

Exercise 3.6

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

Solution:

Let's assume the cost of a pen and pencil be ₹ x and ₹ y respectively.

Then, forming equations according to the question

$$5x + 6y = 9 \dots (i)$$

$$3x + 2y = 5 \dots (ii)$$

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

$$10x + 12y = 18 \dots (iii)$$

$$18x + 12y = 30 \dots (iv)$$

Now on 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 = ₹ 1.50 and so the cost of one pencil = ₹ 0.25

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

Solution:

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

$$7x + 3y = 1110 \dots (i)$$

$$5x + 4y = 1350 \dots (ii)$$

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

We get,

$$28x + 12y = 4440 \dots (iii)$$

$$15x + 4y = 4050 \dots (iv)$$

Subtracting equation (iv) from equation (iii),

$$28x - 15x + 12y - 12y = 4440 - 4050$$

$$13x = 390$$

$$\Rightarrow x = 30$$

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 = ₹ 30
And the cost of one video cassette = ₹ 300

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

Solution:

Let's assume the number of pens and pencils be x and y , respectively.
Forming equations according to the question, we have

$$x + y = 40 \dots (i)$$

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

$$y + 5 = 4x - 20$$

$$5 + 20 = 4x - y$$

$$4x - y = 25 \dots (ii)$$

Adding equation (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.

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

Solution:

Let's assume the cost of 1 table is ₹ x and cost of 1 chair is ₹ y .

Then, according to the question

$$4x + 3y = 2250 \dots (i)$$

$$3x + 4y = 1950 \dots (ii)$$

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

We get,

$$12x + 9y = 6750 \dots (iii)$$

$$12x + 16y = 7800 \dots (iv)$$

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 ₹ 750.

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

Solution:

Let the cost of a bag and a pen be ₹ x and ₹ y , respectively.

Then, according to the question

$$3x + 4y = 257 \dots (i)$$

$$4x + 3y = 324 \dots (ii)$$

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

We get,

$$9x + 12y = 771 \dots (iii)$$

$$16x + 12y = 1296 \dots (iv)$$

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

$$16x - 9x = 1296 - 771$$

$$7x = 525$$

$$x = 525/7 = 75$$

Hence, the cost of a bag = ₹ 75

Substituting $x = 75$ in equation (i),

We get,

$$3 \times 75 + 4y = 257$$

$$225 + 4y = 257$$

$$4y = 257 - 225$$

$$4y = 32$$

$$y = 32/4 = 8$$

Hence, the cost of a pen = ₹ 8

From the question, it's required to find the value of $(x + 10y) \Rightarrow 75 + 10(8) = 155$

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

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

Solution:

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

Then, according to the question

$$5x + 7y = 79 \dots (i)$$

$$7x + 5y = 77 \dots (ii)$$

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

We get,

$$25x + 35y = 395 \dots (iii)$$

$$49x + 35y = 539 \dots (iv)$$

Subtracting equation (iii) from (iv),

We have,

$$49x - 25x = 539 - 395$$

$$24x = 144$$

$$x = 144/24 = 6$$

Hence, the cost of a book = ₹ 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 = ₹ 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 = $6 + 14 = ₹ 20$

7. Jamila sold a table and a chair for ₹ 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 ₹ 1065. Find the cost price of each.

Solution:

Let the cost price of one table and one chair be ₹ x and ₹ y, respectively.

So,

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

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

Hence, according to the question

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

Similarly,

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

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

Hence, again from the question

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

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

$$11x/10 + 5y/4 = 1065 \dots (iii)$$

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

Adding (iii) and (iv), we get

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

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

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

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

Using (v) in (iii),

$$11(900 - y)/10 + 5y/4 = 1065$$

$$2(9900 - 11y) + 25y = 1065 \times 20$$

$$19800 - 22y + 25y = 21300$$

$$3y = 1500$$

$$\Rightarrow y = 500$$

[After taking LCM]

Putting $y = 500$ in (v), we get

$$x = 900 - 500 = 400$$

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