Name: _____

Unit 6 - Statistics and Probability

Module 11 Packet 1 - Analyzing Populations through Random Sampling

Standard	Description
7.SP.1	Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences.
7.SP.2	Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions.

Lesson	I can...
11.1	Differentiate between a population and a sample.
11.2	Determine whether a sample is representative of a population.
11.3	Explain how variability arises from random sampling.
11.4	Use data from a random sample to draw inferences about a population.

SCHEDULE					
Tuesday 2/13	**Wednesday 2/14**	**Thursday 2/15**	**Friday 2/16**	**Monday 2/19**	**Tuesday 2/20**
11.1 HW: Page 6	**Spiral Day**	**11.2** HW: Page 12-13	**11.3** HW: Page 17	**President's Day- No School**	**11.4** HW: Page 22

This packet is due Thursday 2/22
Module 11/12 Assessment is on Tuesday 3/6

The skills and concepts that you learn in this packet will appear as your grade for the standards listed above.	
A = 4 EXCEEDS	You exceed the learning targets in understanding or application.
B = 3 MEETS	You have met all the learning targets for this standard.
C = 2 DEVELOPING	You are approaching the standards or have only partial understanding.
D = 1 WELL BELOW	You have not yet met many of the standards.

Populations & Samples

In math, we define population and sample as:

Population:
_____
_____

Sample:
_____
_____

What do you think the purpose of a sample is? Why might we want to collect data from a sample?

_____
_____

Directions: For each the following questions, determine how you could collect data to answer the question. Then, determine whether the data collected represents a population or sample.

1) *Does the **soup** taste good?*

_____
_____

Will the data collected represent a POPULATION or a SAMPLE? _____

2) *What is the typical lifespan of a particular brand of **flashlight** battery?*

_____
_____

Will the data collected represent a POPULATION or a SAMPLE? _____

3) *What is the most common **blood** type of students in my class?*

_____
_____

Will the data collected represent a POPULATION or a SAMPLE? _____

4) *How many **pets** do people own in my neighborhood?*

_____
_____

Will the data collected represent a POPULATION or a SAMPLE? _____

To answer some questions, it makes more sense to collect data from an entire

_____.

To answer other questions, it makes more sense to collect data from a smaller

_____.

Population Vs. Sample

Directions: Determine whether each of the items below represents a population or sample. Match each population to its sample by organizing them into the appropriate columns in the table below.

The number of mongoose living on Kanela St. in Ewa Beach

Teaspoon of soup   All energizer batteries ever made   An entire pot of soup

Wheeler Middle School Students   Energizer batteries found in your house

All people living in the U.S. in 2010   500 participants surveyed in U.S. in 2010

All mongoose living in Ewa Beach   One homeroom at Wheeler Middle School

Population	Sample

Guided Practice

- When data is collected from an <u>entire population</u>, it is called a **census**.
- The United States takes a census of its population every ten years, with the most recent one occurring in 2010.
- Read the excerpt to the right to learn about the history of the U.S. census.

The History of the U.S. Census

The word *census* is Latin in origin and means to tax. The first U.S. census took place over 200 years ago, but the United States is certainly not the first country to implement a census. Based on archaeological records, it appears that the ancient Egyptians conducted a census as early as 3000 B.C.E.

The U.S. census is mandated by the U.S. Constitution in Article I, Section 2, which states, in part, "Representatives and direct Taxes shall be apportioned among the several States ... according to their respective Numbers .... The Number of Representatives shall not exceed one for every thirty thousand, but each State shall have at Least one Representative ...." The Constitution then specifies how to calculate the number of people in each state and how often the census should take place.

The U.S. census has been conducted every ten years since 1790, but as time has passed, our census has evolved. Not only have the types of questions changed but also the manner in which the data are collected and tabulated. Originally, the census had only a few questions, the purpose of which was to discern the number of people in each household and their ages. Presumably, these data were used to determine the number of men in each state who were available to go to war. Federal marshals were charged with the task of conducting this first census. After collecting data from their respective jurisdictions, the marshals sent the data to President Washington.

As time has passed, more questions have been added to the U.S. census. Today, the census includes questions designed to collect data in various fields such as manufacturing, commerce, and transportation, to name a few. Data that were once manually tabulated are now processed by computers. Home visits by census officials were once the norm, but now the census is conducted primarily through the U.S. Postal Service. Each household in the United States receives in the mail a copy of the census questionnaire to be completed by its head of household who then mails it back to the Census Bureau. Home visits are paid only to those individuals who do not return the questionnaire by the specified deadline.

The census is an important part of our Constitution. Today, the census not only tells us the population of each state, thereby determining the number of representatives that each state will have in the House of Representatives, but it also provides the U.S. government with very useful data that paint a picture of the current state of our population and how it has changed over the decades.

"U.S. Census History," *essortment*, accessed November 4, 2014, http://www.essortment.com/census-history-20901.html.

Answer the following questions based on the excerpt above.

What are three things you found interesting about the U.S. census?

-
-
-

Why is the census important in the United States?

_____

_____

_____

_____

2010 U.S. Census - Hawaii - Part 1

1. How many people were living in Hawaii for the 2010 census? _____

2. Estimate the ratio of those **65** and older to those under **18** years old. Why would people want to know this data? _____

3. Is the ratio a population characteristic or a statistic? Explain your thinking. _____
   _____
   _____
   _____
   _____
   _____

2010 U.S. Census VS The American Community Survey - Part 2

The American Community Survey (ACS) takes samples from a small percentage of the U.S. population in years between the censuses.

1. What is the difference between the way the ACS collects information about the U.S. population and the way the U.S. Census Bureau collects information?
   _____
   _____
   _____
   _____

2. In 2011, the ACS sampled workers living in Hawaii about commuting to work each day. Why do you think these data are important for the state to know?

   _____
   _____
   _____
   _____

3. Suppose that from a sample of **200,000** Hawaiian workers, **32,400** reported traveling more than an hour to work each day. From this information, statisticians determined that between **16%** and **16.4%** of the workers in the state traveled more than an hour to work every day in 2011. If there were **1,056,483** workers in the entire population, about how many traveled more than an hour to work each day?

4. Reasoning from a sample to the population is called **making an inference** about a population characteristic. Identify the statistic involved in making the inference in question 4.

5. The data about traveling time to work suggest that across the United States typically between **79.8%** and **80%** of commuters travel alone, **10%** to **10.2%** carpool, and **4.9%** to **5.1%** use public transportation. **Survey your classmates to find out how a worker in their families gets to work. How do the results compare to the national data? What might explain any differences?**

_____
_____
_____
_____
_____

Let's Reflect- Part 3

1. Describe two examples you have read about or experienced where data was collected from a population and two examples where data was collected from a sample drawn from a population.

_____
_____
_____
_____
_____

2. What does it mean to make an inference in statistics?

_____
_____
_____

To Sum it Up

- When data from a **population** is used to calculate a numerical summary, the value is called a **population characteristic**.

- When data from a **sample** is used to calculate a numerical summary, the value is called a **sample statistic**. Sample statistics can be used to learn about population characteristics.

1. Administrators at Riverview High School surveyed a random sample of 100 of their seniors to see how seniors at the school felt about the lunch offering at the school's cafeteria. Identify the population and sample in this setting.

    a. The population is all high school seniors in the world; the sample is all of the seniors at Riverview High.
    b. The population is all students at Riverview High; the sample is all of the seniors at Riverview High.
    c. The population is all seniors at Riverview High; the sample is the 100 seniors surveyed.

2. A group of librarians are interested in the numbers of books and other media that patrons check out from their library. They examine the checkout records of 150 randomly selected adult patrons. Identify the population and sample in this setting.

    a. The population is all adult patrons of the library; the sample is the 150 patrons selected.
    b. The population is all patrons of the library; the sample is the adult patrons of the library.
    c. The population is all patrons who check out at least 111 book from the library; the sample is the 150150150 patrons selected.

3. Lucio wants to know whether the food he serves in his restaurant are within a safe range of temperatures. He randomly selects 70 entrees and measures their temperatures just before he serves them to his customers.

    a. The population is all of the hot entrees Lucio serves; the sample is the entrees that are a safe temperature.
    b. The population is the 70 selected entrees; the sample is the entrees that are a safe temperature.
    c. The population is all of the entrees Lucio serves; the sample is the 70 selected entrees.

4. A quality control engineer is curious about the thickness of paint on a car at her factory. She randomly selects 30 points on the car and measures the paint thickness at each of those points.

    a. The population is every possible point on the car; the sample is the 30 selected points.
    b. The population is every car at the factory; the sample is the 1 car she is curious about.
    c. The population is every car at the factory; the sample is the 30 selected points.

5. A pediatrician randomly selected 10 parents of his patients. Then he surveyed the parents about their opinions of different kinds of diapers.

    a. The population is the parents of the pediatrician's patients who wear diapers; the sample is the parents of all of the pediatrician's patients.
    b. The population is the pediatrician's patients; the sample is the 10 patients selected.
    c. The population is the parents of the pediatrician's patients; the sample is the 10 parents of patients selected.

| **DO-NOW** | Complete today's Do-Now on the Do-Now sheet, located at the back of this packet. |

Selecting a RELIABLE Sample

Hmmm.....How could you determine the most popular sport among students in your school? To answer this questions, consider the following:

❏ Who is your population?

_____

❏ Who is in your sample?

_____

❏ How did you select your sample?

_____

Now consider this: Is your sample a <u>fair</u> reflection of what sport is most popular in the population?

_____

_____

Random vs. Biased Samples

Random Sample:

_____

_____

Biased Sample:

_____

_____

> <u>R</u>andom samples yield <u>r</u>eliable data. Biased samples do not! (Think: <u>B</u>iased = <u>B</u>ad)

Directions: Identify the population and the sample. Determine whether each sample is a random sample or a biased sample. Explain your reasoning!

1. Gino wants to know how most people in his neighborhood get to work. He surveys 100 people getting off the bus at a bus stop near his house.

     Population: _____

     Sample: _____

     Random or Biased: _____

2. Raylene wants to know the favorite ice cream flavor of the employees at her company. She surveys 150 employees chosen at random from a list of all employees.

Population: _____

Sample: _____

Random or Biased: _____

3. Roberto wants to know the favorite sport of adults in his hometown. He surveys 50 adults at a baseball game.

Population: _____

Sample: _____

Random or Biased: _____

4. Paula wants to know the favorite type of music for students in her class. She puts the names of all students in a hat, draws 8 names, and surveys those students.

Population: _____

Sample: _____

Random or Biased: _____

Can a Survey Question be Biased?

Yes! If a question encourages (or discourages) the survey participant to answer in a certain way, it is considered biased. For example, consider the following scenario... Local residents were surveyed about adding stoplights at the corner of Main Street and Perry Avenue. **Determine whether each survey question below may be biased. Explain.**

Survey Question 1: Are stop lights needed at the intersection of Main and Perry?
_____
_____

Survey Question 2: Fewer accidents occur at intersections with stop lights than at intersections that do not have them. Would you be in favor of having stop lights installed to make the intersection at Main and Perry safer?
_____
_____

Survey Question 3: Installing a new stoplight will require detours that will decrease traffic to local businesses for up to a month. Should stoplights be installed at the corner of Main and Perry?
_____
_____

Survey Question 4: Should stop lights be installed at the corner of Main and Perry?
_____
_____

You Try:

In Madison County, residents were surveyed about a new skateboard park. Determine whether each survey question may be biased. Explain.

1. Would you like to waste the taxpayers' money to build a frivolous skateboard park?

   Biased or **Not Biased**

2. Do you favor a new skateboard park?

   Biased or **Not Biased**

3. Studies have shown that having a safe place to go keeps kids out of trouble. Would you like to invest taxpayers' money to build a skateboard park?

   Biased or **Not Biased**

In Summary:

How can you make sure you are using unbiased samples and unbiased questions when surveying people?

_____

_____

_____

_____

_____

Guided Practice - Length of Words in the Poem "Casey at the Bat"

\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

1. Suppose you wanted to learn about the lengths of the words in the poem "Casey at the Bat." You plan to select a sample of eight words from the poem and use these words to answer the following statistical question:

    Predict the average word length in the poem.

    What is the population of interest here? _____

2. Look at the poem "Casey at the Bat" by Ernest Thayer, and select eight words you think are representative of words in the poem. Record the number of letters in each word you selected.

Find the average number of letters in the words you chose.

3. A random sample is a sample in which every possible sample of the same size has an equal chance of being chosen.

Do you think the set of words you wrote down was random? _____

Why or why not? _____

_____

_____

4. Working with a partner, follow your teacher's instructions for randomly choosing eight words. Begin with the title of the poem, and count a hyphenated word as one word.

   a. Record the eight words you randomly selected. Find the average number of letters in those words.

Group Number	Word Number	Word	Number of Letters

AVERAGE: _____

   b. Compare the average of your random sample to the average you found in number 2. Explain how you found the average for each sample.

_____

_____

_____

5. The actual average of the words in the poem "Casey at the Bat" is 4.2 letters. How did the population mean of 4.2 letters compare to the average of your random sample from number 2 and to the average you found in number 4a?

Was the average you found in number 2 or number 4a a better representation of the average word length of the poem?

_____

Why? _____
_____
_____

Independent Practice

1. The student council at Wheeler Middle School has been asked to conduct a survey of the student body to determine the students' preferences for activity day. Which survey would be the best option for the student council to use?

    a. Write all student names on cards and pull them out of a hat to determine who takes the survey.
    b. Have all students in the school take the survey.
    c. Survey every 4th student who gets off the bus.

    Explain your choice. _____
    _____
    _____
    _____

2. Mrs. Chun wants to find out which Harry Potter themed meal her teachers want to eat at the annual teacher appreciation day luncheon (mark your calendars kids - teacher appreciation day is MAY 8th). She decides to randomly survey five teachers per grade level. What is the population in this scenario??

    _____

3. Angelina needs to help her little sister find the average height of the students at her sisters elementary school. How would could Angeline collect a random sample?

    _____
    _____
    _____
    _____

4. MWR office is curious about what extracurricular activities the residents on Wheeler are interested in. They decided to survey every 3rd person that walked into the MWR office.

   a. Is this sample biased or unbiased? _____

   b. Explain? _____
   _____
   _____

5. Lizzy wants to estimate the number of students at Wheeler Middle School that ride the bus. Which sample should she select if she wants an unbiased sample?

   a. 5 students in the hallway
   b. All students in the band
   c. 45 7th graders at random
   d. 125 students at random during lunch

A Study in Evolution - Mutations in Bacteria

As you will begin to learn in science, populations <u>evolve</u> when their DNA (and, as a result, their genes) change over time. In order to study how changes in DNA affect the traits of certain bacteria, a team of scientists bombard several bacterial colonies of the same species with high doses of radiation (a form of energy that frequently causes mutations in DNA).

In their study, the scientists notice that 100 unique colonies of bacteria form. Since each colony of bacteria arises from a single individual, all bacteria in a colony are identical.

Using genetic technology, the team of scientists then determine the DNA sequence from a bacterium in each colony. The scientists compare the DNA sequence from each bacterium to the DNA sequence of the bacteria before any radiation was applied. With this information, the scientists **calculate the number of differences (mutations)** between the DNA sequences of the original bacteria and each new colony.

This data is summarized in the table below:

Mutations per Bacterial Colony

Bacterial Colony #	# of Mutations	Bacterial Colony #	# of Mutations	Bacterial Colony #	# of Mutations	Bacterial Colony #	# of Mutations	Bacterial Colony #	# of Mutations
1	94	21	68	41	12	61	26	81	86
2	67	22	87	42	57	62	66	82	52
3	15	23	51	43	98	63	7	83	19
4	24	24	57	44	76	64	81	84	77
5	4	25	55	45	37	65	17	85	9
6	60	26	70	46	98	66	65	86	84
7	82	27	46	47	2	67	90	87	17
8	9	28	57	48	71	68	23	88	36
9	28	29	50	49	58	69	48	89	13
10	91	30	24	50	19	70	8	90	70
11	77	31	33	51	76	71	3	91	93
12	67	32	48	52	9	72	73	92	81
13	7	33	68	53	22	73	84	93	7
14	11	34	5	54	45	74	62	94	65
15	58	35	4	55	2	75	85	95	92
16	77	36	20	56	34	76	0	96	99
17	26	37	43	57	84	77	49	97	51
18	62	38	38	58	51	78	14	98	63
19	30	39	10	59	26	79	26	99	91
20	13	40	41	60	35	80	24	100	38

A Study in Evolution - Mutations in Bacteria

STOP & THINK

When analyzing this data, would you prefer to...
1. Analyze the data from a sample of the population, OR
2. Analyze the data from the entire population?

Explain your response using what you have learned about the differences between samples and populations.

_____
_____
_____

Randomly select <u>10</u> different bacteria from the population (be sure to <u>NOT</u> look at the number of mutations before selecting). Find the **mean (average) number of mutations** for the sample you chose.

My Sample Mean: _____ Mutations

STOP & THINK

Why did groups have different values for their answers? Does the difference in values indicate that the groups did something wrong?

_____
_____
_____

My Classmates' Sample Means:

_____ _____ _____ _____ _____

_____ _____ _____ _____ _____

Mean of My Classmates' Means: _____ Mutations

STOP & THINK

Why might the value you calculated above be a *more accurate* estimate of the population mean?

_____
_____
_____

Randomly select 3 different bacteria from the population (be sure to <u>NOT</u> look at the number of mutations before selecting). Find the **mean (average) number of mutations** for the sample you chose.

My Sample Mean: _____ Mutations

STOP & THINK

Why is there a greater range (spread) of values for these samples compared to when we selected samples with 10 bacteria?

_____
_____
_____

THE TRUE POPULATION MEAN IS: _____ **Mutations**

STOP & THINK

Which sample mean (the 10-bacteria or 3-bacteria sample mean) was closer to the true population mean? Does this surprise you?

_____

_____

_____

Guided Practice

You and a team of classmates are working on an article for the Spartan Chronicle. The topic of your article is the height of middle school students at WMS.

As you collect data to answer your question, you survey all 30 students in your news writing class and ask them to measure their heights. Their heights are recorded in the table below.

Student #	Height (in.)	Student #	Height (in.)	Student #	Height (in.)
1	61	11	56	21	51
2	74	12	74	22	51
3	61	13	58	23	72
4	53	14	74	24	62
5	64	15	71	25	68
6	65	16	72	26	59
7	57	17	64	27	66
8	62	18	61	28	64
9	70	19	55	29	65
10	74	20	66	30	70

1. The type of research question you ask in your study determines whether your class of 30 students is the **entire population of interest** or simply a **sample of the larger population.**

Write two different research questions for your study. The first research question should be written so that the 30 students surveyed is the entire population; the second question should be written so that these 30 students are simply a sample of the entire population.

Q1: _____

Q2: _____

2. You and two of your friends (Sarah and Joshua) each decide to take a random sample of 8 students out of the population of 30 students in your news writing class.

Describe how you could select the students in your sample to ensure that they are randomly selected and there is no bias in your sampling method.

_____

_____

_____

3. You take your sample of the population by collecting the data from the first 8 students surveyed. Sarah takes her sample by starting with student 1 and selecting every fourth student (student 1, 5, 9, 13, 17, 21, 25, 29). Joshua takes his sample by collecting the data from the last 8 students surveyed. **Find the sample mean for each person's data set.**

Your Mean: _____ in.   Sarah's Mean: _____ in.   Joshua's Mean: _____ in.

4. Respond to the following two questions. Before responding, be sure to **note the difference between the two questions.**

      a. Do you believe that <u>the way the students in each sample were collected</u> will make one person's average (mean) more reliable than the others'? Explain.

      _____
      _____

      b. Will one student's mean be <u>more representative of the population</u> than the others'?   Why or why not?

      _____
      _____

5. Your friend Andre decides to take a sample of the middle three students who were surveyed (students 14, 15, & 16).
      a. Find the mean of Andre's sample.   **Andre's Sample Mean:** _____

      b. Provide <u>at least one reason</u> why Andre's sample mean might not be as reliable as the sample means taken by you, Sarah, or Joshua.

      _____
      _____

Independent Practice

The table below shows the number of "likes" Mrs. Constantino has had on her last several Instagram posts.

Photo #	# of Likes	Photo #	# of Likes	Photo #	# of Likes	Photo #	# of Likes
1	46	6	78	11	88	16	98
2	120	7	94	12	55	17	130
3	72	8	38	13	70	18	56
4	30	9	49	14	102	19	64
5	110	10	100	15	100	20	79

1. If Mrs. Constantino has posted 50 photos to Instagram in her life, does the data table above represent a sample or a population? How do you know?

_____
_____

2. Mrs. Constantino takes two samples from the data set above. In **Sample 1,** she finds the mean number of likes for photos 1, 6, 11, & 16. In **Sample 2,** she finds the mean number of likes for photos 5, 10, 15, & 20. Find the mean of each sample.

      Sample 1 Mean: _____   **Sample 2 Mean:** _____

3. Provide **two reasons** why, when taking a sample from a data set, the values of your <u>sample calculations</u> could be different from each other even when they come from <u>the same data set</u>.

      Reason 1: _____
      _____

      Reason 2: _____
      _____

4. The mean (average) number of likes out of all 20 of Mrs. Constantino's photos in the table above is 79 likes. Which Sample (sample 1 or 2) was a better representation of this data set? How do you know?

_____
_____

Module 11 - Analyzing Populations through Random Sampling	Lesson 11.4

DO-NOW	Complete today's Do-Now on the Do-Now sheet, located at the back of this packet.

Direct Instruction

We can use data from a random sample to make estimates about a larger population. (IF the sample is an accurate representation of the greater population!) For example...

Mrs. Constantino stood in the front of the school this morning and randomly polled 100 students as they got out of their parents' cars. She asked: What is your favorite school lunch? Out of the 100 students polled, 7 students said that their favorite school lunch is nachos.

1. Does Mrs. Constantino's sample of students likely provide an accurate representation of the entire student body at Wheeler Middle School?

   _____

   _____

2. If you answered yes, how many students in the entire student body (all 750 students) would likely say that nachos is their favorite school lunch?

Mr. Wagner wanted to know the ages of students in his class. He polled all 52 of his students and asked them the question "How old are you?" Of his 52 students, 33 answered with age 13.

1. If Mr. Wagner wanted to know how many 7th grade students (out of 250 total 7th graders) at Wheeler Middle School are 13, what could he do?

2. Could he use this same data to make a prediction a month from now? Why or why not?

   _____

   _____

3. Would it make sense for Mr. Wagner to use this data to make a prediction about the entire student body at Wheeler Middle School? In other words, would the proportion below yield accurate data? Why or why not?

   _____

   _____

You Try:

In November 2015, the Centers for Disease Control (CDC) and Prevention noted in their report, "The percentage of U.S. adults who smoke cigarettes declined from 20.9 percent in 2005 to 16.8 percent in 2014."

1. If you polled a random sample of 500 adults in the U.S. in 2005, how many would likely report smoking cigarettes?

2. If you polled a random sample of 500 adults in the U.S. in 2014, how many would likely report smoking cigarettes?

Guided Practice - Take a Poll

Do you participate in at least one sport at school?

YES	NO

Using the data collected, can you appropriately predict how many students in 7th grade participate in at least one sport at school?

YES   NO

If YES, make a prediction! **If NO,** explain why your sample does not represent the population.

Using the data collected, can you appropriately predict how many students in all of Wheeler Middle School?

YES   NO

If YES, make a prediction! **If NO**, explain why your sample does not represent the population.

Are you at least 5'2" tall?

YES	NO

Using the data collected, can you appropriately predict how many students in 7th grade participate in at least one sport at school?

YES   NO

If yes, make a prediction! If no, explain why your sample does not represent the population.

Using the data collected, can you appropriately predict how many students in all of Wheeler Middle School?

YES   NO

If yes, make a prediction! If no, explain why your sample does not represent the population.

CREATE YOUR OWN QUESTION:

CREATE:

ASK:

How many people answered yes? _____ out of _____

How many people answered no? _____ out of _____

EXPLAIN & PREDICT:

Using the data collected, can you appropriately predict how many students in 7th grade participate in at least one sport at school?

YES   NO

If yes, make a prediction! If no, explain why your sample does not represent the population.

Using the data collected, can you appropriately predict how many students in all of Wheeler Middle School?

YES   NO

If yes, make a prediction! If no, explain why your sample does not represent the population.

1. The table shows the results of a random survey taken at Wheeler Middle School about students' favorite cookies. Use the sample to answer the following questions:

Cookie	Number
Chocolate chip	49
Peanut butter	12
Oatmeal	10
Sugar	8
Raisin	3

   a. If there are 750 students in the whole school, estimate the number that prefers chocolate chip cookies?

   b. If there are 280 students in the 7th grade, estimate the number that prefers chocolate chip cookies?

   c. If there are 290 students in 6th grade, estimate the number that prefers oatmeal cookies.

   d. Could you use this data to predict how many teachers prefer sugar cookies? Why or why not?

2. In 2017, about 29% of the foreign visitors to Hawaii were from Canada. If the Ala Moana Hotel had 150,000 foreign guests that year, how many would you predict were from Canada?

3. The circle graph shows the results of a survey of teens and where they would prefer to spend a family vacation. Predict how many of the 4,000 teens would prefer to go to an amusement park.

Vacation Survey

5% Foreign country

45% Amusement park

7% Other

25% Beach

18% Mountains

Date	Do-Now
Date: _____	
Date: _____	
Date: _____	
Date: _____	