Name: _____ MDM 4U1 Date: _____

1.4 Independence

Independence is a very important concept when it comes to understanding probability. It's probably one of the most commonly misunderstood as well!

Let's start off with a die:

You rolled a 6 on a die.
What is the probability you will roll a 6 on your next roll as well?

You rolled five 6's in a row with a dice.
What is the probability you roll a 6 on the next roll?

You haven't rolled a 6 in one hundred rolls of a die.
What is the probability you roll 6 on the next roll?

Another example: We did this question yesterday…

You roll two dice. The first die shows a ONE and the other die rolls under the table and you cannot see it. **Now**, what is the probability that both die show ONE?

Rolling the two dice are called **independent events**. The number on the first die does not affect the number on the second one. No matter what you rolled previously, the probability of getting a 6 on the next roll will always be 1/6.

A. Independent events

Example 1: Two dice are rolled. What is the probability that two 6's are rolled?

Example 2: Three coins are tossed. What is the probability that all three are heads?

Conclusion…

If A and B are independent events,

$$\boldsymbol{P(A \text{ and } B) \text{ or } P(A \cap B) =}$$

If events aren't independent, they must be **dependent.**

To check for independence (if you are unsure):
Remember, even if you are given A, the probability of B doesn't change!
So $P(B|A) = P(B)$ *if A and B are independent.*

Example 3: A die is rolled twice. What is the probability that both rolls are a "5"?

Example 4: A coin is flipped then a card is randomly drawn from a deck of 52 cards. What is the probability of obtaining a head and a diamond?

Example 5: The probability it will rain today is 0.2 and the probability there is a football game is 0.7. What is the probability of it raining at the football game?

Example 6: What is the probability of rolling the same number on two dice **twice in a row**?

B. What is the difference between mutually exclusive events and independent events?
Come up with an example and Venn Diagram for each to help you explain!

Homework:
Textbook Pg 245 #1-3, 6-12, Practice Problems #1-5,7,9, 17, 18