

Mathematics

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(Chapter – 3) (Pair of Linear Equations in Two Variables)(Exemplar Problems)

(Class – X)

Exercise 3.1

Choose the correct answer from the given four options:

Question 9:

One equation of a pair of dependent linear equations is $-5x + 7y = 2$. The second equation can be

(A) $10x + 14y + 4 = 0$

(B) $-10x - 14y + 4 = 0$

(C) $-10x + 14y + 4 = 0$

(D) $10x - 14y = -4$

Answer 9:

(D) $10x - 14y = -4$

Solution:

For dependent linear equations, we should have

$$\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$$



The given linear equations is $-5x + 7y - 2 = 0$.

Now for case (A) $10x + 14y + 4 = 0$

$$\frac{a_1}{a_2} = \frac{-5}{10} = -\frac{1}{2}, \quad \frac{b_1}{b_2} = \frac{7}{14} = \frac{1}{2}$$

$$\Rightarrow \frac{a_1}{a_2} \neq \frac{b_1}{b_2}$$

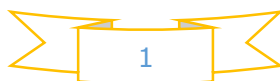
So, $10x + 14y + 4 = 0$ and $-5x + 7y - 2 = 0$ are not dependent.

Now for case (B) $-10x - 14y + 4 = 0$

$$\frac{a_1}{a_2} = \frac{-5}{-10} = \frac{1}{2}, \quad \frac{b_1}{b_2} = \frac{7}{-14} = -\frac{1}{2}$$

$$\Rightarrow \frac{a_1}{a_2} \neq \frac{b_1}{b_2}$$

So, $-10x - 14y + 4 = 0$ and $-5x + 7y - 2 = 0$ are not dependent.



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Now for case (C) $-10x + 14y + 4 = 0$

$$\frac{a_1}{a_2} = \frac{-5}{-10} = \frac{1}{2}, \quad \frac{b_1}{b_2} = \frac{7}{14} = \frac{1}{2} \quad \text{and} \quad \frac{c_1}{c_2} = \frac{-2}{-2} = 1$$

$$\Rightarrow \frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$$

So, $-10x + 14y + 4 = 0$ and $-5x + 7y - 2 = 0$ are not dependent.

Now for case (D) $10x - 14y + 4 = 0$

$$\frac{a_1}{a_2} = \frac{-5}{10} = -\frac{1}{2}, \quad \frac{b_1}{b_2} = \frac{7}{-14} = -\frac{1}{2} \quad \text{and} \quad \frac{c_1}{c_2} = \frac{-2}{4} = -\frac{1}{2}$$

$$\Rightarrow \frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$$

So, $10x - 14y = -4$ and $-5x + 7y - 2 = 0$ are dependent.

Hence, the option (D) is correct.

