The Addition Counting Principle – Mutually Exclusive

The Addition Counting Principle – NOT Mutually Exclusive

Example 1

Suppose at a high school, 298 students study only French, only Spanish, or both languages. The school reports 115 students study French and 209 study Spanish, but because $115 + 209 > 298$, there must be students who study both languages. How many students study both?

Example 2

A pair of six-sided dice is thrown. If the dice are fair, what is the probability that the dice show doubles or a sum less than 10?

Example 3

A pair of fair six-sided dice is thrown. What is the probability that exactly one die shows a 3 or the sum of the numbers is greater than 9?

Complementary Events:

Experiment	Sample Space	Event	Complement
tossing a coin	{heads, tails}	{tails}	{heads}
tossing two coins	{HH, HT, TH, TT}	getting no heads {TT}	getting 1 or 2 heads {HH, HT, TH}
picking an integer from 1 to 100	$\{n \in \mathbb{Z} : 1 \leq n \leq 100\}$	picking a prime number	picking 1 or a composite number

Example 4

Refer to the 298 students studying languages in Example 1. If a student is selected at random, what is the probability that he is not studying both languages at the same time?