

No. **53**

# **Problems based on Work Done**

(ii) 2 women and 5 men together can finish an embroidery work in 4 days, while

3 women and 6 men can finish it in 3 days.

Find the time taken by 1 woman alone to finish the work and also that taken by 1 man alone.

Work	No. of days required to finish the work	Work done one day
1	2	$\frac{1}{2}$
1	3	$\frac{1}{3}$
1		$2p + 5q = \frac{1}{4}$

Substituting  $\frac{1}{x} = p$

Re substitute  $p = \frac{1}{x}$   
and  $q = \frac{1}{y}$

Multiplying Throughout by 4

$$8p + 20q = 1 \dots (i)$$

Substituting  $\frac{1}{y} = q$

$$3p + 6q = \frac{1}{3}$$

Multiplying Throughout by 3

$$9p + 18q = 1 \dots (ii)$$

x & that a man would take be

Comparing (i) and (ii),  
RHS of (i) and (ii) is equal,  
What we need to find?

Hence, LHS will also be equal,

$$\therefore 8p + 20q = 9p + 18q$$

$$\therefore 8p - 9p = 18q - 20q$$

$$\therefore -p = -2q$$

$$\therefore p = 2q \dots (iii)$$

$$x = 18$$

$$y = 36$$

**$\therefore$  Woman would take 18 days and Man will take 36 days to complete the work alone**

No. **54**

**Q]** A work is completed by some workers in some days. If the number of workers exceeds by 25, the work completes 5 days earlier. If the number of workers is less by 50, then it takes 20 days more to complete that work. Find the number of workers and days taken by them to complete that work.

**Sol:** Let the number of workers be  $x$  and the days to complete the work be  $y$ .

$\therefore$  Total work done =  $xy$

As per the 1<sup>st</sup> condition,

$$\therefore (x + 25)(y - 5) = xy$$

$$\therefore xy - 5x + 25y - 125 = xy$$

$$\therefore -5x + 25y = 125$$

$$\therefore -x + 5y = 25 \quad \text{.....(i) (dividing by 5)}$$

As per the 2<sup>nd</sup> condition,

$$\therefore (x - 50)(y + 20) = xy$$

$$\therefore xy + 20x - 50y - 1000 = xy$$

$$\therefore 20x - 50y = 1000$$

$$\therefore 2x - 5y = 100 \quad \text{.....(ii) (dividing the equation by 10)}$$

Substitute the value of  $x$  in any of the two equations

exceeds by 25 means the new number of workers

No, it is a same and the total work done

Similar workers

Work done =  $xy$

days earlier means

number of days to required to complete the work =  $y - 5$

Did the total

work change??

$$-x + 5y = 25$$

$$2x - 5y = 100$$

$$x = 125$$

Substituting  $x = 125$  in equation (ii)

$$-125 + 5y = 25$$

$$5y = 25 + 125$$

$$5y = 150$$

$$y = 30$$

$$3 \times 6 = 18$$

The number of workers is 125 and the number of days to complete the work is 30.

Work	
$-125 + 5y = 25$	
$5y = 25 + 125$	
$5y = 150$	
$y = 30$	
$3 \times 6 = 18$	
$x \times y = xy$	

No. **55**

# **Problems based on Money**

Q) The coach of 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 ball

Soln. Let the cost of 1 bat be Rs.  $x$  and

According to the first condition,

$$7x + 6y = 3800$$

According to the second condition,

$$3x + 5y = 1750$$

$$x = 500$$

Substituting  $x = 500$  in (ii)

$$y = 50$$

∴ Cost of 1 bat is Rs. 500 and 1 ball is Rs. 50

Cost of 1 bat is Rs.  $x$   
Hence cost of 7 bats = Rs.  $7x$   
.....(i)  
Similarly cost of 6 balls = Rs  $6y$

.....(ii)

Solve the equations by  
either Substitution or  
Elimination Method



**Q) The coach of cricket team buys 3 bats and 6 balls for Rs. 3900.  
Later, she buys another bat and 2 more balls for Rs. 1300.  
Represent algebraically and graphically**

**Soln.** Let the cost of 1 bat be Rs.  $x$  and 1 ball be Rs.  $y$

According to the first condition,

$$3x + 6y = 3900$$

Dividing throughout by 3

$$x + 2y = 1300$$

According to the second condition,

$$x + 2y = 1300$$

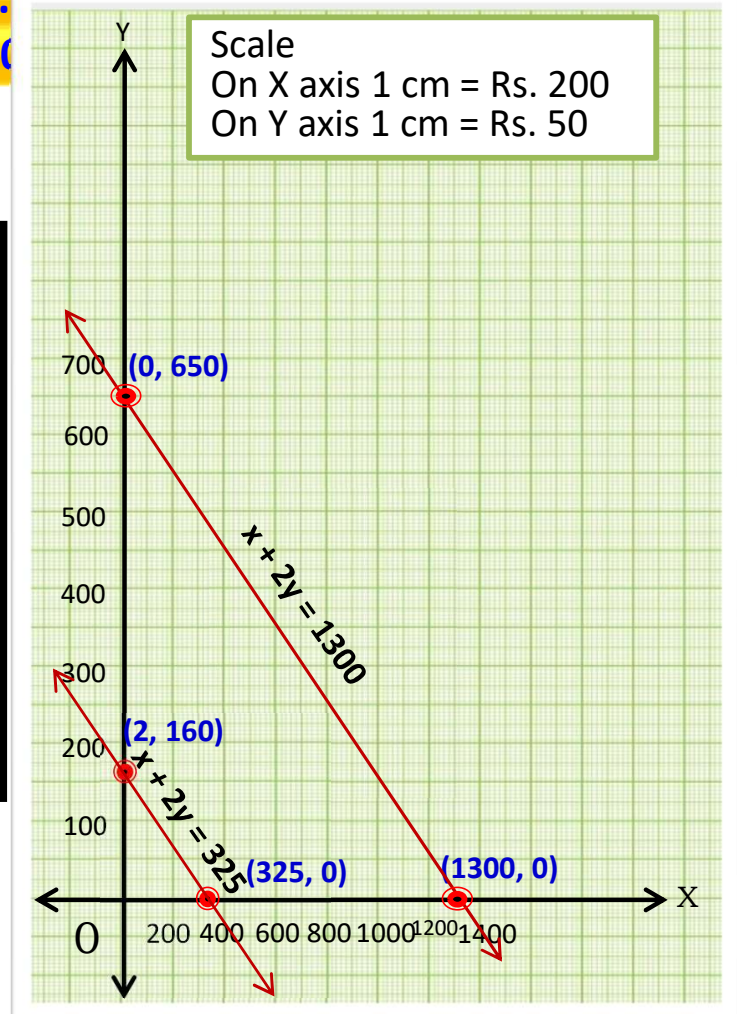
No need to solve the equations as the question is just to represent algebraically and graphically

Represent algebraically means we just need to form the equations

$$x + 2y = 1300$$

$x$	0	1300
$y$	650	0
$(x, y)$	$(0, 650)$	$(1300, 0)$

$x$	0	325
$y$	160	0
$(x, y)$	$(0, 160)$	$(325, 0)$



No. **56**

Q) Cost of 2 kg of apples and 1 kg of grapes on a day was found to be Rs. 160.  
 After a month cost of 4 kg of apples and 2 kg of grapes is Rs. 300.  
 Represent the situation algebraically and graphically

Soln. Let the cost of 1 kg of apple be Rs.  $x$  and 1 kg of grape be Rs.  $y$

According to the first condition,

$$2x + y = 160$$

According to the Second condition,

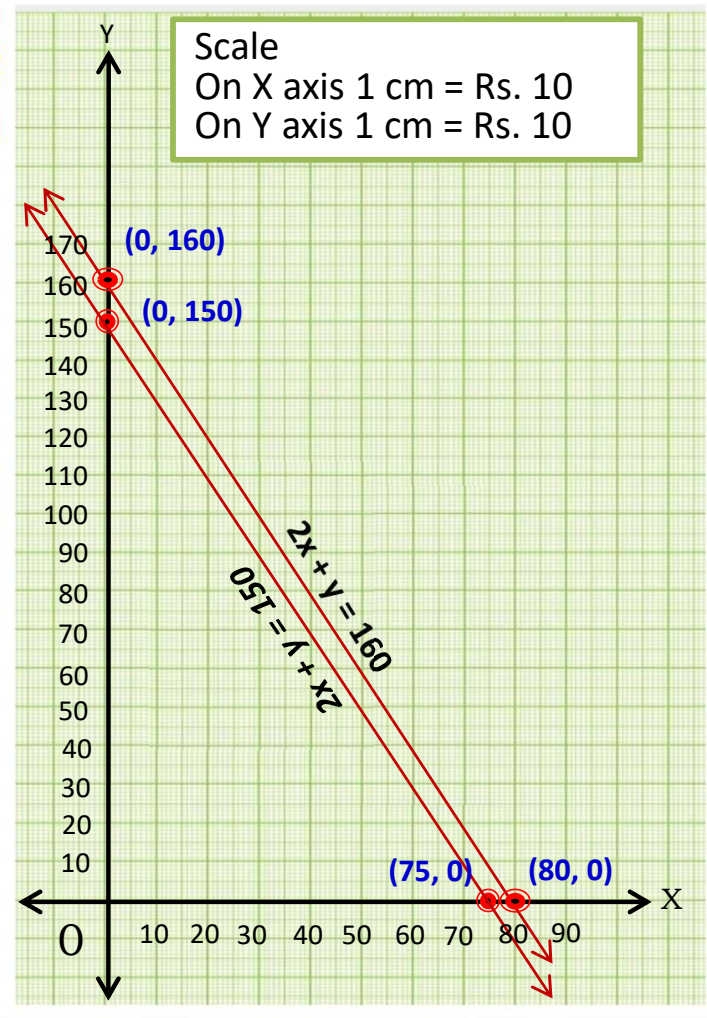
$$2x + y = 150$$

No need to solve the equations as the question is just to represent algebraically and graphically

$x$	0	80
$y$	160	0
	(0, 160)	(80, 0)

$x$	0	75
$y$	150	0
( $x, y$ )	(0, 150)	(75, 0)



1. ii) 5 pencils and 7 pens cost together Rs.50, whereas  
7 pencils and 5 pens cost together Rs. 46  
Find the cost of one pencil and one pen graphically

**Soln.** Let the cost of 1 pencil be Rs.  $x$  and 1 pen be Rs.  $y$

According to the first condition,

$$5x + 7y = 50 \quad \text{.....(i)}$$

According to the Second condition,

$$7x + 5y = 56 \quad \text{.....(ii)}$$

$$5x + 7y = 50$$

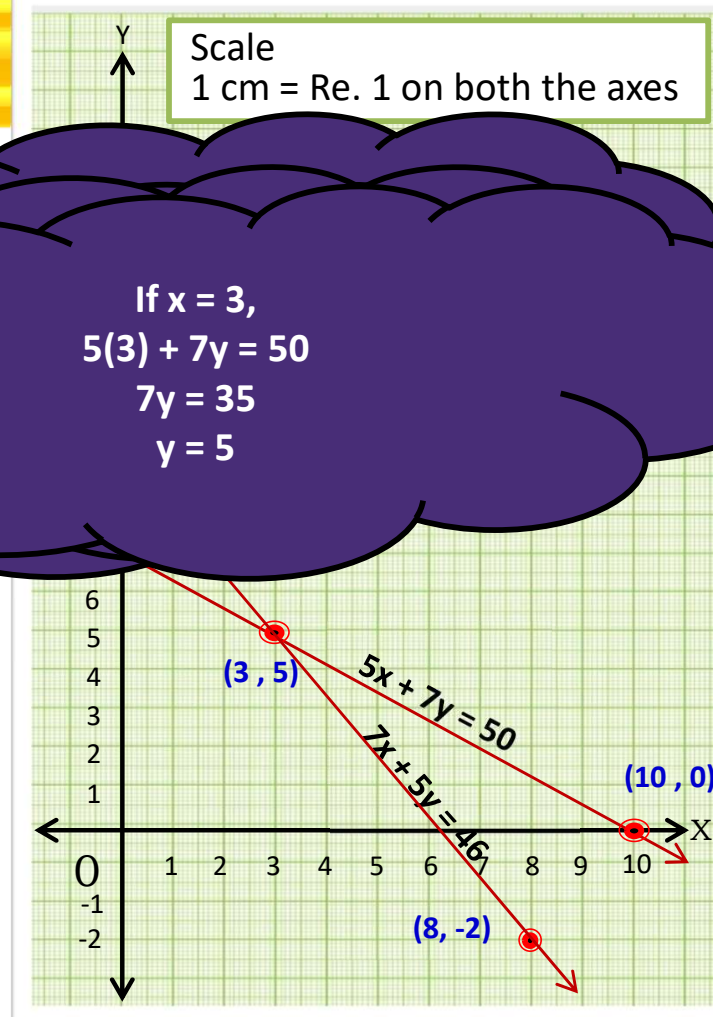
x	3	10
y	5	0
(x, y)	(3, 5)	(10, 0)

$$7x + 5y = 46$$

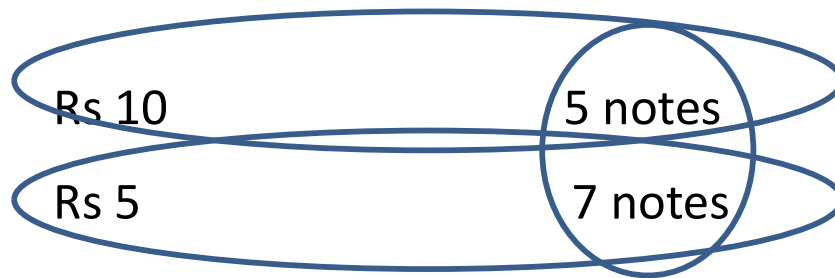
x	3	8
y	5	-2
(x, y)	(3, 5)	(8, -2)

Since the lines intersect at (3, 5)

Cost of one pencil is Rs. 3 and  
Cost of one pen is Rs. 5



No. **57**



Total number of notes = 12

Total Amount =  $10 \times 5 + 5 \times 7 = \text{Rs. } 85$

(iv) 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.

Sol.

	Rs. 50	Rs. 100	Total
N	x	y	25
	50x	100y	2000

Total Amount = Rs. 2000

As per 1<sup>st</sup> condition,

$$50x + 100y = 2000$$

Dividing throughout by 50, we get

$$x + 2y = 40$$

As per the 2<sup>nd</sup> given condition,

$$x + y = 25$$

$$y = 15$$

Substituting  $y = 15$  in (ii)

$$x = 10$$

∴ Meena will receive 10 notes of Rs. 50 and 15 notes of RS. 100

Solve the equations by either Substitution or Elimination Method



Q) A part of monthly hostel charges is fixed and the remaining part depends on the number of days one has taken food in the mess.

When a student A takes food for 20 days she pays Rs. 1000 as hostel charges

Whereas a student B takes food for 26 days and pays Rs. 1180 as hostel charges.

Find the fixed charge and the cost of food per day.

Sol. Let the fixed charge be Rs.  $x$  and the cost of food per day be Rs.  $y$

As per the 1<sup>st</sup> given condition,

$$x + 20y = 1000 \quad \text{.....(i)}$$

As per the 2<sup>nd</sup> given condition,

$$y = 30$$

Substituting  $y = 30$  in (i)

$$x = 400$$

Fixed Charge is Rs. 400 and cost of food per day is Rs. 30

$$\text{Total Cost} = x + \text{no. of days} \times y$$

Cost for 2 days =

$$\text{Cost for 3 days} = 100 + 3 \times 50$$



Q) A lending library has a fixed charge for first 3 days and an additional charge for each day thereafter.

Saritha paid Rs. 27 for the book kept for 7 days

While Susy paid Rs. 21 for the book she kept for 5 days

Find the fixed charge and the charge for each extra day

Sol. Let the fixed charge be Rs.  $x$  and the charge for

As per the 1<sup>st</sup> given condition,

$$x + 4y = 27 \quad \text{.....(i)}$$

As per the 2<sup>nd</sup> given condition,

$$x + 2y = 21$$

Solve the equations with  
either substitution or  
elimination method

Hence additional  
charge will be  
collected only for  
 $5 - 3 = 2$  days

Rs. 3

No. **58**

**Q. Form the pair of linear equations for the following problem and find their solution by substitution method.**

The taxi charges in a city consist of a fixed charge together with the charge for the distance covered. For a distance of 10 km, the charge paid is Rs. 105 and for a journey of 15km, the charge paid is Rs.155. What are the fixed charges and the charge per km? How much does a person have to pay for travelling a distance of 25km?

**Sol.** Let the fixed charges be Rs.  $x$  and the charge per km be Rs.  $y$

**As per the 1<sup>st</sup> given condition,**

$$x + 10y = 105 \quad \text{.....(i)}$$

**As per the 2<sup>nd</sup> given condition,**

$$x + 15y = 155 \quad \text{.....(ii)}$$

Substituting  $y = 10$  in (iii)

$$\begin{aligned} x &= 105 - 10(10) \\ &= 105 - 100 \\ &= 5 \end{aligned}$$

In this sum we have considered fixed charges to be 'x' and charge per km to 'y'

Consider eq (i)  
Fixed charges

$$x + 10y = 105$$

Rs.  $x$

$$x = 105 - 10y \quad \text{.....(iii)}$$

Charges per km

The fixed charges is Rs 5 and charges per km is Rs 10

Charges paid for 1 km =

$$x + y$$

Charges paid for 2 km =

$$x + 2y$$

Charges paid for 10 km =

$$x + 10y$$

Charges paid for 15 km =

$$x + 15y$$

$\therefore$  The person have to pay for 25km =  $x + 25y$

$$= 5 + 25(10)$$

$$= 5 + 250$$

$$= 255$$

The person have to pay Rs 255 for 25km

No. **59**

**Q. A man gets Rs. 100 per day if he works, but he is fined by Rs. 10 per day if he is absent.**  
**In the whole month of April he received Rs. 1900 only. How many days did he work ?**

**Sol.** Let the number of days the man was present be 'x' and the number of days he was absent be 'y'.

According to first condition,

$$100x - 10y = 1900$$

According to second condition,

$$x + y = 30$$

Multiplying (ii) by 10

$$10x + 10y = 300$$

Lets solve it by

Lets make the  
coefficient of y same

Total salary =

Total received - total fine paid

10

y × 10

No. **60**

(Q) A man starts his job with a certain monthly salary and a fixed increment every year.  
 If his salary will be Rs. 11000 after 2 years and Rs. 14000 after 4 years of his service.  
 What is his starting salary and what is the annual increment.

Sol. Let the starting salary be Rs.  $x$  and the annual increment be Rs.  $y$

As per the 1<sup>st</sup> given condition,

$$x + 2y = 11000 \quad \text{.....(i)}$$

As per the 2<sup>nd</sup> given condition,

$$x + 4y = 14000 \quad \text{.....(ii)}$$

In this sum we have considered  
 starting salary to be 'x' and  
 annual increment to 'y'

Starting salary Rs. $x$	Annual Increment Rs. $y$
Salary after 1 year =	$x + y$
Salary after 2 years =	$x + 2y$
Salary after 3 years =	$x + 3y$
Salary after 4 years =	$x + 4y$

**(Q)** A man starts his job with a certain monthly salary and a fixed increment every year. If his salary will be Rs. 11000 after 2 years and Rs. 14000 after 4 years of his service. What is his starting salary and what is the annual increment.

**Sol.** Let the starting salary be Rs.  $x$  and the annual increment be Rs.  $y$

**As per the 1<sup>st</sup> given condition,**

$$x + 2y = 11000 \quad \text{.....(i)}$$

**As per the 2<sup>nd</sup> given condition,**

$$x + 4y = 14000 \quad \text{.....(ii)}$$

**Subtracting (ii) from (i),**

$$\begin{array}{r} \cancel{x} + 2y = 11000 \\ \cancel{x} + 4y = 14000 \\ (-) \quad (-) \quad (-) \\ \hline -2y = -3000 \end{array}$$

$$\therefore y = \frac{-3000}{-2}$$

$$\therefore y = 1500$$

**Substituting  $y = 1500$  in (i),**

$$x + 2(1500) = 11000$$

$\therefore$

$$x + 3000 = 11000$$

$\therefore$

$$x = 11000 - 3000$$

$\therefore$

$$x = 8000$$

$\therefore$

The starting salary of man is Rs.8000 and his fixed annual increment is Rs.1500.



No. **61**

(Q) Monthly hostel charges in a college comprises of 2 parts, one fixed cost for the stay in the hostel and the varying part depending on the number of days one has taken food in the mess. Ram takes food for 20 days and pays Rs. 1700 as hostel charges and Rahim takes food for 24 days and pays Rs. 1900 as hostel charges. Find the fixed charges and the cost of food per day.

Sol. Let the fixed charge be Rs.  $x$  and the cost of food per day be Rs.  $y$ .

As per the 1<sup>st</sup> given condition,

$$x + 20y = 1700 \quad \text{.....(i)}$$

As per the 2<sup>nd</sup> given condition,

$$x + 24y = 1900 \quad \text{.....(ii)}$$

The fixed charges and the cost of food per day will remain the same

day is Rs. 10

If food is consumed for 1 day then the hostel charges would be  $100 + 10$

If food is consumed for 2 days then the hostel charges would be  $100 + 2(10)$

If food is consumed for 3 days then the hostel charges would be  $100 + 3(10)$

If food is consumed for 20 days then the hostel charges would be  $100 + 20(10)$

If food is consumed for 24 days then the hostel charges would be  $100 + 24(10)$

(Q) Monthly hostel charges in a college comprises of 2 parts, one fixed cost for the stay in the hostel and the varying part depending on the number of days one has taken food in the mess. Ram takes food for 20 days and pays Rs. 1700 as hostel charges and Rahim takes food for 24 days and pays Rs. 1900 as hostel charges. Find the fixed charges and the cost of food per day.

Sol. Let the fixed charge be Rs.  $x$  and the cost of food per day be Rs.  $y$

As per the 1<sup>st</sup> given condition,

$$x + 20y = 1700 \quad \text{.....(i)}$$

As per the 2<sup>nd</sup> given condition,

$$x + 24y = 1900 \quad \text{.....(ii)}$$

Subtracting (ii) from (i),

$$\cancel{x} + 20y = 1700$$

$$\cancel{x} + 24y = 1900$$

$$\begin{array}{r} (-) \quad (-) \quad (-) \\ \hline \end{array}$$

$$-4y = -200$$

$$\therefore y = \frac{-200}{-4}$$

$$\therefore y = 50$$

Substituting  $y = 50$  in (i),

$$x + 20(50) = 1700$$

$$\therefore x + 1000 = 1700$$

$$\therefore x = 1700 - 1000$$

$$\therefore x = 700$$

$\therefore$  Fixed charge for stay in the hostel is Rs. 700 and cost of food per day is Rs.50.

**Thank You**