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**Class: X**            **Subject : Mathematics**            **Assignment No. 2**

## PAIR OF LINEAR EQUATIONS IN TWO VARIABLES

1.    Solve the following:-

a)    $\dfrac{3}{2x} + \dfrac{2}{3y} = 5$  and  $\dfrac{5}{x} - \dfrac{3}{y} = 1$

b) 7x -2y = 5xy and 8x + 7y = 15xy

c) a(x+y) + b(x-y) = $a^2$ − ab + $b^2$ and a(x+y) − b(x − y) = $a^2$ + ab + $b^2$

d) $\dfrac{x}{a} + \dfrac{y}{b} = a+b$  and  $\dfrac{x}{a^2} + \dfrac{y}{b^2} = 2$

2.    Solve graphically 4x – 3y +4 =0 and 4x + 3y – 20 = 0. What is the area of the triangle enclosed by the given lines and the x-axis?

3.    Find graphically, the vertices of the triangle whose sides have the equations 2y – x = 8; 5y – x = 14 and y – 2x =1

4.    For what value of k, the system of equations, kx + 3y = k-3 and 12x + ky = k, will have no solution?

5.    Find the values of a & b for which the following system of linear equations has infinite solutions;

2x – 3y = 7 and ( a + b )x – ( a + b – 3 )y = 4a + b

6.    Find whether the given equations have a unique solution, no solution or infinite number of solutions:

i) 6x + 5y = 4; 9x + 7.5y = 6        ii) x – 3y – 3 = 0 ; 3x – 9y – 2 = 0

iii) 2x + y = 5; 3x + 2y = 8 .

7.    Taxi fare consists of a constant charge together with the charge for the distance covered. A person travelling 15km pays Rs.115 for the journey and person travelling 27km pays Rs.199 for it. Find the charges one will have to pay for a journey of 50km.

8.    X takes 3 hours more than Y to walk 30km. But if X doubles his pace, he is ahead of Y by 1.5 hours. Find their speeds of walking.

9.    A boat can go 20km upstream and 30km down stream in 3 hours. It can go 20km downstream and 10 km upstream in $1\dfrac{2}{3}$ hours. Find the speed of the boat in still water and the speed of the stream.

10.    Places A and B are 80km apart from each other on a highway. A car starts from A and another from B at the same time. If they move in the same direction, they meet in 8 hours and if they move in opposite direction they meet in 1hour 20minutes. Find the speeds of the cars.

## TRIANGLES

1.    Prove that in any triangle, the sum of the squares on any two sides is equal to twice the sum of the squares of half of the third side and the median which bisects the third side.

2.    ABC & DBC are two right triangles with common hypotenuse BC and with their sides AC & BD intersecting at point P. Prove that AP x PC = DP x PB.

3.    AD is the median of a ΔABC, DE & DF are the bisectors of ∠ADB & ∠ADC respectively. Show that EF is parallel to BC.

4. ABC is a triangle. XY // BC is a line segment intersecting AB at X and AC at Y and divides ΔABC into two parts equal in area. Prove that $\dfrac{BX}{AB} = \dfrac{\sqrt{2}-1}{\sqrt{2}}$

5. In an equilateral triangle ABC, D is a point on BC such that BD = 1/3 BC. Prove that $9AD^2 = 7AB^2$.

6. In a triangle ABC, D & E are points on the sides AB & AC respectively such that DE // BC. If AD = 4x – 3, AE = 8x – 7, BD = 3x – 1 and CE = 5x – 3, find the value of x.

7. In a triangle ABC, ∠B = $90^0$ and BD ⊥ AC. If AB = 5.7cm, BD = 3.8cm and CD = 5.4cm, then find BC.

8. A line PQ is drawn parallel to the base BC of ΔABC which meets sides AB & AC at points P & Q respectively. If AP = 1/3 PB, find the value of area(ΔABC) : area(ΔAPQ).

9. P & Q are the mid points of the sides CA and CB respectively of a ΔABC, right angled at C. Prove that $4(AQ^2 + BP^2) = 5AB^2$.

10. ABC is a right angled triangle, right angled at B. AD and CE are the two medians drawn from A and C respectively. If AC = 5cm and AD = 3√5 / 2cm, find the length of CE.

11. ABC is an isosceles triangle in which AB = AC = 10cm, BC = 12cm. PQRS is a rectangle inside the isosceles triangle such that P is on AB, Q & R on BC, S on AC. Given PQ = SR = Ycm and PS = QR = 2Xcm. Prove that X = $6 - \dfrac{3Y}{4}$.

**TRIGONOMETRY**

1. If 7cosecA=25, find the value of a] tanA   b] sinA + cosA   c] $\tan^2 A - \dfrac{1}{\cos^2 A}$

2. In ΔOPQ right angled at P, OP = 7cm, OQ– PQ = 1cm. Determine the values of sinQ & cosQ.

3. If ∠A = $45^0$, verify that   (i) $\sin 2A = \dfrac{2\tan A}{(1+\tan A)}$

   $(ii)\tan A = \dfrac{\sqrt{1-\cos^2 A}}{\cos A}$   (iii)sin3A = 3sinA – 4sin³A.

4. If sin (A-B) =0 and cos (A+B) = 0, find the values of A & B.

5. Find the remaining part of the triangle ABC, right angled at B in which
   a] ∠C = $60^0$, AB = 10cm   b] ∠C = $60^0$ , AC = 30cm   c] ∠A = ∠C & AB =12cm

6. Prove that

   a) $\sqrt{\dfrac{1+\sin A}{1-\sin A}} = \sec A + \tan A$

   b) $\dfrac{\sin\theta - 2\sin^3\theta}{2\cos^3\theta - \cos\theta} = \tan\theta$

   c) $\operatorname{cosec}^4 A - \operatorname{cosec}^2 A = \cot^4 A + \cot^2 A$

   d) $(\sin A + \operatorname{cosec} A)^2 + (\cos A + \sec A)^2 = 7 + \tan^2 A + \cot^2 A$

   e) $\dfrac{\tan A}{1-\cot A} + \dfrac{\cot A}{1-\tan A} = 1 + \sec A \operatorname{cosec} A$

   f) $\dfrac{\sin A - \cos A + 1}{\sin A + \cos A - 1} = \dfrac{1}{\sec A - \tan A}$

   g) $\dfrac{1}{\operatorname{cosec} A - \cot A} - \dfrac{1}{\sin A} = \dfrac{1}{\sin A} - \dfrac{1}{\operatorname{cosec} A + \cot A}$

h) $\sin^4 A - \cos^4 A = 1 - 2\cos^2 A$

8. Prove the following

a) $\sin A \cos A - \dfrac{\sin A \cos(90^0 - A)\cos A}{\sec(90^0 - A)} - \dfrac{\cos A \sin(90^0 - A)\sin A}{\cos ec(90^0 - A)} = 0$

b) $\dfrac{1}{\cot(90^0 - A) + \tan(90^0 - A)} = \cos A \sin A$

9. Evaluate

a) $\left(\dfrac{\sin 35^0}{\cos 55^0}\right)^2 + \left(\dfrac{\cos 55^0}{\sin 35^0}\right)^2 - 2\cos 60^0$

b) $\dfrac{\sin^2 20^0 + \sin^2 70^0}{\cos^2 20^0 + \cos^2 70^0} + \dfrac{\sin(90^0 - \theta)\sin \theta}{\tan \theta} + \dfrac{\cos(90^0 - \theta)\cos \theta}{\cot \theta}$

c) $\sec^2 10^0 - \cot^2 80^0 + \dfrac{\sin 15^0 \cos 75^0 + \cos 15^0 \sin 75^0}{\cos \theta \sin(90^0 - \theta) + \sin \theta \cos(90^0 - \theta)}$

## STATISTICS

1. Find the mean of the following data.

| Class Interval | 0-8 | 8-16 | 16-24 | 24-32 | 32-40 |
|---|---|---|---|---|---|
| Frequency | 5 | 9 | 10 | 8 | 8 |

2. If the mean of the distribution is 57.6 and the sum of its observations is 50, find the missing frequencies $f_1$ & $f_2$.

| Class | 0-20 | 20-40 | 40-60 | 60-80 | 80-100 | 100-120 |
|---|---|---|---|---|---|---|
| Frequency | 7 | $f_1$ | 12 | $f_2$ | 8 | 5 |

3. Calculate the modal height from the following table:-

| Height (in cm) | 135-140 | 140-145 | 145-150 | 150-155 | 155-160 | 160-165 | 165-170 | 170-175 |
|---|---|---|---|---|---|---|---|---|
| No. of boys | 4 | 9 | 18 | 28 | 24 | 10 | 5 | 2 |

4. The marks of 200 students in a test were recorded as follows:-

| Mark % | 10-19 | 20-29 | 30-39 | 40-49 | 50-59 | 60-69 | 70-79 | 80-89 |
|---|---|---|---|---|---|---|---|---|
| No. of students | 7 | 11 | 20 | 46 | 57 | 37 | 15 | 7 |

Find the median score of the students.

5. Calculate the mean, median & mode of the following distribution:-

| No. of goals | 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| No. of matches | 2 | 4 | 7 | 6 | 8 | 3 |

6. The following distribution represents the age of 35 females:-

| Age in years | <15 | <30 | <45 | <60 | <75 | <90 |
|---|---|---|---|---|---|---|
| No. of females | 3 | 15 | 20 | 25 | 28 | 35 |

Draw a less than type ogive. Hence obtain the median age from the graph, and verify the result by using the formula.

7. By step deviation method, find the mean marks of the students from the following cumulative frequency table:

| Marks | No. of employees |
|---|---|
| 0 and above | 80 |
| 10 and above | 77 |
| 20 and above | 72 |
| 30 and above | 65 |
| 40 and above | 55 |
| 50 and above | 43 |
| 60 and above | 28 |
| 70 and above | 16 |
| 80 and above | 10 |
| 90 and above | 8 |
| 100 and above | 0 |

8. The annual profits earned by 30 shops of a shopping complex in a locality give rise to the following distribution:

| Profit (in lakhs Rs.) | No. of shops |
|---|---|
| More than or equal to 5 | 30 |
| More than or equal to 10 | 28 |
| More than or equal to 15 | 16 |
| More than or equal to 20 | 14 |
| More than or equal to 25 | 10 |
| More than or equal to 30 | 7 |
| More than or equal to 35 | 3 |

Draw less than and more than ogives for the above data and hence obtain median profit.

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