Pair of Linear Equations in Two Variables

Standard difficulty · 20 questions · 40 marks · Time: 36 minutes

Name: _____ Date: _____ Score: ____ / 40

Show your working for Sections B and C. Answers are on the last page — try every question first!

Section A — Choose the correct answer — 8 × 1 = 8 marks

1. The solution of 2x + 2y = −8 and 4x − 5y = −16 is:
(a) (−4, 0) **(b)** (−3, 0) **(c)** (4, 0) **(d)** (0, −4)

2. The pair 5x + 5y = 12 and 20x + 20y = 48 has:
(a) a unique solution **(b)** no solution
(c) infinitely many solutions **(d)** exactly two solutions

3. For what value of k does 5x − 5y = −9 and 15x + ky = −26 have no solution?
(a) k = 15 **(b)** k = −5 **(c)** k = −15 **(d)** k = −14

4. If x + y = 21 and x − y = 11, then (x, y) is:
(a) (16, 5) **(b)** (21, 11) **(c)** (16, −5) **(d)** (5, 16)

5. Two lines that intersect at one point give a pair of equations with:
(a) a unique solution **(b)** exactly two solutions
(c) no solution **(d)** infinitely many solutions

6. If 4x − 5y = 9 and 5x − y = 27, then x + y equals:
(a) 10 **(b)** 3 **(c)** 18 **(d)** 9

7. For what value of k does 3x + y = −8 and 12x + 4y = k have infinitely many solutions?
(a) k = 32 **(b)** k = −8 **(c)** k = −4 **(d)** k = −32

8. Assertion (A): The pair 3x + y = 1 and 6x + 2y = 3 has a unique solution.
Reason (R): A pair of linear equations has a unique solution when $a_1/a_2 \neq b_1/b_2$.
(a) Both A and R are true, and R is the correct explanation of A.
(b) Both A and R are true, but R is not the correct explanation of A.
(c) A is true, but R is false.
(d) A is false, but R is true.

Section B — Short answer — 8 × 2 = 16 marks

9. Solve by substitution: x + y = 4 and 6x + 3y = 36

10. Solve by elimination: x + y = 15 and 5x − 7y = 3

11. Solve: $x/3 + y/3 = 14$ and $x/2 - y/2 = -3$

12. Find k so that $2x + 2y = -3$ and $4x + ky = -3$ have no solution.

13. Solve: $12/x + 24/y = 7$ and $16/x + 12/y = 6$

14. Check whether $5x + y = 39$ and $x + 2y = 6$ is consistent. If it is, solve it.

15. Solve: $93x + 92y = 929$ and $92x + 93y = 921$

16. The sum of two numbers is 68 and their difference is 26. Find the numbers.

Section C — Word problems — 4 × 4 = 16 marks

17. 4 pencils and 5 erasers cost Rs 55. 3 pencils and 4 erasers cost Rs 42. Find the cost of one pencil and one eraser.

18. Five years ago, Meera was 2 times as old as Zoya. The sum of their present ages is 70 years. Find their present ages.

19. A boat goes 100 km downstream in 5 hours and 32 km upstream in 4 hours. Find the speed of the boat in still water and of the stream.

20. A taxi charges a fixed amount plus a charge per km. For 11 km the fare is Rs 161, and for 16 km it is Rs 216. Find the fixed charge and the charge per km.

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Answer key

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Q	Answer	Working
1	**(a) (−4, 0)**	solve: x = −4, y = 0
2	**(c) infinitely many solutions**	$a_1/a_2 = b_1/b_2 = c_1/c_2$
3	**(c) k = −15**	$a_1/a_2 = 1/3$, so $b_2 = 3 \times (-5) = -15$
4	**(a) (16, 5)**	adding: 2x = 32, x = 16; y = 5
5	**(a) a unique solution**	—
6	**(d) 9**	x = 6, y = 3
7	**(d) k = −32**	the second equation must be 4 times the first
8	**(d) A is false, but R is true.**	A is false: $a_1/a_2 = b_1/b_2 = 1/2$: the lines are parallel. R is true.
9	**x = 8, y = −4**	x = 4 − y; substitute into the second
10	**x = 9, y = 6**	make the coefficients of one variable equal, then subtract
11	**x = 18, y = 24**	multiply the first equation by 3 and the second by 2 to clear the fractions, then eliminate
12	**k = 4**	$a_1/a_2 = 1/2$, so $k = 2 \times 2 = 4$ (and $c_1/c_2 \neq 1/2$)
13	**x = 4, y = 6**	put u = 1/x, v = 1/y: 12u + 24v = 7; u = 1/4, v = 1/6
14	**Consistent; x = 8, y = −1**	$a_1/a_2 \neq b_1/b_2$, so there is a unique solution
15	**x = 9, y = 1**	add: x + y = 10; subtract: x − y = 8
16	**47 and 21**	x + y = 68, x − y = 26; 2x = 94
17	**pencil Rs 10, eraser Rs 3**	4x + 5y = 55; 3x + 4y = 42
18	**Meera 45 years, Zoya 25 years**	x − 5 = 2(y − 5); x + y = 70
19	**boat 14 km/h, stream 6 km/h**	u + v = 20, u − v = 8
20	**fixed Rs 40, Rs 11 per km**	x + 11y = 161; x + 16y = 216; subtract: 5y = 55