WORKSHEETClass- IX

CH – 1: NUMBER SYSTEM

CONTENT:

- Review of representation of natural numbers.
- Integers
- Rational numbers on number line.
- Rational numbers as recurring / terminating decimals
- Existence of irrational numbers
- Representation of Irrational Numbers on Number Line
- n^{th} root of a real number
- Laws of exponents
- Rationalization of real numbers

THINGS TO REMEMBER:

- Natural numbers: The counting numbers 1, 2, 3, 4, 5……. are called natural numbers, denoted by the symbol N
- Whole numbers: The numbers zero (0) together with the natural numbers are called whole numbers, denoted by the symbol W.
- Integers: If we add the collection of all negative Integers like -1,-2… to the whole numbers, we get a new collection know as Integers denoted by the symbol Z.
- Rational numbers: Any numbers that can be expressed in the form p/q where p & q are integers, q≠ 0.
- There are infinitely many rational numbers between any two given rational numbers
- Decimal representation of rational numbers.

a) When the division is exact, then decimal representation is TERMINATING e.g. ½ = 0.5.

b) When the division is not exact, then the decimal representation is NON-TERMINATING REPEATING e.g. 1/3 = 0.333…..

- Irrational numbers- Any number that cannot be the expressed in the form p/q where p & q are Integers and q ≠ 0.
- A number is Irrational if and only if its decimal representation is NON – TERMINATING and NON – REPEATING e.g. √2, √3.
- The negative of an Irrational number is an Irrational number e.g. √2 and -√2.
- The sum of rational number with an irrational number is always irrational e.g. 2 + √3.
- The product of non-zero rational number with an irrational number is always an irrational number e.g. 5 √2.
- Sum of two irrational numbers is not always an irrational number e.g. √2 + (- √2) = 0.
- Product of two irrational numbers is not always an irrational number e.g. √2 x (-√2) = - 2
- Real numbers – Rational numbers and irrational numbers taken together form the collection of real numbers, denoted by R.
- Every real number is represented as a unique point on the number line and every point on the number line represents a unique real number.

Laws of exponents for real numbers

a) $a^m \cdot a^n = a^{m+n.}$

b) $(a^m)^n = a^{mn}$

c)	$a^m \div a^n$	=	a^{m-n}, $m > n$
d)	a^0	=	1
e)	$a^m b^m$	=	$(ab)^m$

- Rationalization

  It is the process of converting an expression whose denominator has a term with a square root into an equivalent expression whose denominator is a rational numbers. To rationalize the denominator of ---

(i) 1/a+b, multiply by a-b/a-b.
(ii) 1/a-b, multiply by a+b/a+b.
(iii) $\frac{1}{\sqrt{a+b}}$, multiply by $\frac{\sqrt{a+b}}{\sqrt{a+b}}$

LEVEL -1

1. An irrational number between 2 and 2.5 is
   (a) √11 (b) √5 (c) √22.5 (d)√12.5

2. Which of the following is irrational?

   (a) $\sqrt{\frac{4}{9}}$ (b) 4/5 (c) $\sqrt{7}$ (d) $\sqrt{81}$

3. The value of $0.\underline{23} + 0.\underline{22}$ is

   (a) $0.\underline{45}$ (b) $0.\underline{43}$ (c) $1.\underline{45}$ (d) 0.45

4. The smallest rational number by which 1/3 should be multiplied so that its decimal expansion terminates after one place of decimal, is

   (a) 1/10 (b) 3/!0 (c) 3 (d) 30

5. The value of $(256)^{0.16}$ x $(256)^{0.09}$ is

   (a) 4 (b) 16 (c) 64 (d) 8

LEVEL -2

6. Represent $\sqrt{10}$, $\sqrt{17}$ and $\sqrt{13}$ in a number line.

7. Arrange in ascending order: $\sqrt{2}$, $\sqrt[4]{3}$, $\sqrt[3]{5}$

8. If a = $2 + \sqrt{3}$, find a – $\frac{1}{a}$. [$2\sqrt{3}$]

9. Find a and b, $\frac{\sqrt{5}+\sqrt{3}}{\sqrt{5}-\sqrt{3}}$ = a + $b\sqrt{15}$. [a = 4, b = 1]

10. Prove that - $\left(\frac{x^a}{x^b}\right)^{a+b}$ x $\left(\frac{x^b}{x^c}\right)^{b+c}$ x $\left(\frac{x^c}{x^a}\right)^{c+a}$ = 1

11. Find the value of x : $\left(\frac{3}{5}\right)^x$ x $\left(\frac{5}{3}\right)^{2x} = \frac{125}{27}$ [3]

LEVEL -3

12. Prove that : $\frac{1}{3-\sqrt{8}} - \frac{1}{\sqrt{8}-\sqrt{7}} + \frac{1}{\sqrt{7}-\sqrt{6}} - \frac{1}{\sqrt{6}-\sqrt{5}} + \frac{1}{\sqrt{5}-2} = 5$ **(HOTS)**

13. Evaluate : $\sqrt{5+2\sqrt{6}} + \sqrt{8-2\sqrt{15}}$. **(HOTS)**

CHAPTER -2 POLYNOMIALS

Points to Remember :

1. Polynomials : Algebraic expressions in which the variables involved have only non-negative integral exponents are called Polynomials.
2. Degree of a Polynomial : Highest power of the variables in a polynomial is the degree of polynomial.
3. Constant Polynomial : A polynomial of degree zero is called a constant polynomial.
4. Zero of a Polynomial : Zero of a polynomial p(x) is a number a such that p(a) = 0
5. Zero may be a zero of a polynomial.
6. Every linear polynomial has one and only one zero.
7. Maximum number of zeros of a polynomial is equal to its degree.
8. Remainder Theorem : Let p(x) be any polynomial of degree greater than or equal to one and let a be any real number. If p(x) is divided by the linear polynomial x-a, then the remainder is p(a).

   Dividend = (Divisor X Quotient) + Remainder
9. Factor Theorem : If p(x) is a polynomial of degree ≥ 1 and a is any real number, then
   (x-a) is a factor of p(x), if p(a) = 0
   P(a) = 0, if x-a is a factor of P(x).
   (x+a) Is a factor of polynomial p(x), if p(-a) = 0
   (ax-b) is a factor of polynomial p(x), if $p(\frac{b}{a}) = 0$
   (x-a) (x-b) are factor of polynomial p(x), if p(a) = 0 and p(b) = 0

LEVEL 1

Q.1. Degree of $\sqrt{2}$ is :
(i) 2 (ii) 0 (iii) 1 (iv) $\frac{1}{2}$

Q.2. When $9x2 - 30x + k$ is a perfect square, then the value of k is :
(i) 25 (ii) 5 (iii) 36 (iv) 81

Q.3. The value of $(10)^3 - (5)^3 - (5)^3$ is :
(i) 750 (ii) 1000 (iii) 250 (iv) 500

Q4. The factors of $a^3 + 27$ are :
(i) $(a+3)(a^2+3a+9)$ (ii) $(a+3)(a^2-3a+9)$
(iii) $(a-3)(a^2-3a+9)$ (iv) $(a-3)(a^2+3a+9)$

Q.5. The Value of $(441)^2 - (440)^2$ is :
(i) 841 (ii) 1 (iii) 881 (iv) 0

LEVEL 2

Q.4. Find the value of a and b so that the polynomial $x^3 + 10x^2 + ax + b$ is exactly divisible by (x – 1) as well as (x – 2).

Q.5. Factorize : 1. $X^4 + 7X^2 + 16$ 2. $X^2 + 1/X^2 - 2 - 3X + 3/X$

Q.6. If (a+b+c) = 6, find the value of $(2-a)^3 + (2-b)^3 + (2-c)^3 - 3(2-a)(2-b)(2-c)$

Q.7.Factorize: $a^9b - ab^9$

Q.8. The volume of a cuboid is given by the algebraic expression $x^3 + 2x^2 - x - 2$. Find the possible expressions for the dimensions of a cuboid.

LEVEL 3

Q.9. What must be added to $x^4 + 2x^3 - 2x^2 + x - 1$ so that the result is exactly divisible by $x^2 + 2x - 3$?

Q.10. If $x^4 + 1/x^4 = 119$, calculate $x^3 - 1/x^3$.

Q.11. $\frac{X}{Y} + \frac{Y}{X} = -1$, the value of $x^3 - y^3$.

Q.12. If a + b + c = 0, then what is the value of $(a + b - c)^3 + (c + a - b)^3 + (b + c - a)^3$

Q.13. If the polynomials $px^3 + 4x^2 + 3x - 4$ and $x^3 - 4x + p$ are divided by (x – 3) then the remainder in each case is the same. Find the value of p.

CHAPTER 3 AND 4
WORKSHEET
CO-ORDINATE GEOMETRY AND LINEAR EQUATIONS IN TWO VARIABLES

Points to Remember

1. To locate the position of a point in a plane, we require two perpendicular lines. One of them is horizontal and the other is vertical. The plane is called Cartesian or coordinate plane and the lines are called the coordinate axes.
2. The horizontal line is called the x – axis and the vertical line is called the y – axis.
3. The coordinate axes divide the plane into four parts called quadrants.
4. The point of intersection of the axes is called the origin.
5. The x-coordinate of every point on y-axis is zero. So, the coordinates of any point on y-axis are (0, y).
6. The y-coordinate of every point on x-axis is zero. So, the coordinates of any point on x-axis are (x, 0).
7. An equation of the type y = mx represents a straight line passing through the origin.
8. The coordinate of origin is (0, 0).
9. Abscissa – Distance of the point from y- axis.
10. Ordinate – Distance of the point from x-axis.
11. The plane contains the two axis and four quadrants is called coordinate plane.
12. X coordinate is also called abscissa of the point.
13. Y coordinate is also called ordinate of the point.
14. The ordered pair $(x,y) \neq (y,x)$, if $y \neq x$ and $(x,y) = (y,x)$ if $y = x$

LEVEL I

Q1. In which quadrant does (0, -3) lies?
(a) 1st Quadrant (b) x axis (c) y axis (d) 2nd Quadrant.

Q2. Where will the point lie if y co-ordinate of a point is zero?
(a) 1st Quadrant (b) x axis (c) y axis (d) 2nd Quadrant.

Q3. If x=0 and y=k is a solution of the equation 5x–3y+3=0, what is the value of k.
(a) k=1 (b)k=2 (c) k=0 (d)k=-1.

Q4. The perpendicular distance of a point from the x- axis is 4 units and the perpendicular distance from the y-axis is 5 units. What is the co-ordinate of such a point if it lies in lll quadrant?
(a) (5, 4) (b) (4, 5) (c) (-5, -4) (d) (-4, -5)

LEVEL II

Q5. Represent it by an equation that if the difference of the ordinate and abscissa is 1.

Q6. Write the co-ordinates of the point at which the line 5x +3y =15 intersect the x-axis.

Q7. Graph the points P (-3,0) and Q (3,0). What are co-ordinates of R and S if PQRS is a square.

Q8. Graph the following points: A (4,1), B (1,5) and C (-2,1). Draw a triangle ABC and find its area

Q9. Write the equations of y-axis and x-axis.

LEVEL – 3

Q10. A family spends Rs 500 monthly as fixed amount on milk and extra milk costs Rs 20 per liters. Taking quantity of extra milk as x and total expenditure on milk as y. Write the linear equation to express the above statement and draw its graph.

Q11. Let x and y be two complementary angles, form an equation for this information and draw its graph. Find graphically angles of the other if one of the angles is 35^0.

Q12. If the point (2k – 3, k+2) lies on the graph of the equation 2x + 3y = 15, find the value of k.

Q13. Draw the graph of linear equation x = 4 and y = 5. Find the area formed by the two graph and the axes.

Q14. Draw the graph of the equations 2x + 3y = -5 and x + y =-1. Find the area formed by these lines and x – axis.

Q15. Find the coordinates where the linear equation 4x – (2/3) y = 7 meets the y – axis.

CH-6 LINES AND ANGLES

Points to remember:

1. **If two lines intersect at a points then the pair of vertically angles are equal.**
2. **In a triangle, the sum of the measure of all the angles is 180.**
3. **In a triangle, the measure of an exterior angle is equal to the sum of two interior opposite angles.**

LEVEL- 1(MCQ)

1)The angles of a triangle are in the ratio 5: 3: 7, the triangle is:

a. A right triangle b. An obtuse angled triangle

c. An isosceles triangle. d. An acute angled triangle

2) The number of lines that can pass through a given point is/are:

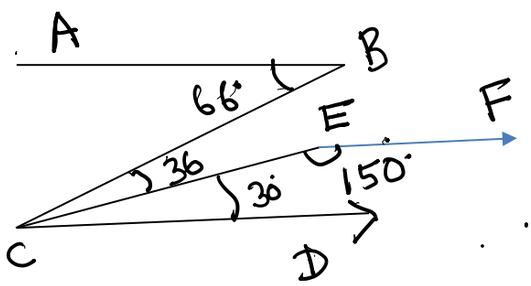
a. Two b. One c. Infinity d. Only one

3) An exterior angle of a triangle is 80° and two interior opposite angles are equal. What will be the measure of each of these angles?

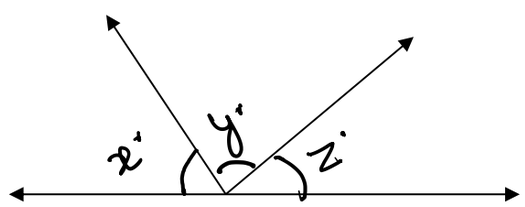
a. 60° b. 40° c. 100° d. 120°

LEVEL 2

4) In the given fig. show that AB ll EF.



5) If y/x =5 and z/x = 4, then the value of x is?

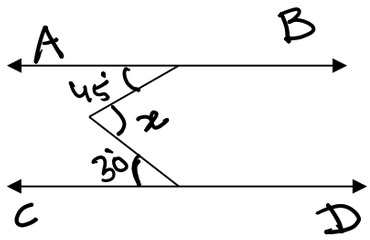


LEVEL 3

6) If two parallel lines are intersected by a transversal, then bisectors of any two corresponding angles are parallel.

7) If two parallel lines are intersected by a transversal, then bisectors of any two pair of alternate interior angles are parallel.

8) AB ll CD. Find the value of x.



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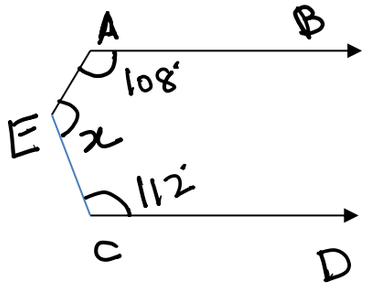
9) AB ll CD. Find the value of x.



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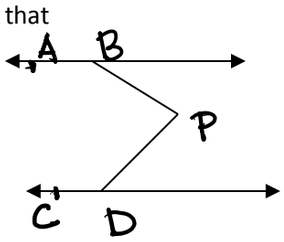
10)AB llCD and P is any point shown in the fig. Prove that

∠ABP + ∠BPD + ∠CDP = 360°



CHAPTER -7 TRIANGLES

POINTS TO REMEMBER

1. Two figures are congruent if they have same shape and are of same size.
2. Two circles of the same radii are congruent.
3. Two squares of the same sides are congruent.
4. Two triangles are congruent if and only if one of them can be made to superimpose on the other, so as to cover it exactly.
5. In symbolic form we represent two congruent triangles as

   $\Delta ABC \cong \Delta DEF$

6. Every triangle is congruent to itself.
7. Two triangles are congruent if any two sides and the included angle of one triangle are equal to any two sides and the included angle of other triangle. (SAS congruence condition)
8. Two triangles are congruent if any two angles and the included side of one triangle are equal to any two angles and the included side of other triangle. (ASA congruence condition)

9. Two triangles are congruent if any two angles and the side of one triangle are equal to any two angles and the side of other triangle. (AAS congruence condition)
10. Two triangles are congruent if three angles sides of one triangle are equal to three sides of another triangle. (SSS congruence condition)
11. The angles opposite to equal sides of a triangle are equal.
12. The sides opposite to equal angles of a triangle are equal.
13. Two right triangles are congruent if hypotenuse and a side of one triangle are respectively equal to hypotenuse and a side of another triangle. (RHS congruence condition)
14. If two sides of a triangle are unequal, the larger side has a greater angle opposite to it.
15. In a triangle, the greater angle has a larger side opposite to it.
16. The sum of any two sides of a triangle is greater than its third side.
17. The difference of any two sides of a triangle is less than its third side.
18. Each angle of an Equilateral triangle is of 60^0

Level -1 (MCQ)

1.Choose the correct statement

(a) a triangle has two right angle (b) all the angles of a triangle are more than 60°

(c) an exterior angle of a triangle is always greater than the opposite interior angles

(d) all the angles of a triangle are less than 60°

2. In two triangles, ABC and PQR, $\angle A = 30°$, $\angle B = 70°$, $\angle P = 70°$, $\angle Q = 80°$ and AB = RP, then

(a) $\Delta ABC \cong \Delta PQR$ (b) $\Delta ABC \cong \Delta QRP$ (c) $\Delta ABC \cong \Delta RPQ$ (d) $\Delta ABC \cong \Delta RQP$

3. In two triangles ABC and DEF, AB = DE, BC = DF and AC = EF, then

(a) $\Delta ABC \cong \Delta DEF$ (b) $\Delta ABC \Delta \Delta EFD$ (c) $\Delta ABC \cong \Delta FDE$ (d) none of these

4. If ΔABC is congruent to ΔDEF by SSS congruence rule, then:

(a) $\angle C < \angle F$ (b) $\angle B < \angle E$ (c) $\angle A < \angle D$ (d) $\angle A = \angle D$, $\angle B = \angle E$, $\angle C = \angle F$

5. In a triangle PQR if $\angle QPR = 80°$ and PQ = PR, then $\angle R$ and $\angle Q$ are

(a) 80°, 70° (b) 80°, 80° (c) 70°, 80° (d) 50°, 50°

Level 2

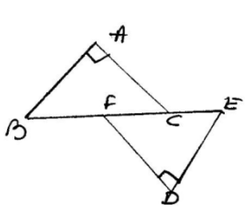
1. In triangle ABC, $\angle A = 70^0$ and $\angle C=30^0$. Determine the longest and the shortest side.

2. AD is the bisector of $\angle A$ of triangle ABC in which AB = AC. Prove that BD = CD.

3.In an acute angled triangle ABC, S is any point on BC. Prove

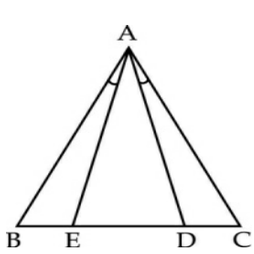
AB+BC+CA >2AS

4.In the given figure BA ⊥ AC and ED⊥FD such that BA=DE and BF=EC show that $\Delta ABC \cong \Delta DEF$.

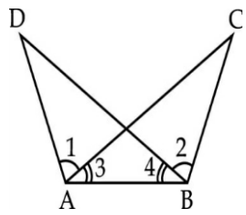


Level-3

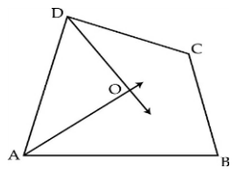
1. In given figure, AE = AD, $\angle BAE = \angle CAD$. Prove that AB = AC.



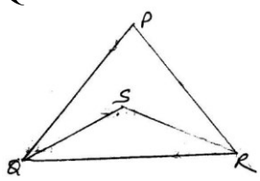
2. In figure ΔABC and ΔABD are such that AD = BC, ∠1 = ∠2 and ∠3 = ∠4. Prove that BD = AC.



3. In figure, AO and DO are the bisectors of ∠A and ∠D respectively of the quadrilateral ABCD. Prove that ∠AOD = 1/2(∠B + ∠C).



4. In the given figure PQR is a triangle and S is any point in its interior, show that SQ + SR < PQ + PR



5. Prove that two triangles are congruent if any two angles and the included side of one triangle is equal to any two angles and the included side of the other triangle.

CH : 8 QUADRILATERALS CLASS – IX

POINTS TO REMEMBER

- Sum of the angles of a quadrilateral is 360^0.
- A diagonal of a parallelogram divides it in to two congruent triangles.
- A quadrilateral which has one pair of opposite sides parallel is called a trapezium.
- A quadrilateral which has both pairs of opposite sides parallel and equal is called a parallelogram.
- The opposite angles of a parallelogram are equal.
- The diagonals of a parallelogram bisect each other.
- If one pair of opposite sides of a quadrilateral are equal and parallel, then the quadrilateral is not a parallelogram.
- A parallelogram with one of its angles as a right angle is a rectangle.
- If a pair of adjacent sides of parallelogram is equal, then parallelogram is a rhombus.
- A square is a rectangle when all of its sides are equal.
- The diagonals of a rectangle are of equal length.
- The diagonals of a rhombus are perpendicular bisectors of each other.
- The diagonals of a square are equal and perpendicular to each other.
- The line segment joining the mid-points of any two sides of a triangle is parallel to the third side and equal to half of it.
- The line drawn through the mid-point of one side of a triangle, parallel to another side, intersects the third side at its mid-point.
- If there are three parallel lines making equal intercepts on any transversal then the intercepts made by them on any other transversal are also equal.

Level-1

1. The figure formed by joining the mid-points of the adjacent sides of a quadrilateral is a

(a) parallelogram (b) rectangle (c) square (d) rhombus

2. The figure formed by joining the mid-points of the adjacent sides of a rectangle is a

(a) Square b) rhombus (c) trapezium (d) none of these

3. The figure formed by joining the mid-points of the adjacent sides of a rhombus is a

(a) Square b) rectangle (c) trapezium (d) none of these

4. The figure formed by joining the mid-points of the adjacent sides of a square is a

a) Square b) rhombus (c) rectangle (d) parallelogram

5. Diagonals of a quadrilateral ABCD bisect each other. If angle A is 45^0, then angle B will be

(a) 115^0 (b) 120^0 (c) 150^0 (d) 135^0

6. The bisectors of the angle of a parallelogram encloses a

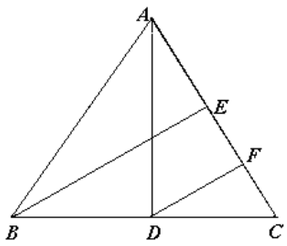
(a) parallelogram (b) rectangle (c) square (d) rhombus

Level-2

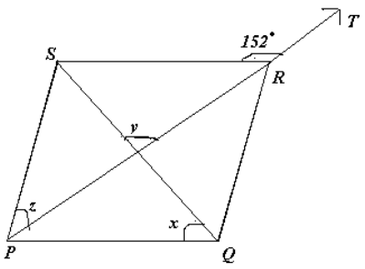
7. If an angle of a parallelogram is 1/3 of its adjacent angle, find the angle of the parallelogram. [108°, 72°, 108°, 72°]

8. In a quadrilateral ABCD, AO and BO are the bisectors of ∠A and ∠B respectively. Prove that ∠AOB = ½ (∠C + ∠D).

9. AD and BE are medians of ΔABC and BE ∥ DF. Prove that CF = ¼ AC.

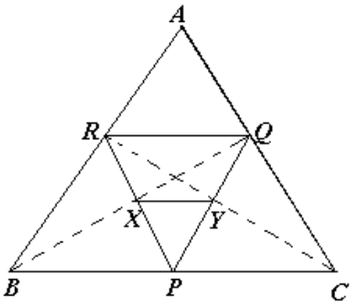


10. PQRS is a rhombus in which the diagonal PR is produced to T. If ∠SRT = 152°, find x, y, z.



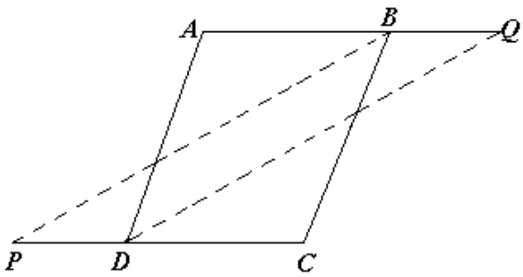
Level-3

11. P, Q and R are respectively, the mid points of sides BC, CA and AB of the ΔABC. PR and BQ meet at X, CR and PQ meet at Y. Prove that XY = ¼ BC.



(**HOTS)**

12. Bisectors of ∠B and ∠D of a quadrilateral ABCD meet CD and AB produced at P and Q respectively, Prove that ∠P + ∠Q = ½ (∠ABC + ∠ADC).



(**HOTS)**

CHAPTER-9

Topic : Area of Parallelogram & Triangle

Points to remember :

* Area of a figure is a number (in some unit) associated with the part of a plane enclosed.

* Two congruent figures have equal areas but the converse is not true.

* Parallelograms on the same base and between the same parallels are equal in area.

* Triangles on the same base and between the same parallels are equal in area.

* A diagonal of a parallelogram divides it into two triangles of equal areas.

* The area of a parallelogram is the product of any of its sides and corresponding altitude.

* The area of a triangle is half the product of any of its sides and corresponding altitude.

* If a triangle and a parallelogram are on the same base and between the same parallels, the area of the triangle is half that of parallelogram.

* The area of a trapezium is half the product of its height and sum of the parallel sides.

* The area of a rhombus is equal to the half the product of its diagonals.

* A median of a triangle divides it into two triangles of equal area.

Level: 1(MCQ)

1.Two parallelograms are on the same base and between the same parallels. The ratio of their areas is

(a) 1 : 2 (b) 2 : 1 (c) 1 : 1 (d) 3 : 1

2.A triangle and a parallelogram are on the same base and between the same parallels. The ratio of the areas of triangle and parallelogram is

(a) 1 : 1 (b) 1 : 2 (c) 2 : 1 (d) 1 : 3

3. Let ABC be a triangle of area 24 sq. units and PQR be the triangle formed by the mid-points of sides of ΔABC.

Then the area of ΔPQR is

(a) 12 sq. units (b) 6 sq. units (c) 4 sq. units (d) 3 sq. units

4.The median of a triangle divides it into two

(a) congruent triangles (b) isosceles triangles

(c) right triangles (d) triangles of equal areas

5.ABCD is a parallelogram. P is any point on CD. If ar (ΔDPA) = 15 cm2 and ar(ΔAPC) = 20 cm2, then ar(ΔAPB) =

(a) 15 cm2 (b) 20 cm2 (c) 35 cm2 (d) 30 cm2

Level -2

Q1. A quadrilateral ABCD is such that diagonal BD divides its area in two equal parts. Prove that BD bisects AC.

Q2. ABCD is a quadrilateral. A line through D, parallel to AC, meets BC produce in P.

Prove that: ar (ABP) = ar (quad. ABCD).

Q3. ABCD is a parallelogram whose diagonals intersect at O. If P is a point on BO,

prove that: (i) Area (ADO) = Area (CDO) (ii) Area (ABP) = Area (CBP)

Q5. ABCD is a parallelogram. E is a point on BA such that BE = 2EA and F is a point on DC, such that DF = 2FC. Prove that AECF is a parallelogram whose area is one third of the area of parallelogram ABCD.

Level -3

Q1. Show that the area of rhombus is half the product of the length of diagonals.

Q2. In a parallelogram ABCD, E, F are any two points on the sides AB and BC respectively. Show that area (ADF) = area (DCE)

Q3. ABC is a triangle in which D is the midpoint of BC and E is the midpoint of AD. Prove that ar (BED) = 1/4(ABC)

Q4. The medians BE and CF of a triangle ABC intersect at G. Prove that the area of triangle GBC = area of quadrilateral AFGE.

Q5. ABCD is a parallelogram. If E is the midpoint of BC and AE is the bisector of angle A, prove that AB = 1/2AD.

CHAPTER : 10

CIRCLES

Points To Remember :

A circle is the collection of all those points in a plane, which are equidistant from a fixed point in a plane.

Equal chords of a circle subtend equal angles at the centre

Equal chords of a circle are equidistant from the centre

The angle subtended by an arc at the centre is double the angle subtended by it at any other point on the remaining part of the circle

Angles in the same segment of a circle are equal

The sum of either pair of opposite angles of a cyclic quadrilateral is 180^0

Level I

1 If the length of a chord of a circle is 16cm and is at a distance of 15 cm from the centre of the circle, then the radius of the circle is

(a) 15 cm (b) 16 cm (c) 17cm (d) 34 cm

2 One chord of a circle is known to be 10 cm. The radius of this circle must be

(a) 5 cm (b) greater than 5 cm (c) greater than or equal to 5 cm (d) less than 5cm

3 The chord of a circle is equal to its radius. The angle subtended by this chord at the minor arc of the circle is

(a) 60^0 (b) 75^0 (c) 120^0 (d) 150^0

4 An equilateral triangle is inscribed in a circle with centre O. The measure of angle BOC is

(a) 30^0 (b) 60^0 (c) 90^0 (d) 120^0

5 Angle formed in minor segment of a circle, is

(a) Acute (b) obtuse (c) right angle (d) none of these

Level II

6 Two equals chords AB and CD of a circle with center O, when produced, meet at a point E. Prove that BE = DE and AE = CE.

7 Two circles of Radii 17 Cm and 10 Cm intersect at two points and the length of the common chord is 16 Cm. Find the distance between their centers.

8 If two sides of a cyclic quadrilateral are parallel, prove that remaining two sides are equal and both diagonals are equal.

9 Prove that the circle drawn with any equal side of an isosceles triangle as diameter bisects the base.

Level III

10 Two diameters of a circle intersect each other at right angles. Prove that the quadrilateral formed by joining their end points is a square.

11 Prove that the quadrilateral formed (If possible) by the internal angle bisectors of a cyclic quadrilateral is also cyclic.

CH : 11 CONSTRUCTIONS CLASS – IX

POINTS TO REMEMBER

- The sum of any two sides of a triangle is greater than its third side.
- The difference of any two sides of a triangle is less than its third side.
- Each angle of an Equilateral triangle is of 60^0.
- Perimeter of a figure means sum of all its sides.
- According to Pythagoras theorem, in a right angled triangle, square of the hypotenuse is equal to the sum of square of its other two sides.
- Hypotenuse is the largest side in a right angled triangle.
- Sum of three angles of a triangle is 180^0.
- On the basis of different congruence conditions of triangle we can conclude that a triangle can be determined uniquely if
  - (a) Two sides and included angle is given.
  - (b) Three sides are given.
  - (c) Two angles and the included side is given.

Level-1

1. Draw a line segment AB of length 6.6cm. Draw ½ AB , ¾ AB , ¼ AB separately.
2. Using a protactor, draw an angle of measure 128°. With this angle, construct an angle of measure 96°.
3. Construct an angle of 60° at the initial point of a given ray and justify the construction.

Level-2

4. Construct a ΔABC in which AB = 5.8cm, BC + CA = 8.4cm and ∠B = 60°.
5. Construct a ΔABC in which BC = 5.6cm, AC – AB = 1.6cm and ∠B = 45°.
6. Construct a ΔPQR whose perimeter is equal to 14cm, ∠P = 45° and ∠Q = 60°.

Level-3

7. Construct a right angled triangle whose perimeter is equal to 10cm and one acute angle equal to 60°.
8. Construct a ΔABC such that BC = 6cm, AB = 6cm and median AD = 4cm.
9. Draw a pair of vertically opposite angles. Bisect each of the two angles. Verify that the bisecting rays are in the same line.

CHAPTER- 12

HERON'S FORMULA

POINTS TO REMEMBER:

1. For a triangle with length of sides *a*, *b* and *c*, perimeter = $a + b + c$.
2.
3. Area of an equilateral triangle = $\sqrt{3}$ / 4 x $(\text{side})^2$.
4. Altitude of an equilateral triangle = $\sqrt{3}$ / 2 x side.
5. Heron's formula: - If *a, b, c* denote the lengths of the sides of a triangle, then the area of the triangle :Δ = $\sqrt{s(s-a)(s-b)(s-c)}$; where s=(a+b+c)/2.

Level -1

1. What in the area of an equilateral triangle with side 2 cm?

   a. √6cm2 b. √3cm2 c. √8cm2 d. 4cm2

2. The sides of a triangle are 3 cm, 5 cm and 6 cm. What is its area?

   a. 2√3cm2 b. 4√14cm2 c. 5√12cm2 d. 2√5cm2

3. If the perimeter of an equilateral triangle is 60 cm, then what is its area?

   a. 200√2cm2 b. 100√2cm2 c. 100√3cm2 d. 200√3cm2

4. The sides of a triangle are 8 cm, 11 cm and 13 cm. What is its area?

   a. 8√30cm2 b. 4√10cm2 c. 3√100cm2 d. 6√200cm2

5. The sides of a triangle are in the ratio of 3 : 4 : 5. If its perimeter is 36 cm, then what is its area?

   a. 32 cm2 b. 54 cm2 c. 67 cm2 d. 72cm2

Level 2

Q.1. The Perimeter of an equilateral triangle is 120 m . Find its area and the distance of the altitude of the triangle.

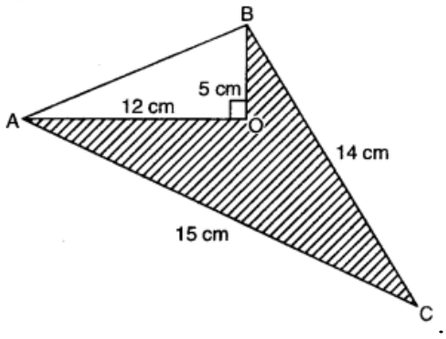
Q.2. An isosceles right triangle has an area of 8 cm^2 . Find the length of its hypotenuse.

Q.3. In a right angled triangle one side is 126m and difference hypotenuse and other side is 42 m. Find the lengths of both sides and area of the triangle.

Q.4. Perimeter of a rhombus is 146 cm and one diagonal is 55 cm. Find the other diagonal and area of the rhombus.

Level -3

Q1. Calculate the area of the shaded region.



Q2 .Hanif wants construct a room for some children who lost of their family members in an earthquake. The floor of room is in the shape of a parallelogram in which its adjacent sides are 51m and 37m. One of its diagonals is 20 m.

(i) Find the area of the floor of the room.

(ii) Find altitude

Q3. Parallel sides of trapezium are 46m and 25m and two other sides are 20m and 13m. Find the area of trapezium.

CHAPTER– 13 **SURFACE AREA AND VOLUME**

Points To Remember :

CUBE

Cube whose edge is a

Diagonal = $\sqrt{3}$ a

Lateral Surface Area = $4a^2$

CUBOID

Cuboid whose length =I, breadth = b and height = h

Diagonal = $\sqrt{l^2 + b^2 + h^2}$

Lateral Surface Area = 2 (l + b) h

CYLINDER

Cylinder whose radius = r and height = h

Curved Surface Area = 2 πrh

CONE

Cone whose radius = r, height = h and slant height = l

Slant height = $\sqrt{r^2 + h^2}$

Curved Surface Area = πrl

SPHERE

Sphere whose radius = r

Surface Area = $4\ \pi r^2$

Volume = $\frac{4}{3}\pi r^3$

HEMISPHERE

Hemisphere whose radius = r

Curved Surface Area = $2\ \pi r^2$

Total surface Area = $3\ \pi r^2$

Volume = $\frac{2}{3}\pi r^3$

l is $2\sqrt{3}$

2 The length of the longest rod that can be placed in a room 12m long, 9m broad and 8m high is :

(b) 15m (b) 20m (c) 18m (d) 17m

3 If the outer diameter of a pipe 21 m long is 1 m, then its outer curved surface area is :

(b) 21 m^2 (b) 63 m^2 (c) 66 m^2 (d) 42 m^2

4 The curved surface area of a right circular cylinder is 4400 cm^2. If the circumference of its base is 110 cm, then its height is :

(b) 36 cm (b) 38 cm (c) 40 cm (d) 42 cm

5 The number of liters that a cuboidal water tank of dimensions 6 m X 5 m X 4.5 m can hold is :

(c) 135000 L (b) 135 L (c) 270 L (d) 270000 L

LEVEL 2

6 The length of a cold storage is double its breadth. Its height is 3 meters. The area of its four walls (including doors) is 108m2. Find its volume. (Ans : 216m3)

7 The sum of length, breadth and depth of a cuboid is 19cm and the length of its diagonal is 11cm. Find the surface area of the cuboid. (Ans : 240cm2)

8 A metallic sheet is of the rectangular shape with dimensions 48cm X 36cm. From each one of its corners, a square of 8cm is cut off. An open box is made of the remaining sheet. Find the volume of each box. (Ans : 5120cm3)

9 A well with 10m inside diameter is dug 14m deep. Earth taken out of it is spread all around to a width of 5m to form an embankment. (Ans : 4.66m)

10 A cone of a radius 5cm is filled with water poured in a cylinder of radius 10cm, the height of the water rises 2cm, find the height of the cone. (Ans : 24cm)

LEVEL 3

11 A solid cylinder has a total surface area of 231 cm^2. Its curved surface area is $\frac{2}{3}$ of the total surface area. Find the volume of the cylinder. (Ans : 269.5 cm^3)

12 The difference between outside and inside surfaces of a cylindrical metallic pipe 14cm long is 44cm2. If the pipe is made of 99cubic cm of metal, find the outer and inner radii of the pipe. (Ans : Outer Radius 2.5cm, Inner Radius 2cm)

13 A cylinder is within the cube touching all the vertical faces. A cone is inside the cylinder. If their heights are same with the same base, find the ratio of their volumes. (Ans : 42 : 33 : 11)

14 A solid lead ball of radius 7cm was melted and then drawn into a wire of diameter 0.2cm. Find the length of the wire. (Ans : 457.33m)

15 If h, C, V are respectively the height, the curved surface and the volume of a cone, prove that 3 Vh3 – C2h2 + 9V2 = 0.

CH:14

WORKSHEET OF STATISTICS CLASS IX

POINTS TO REMEMBER:

- Facts or figures, collected with a definite purpose, are called data.
- Statistics is the area of study dealing with the presentation, analysis and interpretation of data.
- How data can be presented graphically in the form of bar graphs, histograms and frequency polygons.
- The three measures of central tendency for ungrouped data are :
  Mean : It is found by adding all the values of the observations and dividing it by the total number of observations. It is denoted by $\bar{x}$.

  So, $\bar{x} = \frac{\sum_{i=1}^{n} xi}{n} \frac{\sum_{i=1}^{n} xi}{n}$.

For an ungrouped frequency distribution, it is $\bar{x} = \frac{\sum_{i=1}^{n} fi\ xi}{\sum_{i=1}^{n} fi} \frac{\sum_{i=1}^{n} fi\ xi}{\sum_{i=1}^{n} fi}$.

Median: It is the value of the middle-most observation(s).
Write the data in increasing order and find n (number of observations).

n is an odd number, the median = value of the $\left(\frac{n+1}{2}\right)^{th}$ observation.

If *n* is an even number,

Median = $\frac{\left(\frac{n}{2}\right)^{th} + \left(\frac{n}{2}+1\right)^{th}}{2}$.

Mode : The mode is the most frequently occurring observation.

Level-1

1. Mode is

(a) least frequency value (b) middle most value (c) most frequent value (d) none of these.

2.The mode of the following data 0,1,1,2,4,3,3,,2,0,2,4,2 is

(a)0 (b) 1.5 (c) 2 (c) 6

3. The mean of first 5 prime numbers is

(a)5.6 (b) 3.6 (c) 4.2 (d) 2.4

4. If the mean of 2,4,6,8,x,y is 5. Then the value of x+y is

(a) 14 (b) 10 (c) 20 (d) 5

5. The median of the data 25,34,31,23,22,26,35,28,20,32 is

(a) 25 (b) 32 (c) 27 (d) 24

6. A frequency polygon is constructed by plotting frequency of the class interval and the

(a) upper limit of the class (b) lower limit of the class (c) mid value of the class (d) any value of the class

Level-2

7) Find the median of the following data: 19,25,59,48,35,31,30,32,51. If 25 is replaced by 52, what will be the new median. [32, 35]

8) Find the value of **p** for the following distribution whose mean is 16.6.

X	8	12	15	p	20	25	30
Y	12	16	20	24	16	8	4

9) The following table presents the number of illiterate females in the age group (10-34) in a town. Draw a histogram to represent the following data.

Age group	10-14	15-19	20-24	25-29	30-34
No. of females	300	980	800	580	290

10) For the following data , draw a histogram and a frequency polygon:

Marks	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90
No. of students	5	10	4	6	7	3	2	2	3

Level-3

11) Find the missing frequencies in the following frequency distribution if it is known that the mean of the distribution is 1.46.

No. of accidents	0	1	2	3	4	5	Total
frequency	46	F1	F2	25	10	5	200

[76,38]

12)Find the value of **p** , if the mean of the following distribution is 20.

X	15	17	19	20+p	23
Y	2	3	4	5p	6

[p=1]

13) The mean of 200 items was 50. Later on, it was discovered that the two items were misread as 92 and 8 instead of 192 and 88. Find the correct mean. [50.9] (**HOTS)**

14) The sum of the derivations of a set of n values $x_1, x_2, \ldots\ldots, x_n$ measured from 50 is -10 and the sum of derivations of the values from 46 is 70. Find the values of n and the mean. [20,49.5]

(**HOTS)**

CHAPTER –15

PROBABILITY

Points To Remember :

1. Probability is a quantitative measure of likelihood of a given event's occurrence
2. An event for an experiment is the collection of outcomes of the experiment
3. Probability of an event P(E) = $\frac{No\ of\ outcomes\ favorable\ to\ E}{Total\ no\ of\ possible\ outcomes}$
4. The probability of an event E is a number P(E) such that $0 \leq P(E) \leq 1$

LEVEL - 1

Q 1 What is the sum of the probabilities of all events of a trial is

(a) Less than 1 (b) 1 (c) greater than 1 (d) between 0 and 1

Q 2 Which of the following can not be empirical probability of an event?

(a) $\frac{4}{5}$ (b) 1 (c) 0 (d) $\frac{5}{4}$

Q 3 The probability of an impossible event is

(a) Less than 1 (b) 1 (c) greater than 1 (d) between 0 and 1

Q 4 In a cricket match, a batswoman hits the boundary 8 times out of 50 balls played by her. The probability that she did not hit the boundary is

(a) $\frac{4}{25}$ (b) $\frac{21}{25}$ (c) $\frac{41}{50}$ (d) $\frac{1}{50}$

Q 5 In n trials of a random experiment, if an event E happens m times, then P(E) is equal to

(a) $\frac{m}{n}$ (b) $\frac{n}{m}$ (c) $\frac{m}{m+n}$ (d) $\frac{n}{m+n}$

LEVEL -2

Q 1 A die is thrown 300 times and odd numbers are obtained 153 times. Find the probability 0f getting an even number.

Q 2 A survey was conducted in a group of students as a part of their environment awareness programme in which they collected the following data regarding the number of plants planted in 30 hours in a locality.

No. of plants	0-3	3-6	6-9	9-12	12-15

No. of hours	4	5	6	7	8

a) Find the probability of the number of hours having 12-15 plants.
b) Find the probability of number of hours having less than 6 plants.

Q 3 In a survey of 200 children, it was found that 142 like to practice in outdoor games, yoga and jogging while 58 like to watch TV instead.

a) Find the probability that a child chosen at random likes outdoor games, yoga and jogging
b) Likes to watch TV instead.

Q 4 Three coins were tossed simultaneously 100 times with the following frequencies of different outcomes.

Outcomes	3 heads	2 heads	1 heads	No head
Frequency	25	34	15	16

Compute probability of getting (a) less than 3 heads (b) 2 heads

Q 5 There are 17 girls and 13 boys in a class. If one student is chosen at random, find the probability:

a) He is a boy (b) She is a girl

LEVEL - 3

Q 1. Find the value of x, if 2/3 is the probability of an event not happening and x/2 is the probability of the events happening.

Q 2. The number of family members in 20 families were recorded as follows:
3,5,5,4,2,6,3,2,2,4,3,4,6,6,2,3,3,5,4,2. Find in percentage, the probability that a randomly chosen family has (i) 4 members (ii) more than 3 members.

Q 3. Three coins were tossed simultaneously, find the probability of getting :
at least 2 heads (b) at most 2 heads

Q 4. A dice is thrown once, find the probability of getting
even number on the dice 2) a factor of 6

Q 5. A bag contains cards numbered from 1 to 100. A card is drawn at random from the bag. Find the probability that the
Card bears a number which is a multiple of 5.
Cards bears a number which is greater than or equal to 80.