Exercise 3.6 Page No: 3.73

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
$5x + 6y = 9$ … (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 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
$7x + 3y = 1110$ … (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),

$28x - 13x + 12y - 12y = 4440 - 4050$
$13x = 390$
$\Rightarrow x = 30$

On substituting x = 30 in equation (i)

$7(30) + 3y = 1110$
$3y = 1110 – 210$

y = 900/ 3
⇒ 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 … (i)
(y+5) = 4(x-5)
y + 5 = 4x - 20
5 + 20 = 4x - y
4x – y = 25 … (ii)
Adding equation (i) and (ii),
We get,
x + 4x = 40 + 25
5x = 65
⇒ x = 13
Putting x=13 in equation (i), we get
13 + y = 40
⇒ 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 … (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 ₹ 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
$3x + 4y = 257$ … (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 = ₹ 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 $(x + 10y) \Rightarrow 75 + 10(8) = 20$
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 … (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 = ₹ 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) ⇒ 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 … (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 … (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
⇒ x = 900 – y ……. (v)

Using (v) in (iii),
11(900 – y)/10 + 5y/4 = 1050
2(9900 -11y) +25y = 1050 x 20 [After taking LCM]
19800 – 22y + 25y = 21000
3y = 1200
⇒ y = 400

Putting y = 400 in (v), we get
x = 900 – 400 = 500

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