Problem of the Week
Problem E and Solution
Pineapples and Bananas

Problem

In a recent survey, Grade 12 students were asked if they like pineapples. They were then asked if they like bananas. It was found that

- 30% of the students do not like pineapples,

- 36 students do not like bananas,

- 60 students like both fruits, and

- 48 students like one fruit but not the other.

How many students do not like pineapples and do not like bananas?

Solution

Let x be the number of students that like only pineapples.
Let y be the number of students that like only bananas.
Let z be the number of students that do not like pineapples and do not like bananas.
We're given that 60 students like both pineapples and bananas. This information is summarized in the Venn diagram.
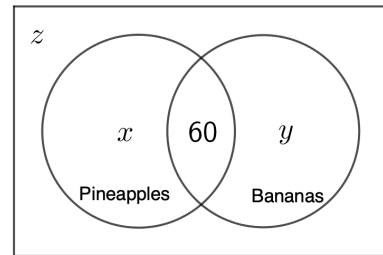
The number of students that do not like bananas is equal to $x + z$. Therefore,

$$x + z = 36 \tag{1}$$

The number of students who like one fruit but not the other is equal to $x + y$. Therefore,

$$x + y = 48 \tag{2}$$

The total number of students is equal to $x + y + z + 60$ and 30% of this is $0.3(x + y + z + 60)$. This is also equal to the number of students that do not like pineapples, $y + z$. Therefore,

$$0.3(x + y + z + 60) = y + z \tag{3}$$

Subtracting equation (1) from equation (2), we get $y - z = 12$. Therefore, $y = z + 12$.

Substituting equation (1) into equation (3) we get $0.3(36 + y + 60) = y + z$, or $0.3(96 + y) = y + z$.

Now substituting $y = z + 12$, we get

$$0.3(96 + (z + 12)) = (z + 12) + z$$
$$28.8 + 0.3z + 3.6 = 2z + 12$$
$$20.4 = 1.7z$$
$$z = 12$$

Therefore, there are 12 students who do not like pineapples and do not like bananas.

Although we are not asked to do so, we could go on and solve for $x = 24$ and $y = 24$.