

MATHS BASEMAKER

Class 10 Mathematics — Chapter 3: Pair of Linear Equations in Two Variables

Test Paper

Q1. A pair of linear equations in two variables is consistent if:

- (a) it has a unique solution
- (b) it has no solution
- (c) it has infinitely many solutions
- (d) Both (a) & (c)

Q2. The pair of linear equations $3x + 7y = p$ and $12x + 2py = 4p + 1$ has no solution if the value of p is:

- (a) 21
- (b) 14
- (c) 7
- (d) 28

Q3. A number consists of two digits whose sum is 10. If 18 is subtracted from the number then the digits are reversed. The number is:

- (a) 55
- (b) 37
- (c) 64
- (d) 28

Q4. Equations $x + 2y + 7 = 0$ and $2x + py + 14 = 0$ represent coincident lines, then the value of p is:

- (a) 1
- (b) 2
- (c) 4
- (d) none

Q5. $ax + by + c = 0$, where a, b, c are real numbers, is called a linear equation in two variables x and y if:

- (a) $a \neq b$
- (b) $a = 0$

(c) $a \neq 0, b \neq 0$

(d) $a^2 = b^2$

Q6. Find the values of α and β for which the following system of equations has an infinite number of solutions:

$$2x + 3y = 7 \text{ and } (\alpha + \beta)x + (2\alpha - \beta)y = 21$$

Q7. For $5x + 7y = 10$, write another linear equation in two variables such that the pair formed represents:

- (a) Intersecting lines
- (b) Parallel lines
- (c) Coincident lines

Q8 Solve the following pair of linear equations graphically:

$$2x - y = 2$$

$$x + 2y = 6$$

Find the coordinates of the vertices of the triangle formed by these lines and the y- axis.

Q9. The age of a father is 4 times the sum of the ages of his two children. After 8 years, his age will be double the sum of the ages of his two children. Find the present age of the father.

Q10. A fraction becomes $\frac{1}{3}$ when 1 is subtracted from the numerator, and it becomes $\frac{1}{4}$ when 8 is added to its denominator. Find the fraction.

Video solution link on youtube:

<https://youtu.be/qfEWj9BjKx0>



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HINTS & STEPS

Q1. Solution & Steps

Hint: A system of linear equations is consistent if it has at least one solution (unique or infinitely many).

Answer: (d) Both a & c

Q2. Solution & Steps

Hint: For no solution, $a_1/a_2 = b_1/b_2 \neq c_1/c_2$.

From $3x + 7y - p = 0$ and $12x + 2py - (4p + 1) = 0$:

$3/12 = 7/(2p) \Rightarrow 1/4 = 7/(2p) \Rightarrow 2p = 28 \Rightarrow p = 14$.

Check constant ratio: $-p / -(4p + 1) = 14 / 57 \neq 1/4$.

Answer: (b) 14

Q3. Solution & Steps OR short trick (by connecting with options)

Hint: Let the tens digit be x and units digit be y . Number = $10x + y$.

Given: $x + y = 10$

$(10x + y) - 18 = 10y + x \Rightarrow 9x - 9y = 18 \Rightarrow x - y = 2$

Solving $x + y = 10$ and $x - y = 2$ gives $x = 6, y = 4$.

Number = 64.

Answer: (c) 64

Q4. Solution & Steps

Hint: For coincident lines, $a_1/a_2 = b_1/b_2 = c_1/c_2$.

$$1/2 = 2/p = 7/14$$

$$1/2 = 2/p \Rightarrow p = 4.$$

Answer: (c) 4

Q5. Solution & Steps

Hint: In a linear equation in two variables $ax + by + c = 0$, both coefficients a and b cannot be zero simultaneously ($a \neq 0, b \neq 0$).

Answer: (c) $a \neq 0, b \neq 0$

Q6. Solution & Steps

Hint: For infinite solutions, $a_1/a_2 = b_1/b_2 = c_1/c_2$.

$$2 / (\alpha + \beta) = 3 / (2\alpha - \beta) = 7 / 21 = 1 / 3$$

$$2 / (\alpha + \beta) = 1 / 3 \Rightarrow \alpha + \beta = 6 \text{ ---(1)}$$

$$3 / (2\alpha - \beta) = 1 / 3 \Rightarrow 2\alpha - \beta = 9 \text{ ---(2)}$$

$$\text{Adding (1) and (2): } 3\alpha = 15 \Rightarrow \alpha = 5$$

$$\text{Substituting } \alpha = 5 \text{ in (1): } \beta = 1.$$

Answer: $\alpha = 5, \beta = 1$

Q7. Solution & Steps

Hint: Given equation: $5x + 7y = 10$.

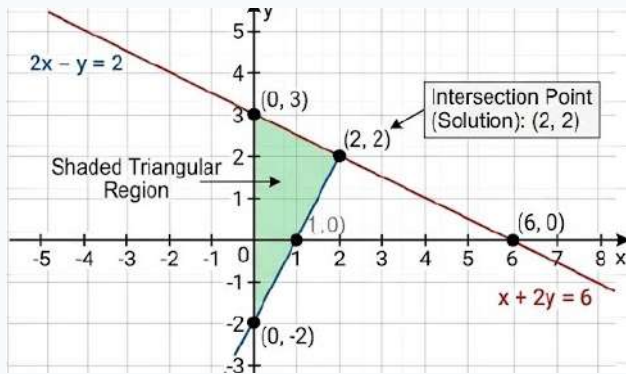
(a) Intersecting lines ($a_1/a_2 \neq b_1/b_2$): Example: $3x + 2y = 8$

(b) Parallel lines ($a_1/a_2 = b_1/b_2 \neq c_1/c_2$): Example: $5x + 7y = 20$

(c) Coincident lines ($a_1/a_2 = b_1/b_2 = c_1/c_2$): Example: $10x + 14y = 20$

Answer: (a) $3x + 2y = 8$, (b) $5x + 7y = 20$, (c) $10x + 14y = 20$

Q8. Solution & Steps



Intersection Point (Solution): $(2, 2)$

☐ **Vertices with Y-axis:** $(0, 3)$, and $(0, -2)$

<https://youtu.be/qfEWj9BjKx0>

Q9. Solution & Steps

Hint: Let father's age = x years and son's age = y years.

$x = 4y$ and $(x + 8) = 2(y + 16)$ Solving the System of Equations: $x = 48$, $y = 12$

Q10. Solution & Steps

Hint: Let the fraction be x/y . Form linear equations from given conditions.

Condition 1: $(x - 1) / y = 1/3 \Rightarrow 3x - 3 = y \Rightarrow 3x - y = 3$ ---(1)

Condition 2: $x / (y + 8) = 1/4 \Rightarrow 4x = y + 8 \Rightarrow 4x - y = 8$ ---(2)

Subtracting (1) from (2): $(4x - y) - (3x - y) = 8 - 3 \Rightarrow x = 5$

Substituting $x = 5$ in (1): $3(5) - y = 3 \Rightarrow 15 - y = 3 \Rightarrow y = 12$.

Answer: The required fraction is $5/12$

Video solution link on youtube:

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