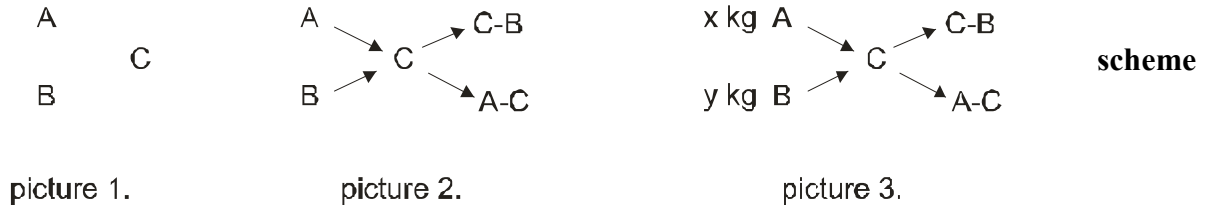


Account interference

First we will do a general task that will help us to solve other such tasks.

You must stir the two types of goods, whose prices are **A** \$ per kg and **B** \$ per kg, to received the goods at a price of **C** \$ per kg, ($B < C < A$). Determine the scale of this should interfere two types of goods.

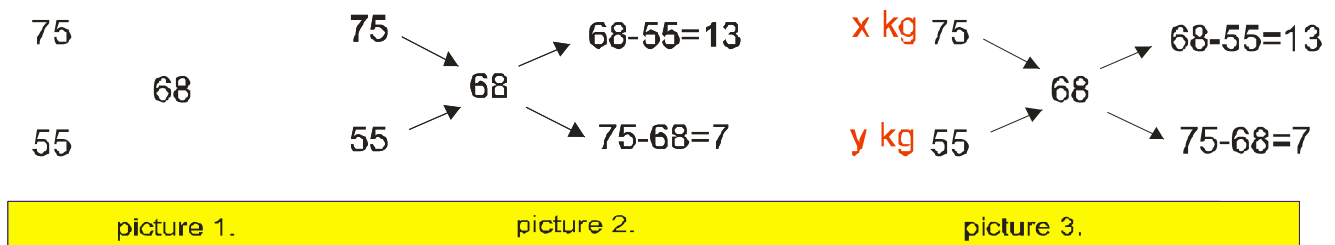


If we take x kg of goods at the price of **A** \$, y kg at the cost of **B** \$, then:

$$\boxed{x : y = (C - B) : (A - C)}$$

- 1) On the stock has coffee at a price of 75 \$ per kg and 55 \$ per kg. Create a 120 kg mixture, which will sell at 68 \$ per kg.

Solution:



$$x : y = 13 : 7 \quad \text{and} \quad x + y = 120$$

$$x : y = 13 : 7$$

$$\left. \begin{array}{l} x = 13k \\ y = 7k \end{array} \right\} \rightarrow \text{replace in } x + y = 120$$

$$x + y = 120$$

$$13k + 7k = 120$$

$$20k = 120$$

$$\boxed{k = 6}$$

$$x = 13k \rightarrow x = 13 \cdot 6 \rightarrow \boxed{x = 78kg}$$

$$y = 7k \rightarrow y = 7 \cdot 6 \rightarrow \boxed{y = 42kg}$$

Of course, this task can be solved with system:

$$75 \cdot x + 55 \cdot y = 68 \cdot (x + y)$$

$$x + y = 120 \text{ kg}$$

$$75x + 55y = 68 \cdot 120$$

$$x + y = 120$$

$$75x + 55y = 8160$$

$$x + y = 120$$

$x = 120 - y \rightarrow$ Express one unknown and change it to another equation

$$75(120 - y) + 55y = 8160$$

$$9000 - 75y + 55y = 8160$$

$$-75y + 55y = 8160 - 9000$$

$$-20y = -840$$

$$y = 42 \text{ kg}$$

$$x = 120 - 42$$

$$x = 78 \text{ kg}$$

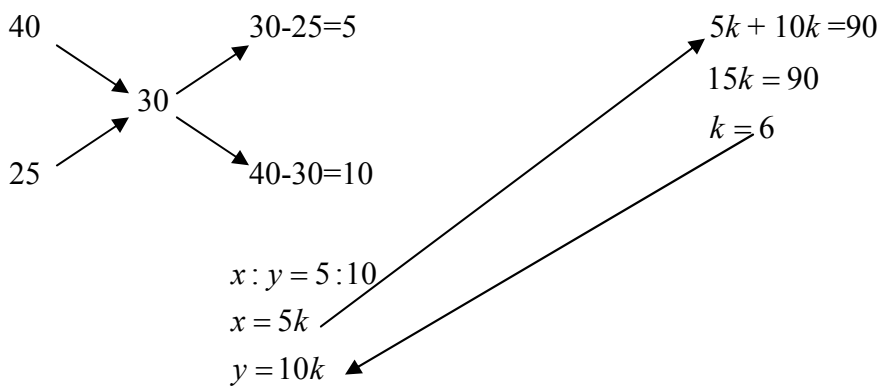
2) How much water temperature 40°C and water temperature 25°C should be mixed to obtain 90 liters of water temperature 30°C ?

Solution:

x liters 40°C

$$\Rightarrow x + y = 90 \text{ l}$$

y liters 25°C



$$x = 30 \text{ l} \quad \text{and} \quad y = 60 \text{ l}$$

Over systems, would be:

$$40 \cdot x + 25y = 90 \cdot 30$$

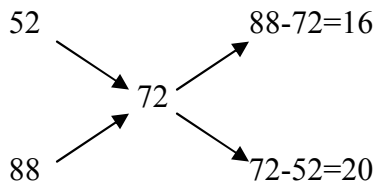
$$x + y = 90$$

3) How should be mixed acid strength 52% and 88% to get mixture of 144 liters with strenght 72 % ?

Solution:

x l strenght 52%

y l strenght 88%



$$x : y = 16 : 20$$

$$x = 16k$$

$$y = 20k$$

$$x + y = 144$$

$$16k + 20k = 144$$

$$36k = 144$$

$$k = 4$$

$$x = 16 \cdot 4 = 64l$$

$$y = 20 \cdot 4 = 80l$$

Watch out when we mix goods with 3 or more different prices !

Complex account of interference we do as is in next example.

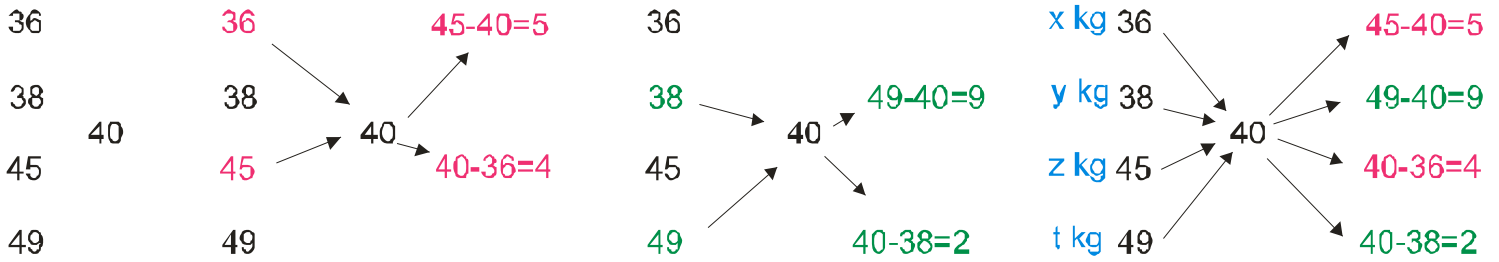
4) The company has 4 types of flour at the price of 36 \$, 38 \$, 45 \$ and 49 \$ per kilogram. How much should be taken of any kind that price is 40 \$ per kilogram?

Solution:

First to say that we write down the information similar as with two types of goods.

But here we have more options.

The first option



Picture 1.

Picture 2.

Picture 3.

Picture 4.

On picture 1. we see how to record data.

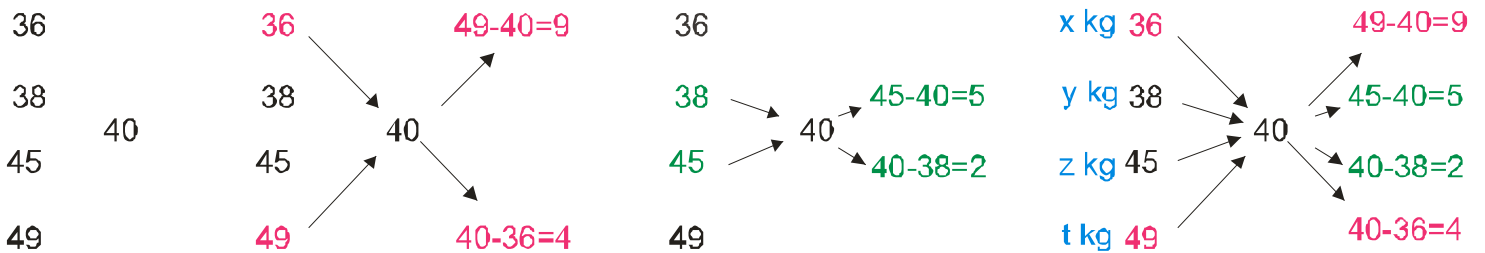
Now we mix two by two types of flour , but take care: Both types should be greater or less than 40 (price of mixture, that is 40\$ in our example)

On picture 2. we took 36 \$ and 45 \$ (one smaller and one larger than 40\$)

On picture 3. we took 38\$ and 49\$ (one smaller and one larger than 40\$)

On picture 4. we obtain proportion: $x : y : z : t = 5 : 9 : 4 : 2$

The second option



Picture 1.

Picture 2.

Picture 3.

Picture 4.

With similar procedure we have (on picture 4.) $x : y : z : t = 9 : 5 : 2 : 4$

In general, we would work this:

$$36x + 38y + 45z + 49t = 40(x + y + z + t)$$

$$36x + 38y + 45z + 49t = 40x + 40y + 40z + 40t$$

$$36x + 38y + 45z + 49t - 40x - 40y - 40z - 40t = 0$$

$$-4x - 2y + 5z + 9t = 0$$

In this way we obtain an equation in which we can take three arbitrary unknown to find a fourth !

In this way we can make as much as we need different proportions.