

Class: IX

Subject : Mathematics

Assignment No. 3

Linear equations in two variables

- Find four different solutions of the equations:
a) $4x-5y=3$ b) $2x+y=7$
- Draw the graph of the equation $2x-3y=5$. From the graph find
(i) The value of y when $x=4$.
(ii) The value of x when $y=3$.
- Give the equation of two lines passing through $(4, 7)$. How many more such lines are there?
- Find the value of a so that $x=1, y=1$ is the solution of $9ax+12ay=63$
- Find the point of intersection of the line represented by the equation $7x+y=-2$ with x -axis. Check whether $(2,1)$ is a solution set of the given equation.

Quadrilaterals

- If ABCD is a square and EDC is an equilateral triangle with side DC of the square as its base, then prove that $AE=BE$ and $\angle DAE=15^\circ$.
- If ABCD is a square and P, Q and R are points on AB, BC and CD such that $PB=CQ=DR$ and $\angle PQR=90^\circ$, then prove that:
(i) $QB=RC$ (ii) $PQ=QR$ (iii) $\angle QPR=45^\circ$
- If the diagonals of a quadrilateral bisect each other at right angles, show that it is a rhombus.
- If in the parallelogram ABCD, the diagonals AC and BD intersect at O. Line segment EOF is drawn to meet AB at E and DC at F, then prove that $OE=OF$.
- If ABCD is a parallelogram in which AB is produced to E such that $BE = AB$, then prove that ED bisects BC.
- ABCD is a rhombus. P, Q, R and S are the midpoints of its sides. Show that PQRS is a rectangle.
- In a trapezium ABCD, AB is parallel to CD and $AD=BC$. If P, Q, R and S are the midpoints of BA, BD, CD and CA respectively, show that PQRS is a rhombus.

Areas of parallelograms and triangles

- In parallelogram ABCD, O is a point in its interior. Prove that ;
(i) $\text{ar}(\triangle AOB) + \text{ar}(\triangle COD) = \frac{1}{2} \text{ar}(\text{ABCD})$
(ii) $\text{ar}(\triangle AOD) + \text{ar}(\triangle BOC) = \text{ar}(\triangle AOB) + \text{ar}(\triangle COD)$
- In $\triangle ABC$, D is the midpoint of AB. P is any point on BC and Q on AB. CQ is parallel to DP. Prove that $\text{ar}(\triangle BPQ) = \frac{1}{2} \text{ar}(\triangle ABC)$.
- In $\triangle ABC$, D and E are the midpoints of AB and AC. Show that $\text{ar}(\triangle BOC) = \text{ar}(\triangle DOE)$.
- ABCD is a parallelogram whose diagonals AC and BD intersect at O. A line segment through O meets AB at P and CD at Q. Prove that $\text{ar}(\triangle APQD) = \frac{1}{2} \text{ar}(\text{ABCD})$

- P, Q, R and S are midpoints of the sides of quadrilateral ABCD. Prove that PQRS is a parallelogram and $\text{ar}(\text{PQRS}) = \frac{1}{2} \text{ar}(\text{ABCD})$.
- ABCD is a trapezium in which AB is parallel to DC. A line parallel to AC intersects AB at X and BC at Y. Prove that $\text{ar}(\triangle ADX) = \text{ar}(\triangle ACY)$.
- ABCD is a parallelogram and a line through A cuts DC at P and BC produced at Q. Prove that $\text{ar}(\triangle BPC) = \text{ar}(\triangle DPQ)$.

CIRCLE :

- OD is perpendicular to a chord AB of a circle whose centre is O. If BC is a diameter, prove that $AC = 2OD$.
- If two circles intersect at two points, prove that their centre lies on the bisector of the common chord.
- Prove that the quadrilateral formed by the internal angle bisectors of any quadrilateral is cyclic.
- AB is the chord of a circle with centre O and AB is produced to C such that $BC = OB$. OC is joined and produced to meet circle at D. If $\angle ACD = y^\circ$ and $\angle AOD = x^\circ$, prove that $x = 3y$.
- ABCD is a parallelogram. A circle through ABC intersects CD produced at E. Prove that $AD = AE$.

Construction

- Construct a triangle ABC where $BC = 8 \text{ cm}$, $\angle B = 45^\circ$ and $AB - AC = 1 \text{ cm}$.
- Construct a triangle ABC whose perimeter is 13 cm and $\angle B = 60^\circ$, $\angle C = 45^\circ$

Volume and surface area

- If three cubes of metal of edges 3cm, 4cm and 5cm are melted to form a single cube, find the L.S.A. of the new cube.
- If the T.S.A. of a solid cylinder is 231 cm^2 and its C.S.A is two-third of the T.S.A, find the volume of the cylinder.
- The external diameter of a cylindrical iron pipe is 25cm and its length is 20cm. If the thickness of the pipe is 1 cm. Find the T.S.A. of the pipe.
- A cone of height 8m has $\text{C.S.A.} = 188.4 \text{ cm}^2$. Find the volume of the cone.
- A cylindrical bucket with base radius 15cm is filled with water up to a height of 20cm. A spherical ball of radius 9cm is dropped into the bucket to submerge completely in water. Find the increase in the level of water.
- A field is 70m long and 40m broad. In a corner of the field a pit which is 10m long, 8m broad and 5m deep has been dug out. Earth taken out is spread evenly over the remaining part of the field. Find the rise in the level of the field.
- A cylindrical pipe is 14cm long. The difference between the inside and outside C.S.A. is 44 cm^2 . If pipe is made of 99 cm^2 of metal. Find the outer and the inner radius of the pipe.

Statistics

- The amounts of time taken (in seconds) to solve a problem by 36 students are as follows;
58,42,47,14,30,38,16,36,32,54,32,19,27,30,35,32,40,42,40,5,2,18,43,40,37,31,29,20,50,28,25,37,50,42,27,28,47.
Construct a frequency distribution table using class intervals each of size 10. Draw a histogram to represent the above data.
- The following two tables give the distribution of students of two sections according to the marks obtained by them.

SECTION - A		SECTION - B	
Marks	Frequency	Marks	Frequency
0-10	3	0-10	5
10-20	9	10-20	19
20-30	17	20-30	15
30-40	12	30-40	10
40-50	9	40-50	1

- 3 Construct a histogram for the following data

Class interval	Frequency
10-15	6
15-20	10
20-30	10
30-50	8
50-80	18

- 4 Calculate the means of the following distribution;

x	2	2.1	2.2	2.3	2.4	2.5	2.6
f	2	4	3	3	5	2	1

- 5 The following number of goals were scored by a team in a series of 10 matches; 2, 3, 4, 5, 0, 1, 3, 3, 4, 3. Find the mean, median and mode of these scores.
- 6 The following data has been arranged in ascending order; 24, 27, 28, 31, 34, x, 37, 40, 42, 45. If the median of the data is 35, find x. In the above data, if 45 is changed to 33, find the new median.
- 7 The mean of 31 numbers is 60. If the mean of the first is 58 and that of last 16 numbers is 62. Find 16th number.

Probability

1. In a one day international cricket, the batsman Doni played 40 balls. The runs scored are as follows;

Runs scored	Number of balls
0	13
1	15
2	5
3	1
4	4
6	2

Find the probability that Dhoni will score

- (i) 3 runs (ii) 4 runs (iii) 1 or 2 runs (iv) 2 or 3 or 4 runs

2. A die is thrown 600-times and the frequencies of the outcomes are as follows;

Outcomes	Frequency
1	75
2	90
3	125
4	135
5	90
6	85

Find the probability of obtaining;

- even number on the die
- odd number on the die
- not a prime number on the die
- getting a number more than three

3. Three similar coins were tossed simultaneously for 100 times and the data recorded is given below

Number of heads	0	1	2	3
Frequency	22	30	28	20

Find the probability of getting;

- two heads and one tail
 - at least one head
 - four heads
 - less than three heads
4. The percentage of marks obtained by a student in the monthly unit test are given below;

Unit test	I	II	III	IV	V
% of marks obtained	85	83	77	65	89

Find the probability that the student gets more than 80% mark in the unit test.

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