Warm Up 1/5/22

1. Fill out the chart and glue it in your notebook.

Use your chart to find:

2. P(rolling a sum of 6)
3. P(rolling a sum of 7 or 11)
4. P(rolling sum that is an even number)
5. P(rolling a sum that is an odd number)

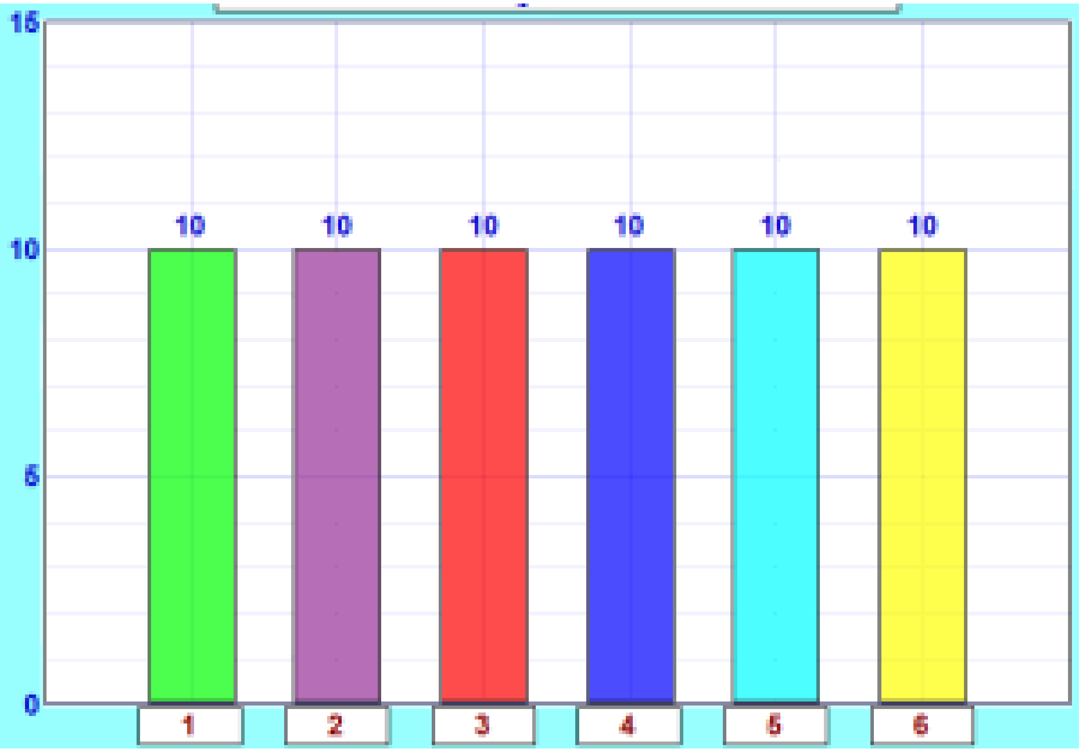
		Cube 1					
		⚀	⚁	⚂	⚃	⚄	⚅
Cube 2	⚀	(,)	(,)	(,)	(,)	(,)	(,)
	⚁	(,)	(,)	(,)	(,)	(,)	(,)
	⚂	(,)	(,)	(,)	(,)	(,)	(,)
	⚃	(,)	(,)	(,)	(,)	(,)	(,)
	⚄	(,)	(,)	(,)	(,)	(,)	(,)
	⚅	(,)	(,)	(,)	(,)	(,)	(,)

Total Score	# of ways to get score	Probability
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		

An Experiment with a Die

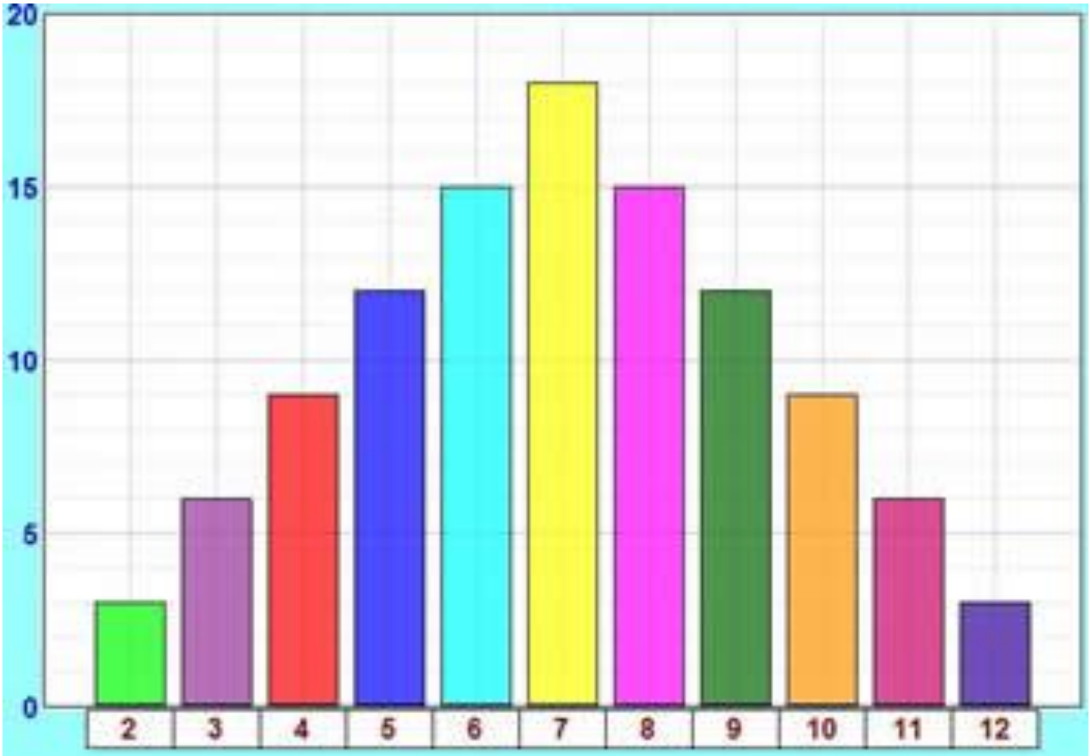
OK, why did I ask you to make **60** throws? Well, only 6 throws would not give you good results, 600 throws would have been too hard, so I chose 60, which is **10 lots of 6**.

So we should (theoretically) **expect 10** of each number, like this:



An Experiment with Dice

The **theoretical** values look like this in a bar graph:



Those are the **theoretical** values,
as opposed to the **experimental** ones you got from your **experiment**!

How do those theoretical results compare with your experimental results?

This graph and your graph should be **similar**, but they are not likely to be exactly the same, as your experiment relied on **chance**, and the number of times you did it was fairly small.

If you did the experiment a very large number of times, you would get results much closer to the theoretical ones.

		Cube 1					
		⚀	⚁	⚂	⚃	⚄	⚅
Cube 2	⚀	2	3	4	5	6	7
	⚁	3	4	5	6	7	8
	⚂	4	5	6	7	8	9
	⚃	5	6	7	8	9	10
	⚄	6	7	8	9	10	11
	⚅	7	8	9	10	11	12

Total Score	# of ways to get score	Probability
2	1	$\frac{1}{36}$
3	2	$\frac{2}{36} = \frac{1}{18}$
4	3	$\frac{3}{36} = \frac{1}{12}$
5	4	$\frac{4}{36} = \frac{1}{9}$
6	5	$\frac{5}{36}$
7	6	$\frac{6}{36} = \frac{1}{6}$
8	5	$\frac{5}{36}$
9	4	$\frac{4}{36} = \frac{1}{9}$
10	3	$\frac{3}{36} = \frac{1}{12}$
11	2	$\frac{2}{36} = \frac{1}{18}$
12	1	$\frac{1}{36}$

Probability Vocabulary

Experiment: an action where the result is uncertain.

Tossing a coin, throwing dice, spinning a spinner, seeing what type of pizza people choose are all examples of experiments

Trial: each repetition of the experiment

Outcome: a possible result of an experiment

In the experiment of rolling a die, the possible outcomes are

1, 2, 3, 4, 5, and 6.

Event: subset of outcome(s) (or results) in an experiment to which a probability is assigned

- Getting a Tail when tossing a coin
- Rolling an odd number when rolling a die

Simple Events consist of a single outcome.

Compound Event consist of more than one outcome:

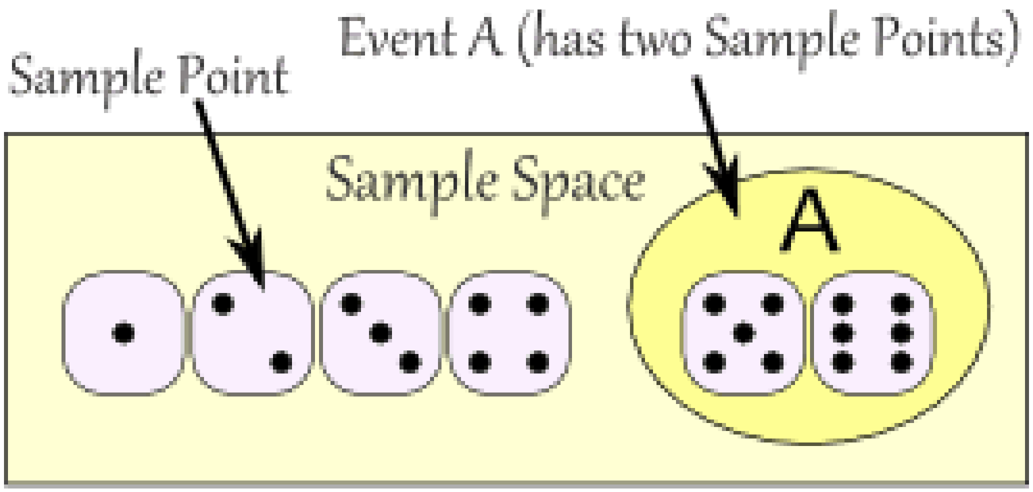
- Choosing a "King" from a deck of cards (any of the 4 Kings) **is** an event
- Rolling an "even number" (2, 4 or 6) is also an event

Trial	Outcomes	Events
Rolling a die	There are 6 possible outcomes: {1, 2, 3, 4, 5, 6}	Rolling an even number: {2, 4, 6} Rolling a 3: {3} Rolling a 1 *or* a 3: {1, 3} Rolling a 1 *and* a 3: { } (Only one number can be rolled, so this is impossible. The event has no outcomes in it.)

Sample Space: the set of all the possible outcomes of an experiment

In the experiment of rolling a die, the sample space is {1, 2, 3, 4, 5, 6}

Sample Point or Element: just **one** of the possible outcomes



The Sample Space is all possible outcomes.

A Sample Point is just one possible outcome.

An Event can be one **or more** of the possible outcomes.

Deck of Cards

There are **52 cards** in a deck (not including Jokers)-

There are **4 suits**:
diamonds (red), hearts (red), spades (black), and clubs (black)

Each suit contains 13 cards: 2-10, Jack, Queen, King, Ace

The **Sample Space** is all 52 possible cards.

A **Sample Point** could be the 5 of clubs or the King of Hearts

"King" is not a sample point. Since there are 4 Kings, each King is a different sample point.

Example: Alex wants to see how many times a "double" comes up when throwing 2 dice.

Each time Alex throws the 2 dice is an **Experiment**.

It is an Experiment because the result is uncertain.

The **Event** Alex is looking for is a "double", where both dice have the same number. It is made up of these **6 Sample Points**:

{1,1} {2,2} {3,3} {4,4} {5,5} and {6,6}

The **Sample Space** is all possible outcomes (**36 Sample Points**):

{1,1} {1,2} {1,3} {1,4} ... {6,3} {6,4} {6,5} {6,6}

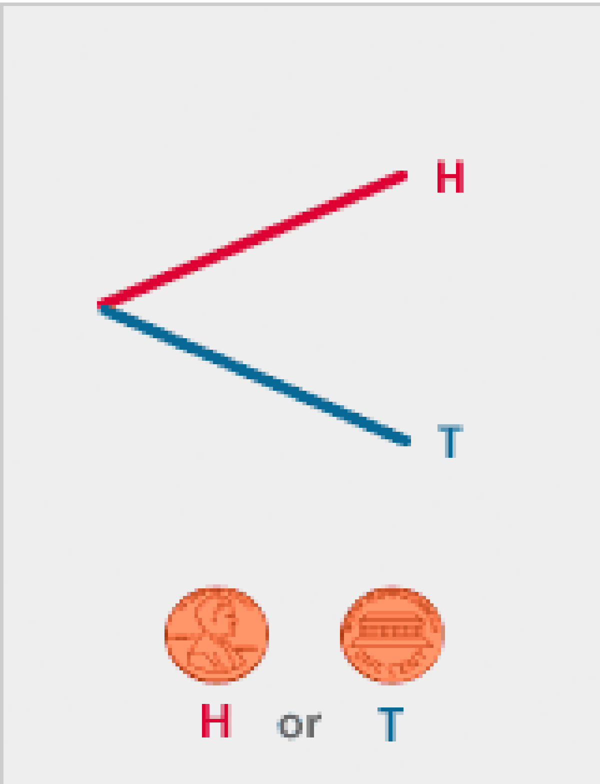
These are Alex's Results:

Experiment	Is it a Double?
{3,4}	No
{5,1}	No
{2,2}	**Yes**
{6,3}	No
...	...

After 100 **Experiments**, Alex has 19 "double" **Events** ... is that close to what you would expect?

Tree diagrams can be used to determine theoretical probabilities.

A tree diagram for the toss of a single coin has two branches that represent the two possible outcomes.



Make a tree diagram for 2 tosses of a coin.

Give the sample space for the event.

Use your diagram to find the probability of tossing at least one tail.