

linear equations in two variables

Meena went to a bank to withdraw Rs.2000. She asked the cashier to give her Rs.50 and Rs.100 notes only. Meena got 25 notes in all. Find how many notes of Rs.50 and Rs.100 she received.

$$\begin{aligned} \text{let } \text{Rs } 50 \text{ notes} &= x \\ \text{Rs } 100 &= y \\ x + y &= 25 \\ 50x + 100y &= 2000 \end{aligned} \quad \left. \vphantom{\begin{aligned} \text{let } \text{Rs } 50 \text{ notes} &= x \\ \text{Rs } 100 &= y \\ x + y &= 25 \\ 50x + 100y &= 2000 \end{aligned}} \right\}$$

$$\begin{aligned} 50 \times 1 &= 50 \\ 50 \times 2 &= 100 \\ 50 \times 3 &= 150 \end{aligned}$$

A lending library has a fixed charge for first three days and an additional charge for each day thereafter. Charges for keeping a book for 5 days is Rs.21 and that for 7 days is Rs.27. find the charges for keeping a book for 9 days.

$$\text{Let fixed charges} = ₹ x$$

$$\text{" charges thereafter} = ₹ y$$

$$x + 2y = 21$$

$$x + 4y = 27$$

A part of monthly hostel charges in a college is fixed and the remaining depends on the number of days one has taken food in the mess. A student X, who takes food for 20 days, pays Rs1000 as hostel charges. However another student Y, taking food for 26 days, pays Rs1180. Find the fixed charges and the cost of food per day.

$$\text{Let fixed charges} = ₹ x$$

$$\text{" charges per food} = ₹ y$$

$$x + 20y = 1000$$

$$x + 26y = 1180$$

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.

let fraction = $\frac{x}{y}$

$$\frac{x-1}{y} = \frac{1}{3}$$

$$\frac{x}{y+8} = \frac{1}{4}$$

Yash scored 40 marks in a test, getting 3 marks for each right answer and losing 1 mark for each wrong answer. Had 4 marks been awarded for each correct answer and 2 marks been deducted for each incorrect answer, then yash would have scored 50 marks. How many questions were there in the test?

let correct attempts = x
let incorrect " = y

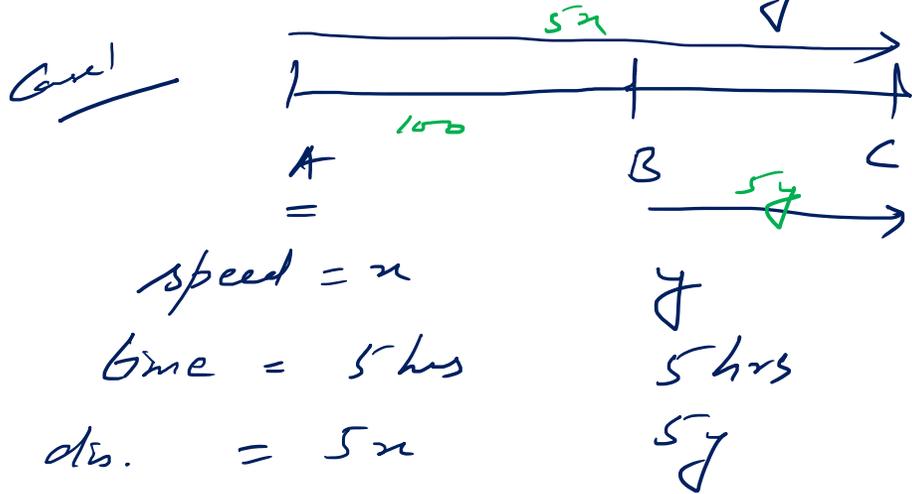
$$3x - y = 40$$

$$4x - 2y = 50$$

$$\text{Total questions} = \underline{x + y}$$

Points A and B are 100 km apart. A car starts from 'A' and another from 'B' at the same time. If they travel in same direction, they meet after 5 hrs. But if they travel towards each other, they meet after 60 minutes. What are their speeds?

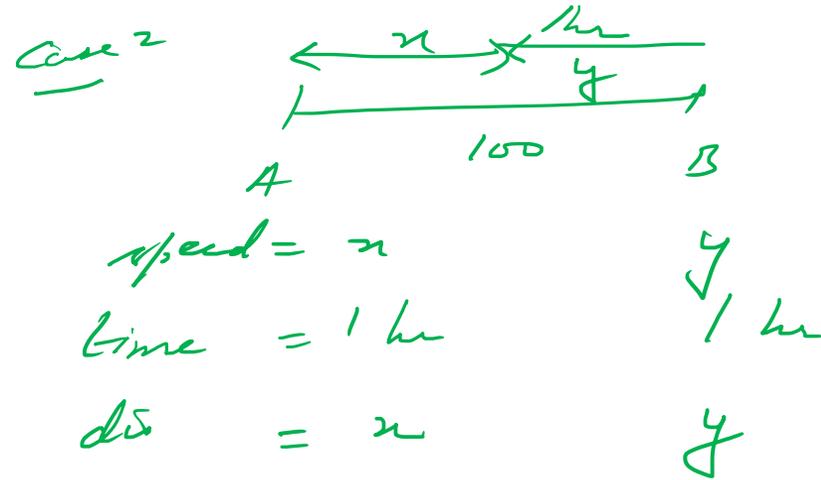
Let speed of car at A = x kmph
 " " " " " B = y kmph



$$5x - 5y = 100$$

$$5(x - y) = 100$$

$$x - y = 20 \quad \text{--- (1)}$$



$$x + y = 100 \quad \text{--- (2)}$$

The area of a rectangle gets reduced by 9 square units, if its length is reduced by 5 units and breadth is increased by 3 units. If we increase the length by 3 units and the breadth by 2 units, the area increases by 67 square units. Find the dimensions of the rectangle.

$$\text{Let length} = x$$

$$x \text{ breadth} = y$$

$$\text{Area} = xy$$

Case 1 New length = $(x-5)$ ✓

New breadth = $(y+3)$ ✓

New area = $(x-5)(y+3)$ ✓

$$xy - 9 = (x-5)(y+3)$$

$$xy - 9 = xy + 3x - 5y - 15$$

$$6 = 3x - 5y \quad \text{--- (1)}$$

Case 2

$$\text{New length} = x+3$$

$$\therefore \text{breadth} = y+2$$

$$\therefore \text{area} = (x+3)(y+2)$$

$$xy + 67 = (x+3)(y+2)$$

$$xy + 67 = xy + 2x + 3y + 6$$

$$61 = 2x + 3y \quad \text{--- (2)}$$

Ritu can row downstream 20 km in 2 hours, and upstream 4 km in 2 hours. Find her speed of rowing in still water and the speed of the current.

Let speed of boat = x kmph
" " " " stream = y kmph

Case 1 dis. = 20 km
 $t = 2$ hrs
sp. = $x + y$
 $20 = 2(x + y)$ — (1)

Case 2 dis = 4 km
 $t = 2$ hrs
sp = $x - y$
 $4 = (x - y) \cdot 2$
 $2 = x - y$ — (2)

A boat goes 30 km upstream and 44 km downstream in 10 hours. It can go 40 km upstream and 55 km downstream in 13 hours. Find the speed of the boat in still water and the speed of the stream.

Let speed of boat = x
" " " " stream = y

$$\frac{30}{x-y} + \frac{44}{x+y} = 10$$

$$\frac{40}{x-y} + \frac{55}{x+y} = 13$$

$$\text{Let } \frac{1}{x-y} = a, \quad \frac{1}{x+y} = b$$

$$30a + 44b = 10$$

$$40a + 55b = 13$$

$$a = \quad b =$$

$$x, y =$$

A man travels 300 km to his home partly by train and partly by car. He takes 4 hrs if he travels ⁶⁰~~60~~ km by train and rest by car. He takes 10 minutes longer, if he travels 100 km by train and rest by car. Find the speed of train and the car.

Let speed of train = x
 " " " car = y

$$\frac{60}{x} + \frac{240}{y} = 4$$

$$\frac{100}{x} + \frac{200}{y} = 4 + \frac{10}{60}$$

Let $\frac{1}{x} = a$, $\frac{1}{y} = b$

$$60a + 240b = 4$$

$$100a + 200b = \frac{25}{6}$$

$$60a + 240b = 4$$

$$600a + 1200b = 25$$

✓ ✓
5 men and 2 women can do a work in 4 days. 6 men and 3 women can do the same work in 3 days. In how many days a man and a woman can do the same work?

let time taken by 1 man = x

" " " " 1 woman = y

1 man's 1 day work = $\frac{1}{x}$ ✓

1 woman's 1 " " = $\frac{1}{y}$ ✓

$$\frac{5}{x} + \frac{2}{y} = \frac{1}{4}$$

$$\frac{6}{x} + \frac{3}{y} = \frac{1}{3}$$

Draw the graphs of the equations $5x - y = 5$ and $3x - y = 3$. Determine the coordinates of the vertices and the area of the triangle formed by these lines and (i) x-axis (ii) y-axis.

no Δ formed

$$5x - y = 5$$

$$5x - 5 = y$$

| | | | |
|---|----|---|---|
| x | 0 | 1 | 2 |
| y | -5 | 0 | 5 |

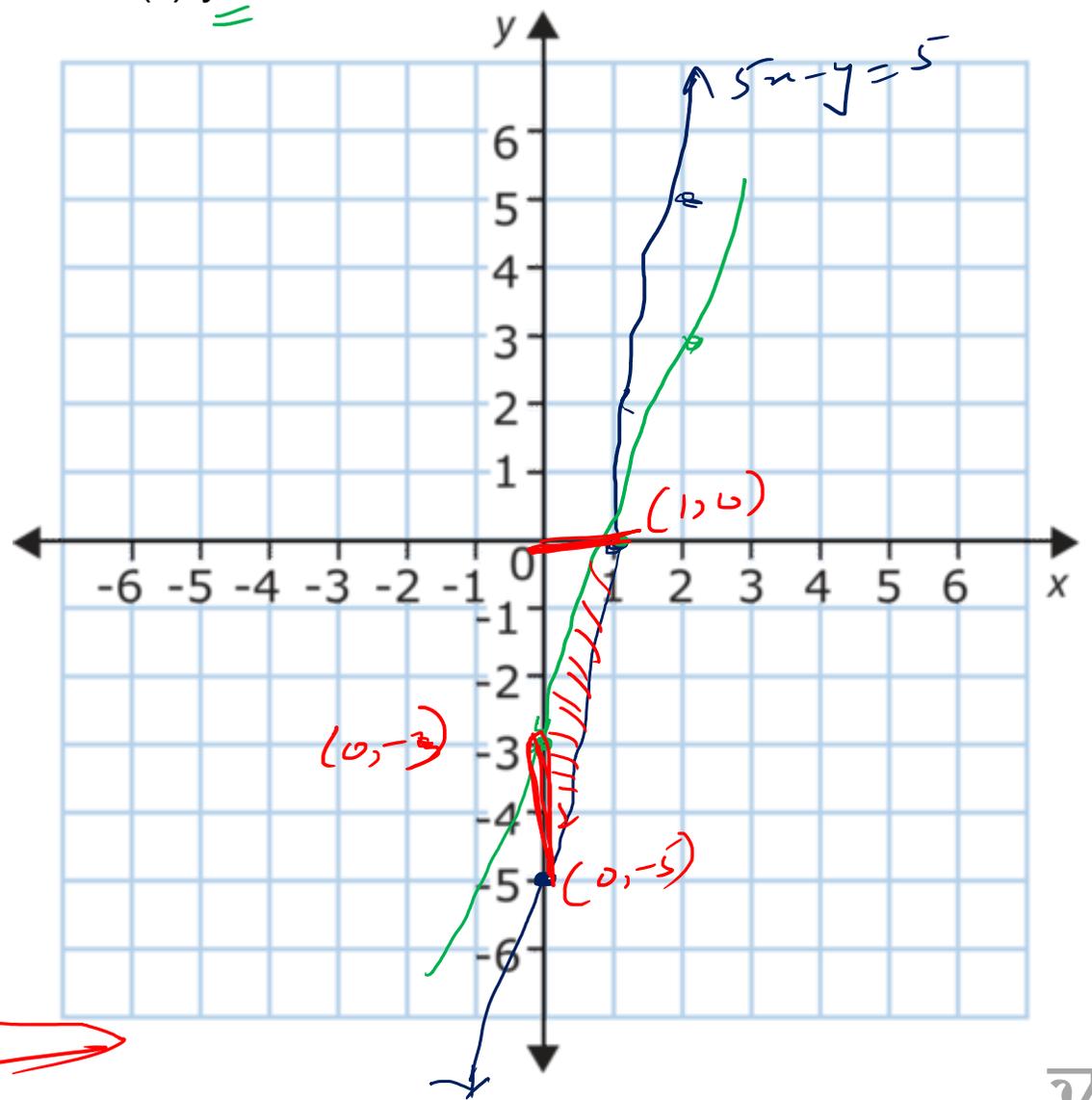
$$3x - y = 3$$

$$3x - 3 = y$$

| | | | |
|---|----|---|---|
| x | 0 | 1 | 2 |
| y | -3 | 0 | 3 |

coordinates = $(1, 0)$, $(0, -3)$, $(0, -5)$

$$\text{Area} = \frac{1}{2} \times 2 \times 1 = 1 \text{ sq. units}$$



चौ

