Mutually exclusive and independent events

This worksheet is designed to investigate the relationship between mutually exclusive and independent events.

1. Use the experiment of rolling two dice. Give two events that are mutually exclusive and non-independent.

2. Use the experiment of rolling two dice. Give two events that are non-mutually exclusive and non-independent.

3. Use the experiment of rolling two dice. Give two events that are non-mutually exclusive and independent.
4. Now it so happens that **two events cannot be mutually exclusive and independent unless at least one of the events cannot happen at all.** Let’s prove this. Follow the steps outlined below.

Let A and B be two events that are mutually exclusive and independent.

a.) If A and B are mutually exclusive, what is \( P(A \text{ and } B) \)?

b.) If A and B are independent, how else can we write \( P(A \text{ and } B) \)?

c.) If A could not happen, what would \( P(A) \) have to be? If B could not happen, what would \( P(B) \) have to be?

d.) Put parts a through c together to show that if A and B are mutually exclusive and independent, then either A cannot happen or B cannot happen.