

Pair of linear equations in two variables

Elimination method

Example 1 $3x + 4y = 10$ and $2x - 2y = 2$.

SOLUTION: we have $3x + 4y = 10$ (1)

$2x - 2y = 2$ (2)

Multiplying equation (2) by 2 ,we get $4x - 4y = 4$ (3)

Adding equation (1) and equation (3) we get

$$\begin{array}{r} 3x + 4y = 10 \\ + \quad 4x - 4y = 4 \\ \hline 7x \quad = 14 \\ \hline X = \frac{14}{7} = 2 \end{array}$$

Substituting $x = 2$ in equation (2) , we get $(2 \times 2) - 2y = 2$

$$4 - 2y = 2$$

$$-2y = 2 - 4$$

$$-2y = -2$$

$$Y = \frac{-2}{-2} = 1$$

Hence, the solution is $x = 2$ and $y = 1$.

Worksheet

Solve the following pairs of linear equations by elimination method:

- $x + y = 5$ and $2x - 3y = 4$
- $2x + 3y = 8$ and $4x - 6y = 7$
- $5x + y = 2$ and $6x - 3y = 1$
- $x + y = 3$ and $2x + 5y = 12$
- $3x + 2y = 12$ and $5x - 2y = 4$

Word problems based on elimination method

Example 2: The coach of a cricket team buys 7 bats and 6 balls for Rs. 3800. Later she buys 3 bats and 5 balls for Rs. 1750. Find the cost of each bat and each ball.

SOLUTION: let the cost of each bat and each ball be Rs x and Rs y respectively.

The cost of 7 bats and 6 balls = Rs 3800

i.e. $7x + 6y = 3800$ (1)

The cost of 3 bats and 5 balls = Rs 1750

i.e. $3x + 5y = 1750$... (2)

multiplying equation (1) by 3 and equation (2) by 7, we get

$$21x + 18y = 11400 \quad \dots(3)$$

$$21x + 35y = 12250 \quad \dots(4)$$

Subtracting equation (3) from equation (4)

$$\begin{array}{r} 21x + 35y = 12250 \\ - \quad 21x + 18y = 11400 \\ \hline 17y = 850 \\ Y = \frac{850}{17} = 50 \end{array}$$

Substituting $y = 50$ in equation (2) we get, $3x + (5 \times 50) = 1750$

$$3x + 250 = 1750$$

$$3x = 1750 - 250$$

$$3x = 1500$$

$$x = \frac{1500}{3} = 500$$

hence the cost of each bat is Rs 500 and each ball is Rs .50

WORKSHEET

1. Five books and seven pens together cost Rs .285. Four books and four pens together cost Rs.220. Find the cost of each book and each pen.
2. Two tables and three chairs together cost Rs. 2000 whereas three tables and two chairs together cost Rs.2500. Find the total cost of 1 table and 5 chairs.
3. Seven audio cassettes and three video cassettes together cost Rs. 1110. While, five audio cassettes and four video cassettes together cost Rs. 1350.. Find the cost of an audio cassette and a video cassette.
4. The cost of 2kg apples and 1 kg of grapes on a day was found to be Rs. 160. On the same day, the cost of 4 kg apples and 3kg of grapes was Rs .360. Find the cost of apples and grapes per kg.
5. Three bags and four pens together cost Rs.257 whereas four bags and three pens together cost Rs.324. Find the total cost of 1 bag and 10 pens.