(MATHS)   PAIR OF LINEAR EQUATIONS IN TWO VARIABLES

Q.1   5 pens and 6 pencils together cost Rs. 9, and 3 pens and 2 pencils cost Rs. 5. Find the cost of 1 pen and 1 pencil.

Q.2   7 audio cassettes and 3 videocassettes cost Rs. 1110, while 5 audio cassettes and 4 videocassettes cost Rs. 1350. Find the cost of audio cassettes and a video cassette.

Q.3   Reena has pens and pencils, which together are 40 in number. If she has 5 more pencils and 5 less pens, then the number of pencils would become 4 times the number of pens. Find the original number of pens and pencils.

Q.4   4 tables and 3 chairs, together, cost Rs. 2250, and 3 tables and 4 chairs cost Rs. 1950. Find the cost of 2 chairs and 1 table.

Q.5   3 bags and 4 pens together cost Rs. 257, whereas 4 bags and 3 pens together cost Rs. 324. Find the total cost of 1 bag and 10 pens.

Q.6   5 books and 7 pens together cost Rs. 79, whereas 7 books and 5 pens together cost Rs. 77. Find the total cost of 1 book and 2 pens.

Q.7   Jamila sold a table and a chair for Rs.1050, thereby making a profit of 10% on the table and 25% on the chair. If she had taken a profit of 25% on the table and 10% on the chair, she would have got Rs. 1065. Find the cost price of each.

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DPP – 10

CLASS – 10th

TOPIC – WORD PROBLEMS

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Sol.1 Let's assume the cost of a pen and pencil is Rs. x and Rs. y, respectively.

Then, forming equations according to the question,

5x + 6y = 9 ... (i)

3x + 2y = 5 ... (ii)

On multiplying equation (i) by 2 and equation (ii) by 6, we get

10x + 12y = 18 ... (iii)

18x + 12y = 30 ... (iv)

Now by subtracting equation (iii) from equation (iv), we get

18x – 10x + 12y – 12y = 30 – 18

8x = 12

x = 3/2 = 1.5

Putting x = 1.5 in equation (i), we find y.

5(1.5) + 6y = 9

6y = 9 – 7.5

y = (1.5)/ 6 = 0.25

Therefore, the cost of one pen = Rs. 1.50, and so the cost of one pencil = Rs. 0.25

Sol.2 Let's assume the cost of an audio cassette, and that of a video cassette be Rs. x and Rs. y, respectively. Then, forming equations according to the question, we have

7x + 3y = 1110 ... (i)

5x + 4y = 1350 ... (ii)

On multiplying equation (i) by 4 and equation (ii) by 3,

We get

28x + 12y = 4440 ... (iii)

15x + 4y = 4050 ... (iv)

Subtracting equation (iv) from equation (iii),

28x – 13x + 12y – 12y = 4440 – 4050

13x = 390

⇒ x = 30

On substituting x = 30 in equation (I),

7(30) + 3y = 1110

3y = 1110 – 210

$y = 900 / 3$

$\Rightarrow y = 300$

Therefore, it's found that the cost of one audio cassette = Rs. 30

And the cost of one video cassette = Rs. 300

Sol.3   Let's assume the number of pens and pencils is x and y, respectively.

Forming equations according to the question, we have

$x + y = 40$ ... (i)

$(y + 5) = 4(x - 5)$

$y + 5 = 4x - 20$

$5 + 20 = 4x - y$

$4x - y = 25$ ... (ii)

Adding equations (i) and (ii),

We get

$x + 4x = 40 + 25$

$5x = 65$

$\Rightarrow x = 13$

Putting x = 13 in equation (i), we get

$13 + y = 40$

$\Rightarrow y = 40 - 13 = 27$

Therefore, it's found that the number of pens Reena has is 13.

And the number of pencils Reena has is 27.

Sol.4   Let's assume the cost of 1 table is Rs. x, and the cost of 1 chair is Rs. y.

Then, according to the question,

$4x + 3y = 2250$ ... (i)

$3x + 4y = 1950$ ... (ii)

On multiplying (i) with 3 and (ii) with 4,

We get,

$12x + 9y = 6750$ ... (iii)

$12x + 16y = 7800$ ... (iv)

Now, subtracting equation (iv) from (iii),

We get,

$-7y = -1050$

$y = 150$

Using y = 150 in (i), we find x

4x + 3(150) = 2250

4x = 2250 – 450

x = 1800/ 4

$\Rightarrow$ x = 450

From the question, it's required to find the value of (x + 2y) $\Rightarrow$ 450 + 2(150) = 750

Therefore, the total cost of 2 chairs and 1 table is Rs. 750.

Sol.5   Let the cost of a bag and a pen be Rs. x and Rs. y, respectively.

Then, according to the question,

3x + 4y = 257 … (i)

4x + 3y = 324 … (ii)

On multiplying equation (i) by 3 and (ii) by 4,

We get,

9x + 12y = 770 … (iii)

16x + 12y = 1296 … (iv)

Subtracting equation (iii) from (iv), we get

16x – 9x = 1296 – 771

7x = 525

x = 525/7 = 75

Hence, the cost of a bag = Rs. 75

Substituting x = 75 in equation (i),

We get,

3 x 75 + 4y = 257

225 + 4y = 257

4y = 257 – 225

4y = 32

y = 32/4 = 8

Hence, the cost of a pen = Rs. 8

From the question, it's required to find the value of (x + 10y) $\Rightarrow$ 75 +10(8) = 20

Therefore, the total cost of 1 bag and 10 pens = 75 + 80 = Rs. 155

Sol.6   Let's assume the cost of a book and a pen be Rs. x and Rs. y, respectively.

Then, according to the question,

5x + 7y = 79 … (i)

7x + 5y = 77 … (ii)

On multiplying equation (i) by 5 and (ii) by 7,

We get,

$25x + 35y = 395$ ... (iii)

$49x + 35y = 539$ ... (iv)

Subtracting equation (iii) from (iv),

We have,

$49x - 25x = 539 - 395$

$24x = 144$

$x = 144/24 = 6$

Hence, the cost of a book = Rs. 6

Substituting x= 6 in equation (i),

We get

$5(6) + 7y = 79$

$30 + 7y = 79$

$7y = 79 - 30$

$7y = 49$

$y = 49/7 = 7$

Hence, the cost of a pen = Rs. 7

From the question, it's required to find the value of $(x + 2y) \Rightarrow 6 + 2(7) = 20$

Therefore, the total cost of 1 book and 2 pens = 6 + 14= Rs. 20

Sol.7 Let the cost price of one table and one chair be Rs. x and Rs. y, respectively.

So,

The selling price of the table, when it's sold at a profit of 10% = Rs. x + 10x/100 = Rs. 110x / 100

The selling price of the chair, when it's sold at a profit of 25% = Rs. y + 25y/100 = Rs. 125y / 100

Hence, according to the question,

$110x / 100 + 125y / 100 = 1050$ ... (i)

Similarly,

The selling price of the table, when it's sold at a profit of 25% = Rs. (x + 25x/100) = Rs. 125x/ 100

The selling price of the chair, when it's sold at a profit of 10% = Rs. (y + 10y/100) = Rs. 110y / 100

Hence, again from the question

$125x / 100 + 110y / 100 = 1065$ ... (ii)

Re-written (i) and (ii) with their simplest coefficients,

$11x/10 + 5y/4 = 1050$........ (iii)

$5x/4 + 11y/10 = 1065$........ (iv)

Adding (iii) and (iv), we get

$(11/10 + 5/4)x + (5/4 + 11/10)y = 2115$

$47/20x + 47/20y = 2115$

$x + y = 2115(20/47) = 900$

$\Rightarrow x = 900 - y$ .... (v)

Using (v) in (iii),

$11(900 - y)/10 + 5y/4 = 1050$

$2(9900 - 11y) + 25y = 1050 \times 20$ [After taking LCM]

$19800 - 22y + 25y = 21000$

$3y = 1200$

$\Rightarrow y = 400$

Putting y = 400 in (v), we get

$x = 900 - 400 = 500$

Therefore, the cost price of the table is Rs. 500, and that of the chair is Rs. 400