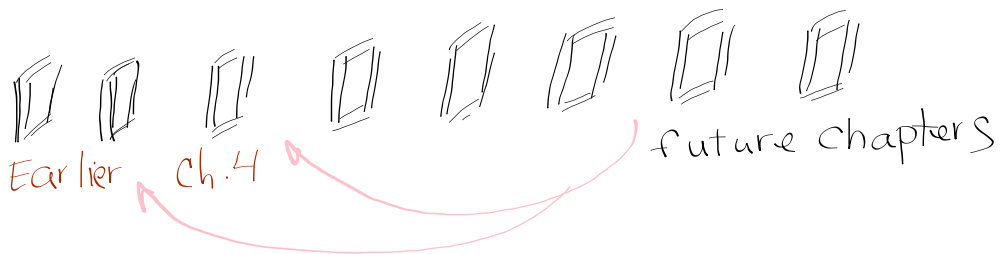


Have your textbook handy.

Keep Organized

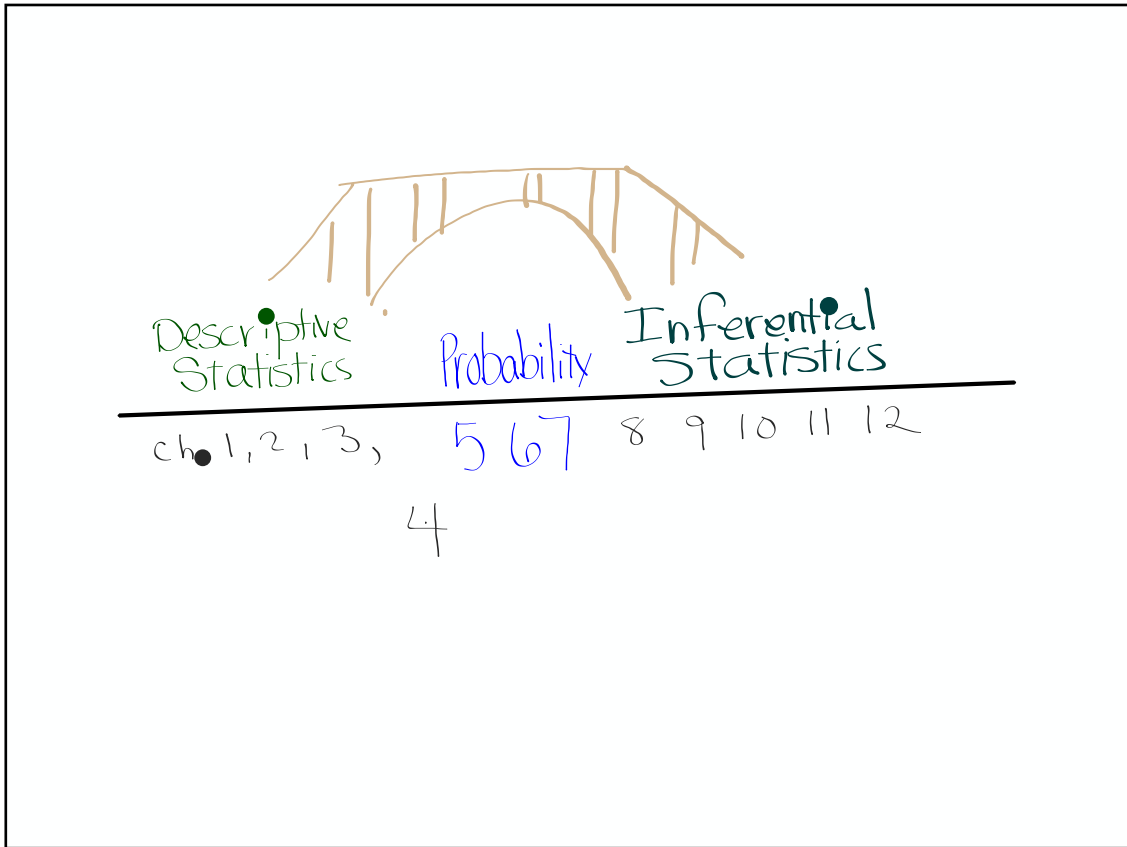


You will need to refer back to your notes every so often

It's not too late to get a 3-ring system started.

## The Big Picture: Where Chapter 5 Fits

- Chapters 5 to 7 cover much of AP Statistics Topic Outline III. Anticipating Patterns: Exploring random phenomena using probability and simulations.
- About 20-30% of questions on the AP exam
- Chapter 5 is about methods for finding probabilities.
  - Chapter 6: Random Variables
  - Chapter 7: Sampling Distributions
- Probability is the link between descriptive and inferential statistics.



• **PACING 8 days**

**Chapter 5: Probability: What Are the Chances?**

5.1 Randomness, Probability, and Simulation	2 Days
5.2 Probability Rules	2 Days
5.3 Conditional Probability and Independence	2 Days
Review, FRAPPY!, and Test	2 Days

Ch. 5 TEST - Wed. Nov. 13<sup>th</sup>

## Warning about Ch. 5 !

At the end of the entire AP Stats course, many students expressed that Ch. 5 was the hardest.

Ideas to help with this...

Appreciate the Conceptual experiences you will be getting. Don't rush to use formulas.

Use strategies (simulation, sample space, Venn Diagrams, two-way tables, tree diagrams) before resorting to a formula.

and...

Getting good at probability  
requires practice.

- Practice in class
- Practice on homework
- Practice at end of Chapter 5
- Practice at end of Course Review < <sup>march</sup> April
- Reading :)

13 14

Textbook page 298



Activity : "1 in 6 wins"

need a  
die

Pick up the handout when  
you get to step #4

New TI's

Prob Sim

can be used to simulate coin tossing, dice throwing,  
etc

1. Roll your die 30 times to imitate the  
of students buying soda.

• Count # of winners

•  
2. Add your # of winners to the  
class dot plot.

We need at least 40 repetitions, so.....

What percent of the time did the simulation yield 2 or fewer winners in a class of 30, just by chance?

Does it seem plausible that the company is telling the truth, but that the class just got lucky? Or, is there convincing evidence that the 1-in-6 claim is wrong?

$$\frac{1}{6} \approx 0.163 \approx 16\%$$

NOTE: The actual theoretical probability is 0.1028

The Idea of Probability

Important ideas:

We'll  
return  
here  
later

•  
Mr. C will now read the  
top of page 299.



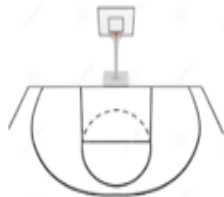
and a volunteer can read  
the paragraph half way  
down. ✎ pretty please!



## Learning Target

Interpret probability as  
a long run relative frequency

### How good is Mrs. Gallas at free throws?



Mrs. Gallas thinks she is a pretty good free throw shooter. How many free throws would you like to see Mrs. Gallas shoot before you could be confident guessing her free throw percentage? We'll watch [Mrs. Gallas shoot free throws](#), when you are confident make a guess at her free throw percentage.

Start with 1 and keep it at 1 until you need to change to a bigger increment (i.e. 5)

don't use till very, etc

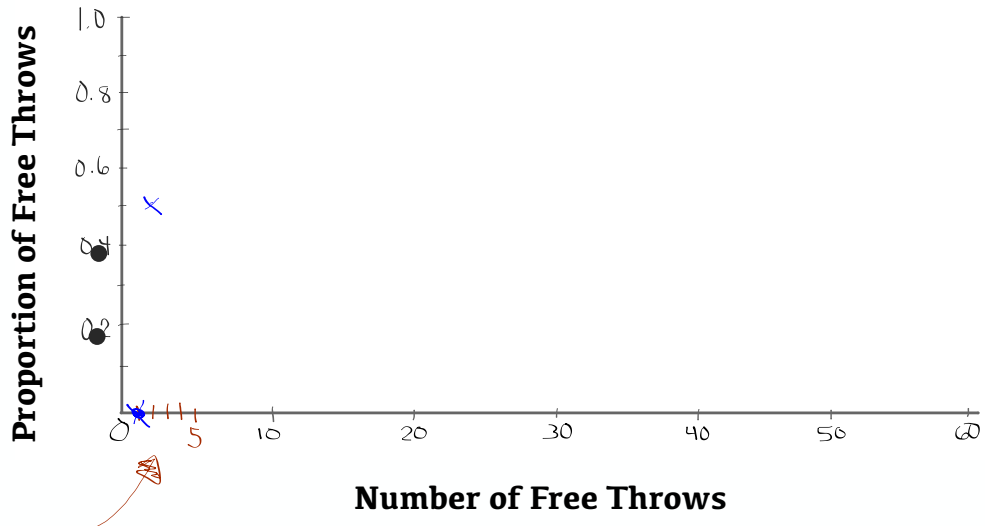
don't use (re-starts) simulation

- As each shot is attempted, keep track of the number of made free throws and the total number of shots attempted in the table below. When you think you know Mrs. Gallas' true free throw percentage, stop recording the shots.

Shot #	1	2	3	4	5	10	15	20	30	40	50	60	70	80
Result (Make or Miss)														
Proportion of Makes														

- What do you think Mrs. Gallas' true free throw percentage is?

3. Sketch the graph displaying the proportion of made free throws.



4. How could you make your guess more accurate?

5. Mrs. Gallas has a \_\_\_\_% probability of making a free throw. Interpret this probability.

4. How could you make your guess more accurate?

We could see more shots  
(get more evidence)

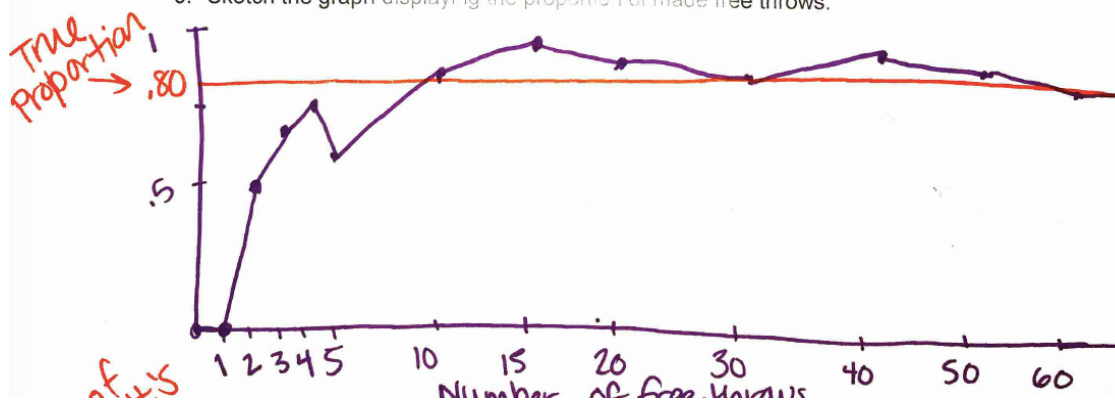
Law of Large Numbers

5. Mrs. Gallas has a 40% probability of making a free throw. Interpret this probability.

If Mrs. Gallas takes many, many free throws, about 40 % will be made.

Interpret this probability.

3. Sketch the graph displaying the proportion of made free throws.



4. How could you make your guess more accurate?

We could see more shots  
(get more evidence)

Law of Large Numbers

5. Mrs. Gallas has a 80<sup>30''</sup>% probability of making a free throw. Interpret this probability.

If Mrs. Gallas takes many, many free throws, about 80% will be made.

interpretations will look like

### The Idea of Probability

Important ideas:

Probability

Long run relative frequency

•

•

•

## The Idea of Probability

Important ideas:

### Probability

Long run relative frequency

- It's always between 0 and 1
- Short term  $\rightarrow$  unpredictable
- Long term  $\rightarrow$  predictable

## The Idea of Probability

Important ideas:

### Probability

Long run relative frequency

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Law of Large Numbers

## The Idea of Probability

Important ideas:

### Probability

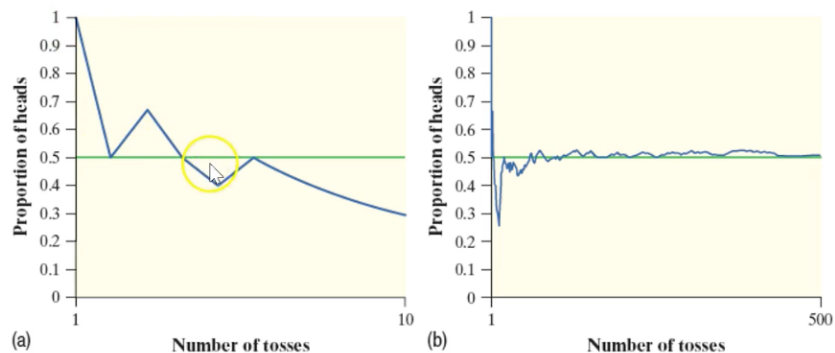
Long run relative frequency

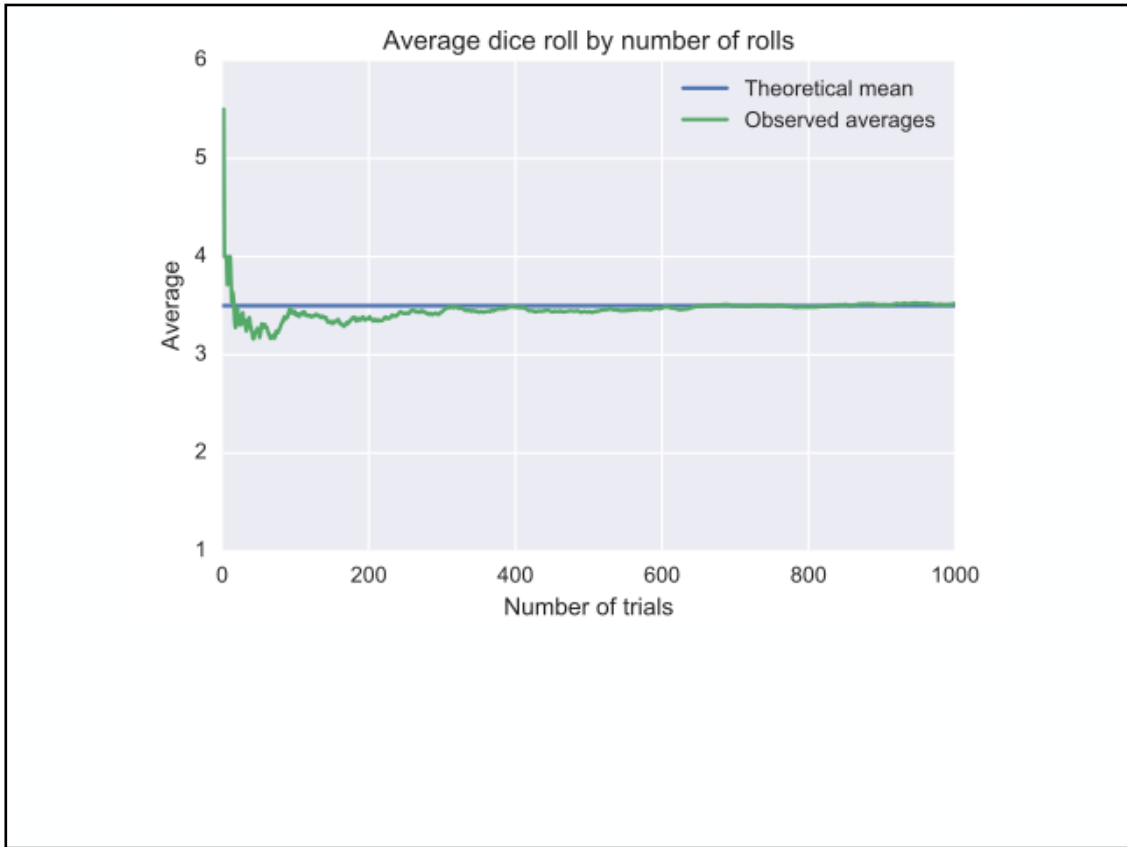
- It's always between 0 and 1
- Short term  $\rightarrow$  unpredictable
- Long term  $\rightarrow$  predictable

### Law of Large Numbers

If we do something many many times, the proportion of desired outcomes will approach its probability.

- Chance behavior: Unpredictable in short run; follows predictable pattern in long run





do

Check  
YOUR  
Understanding



### Check Your Understanding

1. Pedro drives the same route to work on Monday through Friday. His route includes one traffic light. According to the local traffic department, there is a 55% probability that the light will be red when Pedro reaches the light. Interpret the probability.

### Check Your Understanding

1. Pedro drives the same route to work on Monday through Friday. His route includes one traffic light. According to the local traffic department, there is a 55% probability that the light will be red when Pedro reaches the light. Interpret the probability.

If Pedro drives to work many many times, about 55% of the time he will hit a red light.

2. Probability is a measure of how likely an outcome is to occur. Match one of the probabilities that follow with each statement. Explain your answers to your neighbor.

0 0.001 0.3 0.6 0.99 1

- (a) This outcome is impossible. It can never occur.
- (b) This outcome is certain. It will occur on every trial.
- (c) This outcome is very unlikely, but it will occur once in a while in a long sequence of trials.
- (d) This outcome will occur more often than not.

2. Probability is a measure of how likely an outcome is to occur. Match one of the probabilities that follow with each statement. Explain your answers to your neighbor.

0 0.001 0.3 0.6 0.99 1

- (a) This outcome is impossible. It can never occur. ○
- (b) This outcome is certain. It will occur on every trial. 1
- (c) This outcome is very unlikely, but it will occur once in a while in a long sequence of trials. .001
- (d) This outcome will occur more often than not. .6 or .99

3. A husband and wife decide to have children until they have at least one child of each sex. The couple has had seven girls in a row. Their doctor assures them that they are much more likely to have a boy next. Explain why the doctor is wrong.

3. A husband and wife decide to have children until they have at least one child of each sex. The couple has had seven girls in a row. Their doctor assures them that they are much more likely to have a boy next. Explain why the doctor is wrong.

Probability is unpredictable with short term situations. The prob. the next baby born is <sup>a girl is</sup> still 50%.

4. The Chicago Cubs play their home games at Wrigley Field, located in the Lakeview neighborhood of Chicago. A recent New York Times study concluded that the probability that a randomly selected Lakeview resident is a Cubs fan is 0.44.

(a) Interpret this probability as a long-run relative frequency.

(b) If a researcher randomly selects 100 Lakeview residents, will exactly 44 of them be Cubs fans? Explain your answer.

4. The Chicago Cubs play their home games at Wrigley Field, located in the Lakeview neighborhood of Chicago. A recent New York Times study concluded that the probability that a randomly selected Lakeview resident is a Cubs fan is 0.44.

(a) Interpret this probability as a long-run relative frequency.

↙ many many  
 If you take a very large sample of Lakeview residents, about 44% of them will be Cub fans.

(b) If a researcher randomly selects 100 Lakeview residents, will exactly 44 of them be Cubs fans? Explain your answer.

Probably not; with only 100 randomly selected residents, the number who are Cub fans may not be close to 44.

## 5.1 ..... 1, 3, 5, 7, 29

and read pp.299-304

Proposal due tomorrow •

⑧ If you toss a fair coin, the probability of heads is 0.5•

↳ what does this really mean•

If you take a very large random sample of coin tosses, about 50% of them will be heads•

⑨ If you toss a coin, it can land heads or tails. If you "toss" a thumbtack, it can land with the point sticking up or down. Does that mean that the probability of a tossed thumbtack landing point up is 0.5 ???

How can you find out ?

To find out the true probability ●●●●●

Toss a thumbtack many, many, many times and record the proportion of times it lands up.

**October 31, 2019**

