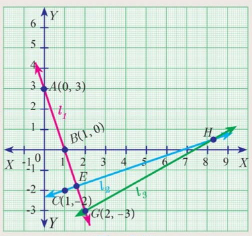


Fig. 5.38

Ans:

(i) Line l_1 Equation: X - intercept = 1, Y intercept =3,

Using two intercept form. $\frac{x}{a}+\frac{y}{b}=1 \rightarrow \frac{x}{1}+\frac{y}{3}=1.$

$$\mathbf{3x+y-3=0}$$

(ii) Line l_2 Equation: Since, l_2 is perpendicular to l_1.

Slope $l_1=-3, and\ l_2=\frac{1}{3}$. Passing point $(1,-2)$

Using Slope point form $y-y_1=m(x-x_1)$

$$y+2=\frac{1}{3}(x-1)\rightarrow 3y+6=x-1$$

Equation of S.L $\mathbf{x-3y-7=0}$

(iii) Line l_3 Equation: Slope $l_3=3$ Passing $(2,-3)$

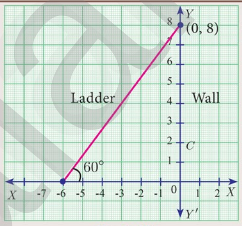
Using Slope point Form $y-y_1=m(x-x_1)$

$y+3=3(x-2)\rightarrow \mathbf{3x-y-9=0}$.

5.

Activity 5

A ladder is placed against a vertical wall with its foot touching the horizontal floor. Find the equation of the ladder under the following conditions.

No.	Condition	Picture	Equation of the ladder
(i)	The ladder is inclined at 60° to the floor and it touches the wall at (0,8)	 Fig. 5.39	__________
(ii)	The foot and top of the ladder are at the points (2,4) and (5,1)	__________	__________

Ans:

(i) Slope of the Ladder is $\frac{8}{6}=\boldsymbol{m}=\frac{\mathbf{4}}{\mathbf{3}}$.

Point - slope form (0,8) $m=\frac{4}{3}(y-y_1)=m(x-x_1)$

$$y-8=\frac{4}{3}(x-0)\rightarrow 3(y-8)=4x$$

$$\mathbf{4x-3y-24=0}$$

(ii) Two point are (2,4) and (5,1)

Two point form $\frac{y-y_1}{y_2-y_1}=\frac{x-x_1}{x_2-x_1}=\frac{y-4}{1-4}=\frac{x-2}{5-2}$

$$\frac{y-4}{-3}=\frac{x-2}{3}\rightarrow 3y-12=-3x+6$$

$$\mathbf{3x+3y-18=0, x+y-6=0}$$

6.

Activity 6

Find the equation of a straight line for the given diagrams

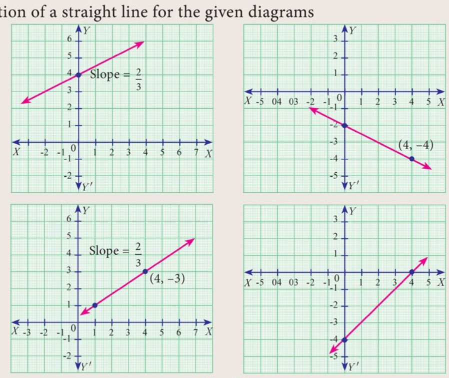


Fig. 5.41

Ans:

(i) Point (0,4) , slope $m = \frac{2}{3}$. Using Point slope form

$$(y - y_1) = m(x - x_1) \rightarrow (y - 4) = \frac{2}{3}(x - 0)$$

$$3y - 12 = 2x \rightarrow \mathbf{2x - 3y + 12 = 0.}$$

(ii) Two points $(0, -2), (4, -4)$. Two point form

$$\frac{y - y_1}{y_2 - y_1} = \frac{x - x_1}{x_2 - x_1} = \frac{y + 2}{-4 + 2} = \frac{x - 0}{4 - 0}$$

$$\frac{y+2}{-2} = \frac{x}{4} \rightarrow 4y + 8 = -2x, \mathbf{2x + 4y + 8 = 0.}$$

(iii) Point (4,3) , slope $m = \frac{2}{3}$. Using Point slope form

$$(y - y_1) = m(x - x_1) \rightarrow (y - 3) = \frac{2}{3}(x - 4)$$

$$3y - 9 = 2x - 8 \rightarrow \mathbf{2x - 3y + 1 = 0}$$

(iv) Points $(4,0), (0, -4)$. Two point form

$$\frac{y - y_1}{y_2 - y_1} = \frac{x - x_1}{x_2 - x_1} = \frac{y - 0}{-4 - 0} = \frac{x - 4}{0 - 4}$$

$$\frac{y}{-4} = \frac{x - 4}{-4} \rightarrow -4y = -4x + 16$$

$$\mathbf{4x - 4y - 16 = 0}$$

CHAPTER – 6 (TRIGONOMETRY)

1.

Activity 1

Take a white sheet of paper. Construct two perpendicular lines OX, OY which meet at O, as shown in the Fig. 6.4(a).

Considering OX as X axis, OY as Y axis.

We will verify the values of $\sin\theta$ and $\cos\theta$ for certain angles θ.

Let $\theta = 30°$

Construct a line segment OA of any length such that $\angle AOX = 30°$, as shown in the Fig. 6.4(b).

Draw a perpendicular from A to OX, meeting at B.

Now using scale, measure the lengths of AB, OB and OA.

Find the ratios $\frac{AB}{OA}, \frac{OB}{OA}$ and $\frac{AB}{OB}$.

What do you get? Can you compare these values with the trigonometric table values? What is your conclusion? Carry out the same procedure for $\theta = 45°$ and $\theta = 60°$. What are your conclusions?

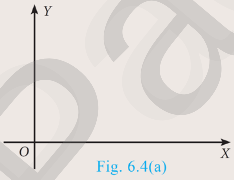


Fig. 6.4(a)

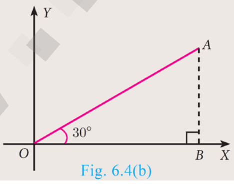
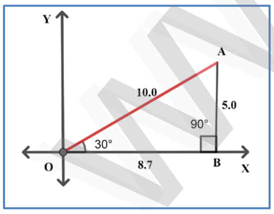


Fig. 6.4(b)

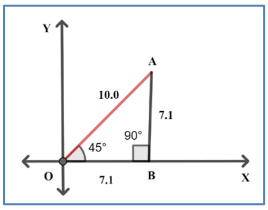
Ans:



$$\frac{AB}{OA} = \frac{5}{10} = \frac{1}{2} = \sin 30°$$

$$\frac{OB}{OA} = \frac{8.7}{10} = 0.87 = \cos 30°$$

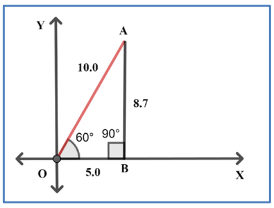
$$\frac{AB}{OB} = \frac{5}{8.7} = 0.57 = \tan 30°$$



$$\frac{AB}{OA} = \frac{7.1}{10} = 0.71 = \sin 45°$$

$$\frac{OB}{OA} = \frac{7.1}{10} = 0.71 = \cos 45°$$

$$\frac{AB}{OB} = \frac{7.1}{7.1} = 1 = \tan 45°$$



$$\frac{AB}{OA} = \frac{8.7}{10} = 0.87 = \sin 60°$$

$$\frac{OB}{OA} = \frac{5}{10} = \frac{1}{2} = \cos 60°$$

$$\frac{AB}{OB} = \frac{8.7}{5} = 1.74 = \tan 60°$$

We conclude that

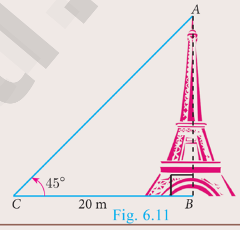
$$\sin 30° = \cos 60° , \sin 60° = \cos 30°$$

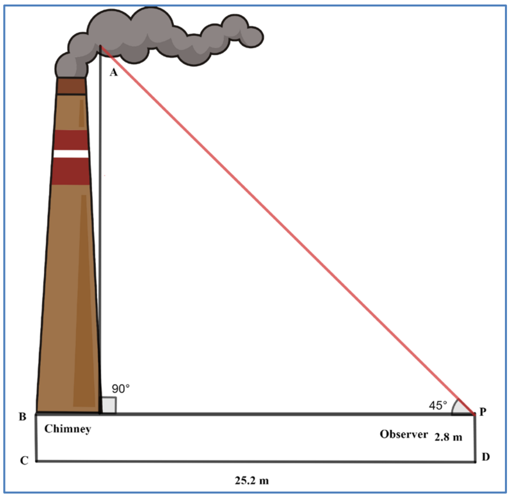
$$\sin 45° = \cos 45°, \tan 30° = \frac{1}{\tan 60°} = \cot 60°$$

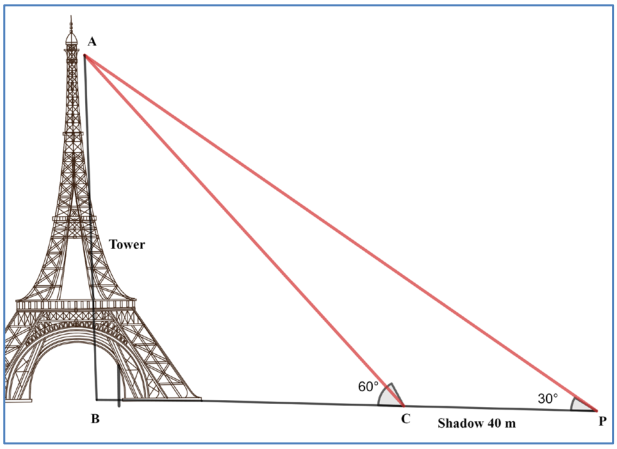
2.

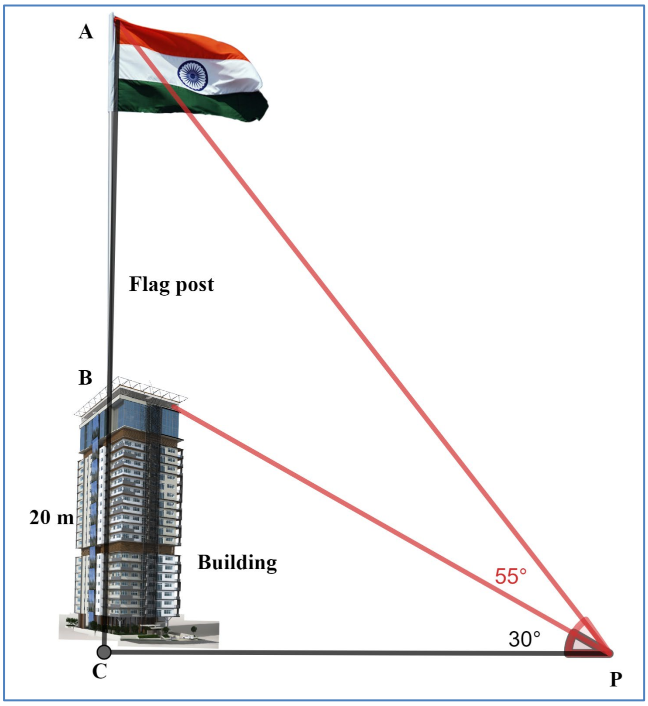
Activity 2

Representation of situations through right triangles. Draw a figure to illustrate the situation.

Situations	Draw a figure
A tower stands vertically on the ground. From a point on the ground, which is 20m away from the foot of the tower, the angle of elevation of the top of the tower is found to be 45°.	 Fig. 6.11
An observer of 1.8 m tall is 25.2 m away from a chimney. The angle of elevation of the top of the chimney from her eyes is 45°.	…………………………………
From a point P on the ground the angle of elevation of the top of a 20 m tall building is 30°. A flag is hoisted at the top of the building and the angle of elevation of the top of the flagstaff from P is 55° .	…………………………………
The shadow of a tower standing on a level ground is found to be 40 m longer when the Sun's altitude is 30° than when it is 60°.	…………………………………







CHAPTER – 7 (MENSURATION)

1.

Activity 1

(i) Take a semi-circular paper with radius 7 cm and make it a cone. Find the C.S.A. of the cone.

(ii) Take a quarter circular paper with radius 3.5 cm and make it a cone. Find the C.S.A. of the cone.

Ans:

(i) The C.S.A of cone = The Area of the Semi-Circular Paper.

$$= \frac{1}{2}(\pi r^2) = \frac{1}{2} \times \frac{22}{7} \times 7 \times 7$$

$$= 77\ cm^2.$$

(ii) The C.S.A of the cone = The Area of the Quadrant Paper

$$= \frac{1}{4}(\pi r^2) = \frac{1}{4} \times \frac{22}{7} \times 3.5 \times 3.5$$

$$= 9.625\ cm^2.$$

2.

Activity 2

(i) Take a sphere of radius 'r'.

(ii) Take a cylinder whose base diameter and height are equal to the diameter of the sphere.

(iii) Now, roll thread around the surface of the sphere and the cylinder without overlapping and leaving space between the threads.

(iv) Now compare the length of the two threads in both the cases.

(v) Use this information to find surface area of sphere.

Ans:

Given, Sphere Radius = r.

Cylinder radius = r, it's height = $2r$.

The length of the threads are equal.

The S.A of the sphere = The CSA of the cylinder.

$$= 2\pi rh = 2\pi r(2r)$$

$$= 4\pi r^2.$$

3.

Activity 3

Using a globe, list any two countries in the northern and southern hemispheres.

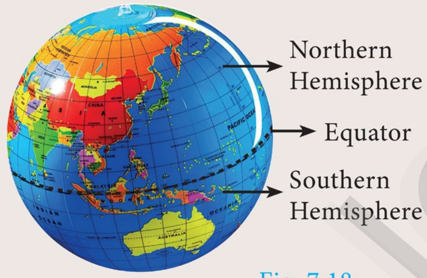


Fig. 7.18

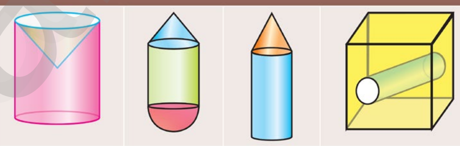
Ans:

Northern Hemisphere Countries: **India, Japan.**

Southern Hemisphere Countries: **Australia, New Zealand**.

4.

Activity 4



Combined solids	(i)	(ii)	(iii)	(iv)
List out the solids in each combined solid				
Total Surface Area of the combined solid				

Ans:

(i) Solid Cylinder and Circular Cone.

TSA= $2\pi rh + \pi r^2 + \pi rl = \pi r(2h + r + l)$.

(ii) Solid cylinder, Hemisphere, Circular cone

TSA = $2\pi rh + 2\pi r^2 + \pi rl = \pi r(2h + 2r + l)$

(iii) Solid cylinder and Circular cone

TSA = $2\pi rh + \pi r^2 + \pi rl = \pi r(2h + r + l)$

(iv) Cube and Solid cylinder and

TSA = $6a^2 + 2\pi rh - 2\pi r^2 = 6a^2 + 2\pi r(h - r)$

5.

Activity 5

The adjacent figure shows a cylindrical can with two balls. The can is just large enough so that two balls will fit inside with the lid on. The radius of each tennis ball is 3 cm. Calculate the following

(i) height of the cylinder.
(ii) radius of the cylinder.
(iii) volume of the cylinder.
(iv) volume of two balls.
(v) volume of the cylinder not occupied by the balls.
(vi) percentage of the volume occupied by the balls.

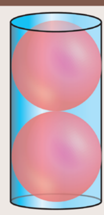


Fig. 7.43

Ans:

(i) Height of the cylinder = $4 \times 3 = 12\ cm$.

(ii) Radius of the cylinder = $3\ cm$.

(iii) Volume of the cylinder. $\pi r^2 h = \pi \times 3^2 \times 12$

$= 108\pi\ cm^3$

(iv) Volume of two balls. $2 \times \frac{4}{3} \times \pi r^3 = 2 \times \frac{4}{3} \times \pi 3^3$

$= 72\pi\ cm^3$

(v) Volume of the cylinder occupied by the balls

$= 36\pi\ cm^3$.

(vi) Percentage of the volume by the balls $= 66.67\%$

$$\% \text{ of Volume} = \frac{\textbf{Volume of 2 balls}}{\textbf{Volume of cylinder}} \times 100 = \frac{72\pi}{108\pi} \times 100$$

$$= \mathbf{66.67\%}$$

CHAPTER – 8 (STATISTICS AND PROBABILITY)

1.

Activity 1

Find the standard deviation of the marks obtained by you in all five subjects in the quarterly examination and in the midterm test separately. What do you observe from your results.

Ans:

Test	Tamil	English	Maths	Science	S.S
Mid Term	**80**	**81**	**100**	**92**	**97**
Quart	**92**	**88**	**90**	**90**	**90**

Mid Term : Mean

$$\bar{x} = \frac{80 + 81 + 100 + 92 + 97}{5} = \frac{450}{5} = 90$$

x_i	$d_i = x_i - \bar{x}$ $= x_i - 90$	d_i^2
80	-10	100
81	-9	81
100	10	100
92	2	4
97	7	49
	$\sum d_i^2$	334

S.D

$$\sigma = \sqrt{\frac{\sum d_i^2}{n}}$$

$$= \sqrt{\frac{334}{5}}$$

$$= \sqrt{66.8}$$

$$= \mathbf{8.17}$$

Quarterly Exam : Mean

$$\bar{x} = \frac{92 + 88 + 90 + 90 + 90}{5} = \frac{450}{5} = 90$$

x_i	$d_i = x_i - \bar{x}$ $= x_i - 90$	d_i^2
92	-2	4
88	-2	4
90	0	0
90	0	
90	0	0
	$\sum d_i^2$	4

S.D

$$\sigma = \sqrt{\frac{\sum d_i^2}{n}}$$

$$= \sqrt{\frac{4}{5}}$$

$$= \sqrt{0.8}$$

$$= \mathbf{0.89}$$

We observe that total and Mean are both same, there are much difference in standard deviation. Because the mark obtained in the mid term are scatted towards the central value of the Quarterly exam.

2.

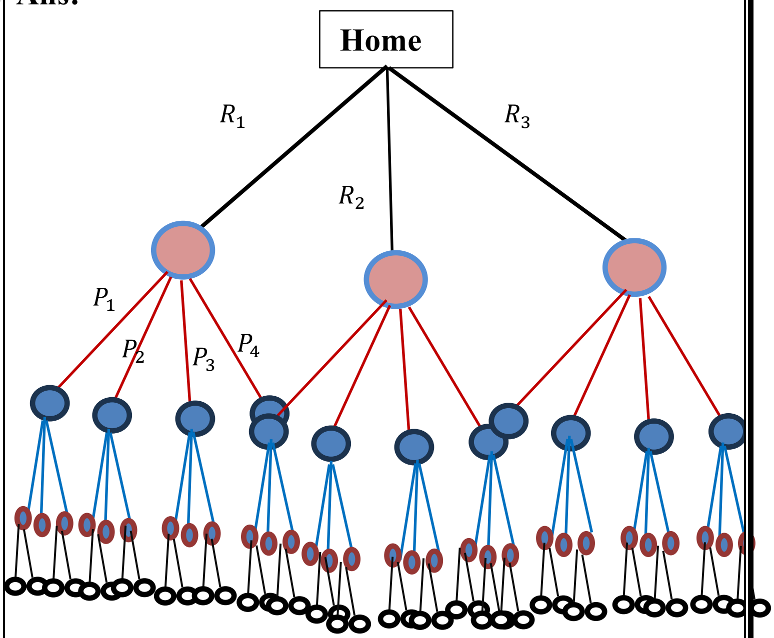
Activity 3

There are three routes R_1, R_2 and R_3 from Madhu's home to her place of work. There are four parking lots P_1, P_2, P_3, P_4 and three entrances B_1, B_2, B_3 into the office building. There are two elevators E_1 and E_2 to her floor. Using the tree diagram explain how many ways can she reach her office?

Activity 4

Collect the details and find the probabilities of
(i) selecting a boy from your class.
(ii) selecting a girl from your class.
(iii) selecting a student from tenth standard in your school.
(iv) selecting a boy from tenth standard in your school.
(v) selecting a girl from tenth standard in your school.

Ans:



No. of Ways to Reach the office:

$= 3(R_1, R_2, R_3) \times 4(P_1, P_2, P_3, P_4) \times$

$= 3(B_1, B_2, B_3) \times 2(E_1, E_2)$

$= 72$ ways.

Activity : 4

Let 10th Boys = 16. Girls =8 . Total = 24.

Total strength =800.Sample space for 10 Std =24.

(i) Probability of selecting a boy from 10 Std

$$= \frac{16}{24} = 0.666$$

(ii) Probability of selecting a Girl from 10 Std

$$= \frac{8}{24} = 0.333$$

(iii) Probability of selecting a Student from 10 Std

$$= \frac{24}{800} = 0.03$$

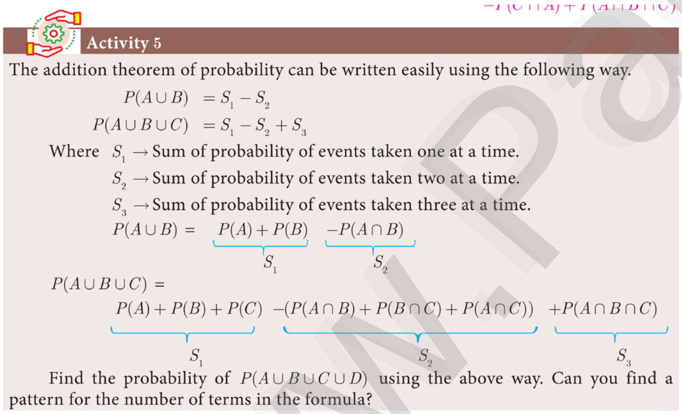
(iv) Probability of selecting a boy from 10 Std in school

$$= \frac{16}{800} = 0.02$$

(v) Probability of selecting a Girl from 10 Std in school

$$= \frac{8}{800} = 0.01$$

Activity : 5



Activity 5

The addition theorem of probability can be written easily using the following way.

$P(A\cup B) = S_1 - S_2$

$P(A\cup B\cup C) = S_1 - S_2 + S_3$

Where $S_1 \rightarrow$ Sum of probability of events taken one at a time.

$S_2 \rightarrow$ Sum of probability of events taken two at a time.

$S_3 \rightarrow$ Sum of probability of events taken three at a time.

$P(A\cup B) = \underbrace{P(A)+P(B)}_{S_1} \underbrace{-P(A\cap B)}_{S_2}$

$P(A\cup B\cup C) = \underbrace{P(A)+P(B)+P(C)}_{S_1} \underbrace{-(P(A\cap B)+P(B\cap C)+P(A\cap C))}_{S_2} \underbrace{+P(A\cap B\cap C)}_{S_3}$

Find the probability of $P(A\cup B\cup C\cup D)$ using the above way. Can you find a pattern for the number of terms in the formula?

Ans:

Let

$S_1 \rightarrow$ Sum of Probability of events taken one at a time.

$S_2 \rightarrow$ Sum of Probability of events taken two at a time.

$S_3 \rightarrow$ Sum of Probability of events taken three at a time.

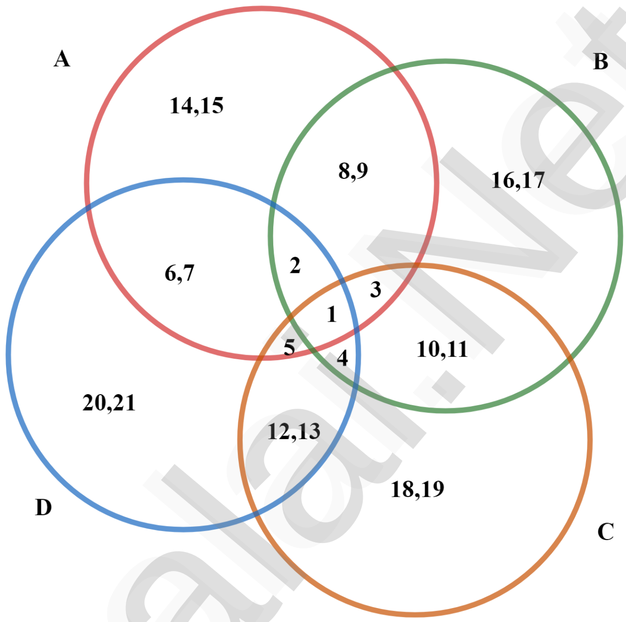
$S_4 \rightarrow$ Sum of Probability of events taken four at a time.

$S_5 \rightarrow$ Sum of Probability of events taken five at a time.

And so on…..

Let numbers from 1 to 21. $n(S) = 21$.

$(A\cup B\cup C\cup D) = \{1,2,3 \dots ,21\}$,



$n(A\cup B\cup C\cup D) = 21$

$$P(A\cup B\cup C\cup D) = \frac{n(A\cup B\cup C\cup D)}{n(S)} = \frac{21}{21} = 1$$

From venn diagram.

Taking One at a time.

$A = \{1,2,3,5,6,7,8,9,14,15\}, n(A) = 10, P(A) = \frac{10}{21}$

$B = \{1,2,3,4,8,9,10,11,16,17\}, n(B) = 10, P(B) = \frac{10}{21}$

$C = \{1,3,4,5,10,11,12,13,18,19\}, n(C) = 10, P(C) = \frac{10}{21}$

$D = \{1,2,4,5,6,7,12,13,20,21\}, n(D) = 10, P(D) = \frac{10}{21}$

$$\therefore \boldsymbol{P(A) + P(B) + P(C) + P(D) = S_1 = \frac{40}{21}}$$

Taking Two at a time.

$(A\cap B) = \{1,2,3,8,9\}; n(A\cap B) = 5; P(A\cap B) = \frac{5}{21}$

$(B\cap C) = \{1,3,4,10,11\}; n(B\cap C) = 5; P(B\cap C) = \frac{5}{21}$

$(C\cap D) = \{1,4,5,12,13\}; n(C\cap D) = 5; P(C\cap D) = \frac{5}{21}$

$(D\cap A) = \{1,2,5,6,7\}; n(D\cap A) = 5; P(A\cap B) = \frac{5}{21}$

$(A\cap C) = \{1,3,5\}; n(A\cap C) = 3; P(A\cap B) = \frac{3}{21}$

$(B\cap D) = \{1,2,4\}; n(A\cap C) = 3; P(A\cap B) = \frac{3}{21}$

$$\boldsymbol{P(A\cap B)+P(B\cap C)+P(C\cap D)+P(D\cap A)+P(A\cap C)+P(B\cap D)=S_2=\frac{26}{21}}$$

Taking Three at a time.

$(A\cap B\cap C)=\{1,3\};\ n(A\cap B\cap C)=2;$

$P(A\cap B\cap C)=\frac{2}{21}$

$(B\cap C\cap D)=\{1,4\};\ n(B\cap C\cap D)=2;$

$P(B\cap C\cap D)=\frac{2}{21}$

$(C\cap D\cap A)=\{1,5\};\ n(C\cap D\cap A)=2;$

$P(C\cap D\cap A)=\frac{2}{21}$

$(D\cap A\cap B)=\{1,2\};\ n(D\cap A\cap B)=2;$

$P(D\cap A\cap B)=\frac{2}{21}$

$P(A\cap B\cap C)+P(B\cap C\cap D)+P(C\cap D\cap A)+P(D\cap A\cap B)=S_3=\frac{8}{21}.$

Taking Four at a time.

$(A\cap B\cap C\cap D)=\{1\}; n(A\cap B\cap C\cap D)=1;$

$P(A\cap B\cap C\cap D)=S_4=\frac{1}{21}.$

$P(A\cup B\cup C\cup D)=P(A)+P(B)+P(C)+P(D)-P(A\cap B)+P(B\cap C)+P(C\cap D)+P(D\cap A)+P(A\cap C)+P(B\cap D)+P(A\cap B\cap C)+P(B\cap C\cap D)+P(C\cap D\cap A)+P(D\cap A\cap B)-P(A\cap B\cap C\cap D).$

$P(A\cup B\cup C\cup D)=\frac{40}{21}-\frac{26}{21}+\frac{8}{21}-\frac{1}{21}=\frac{21}{21}=1.$

$$P(A\cup B\cup C\cup D)=S_1-S_2+S_3-S_4$$

The Probability pattern follow as.

$$P(A\cup B)=S_1-S_2$$

$$P(A\cup B\cup C)=S_1-S_2+S_3$$

$$P(A\cup B\cup C\cup D)=S_1-S_2+S_3-S_4$$

$$P(A\cup B\cup C\cup D\cup E)=S_1-S_2+S_3-S_4+S_5$$

And so on like this

The probability pattern for the number of terms = Sum of odd terms − sum of even terms.

****

ALL THE BEST STUDENTS

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