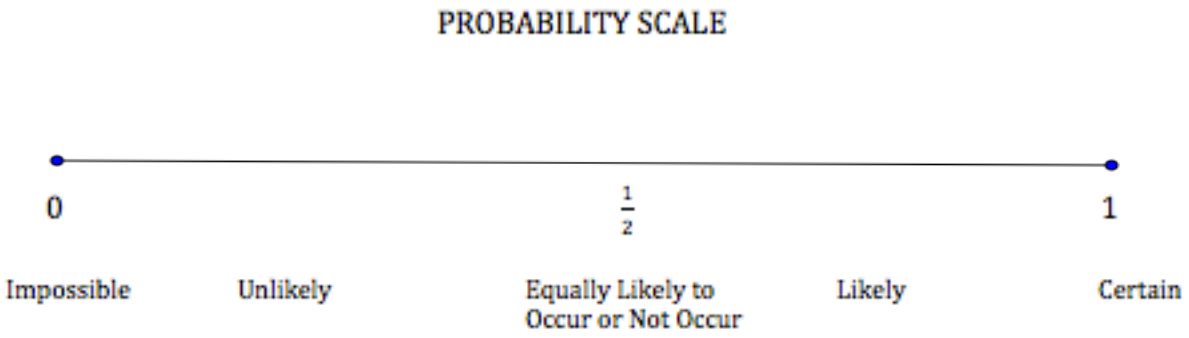
Name _____ Date_____

Lesson 1: Chance Experiments

Exit Ticket

Decide where each of the following events would be located on the scale below. Place the letter for each event on the appropriate place on the probability scale.



The numbers from 1 to 10 are written on small pieces of paper and placed in a bag. A piece of paper will be drawn from the bag.

A. A piece of paper with a 5 is drawn from the bag.

B. A piece of paper with an even number is drawn.

C. A piece of paper with a 12 is drawn.

D. A piece of paper with a number other than 1 is drawn.

E. A piece of paper with a number divisible by 5 is drawn.

Name _____ Date_____

Lesson 2: Estimating Probabilities by Collecting Data

Exit Ticket

In the following problems, round all of your decimal answers to 3 decimal places. Round all of your percents to the nearest tenth of a percent.

A student randomly selected crayons from a large bag of crayons. The table below shows the number of each color crayon in a bag. Now, suppose the student were to randomly select one crayon from the bag.

Color	Number
Brown	10
Blue	5
Yellow	3
Green	3
Orange	3
Red	6

1. What is the estimate for the probability of selecting a blue crayon from the bag? Express your answer as a fraction, decimal, or percent.

2. What is the estimate for the probability of selecting a brown crayon from the bag?

3. What is the estimate for the probability of selecting a red crayon or a yellow crayon from the bag?

4. What is the estimate for the probability of selecting a pink crayon from the bag?

5. Which color is most likely to be selected?

6. If there are 300 crayons in the bag, how many will be red? Justify your answer.

Name _____ Date_____

Lesson 3: Chance Experiments with Equally Likely Outcomes

Exit Ticket

The numbers from 1–10 are written on note cards and placed in a bag. One card will be drawn from the bag at random.

1. List the sample space for this experiment.

2. Are the events selecting an even number and selecting an odd number equally likely? Explain your answer.

3. Are the events selecting a number divisible by 3 and selecting a number divisible by 5 equally likely? Explain your answer.

Name _____ Date_____

Lesson 4: Calculating Probabilities for Chance Experiments with Equally Likely Outcomes

Exit Ticket

An experiment consists of randomly drawing a cube from a bag containing three red and two blue cubes.

1. What is the sample space of this experiment?

2. List the probability of each outcome in the sample space.

3. Is the probability of selecting a red cube equal to the probability of selecting a blue cube? Explain.

Name _____ Date_____

Lesson 5: Chance Experiments with Outcomes That Are Not Equally Likely

Exit Ticket

Carol is sitting on the bus on the way home from school and is thinking about the fact that she has three homework assignments to do tonight. The table below shows her estimated probabilities of completing $0, 1, 2$, or all 3 of the assignments.

Number of Homework Assignments Completed	0	1	2	3
Probability	$\frac{1}{6}$	$\frac{2}{9}$	$\frac{5}{18}$	$\frac{1}{3}$

1. Writing your answers as fractions in lowest terms, find the probability that Carol completes
   a. Exactly one assignment.

   b. More than one assignment.

   c. At least one assignment.

2. Find the probability that the number of homework assignments Carol completes is not exactly 2.

3. Carol has a bag containing 3 red chips, 10 blue chips, and 7 green chips. Estimate the probability (as a fraction or decimal) of Carol reaching into her bag and pulling out a green chip.

Name _____ Date_____

Lesson 6: Using Tree Diagrams to Represent a Sample Space and to Calculate Probabilities

Exit Ticket

In a laboratory experiment, two mice will be placed in a simple maze with one decision point where a mouse can turn either left (L) or right (R). When the first mouse arrives at the decision point, the direction it chooses is recorded. Then, the process is repeated for the second mouse.

1. Draw a tree diagram where the first stage represents the decision made by the first mouse, and the second stage represents the decision made by the second mouse. Determine all four possible decision outcomes for the two mice.

2. If the probability of turning left is 0.5, and the probability of turning right is 0.5 for each mouse, what is the probability that only one of the two mice will turn left?

3. If the researchers add food in the simple maze such that the probability of each mouse turning left is now 0.7, what is the probability that only one of the two mice will turn left?

Name _____ Date_____

Lesson 7: Calculating Probabilities of Compound Events

Exit Ticket

In a laboratory experiment, three mice will be placed in a simple maze that has just one decision point where a mouse can turn either left (L) or right (R). When the first mouse arrives at the decision point, the direction he chooses is recorded. The same is done for the second and the third mice.

1. Draw a tree diagram where the first stage represents the decision made by the first mouse, and the second stage represents the decision made by the second mouse, and so on. Determine all eight possible outcomes of the decisions for the three mice.

2. Use the tree diagram from Question 1 to help answer the following question. If, for each mouse, the probability of turning left is 0.5 and the probability of turning right is 0.5, what is the probability that only one of the three mice will turn left?

3. If the researchers conducting the experiment add food in the simple maze such that the probability of each mouse turning left is now 0.7, what is the probability that only one of the three mice will turn left? To answer the question, use the tree diagram from Question 1.

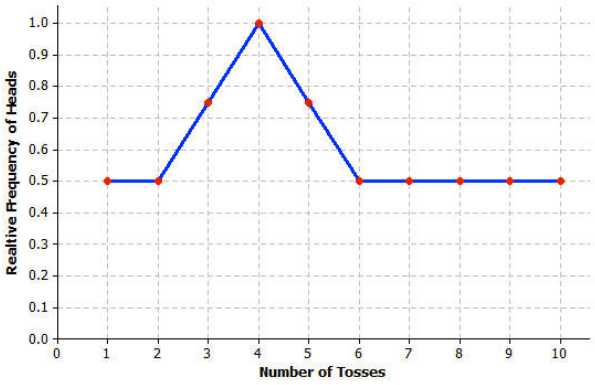
Name _____ Date_____

Lesson 8: The Difference Between Theoretical Probabilities and Estimated Probabilities

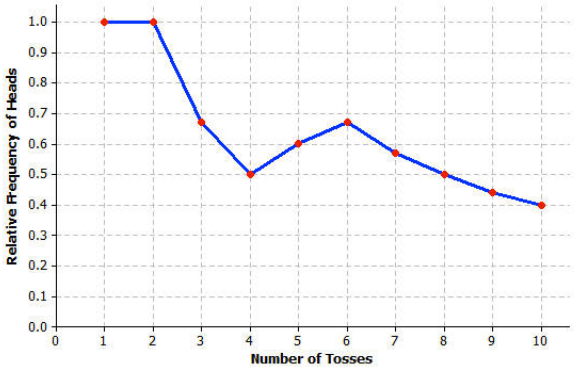
Exit Ticket

1. Which of the following graphs would NOT represent the relative frequencies of heads when tossing 1 penny? Explain your answer.

Graph A



Graph B



2. Jerry indicated that after tossing a penny 30 times, the relative frequency of heads was 0.47 (to the nearest hundredth). He indicated that after 31 times, the relative frequency of heads was 0.55. Are Jerry's summaries correct? Why or why not?

3. Jerry observed 5 heads in 100 tosses of his coin. Do you think this was a fair coin? Why or why not?

Name _____ Date_____

Lesson 10: Conducting a Simulation to Estimate the Probability of an Event

Exit Ticket

1. Nathan is your school's star soccer player. When he takes a shot on goal he typically scores half of the time. Suppose that he takes six shots in a game. To estimate the probability of the number of goals Nathan makes, use simulation with a number cube. One roll of a number cube represents one shot.
   a. Specify what outcome of a number cube you want to represent a goal scored by Nathan in one shot.

   b. For this problem, what represents a trial of taking six shots?

   c. Perform and list the results of ten trials of this simulation.

   d. Identify the number of goals Nathan made in each of the ten trials you did in part (c).

   e. Based on your ten trials, what is your estimate of the probability that Nathan scores three goals if he takes six shots in a game?

2. Suppose that Pat scores 40% of the shots he takes in a soccer game. If he takes six shots in a game, what would one simulated trial look like using a number cube in your simulation?

Name _____ Date_____

Lesson 11: Conducting a Simulation to Estimate the Probability of an Event

Exit Ticket

Liang wants to form a chess club. His principal says that he can do that if Liang can find six players, including him. How would you conduct a simulated model that estimates the probability that Liang will find at least five other players to join the club if he asks eight players who have a 70% chance of agreeing to join the club? Suggest a simulation model for Liang by describing how you would do the following parts.

a. Specify the device you want to use to simulate one person being asked.

b. What outcome(s) of the device would represent the person agreeing to be a member?

c. What constitutes a trial using your device in this problem?

d. What constitutes a success using your device in this problem?

e. Based on 50 trials, using the method you have suggested, how would you calculate the estimate for the probability that Liang will be able to form a chess club?

Name _____ Date_____

Lesson 12: Applying Probability to Make Informed Decisions

Exit Ticket

There are four pieces of bubble gum left in a quarter machine. Two are red and two are yellow. Chandra puts two quarters in the machine. One piece is for her and one is for her friend, Kay. If the two pieces are the same color, she is happy because they will not have to decide who gets what color. Chandra claims that they are equally likely to get the same color because the colors are either the same or they are different. Check her claim by doing a simulation.

a. Name a device that can be used to simulate getting a piece of bubble gum. Specify what outcome of the device represents a red piece and what outcome represents yellow.

b. Define what a trial is for your simulation.

c. Define what constitutes a success in a trial of your simulation.

d. Perform and list 50 simulated trials. Based on your results, is Chandra's equally likely model correct?

Name _____ Date _____

Round all decimal answers to the nearest hundredth.

1. Each student in a class of 38 students was asked to report how many siblings (brothers and sisters) he or she has. The data are summarized in the table below.

Number of Siblings	0	1	2	3	4	5	6
Count	8	13	12	3	1	0	1

a. Based on the data, estimate the probability that a randomly selected student from this class is an only child.

b. Based on the data, estimate the probability that a randomly selected student from this class has three or more siblings.

c. Consider the following probability distribution for the number of siblings:

Number of Siblings	0	1	2	3	4	5	6
Probability	0.15	0.35	0.30	0.10	0.05	0.03	0.02

Explain how you could use simulation to estimate the probability that you will need to ask at least five students the question, "Are you an only child?" if each is an only child before you find the first one that is an only child.

2. A cell phone company wants to predict the probability of a seventh grader in your city, City A, owning a cell phone. Records from another city, City B, indicate that 201 of $1{,}000$ seventh graders own a cell phone.

a. Assuming the probability of a seventh grader owning a cell phone is similar for the two cities, estimate the probability that a randomly selected seventh grader from City A owns a cell phone.

b. The company estimates the probability that a randomly selected seventh-grade male owns a cell phone is 0.25. Does this imply that the probability that a randomly selected seventh-grade female owns a cell phone is 0.75? Explain.

c. According to the data, which of the following is more likely?

- a seventh-grade male owning a cell phone
- a seventh grader owning a cell phone

Explain your choice.

Suppose the cell phone company sells three different plans to its customers:

- Pay-as-you-go: Customer is charged per minute for each call.
- Unlimited minutes: Customer pays a flat fee per month and can make unlimited calls with no additional charges.
- Basic plan: Customer not charged per minute unless the customer exceeds 500 minutes in the month; then, the customer is charged per minute for the extra minutes.

Consider the chance experiment of selecting a customer at random and recording which plan they purchased.

d. What outcomes are in the sample space for this chance experiment?

e. The company wants to assign probabilities to these three plans. Explain what is wrong with each of the following probability assignments.

Case 1: Probability of pay-as-you-go = 0.40, probability of unlimited minutes = 0.40, and probability of basic plan = 0.30.

Case 2: Probability of pay-as-you-go = 0.40, probability of unlimited minutes = 0.70, and probability of basic plan = -0.10.

Now consider the chance experiment of randomly selecting a cell phone customer and recording both the cell phone plan for that customer and whether or not the customer exceeded 500 minutes last month.

f. One possible outcome of this chance experiment is (pay-as-you-go, over 500). What are the other possible outcomes in this sample space?

g. Assuming the outcomes of this chance experiment are equally likely, what is the probability that the selected cell phone customer had a basic plan and did not exceed 500 minutes last month?

h. Suppose the company randomly selects 500 of its customers and finds that 140 of these customers purchased the basic plan and did not exceed 500 minutes. Would this cause you to question the claim that the outcomes of the chance experiment described in part (g) are equally likely? Explain why or why not.

3. In the game of Darts, players throw darts at a circle divided into 20 wedges. In one variation of the game, the score for a throw is equal to the wedge number that the dart hits. So, if the dart hits anywhere in the 20 wedge, you earn 20 points for that throw.

a. If you are equally likely to land in any wedge, what is the probability you will score 20 points?

b. If you are equally likely to land in any wedge, what is the probability you will land in the upper right and score 20, 1, 18, 4, 13, or 6 points?

c. Below are the results of 100 throws for one player. Does this player appear to have a tendency to land in the upper right more often than we would expect if the player was equally likely to land in any wedge?

Points	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Count	7	9	2	6	6	3	5	2	4	7	2	6	4	6	5	7	4	6	5	4

Name _____ Date_____

Lesson 13: Populations, Samples, and Generalizing from a Sample to a Population

Exit Ticket

What is the difference between a population characteristic and a sample statistic? Give an example to support your answer. Clearly identify the population and sample in your example.

Name _____ Date_____

Lesson 14: Selecting a Sample

Exit Ticket

Write down three things you learned about taking a sample from the work we have done today.

Handout

\1 Casey at the Bat

The Outlook wasn't brilliant for the Mudville nine that day: The score stood four to two, **\2** with but one inning more to play. And then when Cooney died at first, and Barrows did the same, A **\3** sickly silence fell upon the patrons of the game.

A straggling few got up to go in deep despair. The **\4** rest Clung to that hope which springs eternal in the human breast; They thought, if only Casey could get but **\5** a whack at that—We'd put up even money, now, with Casey at the bat.

But Flynn preceded Casey, as **\6** did also Jimmy Blake, And the former was a lulu and the latter was a cake; So upon that stricken **\7** multitude grim melancholy sat, For there seemed but little chance of Casey's getting to the bat.

But Flynn let drive **\8** a single, to the wonderment of all, And Blake, the much despised, tore the cover off the ball; And when **\9** the dust had lifted, and the men saw what had occurred, There was Jimmy safe at second and Flynn a **\10** hugging third.

Then from five thousand throats and more there rose a lusty yell; It rumbled through the valley, it **\11** rattled in the dell; It knocked upon the mountain and recoiled upon the flat, For Casey, mighty Casey, was advancing **\12** to the bat**.**

There was ease in Casey's manner as he stepped into his place; There was pride in Casey's **\13** bearing and a smile on Casey's face. And when, responding to the cheers, he lightly doffed his hat, No stranger **\14** in the crowd could doubt 'twas Casey at the bat.

Ten thousand eyes were on him as he rubbed his **\15** hands with dirt**;** Five thousand tongues applauded when he wiped them on his shirt. Then while the writhing pitcher ground **\16** the ball into his hip, Defiance gleamed in Casey's eye, a sneer curled Casey's lip.

And now the leather covered **\17** sphere came hurtling through the air, And Casey stood a-watching it in haughty grandeur there. Close by the sturdy batsman **\18** the ball unheeded sped—"That ain't my style," said Casey. "Strike one," the umpire said.

From the benches, black with **\19** people, there went up a muffled roar, Like the beating of the storm waves on a stern and distant shore. **\20** "Kill him! Kill the umpire!" shouted someone on the stand; And it's likely they'd a-killed him had not Casey raised **\21** his hand.

With a smile of Christian charity great Casey's visage shone; He stilled the rising tumult; he bade the **\22** game go on; He signaled to the pitcher, and once more the spheroid flew; But Casey still ignored it, and **\23** the umpire said, "Strike two."

"Fraud!" cried the maddened thousands, and echo answered fraud; But one scornful look from Casey **\24** and the audience was awed. They saw his face grow stern and cold, they saw his muscles strain, And they **\25** knew that Casey wouldn't let that ball go by again.

The sneer is gone from Casey's lip, his teeth are **\26** clenched in hate; He pounds with cruel violence his bat upon the plate. And now the pitcher holds the ball, **\27** and now he lets it go, And now the air is shattered by the force of Casey's blow.

Oh, somewhere **\28** in this favored land the sun is shining bright; The band is playing somewhere, and somewhere hearts are light, And **\29** somewhere men are laughing, and somewhere children shout; But there is no joy in Mudville —mighty Casey has struck out.

by Ernest Lawrence Thayer

Name _____ Date_____

Lesson 15: Random Sampling

Exit Ticket

Identify each as true or false. Explain your reasoning in each case.

1. The values of a sample statistic for different random samples of the same size from the same population will be the same.

2. Random samples from the same population will vary from sample to sample.

3. If a random sample is chosen from a population that has a large cluster of points at the maximum, the sample is likely to have at least one element near the maximum.

100 Grocery Items (2013 prices)

T-bone steaks $6.99 (1 lb.)	Porterhouse steaks $7.29 (1 lb.)	Pasta sauce $2.19 (16 oz.)	Ice cream cups $7.29 (6 cups)
Hot dog buns $0.88 (6 buns)	Baking chips $2.99 (12 oz.)	Cheese chips $2.09 (12 oz.)	Cookies $1.77 (15 oz.)
Kidney beans $0.77 (15 oz.)	Box of oatmeal $1.77 (18 oz.)	Soup $0.77 (14 oz.)	Chicken breasts $7.77 (1.5 lb.)
Pancake syrup $2.99 (28 oz.)	Cranberry juice $2.77 (64 oz.)	Asparagus $3.29 (1 lb.)	Seedless cucumbers $1.29 (1 ct.)
Avocado $1.30 (1 ct.)	Sliced pineapple $2.99	Box of tea $4.29 (16 tea bags)	Cream cheese $2.77 (16 oz.)
Italian roll $1.39 (1 roll)	Turkey breast $4.99 (1 lb.)	Meatballs $5.79 (26 oz.)	Chili $1.35 (15 oz.)
Peanut butter $1.63 (12 oz.)	Green beans $0.99 (1 lb.)	Apples $1.99 (1 lb.)	Mushrooms $0.69 (8 oz.)
Brown sugar $1.29 (32 oz.)	Confectioners' sugar $1.39 (32 oz.)	Zucchini $0.79 (1 lb.)	Yellow onions $0.99 (1 lb.)
Green peppers $0.99 (1 ct.)	Mozzarella cheese $2.69 (8 oz.)	Frozen chicken $6.49 (48 oz.)	Olive oil $2.99 (17 oz.)
Dark chocolate $2.99 (9 oz.)	Cocoa mix $3.33 (1 package)	Margarine $1.48 (16 oz.)	Mac and cheese $0.66 (6 oz. box)
Birthday cake $9.49 (7 in.)	Crab legs $19.99 (1 lb.)	Sushi rolls $12.99 (20 ct.)	Prime rib $19.99 (4 lb.)
Cooked shrimp $12.99 (32 oz.)	Ice cream $4.49 (1 qt.)	Pork chops $1.79 (1 lb.)	Bananas $0.44 (1 lb.)
Chocolate milk $2.99 (1 gal.)	Beef franks $3.35 (1 lb.)	Sliced bacon $5.49 (1 lb.)	Fish fillets $6.29 (1 lb.)

Pears $1.29 (1 lb.)	Tangerines $3.99 (3 lb.)	Orange juice $2.98 (59 oz.)	Cherry pie $4.44 (8 in.)
Grapes $1.28 (1 lb.)	Peaches $1.28 (1 lb.)	Melon $1.69 (1 melon)	Tomatoes $1.49 (1 lb.)
Shredded cheese $1.88 (12 oz.)	Soda $0.88 (1 can)	Roast beef $6.49 (1 lb.)	Coffee $6.49 (1 lb.)
Feta cheese $4.99 (1 lb.)	Pickles $1.69 (12 oz. jar)	Loaf of rye bread $2.19	Crackers $2.69 (7.9 oz.)
Purified water $3.47 (35 pk.)	BBQ sauce $2.19 (24 oz.)	Ketchup $2.29 (34 oz.)	Chili sauce $1.77 (12 oz.)
Sugar $1.77 (5 lb.)	Flour $2.11 (4 lb.)	Breakfast cereal $2.79 (9 oz.)	Cane sugar $2.39 (4 lb.)
Cheese sticks $1.25 (10 oz.)	Cheese spread $2.49 (45 oz.)	Coffee creamer $2.99 (12 oz.)	Candy bars $7.77 (40 oz.)
Pudding mix $0.98 (6 oz.)	Fruit drink $1.11 (24 oz.)	Biscuit mix $0.89 (4 oz.)	Sausages $2.38 (13 oz.)
Ground beef $4.49 (1 lb.)	Apple juice $1.48 (64 oz.)	Ice cream sandwich $1.98 (12 ct.)	Cottage cheese $1.98 (24 oz.)
Frozen vegetables $0.88 (10 oz.)	English muffins $1.68 (6 ct.)	String cheese $6.09 (24 oz.)	Baby greens $2.98 (10 oz.)
Caramel apples $3.11 (1 ct.)	Pumpkin mix $3.50 (1 lb.)	Chicken salad $0.98 (2 oz.)	Whole wheat bread $1.55 (1 loaf)
Tuna $0.98 (2.5 oz.)	Nutrition bar $2.19 (1 bar)	Potato chips $2.39 (12 oz.)	2% milk $3.13 (1 gal.)

Name _____ Date_____

Lesson 16: Methods for Selecting a Random Sample

Exit Ticket

1. Name two things to consider when you are planning how to select a random sample.

2. Consider a population consisting of the 200 seventh graders at a particular middle school. Describe how you might select a random sample of 20 students from a list of the students in this population.

Name _____ Date_____

Lesson 17: Sampling Variability

Exit Ticket

Suppose that you want to estimate the mean time per evening students at your school spend doing homework. You will do this using a random sample of 30 students.

1. Suppose that you have a list of all the students at your school. The students are numbered $1, 2, 3, \ldots$. One way to select the random sample of students is to use the random digit table from today's class, taking three digits at a time. If you start at the third digit of row 9, what is the number of the first student you would include in your sample?

2. Suppose that you have now selected your random sample and that you have asked the students how long they spend doing homework each evening. How will you use these results to estimate the mean time spent doing homework for *all* students?

3. Explain what is meant by *sampling variability* in this context.

Name _____ Date_____

Lesson 18: Sampling Variability and the Effect of Sample Size

Exit Ticket

Suppose that you wanted to estimate the mean time per evening spent doing homework for students at your school. You decide to do this by taking a random sample of students from your school. You will calculate the mean time spent doing homework for your sample. You will then use your sample mean as an estimate of the population mean.

1. The sample mean has *sampling variability*. Explain what this means.

2. When you are using a sample statistic to estimate a population characteristic, do you want the sampling variability of the sample statistic to be large or small? Explain why.

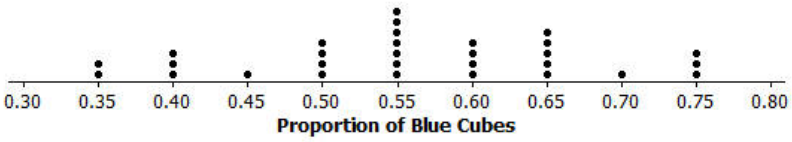
3. Think about your estimate of the mean time spent doing homework for students at your school. Given a choice of using a sample of size 20 or a sample of size 40, which should you choose? Explain your answer.

Name _____ Date_____

Lesson 19: Understanding Variability When Estimating a Population Proportion

Exit Ticket

A group of seventh graders took repeated samples of size 20 from a bag of colored cubes. The dot plot below shows the sampling distribution of the sample proportion of blue cubes in the bag.



1. Describe the shape of the distribution.

2. Describe the variability of the distribution.

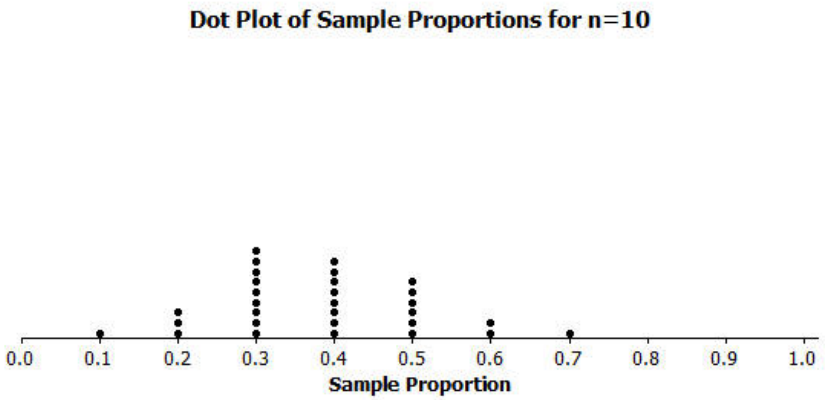
3. Predict how the dot plot would look differently if the sample sizes had been 40 instead of 20.

Name _____ Date_____

Lesson 20: Estimating a Population Proportion

Exit Ticket

Thirty seventh graders each took a random sample of 10 middle school students and asked each student whether or not they like pop music. Then, they calculated the proportion of students who like pop music for each sample. The dot plot below shows the distribution of the sample proportions.



1. There are three dots above 0.2. What does each dot represent in terms of this scenario?

2. Based on the dot plot, do you think the proportion of the middle school students at this school who like pop music is 0.6? Explain why or why not.

Table of Random Digits

Row																				
1	6	6	7	2	8	0	0	8	4	0	0	4	6	0	3	2	2	4	6	8
2	8	0	3	1	1	1	1	2	7	0	1	9	1	2	7	1	3	3	5	3
3	5	3	5	7	3	6	3	1	7	2	5	5	1	4	7	1	6	5	6	5
4	9	1	1	9	2	8	3	0	3	6	7	7	4	7	5	9	8	1	8	3
5	9	0	2	9	9	7	4	6	3	6	6	3	7	4	2	7	0	0	1	9
6	8	1	4	6	4	6	8	2	8	9	5	5	2	9	6	2	5	3	0	3
7	4	1	1	9	7	0	7	2	9	0	9	7	0	4	6	2	3	1	0	9
8	9	9	2	7	1	3	2	9	0	3	9	0	7	5	6	7	1	7	8	7
9	3	4	2	2	9	1	9	0	7	8	1	6	2	5	3	9	0	9	1	0
10	2	7	3	9	5	9	9	3	2	9	3	9	1	9	0	5	5	1	4	2
11	0	2	5	4	0	8	1	7	0	7	1	3	0	4	3	0	6	4	4	4
12	8	6	0	5	4	8	8	2	7	7	0	1	0	1	7	1	3	5	3	4
13	4	2	6	4	5	2	4	2	6	1	7	5	6	6	4	0	8	4	1	2
14	4	4	9	8	7	3	4	3	8	2	9	1	5	3	5	9	8	9	2	9
15	6	4	8	0	0	0	4	2	3	8	1	8	4	0	9	5	0	9	0	4
16	3	2	3	8	4	8	8	6	2	9	1	0	1	9	9	3	0	7	3	5
17	6	6	7	2	8	0	0	8	4	0	0	4	6	0	3	2	2	4	6	8
18	8	0	3	1	1	1	1	2	7	0	1	9	1	2	7	1	3	3	5	3
19	5	3	5	7	3	6	3	1	7	2	5	5	1	4	7	1	6	5	6	5
20	9	1	1	9	2	8	3	0	3	6	7	7	4	7	5	9	8	1	8	3
21	9	0	2	9	9	7	4	6	3	6	6	3	7	4	2	7	0	0	1	9
22	8	1	4	6	4	6	8	2	8	9	5	5	2	9	6	2	5	3	0	3
23	4	1	1	9	7	0	7	2	9	0	9	7	0	4	6	2	3	1	0	9
24	9	9	2	7	1	3	2	9	0	3	9	0	7	5	6	7	1	7	8	7
25	3	4	2	2	9	1	9	0	7	8	1	6	2	5	3	9	0	9	1	0
26	2	7	3	9	5	9	9	3	2	9	3	9	1	9	0	5	5	1	4	2
27	0	2	5	4	0	8	1	7	0	7	1	3	0	4	3	0	6	4	4	4
28	8	6	0	5	4	8	8	2	7	7	0	1	0	1	7	1	3	5	3	4
29	4	2	6	4	5	2	4	2	6	1	7	5	6	6	4	0	8	4	1	2
30	4	4	9	8	7	3	4	3	8	2	9	1	5	3	5	9	8	9	2	9
31	6	4	8	0	0	0	4	2	3	8	1	8	4	0	9	5	0	9	0	4
32	3	2	3	8	4	8	8	6	2	9	1	0	1	9	9	3	0	7	3	5
33	6	6	7	2	8	0	0	8	4	0	0	4	6	0	3	2	2	4	6	8
34	8	0	3	1	1	1	1	2	7	0	1	9	1	2	7	1	3	3	5	3
35	5	3	5	7	3	6	3	1	7	2	5	5	1	4	7	1	6	5	6	5
36	9	1	1	9	2	8	3	0	3	6	7	7	4	7	5	9	8	1	8	3
37	9	0	2	9	9	7	4	6	3	6	6	3	7	4	2	7	0	0	1	9
38	8	1	4	6	4	6	8	2	8	9	5	5	2	9	6	2	5	3	0	3
39	4	1	1	9	7	0	7	2	9	0	9	7	0	4	6	2	3	1	0	9
40	9	9	2	7	1	3	2	9	0	3	9	0	7	5	6	7	1	7	8	7

ID	Travel to School	Favorite Season	Allergies	Favorite School Subject	Favorite Music	Superpower
1	Car	Spring	Yes	English	Pop	Freeze time
2	Car	Summer	Yes	Music	Pop	Telepathy
3	Car	Summer	No	Science	Pop	Fly
4	Walk	Fall	No	Computers and technology	Pop	Invisibility
5	Car	Summer	No	Art	Country	Telepathy
6	Car	Summer	No	Physical education	Rap/Hip hop	Freeze time
7	Car	Spring	No	Physical education	Pop	Telepathy
8	Car	Winter	No	Art	Other	Fly
9	Car	Summer	No	Physical education	Pop	Fly
10	Car	Spring	No	Mathematics and statistics	Pop	Telepathy
11	Car	Summer	Yes	History	Rap/Hip hop	Invisibility
12	Car	Spring	No	Art	Rap/Hip hop	Freeze time
13	Bus	Winter	No	Computers and technology	Rap/Hip hop	Fly
14	Car	Winter	Yes	Social studies	Rap/Hip hop	Fly
15	Car	Summer	No	Art	Pop	Freeze time
16	Car	Fall	No	Mathematics and statistics	Pop	Fly
17	Bus	Winter	No	Science	Rap/Hip hop	Freeze time
18	Car	Spring	Yes	Art	Pop	Telepathy
19	Car	Fall	Yes	Science	Pop	Telepathy
20	Car	Summer	Yes	Physical education	Rap/Hip hop	Invisibility
21	Car	Spring	Yes	Science	Pop	Invisibility
22	Car	Winter	Yes	Mathematics and statistics	Country	Invisibility
23	Car	Summer	Yes	Art	Pop	Invisibility
24	Bus	Winter	Yes	Other	Pop	Telepathy
25	Bus	Summer	Yes	Science	Other	Fly
26	Car	Summer	No	Science	Pop	Fly
27	Car	Summer	Yes	Music	Pop	Telepathy
28	Car	Summer	No	Physical education	Country	Super strength
29	Car	Fall	Yes	Mathematics and statistics	Country	Telepathy
30	Car	Summer	Yes	Physical education	Rap/Hip hop	Telepathy
31	Boat	Winter	No	Computers and technology	Gospel	Invisibility
32	Car	Spring	No	Physical education	Pop	Fly
33	Car	Spring	No	Physical education	Pop	Fly
34	Car	Summer	No	Mathematics and statistics	Classical	Fly
35	Car	Fall	Yes	Science	Jazz	Telepathy
36	Car	Spring	No	Science	Rap/Hip hop	Telepathy
37	Car	Summer	No	Music	Country	Telepathy
38	Bus	Winter	No	Mathematics and statistics	Pop	Fly
39	Car	Spring	No	Art	Classical	Freeze time
40	Car	Winter	Yes	Art	Pop	Fly
41	Walk	Summer	Yes	Physical education	Rap/Hip hop	Fly
42	Bus	Winter	Yes	Physical education	Gospel	Invisibility

43	Bus	Summer	No	Art	Other	Invisibility
44	Car	Summer	Yes	Computers and technology	Other	Freeze time
45	Car	Fall	Yes	Science	Pop	Fly
46	Car	Summer	Yes	Music	Rap/Hip hop	Fly
47	Car	Spring	No	Science	Rap/Hip hop	Invisibility
48	Bus	Spring	No	Music	Pop	Telepathy
49	Car	Summer	Yes	Social studies	Techno/ Electronic	Telepathy
50	Car	Summer	Yes	Physical education	Pop	Telepathy
51	Car	Spring	Yes	Other	Other	Telepathy
52	Car	Summer	No	Art	Pop	Fly
53	Car	Summer	Yes	Other	Pop	Telepathy
54	Car	Summer	Yes	Physical education	Rap/Hip hop	Invisibility
55	Bus	Summer	Yes	Physical education	Other	Super strength
56	Car	Summer	No	Science	Rap/Hip hop	Invisibility
57	Car	Winter	No	Languages	Rap/Hip hop	Super strength
58	Car	Fall	Yes	English	Pop	Fly
59	Car	Winter	No	Science	Pop	Telepathy
60	Car	Summer	No	Art	Pop	Invisibility
61	Car	Summer	Yes	Other	Pop	Freeze time
62	Bus	Spring	No	Science	Pop	Fly
63	Car	Winter	Yes	Mathematics and statistics	Other	Freeze time
64	Car	Summer	No	Social studies	Classical	Fly
65	Car	Winter	Yes	Science	Pop	Telepathy
66	Car	Winter	No	Science	Rock and roll	Fly
67	Car	Summer	No	Mathematics and statistics	Rap/Hip hop	Super strength
68	Car	Fall	No	Music	Rock and roll	Super strength
69	Car	Spring	No	Other	Other	Invisibility
70	Car	Summer	Yes	Mathematics and statistics	Rap/Hip hop	Telepathy
71	Car	Winter	No	Art	Other	Fly
72	Car	Spring	Yes	Mathematics and statistics	Pop	Telepathy
73	Car	Winter	Yes	Computers and technology	Techno/ Electronic	Telepathy
74	Walk	Winter	No	Physical education	Techno/ Electronic	Fly
75	Walk	Summer	No	History	Rock and roll	Fly
76	Skateboard/ Scooter/ Rollerblade	Winter	Yes	Computers and technology	Techno/ Electronic	Freeze time
77	Car	Spring	Yes	Science	Other	Telepathy
78	Car	Summer	No	Music	Rap/Hip hop	Invisibility
79	Car	Summer	No	Social studies	Pop	Invisibility
80	Car	Summer	No	Other	Rap/Hip hop	Telepathy
81	Walk	Spring	Yes	History	Rap/Hip hop	Invisibility
82	Car	Summer	No	Art	Pop	Invisibility

83	Walk	Spring	No	Languages	Jazz	Super strength
84	Car	Fall	No	History	Jazz	Invisibility
85	Car	Summer	No	Physical education	Rap/Hip hop	Freeze time
86	Car	Spring	No	Mathematics and statistics	Pop	Freeze time
87	Bus	Spring	Yes	Art	Pop	Telepathy
88	Car	Winter	No	Mathematics and statistics	Other	Invisibility
89	Car	Summer	Yes	Physical education	Country	Telepathy
90	Bus	Summer	No	Computers and technology	Other	Fly
91	Car	Winter	No	History	Pop	Telepathy
92	Walk	Winter	No	Science	Classical	Telepathy
93	Bicycle	Summer	No	Physical education	Pop	Invisibility
94	Car	Summer	No	English	Pop	Telepathy
95	Car	Summer	Yes	Physical education	Pop	Fly
96	Car	Winter	No	Science	Other	Freeze time
97	Car	Winter	No	Other	Rap/Hip hop	Super strength
98	Car	Summer	Yes	Physical education	Rap/Hip hop	Freeze time
99	Car	Spring	No	Music	Classical	Telepathy
100	Car	Spring	Yes	Science	Gospel	Telepathy
101	Car	Summer	Yes	History	Pop	Super strength
102	Car	Winter	Yes	English	Country	Freeze time
103	Car	Spring	No	Computers and technology	Other	Telepathy
104	Car	Winter	No	History	Other	Invisibility
105	Car	Fall	No	Music	Pop	Telepathy
106	Car	Fall	No	Science	Pop	Telepathy
107	Car	Winter	No	Art	Heavy metal	Fly
108	Car	Spring	Yes	Science	Rock and roll	Fly
109	Car	Fall	Yes	Music	Other	Fly
110	Car	Summer	Yes	Social studies	Techno/ Electronic	Telepathy
111	Car	Spring	No	Physical education	Pop	Fly
112	Car	Summer	No	Physical education	Pop	Fly
113	Car	Summer	Yes	Social studies	Pop	Freeze time
114	Car	Summer	Yes	Computers and technology	Gospel	Freeze time
115	Car	Winter	Yes	Other	Rap/Hip hop	Telepathy
116	Car	Summer	Yes	Science	Country	Telepathy
117	Car	Fall		Music	Country	Fly
118	Walk	Summer	No	History	Pop	Telepathy
119	Car	Spring	Yes	Art	Pop	Freeze time
120	Car	Fall	Yes	Physical education	Rap/Hip hop	Fly
121	Car	Spring	No	Music	Rock and roll	Telepathy
122	Car	Fall	No	Art	Pop	Invisibility
123	Car	Summer	Yes	Physical education	Rap/Hip hop	Fly
124	Walk	Summer	No	Computers and technology	Pop	Telepathy
125	Car	Fall	No	Art	Pop	Fly

126	Bicycle	Spring	No	Science	Pop	Invisibility
127	Car	Summer	No	Social studies	Gospel	Fly
128	Bicycle	Winter	No	Social studies	Rap/Hip hop	Fly
129	Car	Summer	Yes	Mathematics and statistics	Pop	Invisibility
130	Car	Fall	Yes	Mathematics and statistics	Country	Telepathy
131	Car	Winter	Yes	Music	Gospel	Super strength
132	Rail (Train/Tram/ Subway)	Fall	Yes	Art	Other	Fly
133	Walk	Summer	No	Social studies	Pop	Invisibility
134	Car	Summer	Yes	Music	Pop	Freeze time
135	Car	Winter	No	Mathematics and statistics	Pop	Telepathy
136	Car	Fall	Yes	Music	Pop	Telepathy
137	Car	Summer	Yes	Computers and technology	Other	Freeze time
138	Car	Summer	Yes	Physical education	Pop	Telepathy
139	Car	Summer	Yes	Social studies	Other	Telepathy
140	Car	Spring	Yes	Physical education	Other	Freeze time
141	Car	Fall	Yes	Science	Country	Telepathy
142	Car	Spring	Yes	Science	Pop	Invisibility
143	Car	Summer	No	Other	Rap/Hip hop	Freeze time
144	Car	Summer	No	Other	Other	Fly
145	Car	Summer	No	Languages	Pop	Freeze time
146	Car	Summer	Yes	Physical education	Pop	Telepathy
147	Bus	Winter	No	History	Country	Invisibility
148	Car	Spring	No	Computers and technology	Other	Telepathy
149	Bus	Winter	Yes	Science	Pop	Invisibility
150	Car	Summer	No	Social studies	Rap/Hip hop	Invisibility
151	Car	Summer	No	Physical education	Pop	Invisibility
152	Car	Summer	Yes	Physical education	Pop	Super strength
153	Car	Summer	No	Mathematics and statistics	Pop	Fly
154	Car	Summer	No	Art	Rap/Hip hop	Freeze time
155	Car	Winter	Yes	Other	Classical	Freeze time
156	Car	Summer	Yes	Computers and technology	Other	Telepathy
157	Car	Spring	No	Other	Pop	Freeze time
158	Car	Winter	Yes	Music	Country	Fly
159	Car	Winter	No	History	Jazz	Invisibility
160	Car	Spring	Yes	History	Pop	Fly
161	Car	Winter	Yes	Mathematics and statistics	Other	Telepathy
162	Car	Fall	No	Science	Country	Invisibility
163	Car	Winter	No	Science	Other	Fly
164	Car	Summer	No	Science	Pop	Fly
165	Skateboard/ Scooter/ Rollerblade	Spring	Yes	Social studies	Other	Freeze time
166	Car	Winter	Yes	Art	Rap/Hip hop	Fly

167	Car	Summer	Yes	Other	Pop	Freeze time
168	Car	Summer	No	English	Pop	Telepathy
169	Car	Summer	No	Other	Pop	Invisibility
170	Car	Summer	Yes	Physical education	Techno/ Electronic	Freeze time
171	Car	Summer	No	Art	Pop	Telepathy
172	Car	Summer	No	Physical education	Rap/Hip hop	Freeze time
173	Car	Winter	Yes	Mathematics and statistics	Other	Invisibility
174	Bus	Summer	Yes	Music	Pop	Freeze time
175	Car	Winter	No	Art	Pop	Fly
176	Car	Fall	No	Science	Rap/Hip hop	Fly
177	Car	Winter	Yes	Social studies	Pop	Telepathy
178	Car	Fall	No	Art	Other	Fly
179	Bus	Spring	No	Physical education	Country	Fly
180	Car	Winter	No	Music	Other	Telepathy
181	Bus	Summer	No	Computers and technology	Rap/Hip hop	Freeze time
182	Car	Summer	Yes	Physical education	Rap/Hip hop	Invisibility
183	Car	Summer	Yes	Music	Other	Telepathy
184	Car	Spring	No	Science	Rap/Hip hop	Invisibility
185	Rail (Train/Tram/ Subway)	Summer	No	Physical education	Other	Freeze time
186	Car	Summer	Yes	Mathematics and statistics	Rap/Hip hop	Fly
187	Bus	Winter	Yes	Mathematics and statistics	Other	Super strength
188	Car	Summer	No	Mathematics and statistics	Other	Freeze time
189	Rail (Train/Tram/ Subway)	Fall	Yes	Music	Jazz	Fly
190	Car	Summer	Yes	Science	Pop	Super strength
191	Car	Summer	Yes	Science	Techno/ Electronic	Freeze time
192	Car	Spring	Yes	Physical education	Rap/Hip hop	Freeze time
193	Car	Summer	Yes	Physical education	Rap/Hip hop	Freeze time
194	Car	Winter	No	Physical education	Rap/Hip hop	Telepathy
195	Car	Winter	No	Music	Jazz	Freeze time
196	Walk	Summer	Yes	History	Country	Freeze time
197	Car	Spring	No	History	Rap/Hip hop	Freeze time
198	Car	Fall	Yes	Other	Pop	Freeze time
199	Car	Spring	Yes	Science	Other	Freeze time
200	Bicycle	Winter	Yes	Other	Rap/Hip hop	Freeze time

Name _____ Date_____

Lesson 21: Why Worry About Sampling Variability?

Exit Ticket

How is a *meaningful* difference in sample means different from a *non-meaningful* difference in sample means? You may use what you saw in the dot plots of this lesson to help you answer this question.

Template for Bags A and B

5	5	5	5	5	6	6	6	6	6
7	7	7	7	7	8	8	8	8	8
9	9	9	9	9	10	10	10	10	10
11	11	11	11	11	12	12	12	12	12
13	13	13	13	13	14	14	14	14	14
15	15	15	15	15	16	16	16	16	16
17	17	17	17	17	18	18	18	18	18
19	19	19	19	19	20	20	20	20	20
21	21	21	21	21	22	22	22	22	22
23	23	23	23	23	24	24	24	24	24

Template for Bag C

1	1	1	1	1	2	2	2	2	2
3	3	3	3	3	4	4	4	4	4
5	5	5	5	5	6	6	6	6	6
7	7	7	7	7	8	8	8	8	8
9	9	9	9	9	10	10	10	10	10
11	11	11	11	11	12	12	12	12	12
13	13	13	13	13	14	14	14	14	14
15	15	15	15	15	16	16	16	16	16
17	17	17	17	17	18	18	18	18	18
19	19	19	19	19	20	20	20	20	20

Name _____ Date_____

Lesson 22: Using Sample Data to Compare the Means of Two or More Populations

Exit Ticket

Suppose that Brett randomly sampled 12 tenth-grade girls and boys in his school district and asked them for the number of minutes per day that they text. The data and summary measures follow.

Gender	Number of Minutes of Texting													Mean	MAD
Girls	98	104	95	101	98	107	86	92	96	107	88	95		97.3	5.3
Boys	66	72	65	60	78	82	63	56	85	79	68	77		70.9	7.9

1. Draw dot plots for the two data sets using the same numerical scales. Discuss the amount of overlap between the two dot plots that you drew and what it may mean in the context of the problem.

2. Compare the variability in the two data sets using the MAD. Interpret the result in the context of the problem.

3. From 1 and 2, does the difference in the two means appear to be meaningful? Explain.

Name _____ Date_____

Lesson 23: Using Sample Data to Compare the Means of Two or More Populations

Exit Ticket

1. Do eleventh-grade males text more per day than eleventh-grade females do? To answer this question, two randomly selected samples were obtained from the Excel data file used in this lesson. Indicate how 20 randomly selected eleventh-grade females would be chosen for this study. Indicate how 20 randomly selected eleventh-grade males would be chosen.

2. Two randomly selected samples (one of eleventh-grade females and one of eleventh-grade males) were obtained from the database. The results are indicated below:

	Mean number of minutes per day texting	MAD (minutes)
Eleventh-grade females	102.55	1.31
Eleventh-grade males	100.32	1.12

Is there a meaningful difference in the number of minutes per day that eleventh-grade females and males text? Explain your answer.

Copy of the Excel student data file

ID Number	Texting	ReacTime	Homework	Sleep
1	99	0.33	9.0	8.2
2	69	0.39	8.6	7.5
3	138	0.36	6.1	8.7
4	100	0.40	7.9	7.8
5	116	0.28	5.1	8.8
6	112	0.38	6.5	7.9
7	79	0.35	6.5	8.8
8	111	0.41	8.8	8.5
9	115	0.49	8.4	8.4
10	82	0.43	8.7	8.8
11	136	0.46	7.2	8.4
12	112	0.51	8.3	9.0
13	101	0.42	7.0	8.8
14	89	0.38	5.6	8.3
15	120	0.35	7.2	8.2
16	144	0.36	3.9	8.8
17	131	0.26	9.0	8.9
18	126	0.39	7.0	8.5
19	118	0.37	9.2	8.7
20	83	0.34	7.4	8.6
21	120	0.20	4.5	8.7
22	114	0.38	6.0	8.6
23	90	0.25	7.0	8.4
24	116	0.36	5.8	8.4
25	108	0.36	8.9	8.1
26	89	0.31	8.4	8.8
27	124	0.44	6.3	8.3
28	121	0.32	5.2	8.0
29	104	0.30	6.7	8.1
30	110	0.39	7.8	8.1
31	119	0.36	8.5	8.0
32	113	0.40	5.3	9.4
33	106	0.36	5.7	8.6
34	119	0.33	5.9	8.4
35	129	0.38	6.2	9.0
36	95	0.44	7.9	8.3
37	126	0.41	7.2	8.6

38	106	0.26	7.1	8.5
39	116	0.34	4.9	8.4
40	107	0.35	9.3	8.1
41	108	0.48	8.1	8.6
42	97	0.40	7.1	8.8
43	97	0.27	4.2	8.3
44	100	0.24	6.2	8.9
45	123	0.50	8.1	8.6
46	94	0.39	5.2	8.3
47	87	0.37	8.0	8.3
48	93	0.42	9.7	8.1
49	117	0.39	7.9	8.3
50	94	0.36	6.9	8.9
51	124	0.29	8.1	8.4
52	116	0.44	4.9	8.2
53	137	0.25	9.1	8.3
54	123	0.30	3.8	8.7
55	122	0.21	6.6	8.8
56	92	0.41	7.6	8.6
57	101	0.36	8.5	8.2
58	111	0.34	6.5	8.7
59	126	0.31	5.6	8.6
60	81	0.33	7.3	8.4
61	118	0.35	8.4	8.3
62	113	0.37	7.7	8.4
63	114	0.49	6.9	8.6
64	124	0.34	8.5	8.1
65	90	0.48	6.6	8.7
66	99	0.39	6.5	8.5
67	155	0.40	6.5	9.0
68	77	0.45	4.9	8.3
69	79	0.23	7.7	8.6
70	91	0.43	6.7	8.9
71	107	0.42	6.9	8.6
72	112	0.39	6.3	8.6
73	147	0.34	7.8	8.3
74	126	0.52	9.2	8.9
75	106	0.27	6.7	8.0
76	86	0.21	6.1	8.4
77	111	0.29	7.4	8.0
78	118	0.41	5.2	8.8

79	105	0.28	5.9	8.3
80	108	0.40	7.0	8.6
81	131	0.32	7.5	8.5
82	86	0.34	7.4	8.4
83	87	0.27	7.7	8.6
84	116	0.34	9.6	9.1
85	102	0.42	5.6	8.7
86	105	0.41	8.2	8.2
87	96	0.33	4.9	8.4
88	90	0.20	7.5	8.6
89	109	0.39	6.0	8.5
90	103	0.36	5.7	9.1
91	98	0.26	5.5	8.4
92	103	0.41	8.2	8.0
93	110	0.39	9.2	8.4
94	101	0.39	8.8	8.6
95	101	0.40	6.1	9.0
96	98	0.22	7.0	8.6
97	105	0.43	8.0	8.5
98	110	0.33	8.0	8.8
99	104	0.45	9.6	8.5
100	119	0.29	7.2	9.1
101	120	0.48	6.7	8.4
102	109	0.36	6.8	8.5
103	105	0.29	8.6	8.6
104	110	0.29	7.1	8.9
105	116	0.41	6.7	8.8
106	114	0.25	9.0	8.8
107	111	0.35	9.9	8.6
108	137	0.37	6.1	7.9
109	104	0.37	7.3	9.0
110	95	0.33	8.3	8.0
111	117	0.29	7.5	8.8
112	100	0.30	2.9	9.3
113	105	0.24	6.1	8.5
114	102	0.41	7.7	8.0
115	109	0.32	5.8	8.2
116	108	0.36	6.6	8.3
117	111	0.43	8.2	8.5
118	115	0.20	5.7	8.9
119	89	0.34	5.1	8.1

120	94	0.29	9.2	8.5
121	105	0.26	7.3	8.6
122	143	0.42	5.8	8.1
123	129	0.29	6.8	8.8
124	118	0.31	6.2	8.7
125	129	0.38	9.1	8.4
126	96	0.25	6.7	8.5
127	95	0.27	7.7	8.3
128	43	0.22	6.3	9.2
129	64	0.23	3.7	8.5
130	38	0.41	5.2	9.1
131	46	0.35	7.1	8.3
132	56	0.32	4.7	8.9
133	41	0.45	7.2	8.8
134	55	0.27	4.1	8.5
135	57	0.40	7.5	8.6
136	66	0.41	6.9	8.0
137	62	0.39	3.8	8.5
138	49	0.36	6.4	8.5
139	33	0.21	4.8	9.0
140	38	0.34	5.6	8.5
141	75	0.19	5.0	8.2
142	68	0.25	5.4	8.4
143	60	0.47	7.4	9.1
144	63	0.33	4.4	8.2
145	48	0.28	7.1	8.2
146	49	0.36	2.7	8.5
147	72	0.44	5.6	7.6
148	54	0.51	4.3	8.7
149	65	0.38	7.7	8.5
150	72	0.40	3.4	9.1
151	51	0.16	4.9	8.4
152	64	0.16	4.4	8.5
153	43	0.34	0.1	8.8
154	57	0.38	4.4	8.2
155	72	0.51	3.2	8.4
156	37	0.46	5.3	8.6
157	50	0.33	4.1	8.2
158	41	0.46	4.5	8.9
159	63	0.40	5.0	8.7
160	51	0.33	5.4	7.9

161	57	0.51	4.9	8.6
162	51	0.24	1.7	8.4
163	73	0.32	5.6	8.6
164	51	0.37	4.0	8.5
165	52	0.36	5.8	8.3
166	52	0.34	4.6	8.1
167	63	0.34	4.1	8.1
168	76	0.30	6.1	8.2
169	56	0.40	5.7	8.5
170	47	0.33	5.0	8.2
171	44	0.41	5.0	8.3
172	60	0.33	7.7	8.4
173	36	0.39	6.5	8.8
174	52	0.30	5.4	8.2
175	53	0.27	5.6	8.2
176	60	0.35	6.0	8.6
177	48	0.43	3.6	8.6
178	63	0.49	0.2	8.2
179	76	0.42	5.9	8.9
180	58	0.34	7.3	8.3
181	51	0.43	6.4	8.7
182	38	0.33	4.9	8.5
183	46	0.17	4.7	8.3
184	53	0.34	6.4	8.7
185	60	0.38	6.1	8.7
186	71	0.23	6.9	8.2
187	54	0.41	2.9	8.3
188	61	0.44	5.8	8.4
189	62	0.35	3.9	8.9
190	55	0.15	4.8	8.0
191	57	0.22	4.1	8.2
192	43	0.41	7.5	8.5
193	51	0.34	2.4	8.6
194	34	0.55	3.5	8.4
195	38	0.43	7.1	8.8
196	49	0.38	3.5	8.3
197	57	0.30	3.6	8.5
198	53	0.37	5.2	9.1
199	51	0.36	5.1	8.2
200	59	0.38	3.6	8.7
201	35	0.44	4.0	8.0

202	73	0.32	3.0	8.3
203	68	0.37	2.7	8.4
204	31	0.36	4.6	8.6
205	40	0.33	9.0	8.3
206	60	0.36	6.6	8.5
207	66	0.44	4.2	8.5
208	47	0.22	4.5	8.7
209	56	0.30	4.8	8.6
210	72	0.36	2.9	8.8
211	68	0.50	6.6	8.3
212	45	0.37	7.3	8.5
213	58	0.17	4.9	9.0
214	64	0.34	3.2	8.6
215	66	0.34	2.5	8.4
216	49	0.29	5.0	8.3
217	83	0.39	2.5	8.8
218	73	0.33	3.6	8.4
219	52	0.34	3.3	8.8
220	56	0.28	8.8	8.7
221	58	0.32	5.6	8.3
222	53	0.40	5.9	8.1
223	50	0.23	4.4	8.4
224	43	0.34	3.9	8.7
225	50	0.39	4.4	8.0
226	44	0.31	4.4	8.4
227	59	0.36	6.0	9.1
228	41	0.35	3.2	8.4
229	53	0.29	6.6	8.7
230	49	0.37	5.7	8.3
231	42	0.22	8.5	8.6
232	48	0.34	3.9	8.2
233	60	0.31	6.1	8.8
234	56	0.50	2.6	8.5
235	43	0.25	5.3	8.9
236	67	0.32	6.1	8.8
237	43	0.24	8.6	8.8
238	41	0.46	5.1	8.7
239	66	0.45	4.9	8.3
240	44	0.52	4.1	8.7
241	70	0.43	6.6	8.8
242	63	0.38	7.9	8.4

243	47	0.24	3.9	8.3
244	52	0.38	5.4	8.8
245	49	0.47	4.2	8.4
246	45	0.31	8.1	8.8
247	46	0.37	1.9	8.3
248	19	0.31	6.5	8.3
249	63	0.40	6.1	8.5
250	64	0.35	5.8	8.1
251	63	0.34	6.7	8.5
252	68	0.46	6.9	8.5
253	48	0.43	8.6	8.7
254	43	0.38	4.4	8.3
255	50	0.32	4.6	8.7
256	76	0.31	4.0	8.3
257	64	0.39	5.7	8.6
258	38	0.29	6.4	8.0
259	90	0.30	7.0	8.6
260	37	0.39	4.8	8.8
261	58	0.37	6.5	8.0
262	42	0.27	4.5	8.6
263	58	0.37	6.0	8.3
264	42	0.42	7.2	8.8
265	66	0.33	12.6	8.8
266	116	0.44	8.7	7.5
267	76	0.43	9.5	6.9
268	125	0.46	9.9	6.8
269	128	0.41	9.8	6.6
270	128	0.37	11.3	7.1
271	125	0.44	6.7	7.9
272	80	0.49	10.6	7.1
273	110	0.48	9.9	7.2
274	135	0.41	9.8	7.8
275	136	0.45	8.9	7.2
276	142	0.43	10.2	8.0
277	120	0.48	10.2	7.5
278	109	0.43	10.1	7.1
279	109	0.50	10.9	7.5
280	111	0.35	11.8	7.4
281	101	0.49	8.5	7.8
282	98	0.50	11.6	7.2
283	91	0.56	10.0	7.3

284	151	0.50	7.7	6.7
285	82	0.48	14.0	7.5
286	107	0.48	9.5	7.5
287	83	0.40	12.0	7.2
288	91	0.40	9.2	7.9
289	127	0.40	9.1	7.6
290	115	0.42	11.6	6.8
291	118	0.40	9.8	7.3
292	89	0.42	10.8	7.0
293	100	0.46	11.6	7.3
294	97	0.39	8.5	7.8
295	110	0.36	11.1	7.7
296	88	0.40	9.0	6.7
297	103	0.47	11.7	6.7
298	82	0.49	10.7	7.5
299	87	0.41	8.1	7.4
300	130	0.39	9.8	7.6
301	116	0.42	9.6	7.6
302	96	0.42	11.8	7.1
303	122	0.39	7.9	7.1
304	70	0.38	11.1	7.4
305	116	0.47	8.8	7.3
306	122	0.48	9.0	7.0
307	109	0.45	10.0	7.3
308	114	0.50	10.1	7.3
309	62	0.47	11.4	7.3
310	120	0.51	9.5	6.3
311	130	0.38	10.5	7.7
312	92	0.47	11.8	7.3
313	81	0.55	7.9	7.3
314	82	0.51	10.1	7.7
315	102	0.48	10.9	6.5
316	113	0.43	10.2	7.9
317	119	0.43	8.0	6.8
318	108	0.48	8.9	7.0
319	130	0.53	8.3	7.3
320	111	0.50	9.9	6.6
321	132	0.50	11.5	6.8
322	110	0.47	10.8	7.1
323	95	0.49	10.4	7.5
324	137	0.29	9.8	7.5

325	98	0.53	11.5	7.0
326	124	0.55	10.2	6.6
327	146	0.36	10.2	7.5
328	126	0.51	10.6	6.5
329	124	0.53	9.4	7.6
330	99	0.47	8.7	7.7
331	100	0.51	9.5	7.9
332	101	0.45	9.5	7.1
333	113	0.37	9.4	7.8
334	139	0.42	8.9	7.1
335	105	0.38	8.7	7.4
336	113	0.45	10.7	7.3
337	104	0.45	9.6	7.2
338	117	0.48	10.3	7.3
339	132	0.43	10.9	7.7
340	100	0.44	11.8	6.8
341	109	0.40	8.1	7.2
342	95	0.39	9.7	7.4
343	139	0.39	9.8	7.7
344	140	0.47	8.9	7.3
345	110	0.48	12.1	7.2
346	97	0.56	11.5	8.2
347	98	0.49	11.2	6.9
348	146	0.44	10.0	7.2
349	92	0.47	12.0	6.5
350	128	0.43	10.8	7.7
351	156	0.50	11.4	6.3
352	134	0.39	9.1	8.2
353	110	0.44	7.6	6.6
354	104	0.45	12.4	7.5
355	98	0.54	11.0	7.1
356	120	0.50	10.5	7.3
357	140	0.50	10.6	6.9
358	130	0.53	10.7	7.4
359	115	0.45	10.1	7.1
360	159	0.41	10.7	7.5
361	114	0.43	9.9	6.9
362	128	0.46	9.3	7.0
363	96	0.49	7.6	7.5
364	61	0.49	12.0	6.7
365	60	0.46	8.2	7.6

366	51	0.50	7.8	7.6
367	61	0.49	7.9	7.1
368	46	0.57	7.5	6.5
369	60	0.44	8.0	7.7
370	53	0.36	12.5	7.1
371	55	0.45	10.7	7.3
372	59	0.38	9.0	7.0
373	61	0.38	9.3	6.9
374	69	0.57	10.4	7.4
375	63	0.51	10.6	7.0
376	62	0.48	12.8	7.1
377	57	0.49	7.8	7.4
378	70	0.40	11.2	6.9
379	31	0.46	9.2	6.6
380	70	0.41	10.8	6.8
381	66	0.39	10.9	7.8
382	62	0.51	9.8	6.3
383	75	0.50	9.6	7.2
384	58	0.34	9.1	7.2
385	50	0.47	11.3	7.3
386	73	0.44	9.1	7.4
387	61	0.37	10.8	7.2
388	48	0.48	8.1	6.8
389	54	0.52	12.4	7.6
390	63	0.52	9.4	7.1
391	69	0.35	13.2	7.1
392	71	0.39	12.0	7.6
393	44	0.40	10.6	7.4
394	60	0.42	11.8	6.8
395	79	0.37	9.4	7.9
396	38	0.50	9.9	7.3
397	80	0.57	11.0	7.0
398	54	0.46	8.8	6.9
399	74	0.44	10.8	7.6
400	37	0.40	9.3	7.8
401	69	0.47	9.8	7.1
402	54	0.47	9.6	7.3
403	68	0.42	10.1	8.1
404	49	0.56	8.9	7.2
405	55	0.45	6.1	7.2
406	64	0.43	10.2	6.9

407	83	0.41	7.3	6.6
408	36	0.46	11.5	7.3
409	44	0.43	11.0	6.7
410	65	0.44	11.1	7.0
411	77	0.39	12.1	7.7
412	33	0.44	6.9	7.1
413	45	0.47	8.2	6.9
414	70	0.53	7.3	7.2
415	77	0.44	8.9	7.2
416	53	0.46	9.2	6.8
417	60	0.49	11.0	7.4
418	86	0.44	5.8	7.8
419	49	0.55	8.4	7.2
420	50	0.45	12.3	6.5
421	64	0.41	10.7	7.2
422	57	0.45	7.0	7.1
423	56	0.40	12.1	6.5
424	41	0.45	12.7	7.2
425	50	0.50	8.3	6.8
426	63	0.45	11.6	7.4
427	44	0.43	7.7	7.1
428	51	0.42	10.3	7.5
429	51	0.50	8.7	7.1
430	54	0.43	8.4	7.2
431	45	0.44	7.0	6.9
432	65	0.46	10.5	7.5
433	60	0.45	7.4	7.1
434	52	0.42	4.1	7.1
435	50	0.49	11.2	6.9
436	61	0.52	10.7	6.7
437	42	0.43	9.2	6.8
438	42	0.50	11.4	6.8
439	66	0.47	7.9	7.2
440	65	0.43	9.2	7.1

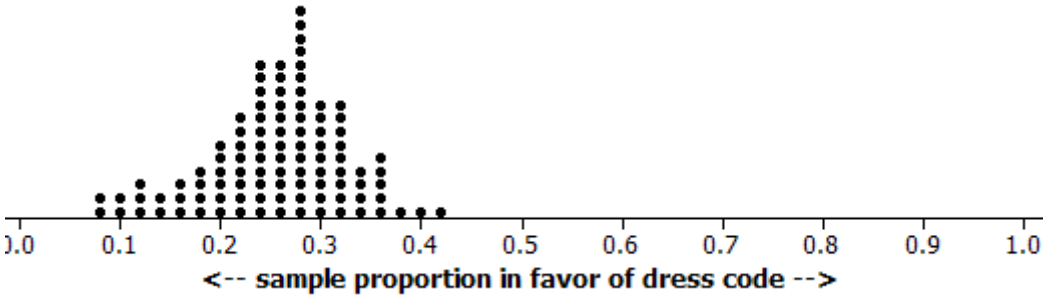
Name _____ Date _____

Round all decimal answers to the nearest hundredth.

1. You and a friend decide to conduct a survey at your school to see whether students are in favor of a new dress code policy. Your friend stands at the school entrance and asks the opinions of the first 100 students who come to campus on Monday. You obtain a list of all students at the school and randomly select 60 to survey.

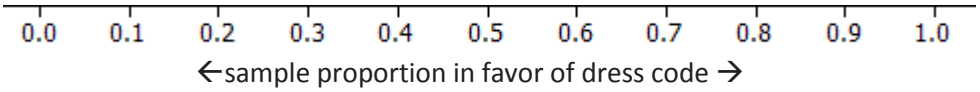
   a. Your friend finds 34% of his sample in favor of the new dress code policy, but you find only 16%. Which do you believe is more likely to be representative of the school population? Explain your choice.

   b. Suppose 25% of the students at the school are in favor of the new dress code policy. Below is a dot plot of the proportion of students who favor the new dress code for each of 100 different random samples of 50 students at the school.



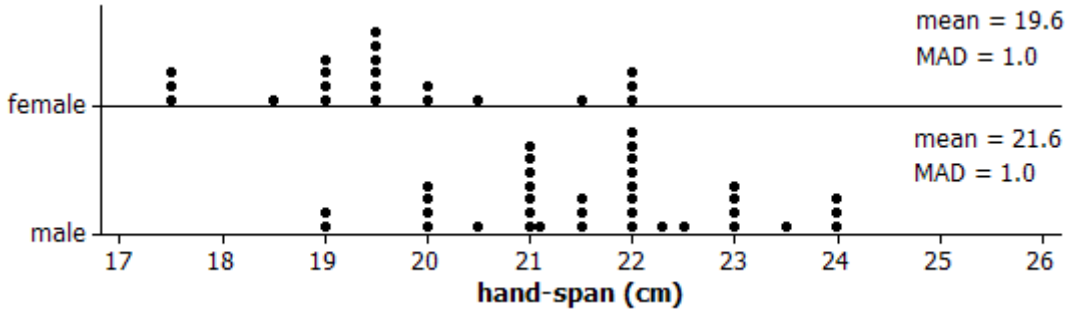
   If you were to select a random sample of 50 students and ask them if they favor the new dress code, do you think that your sample proportion will be within 0.05 of the population proportion? Explain.

c. Suppose ten people each take a simple random sample of 100 students from the school and calculate the proportion in the sample who favors the new dress code. On the dot plot axis below, place 10 values that you think are most believable for the proportions you could obtain.



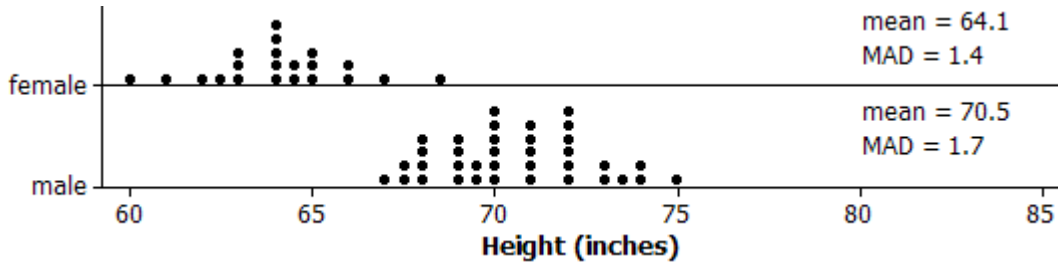
Explain your reasoning.

2. Students in a random sample of 57 students were asked to measure their hand spans (distance from outside of thumb to outside of little finger when the hand is stretched out as far as possible). The graphs below show the results for the males and females.



a. Based on these data, do you think there is a difference between the population mean hand span for males and the population mean hand span for females? Justify your answer.

b. The same students were asked to measure their heights, with the results shown below.



Are these height data more or less convincing of a difference in the population mean height than the hand-span data are of a difference in population mean hand span? Explain.

3. A student purchases a bag of "mini" chocolate chip cookies, and after opening the bag, finds one cookie that does not contain any chocolate chips! The student then wonders how unlikely it is to randomly find a cookie with no chocolate chips for this brand.

   a. Based on the bag of 30 cookies, estimate the probability of this company producing a cookie with no chocolate chips.

   b. Suppose the cookie company claims that 90% of all cookies it produces contain chocolate chips. Explain how you could simulate randomly selecting 30 cookies (one bag) from such a population to determine how many of the sampled cookies do not contain chocolate chips. Explain the details of your method so it could be carried out by another person.

c. Now, explain how you could use simulation to estimate the probability of obtaining a bag of 30 cookies with exactly one cookie with no chocolate chips.

d. If 90% of the cookies made by this company contain chocolate chips, then the actual probability of obtaining a bag of 30 cookies with one chipless cookie equals 0.143. Based on this result, would you advise this student to complain to the company about finding one cookie with no chocolate chips in her bag of 30? Explain.