# Problem of the Week
## Problem C and Solution
## Moving Time

## Problem

Stefania's family is looking for a new apartment and Stefania is hoping to get a dog after they move. Of the 65 apartments she has found online, 40 are close to a park, 28 allow dogs, and 8 are not close to a park and do not allow dogs. How many of the apartments are close to a park and allow dogs?

## Solution

## Solution 1

Let $n$ be the number of apartments that are close to a park and allow dogs. Since 40 apartments are close to a park and $n$ apartments are close to a park and allow dogs, then $40 - n$ apartments are close to a park but do not allow dogs. Similarly, since 28 apartments allow dogs and $n$ apartments are close to a park and allow dogs, then $28 - n$ apartments allow dogs but are not close to a park. We also know that 8 apartments are not close to a park and do not allow dogs. This information is summarized in the following Venn diagram.
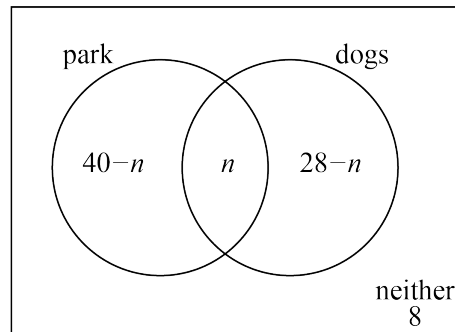


Since there are 65 apartments in total, then

$$65 = (40 - n) + n + (28 - n) + 8$$
$$65 = 76 - n$$
$$n = 76 - 65 = 11$$

Therefore, 11 of the apartments are close to a park and allow dogs.

## Solution 2

Since 8 of the 65 apartments are not close to a park and do not allow dogs, we know that $65 - 8 = 57$ apartments must be close to a park or allow dogs, or both. We know that the 40 apartments close to a park will include the apartments that are close to a park and also allow dogs. Similarly, the 28 apartments that allow dogs will include the apartments that are close to a park and also allow dogs. Thus, if we consider $40 + 28 = 68$, we will be double counting the apartments that are close to a park and also allow dogs. Since there are 57 apartments that are close to a park or allow dogs, or both, we have double-counted $68 - 57 = 11$ apartments. Thus, there must be 11 apartments that are both close to a park and allow dogs.