Chapter 5: Probability

5.1 Exploring Probability

fair game: a game in which all the players are equally likely to win

ex. tossing a coin to see who goes first

Getting Started Pg. 300: Use the back of this page to record your answers

Explore the Math: pg. 302 together

In Summary

Key Ideas

- Knowing the probability of an event is useful when making decisions.
- The **experimental probability** of event A is represented as

$$P(A) = \frac{n(A)}{n(T)}$$

where $n(A)$ is the number of times event A occurred and $n(T)$ is the total number of trials, T, in the experiment.

- The **theoretical probability** of event A is represented as

$$P(A) = \frac{n(A)}{n(S)}$$

where $n(A)$ is the number of favourable outcomes for event A and $n(S)$ is the total number of outcomes in the sample space, S, where all outcomes are equally likely.

- A game is fair when all the players are equally likely to win.

Need to Know

- An event is a collection of outcomes that satisfy a specific condition. For example, when throwing a standard die, the event "throw an odd number" is a collection of the outcomes 1, 3, and 5.
- The probability of an event can range from 0 (impossible) to 1 (certain). You can express probability as a fraction, a decimal, or a percent.
- You can use theoretical probability to determine the likelihood that an event will happen.

100%

Homework: pg. 303 #1-4

A. maybe a difference of one occurs most often since there are many ways of doing it.

B.

0	2	1	4	2	1
2	2	3	2	1	0
2	3	3	3	1	2
3	1	3	1	3	2
5	2	2	1	2	0
2	5	1	0	0	0

D.

0	1	2	3	4	5
$\frac{6}{36}$	$\frac{8}{36}$	$\frac{12}{36}$	$\frac{7}{36}$	$\frac{1}{36}$	$\frac{2}{36}$

G. Copy and complete this outcome table. Record the differences as positive values.

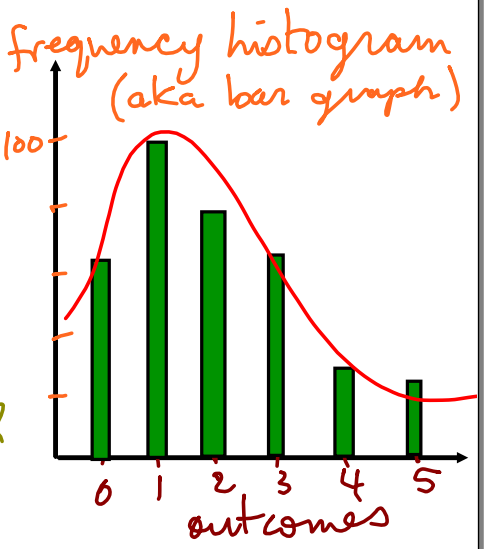
sample space

Differences in Rolls of Two Dice						
Die 1/Die 2	1	2	3	4	5	6
1	0	1	2	3	4	5
2	1	0	1	2	3	4
3	2	1	0	1	2	3
4	3	2	1	0	1	2
5	4	3	2	1	0	1
6	5	4	3	2	1	0

H. Determine the **theoretical probability** of each difference as a fraction. How closely does the experimental probability for the class results match the theoretical probability?

0	1	2	3	4	5	total
$\frac{6}{36}$	$\frac{10}{36}$	$\frac{8}{36}$	$\frac{6}{36}$	$\frac{4}{36}$	$\frac{2}{36}$	$\frac{36}{36}$

E.



WHAT DO You Think?

Decide whether you agree or disagree with each statement. Explain your decision.

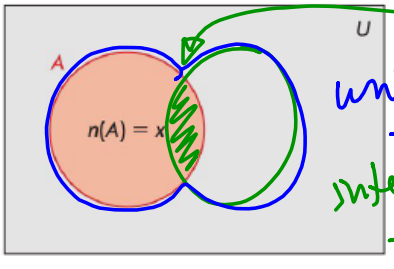
1. The probability that event X will happen is $\frac{2}{9}$. The probability that event Y will happen is $\frac{5}{9}$. Therefore, the probability that either event X or event Y will happen is $\frac{(2+5)}{9}$ or $\frac{7}{9}$.

I can satisfy the condition in 2 ways: OR means add

2. Ideas from set theory are useful when you are solving probability problems.

F. satisfying 2 conditions simultaneously is much harder to do

3. You can use a Venn diagram to determine the probability of an event.



union = or → easy to do

intersection = and → harder to do

4. You can solve probability problems using the same techniques you use to solve counting problems. For example, suppose that you are going to draw two balls from a bag with five different-coloured balls. You can use combinations to determine the probability that you will draw a red ball and a blue ball.