



Problem of the Week

Problem E and Solution

Apples and Bananas

**Problem**

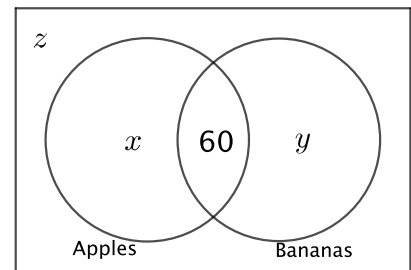
In a survey, Grade 12 students were asked if they like apples. They were then asked if they like bananas. The information is summarized: 30% of the students do not like apples; 36 students do not like bananas; 60 students like both; and 48 students like one but not the other.

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

Solution

We will set up a Venn Diagram.

Let z be the number of students that do not like apples and do not like bananas, x be the number of students that like only apples and y be the number of students that like only bananas. The 60 is the number of students who like both apples and bananas.



The number of students that do not like bananas is equal to the number of students outside the circle that is labelled bananas. This is $x + z$. Therefore $x + z = 36$. Call this equation (1).

The number of students who like one but not the other is $x + y = 48$. Call this equation (2).

The total number of students is $x + y + z + 60$ and 30% of this is $0.3(x + y + z + 60)$. This is equal to the number of students that do not like apples, $y + z$. Therefore, $0.3(x + y + z + 60) = y + z$. Call this equation (3). Subtracting (1) from (2), we get $y - z = 12$. Therefore, $y = z + 12$. Call this equation (4).

Substituting (1) into (3) we get $0.3(36 + y + 60) = y + z$, or $0.3(96 + y) = y + z$. Now substitute equation (4) for y ,

$$0.3(96 + (z + 12)) = (z + 12) + z$$

$$28.8 + 0.3z + 3.6 = 2z + 12$$

$$20.4 = 1.7z$$

$$z = 12$$

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

