Answer on Question #67099 – Math – Algebra

Question

A firm has two grades of coffee beans, Grade A and Grade B. 40 kg of Grade A and 45 kg of Grade B are to be mixed and packaged into two types of packets of 1 kg each — economy type and special type. The economy pack consists of beans of Grade A and Grade B in the ratio 1 : 3. The special pack consists of beans of Grade A and Grade B in equal proportion. Find the number of economy and special packs that can be made, using the substitution method.

Solution

We denote the number of economy packs by x, and the number of special packs by y. In 1 kg of an economy pack there will be 0.25 kg of Grade A and 0.75 kg of Grade B. In 1 kg of a special pack there will be 0.5 kg of Grade A and 0.5 kg of Grade B.
Let us compose a system of linear equations for this task:

$$\begin{cases} 0.25x + 0.5y = 40 \\ 0.75x + 0.5y = 45 \end{cases}$$

Now we solve this equation by the substitution method.
It follows from the first equation of the system that

$$0.25x + 0.5y = 40$$
$$0.25x = 40 - 0.5y$$
$$x = 160 - 2y$$

Substituting for x into the second equation of the system

$$0.75(160 - 2y) + 0.5y = 45$$
$$120 - 1.5y + 0.5y = 45$$
$$y = 75$$
$$x = 160 - 2 \cdot 75$$
$$x = 10$$

Thus, from a given number of grains you can make 10 economy packs and 75 special packs.

Answer:

10 economy packs and 75 special packs.