**Teacher(s):** *Mrs. Breazeale* & *Ms. DeBLanc*
**Subject/Grade:** 7th /Grade Math
**Week of** February 26, 2024
**Domains:** Statistics & Probability
**Lesson Plan Title:** The Population verses Random Samples

**Q3W8**

## MATHEMATICS - Mississippi College and Career Readiness Standards for 7th Grade

**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. For example, estimate the mean word length in a book by randomly sampling words from the book; predict the winner of a school election based on randomly sampled survey data. Gauge how far off the estimate or prediction might be.

**7.SP.3** Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability. For example, the mean height of players on the basketball team is 10 cm greater than the mean height of players on the soccer team, about twice the variability on either team; on a dot plot, the separation between the two distributions of heights is noticeable.

**7.SP.4** Use measures of center and measures of variability (i.e. inter-quartile range) for numerical data from random samples to draw informal comparative inferences about two populations. For example, decide whether the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a fourth-grade science book.

**ESSENTIAL QUESTION:** How can I use data from random samples to gauge the variation in estimates and predictions?

| Date | Focus Question | Objective | I will... |
|---|---|---|---|
| 2/26 M | How will I use samples to gain information about a population?(7.SP.1) | TSWBAT distinguish an accurate statistical question that will result in variable data from a question that will not by providing examples during a class discussion and completing practice problems from Lesson 22 workbook. | -Provide examples of statistical and non-statistical questions.<br>-Explain the difference between bias and representative samples.<br>-Describe how a population and its representative sample is alike and different. |
| 2/27 T | 1) How do I distinguish between a populations and a sample of populations?<br>2) How will I use a sample to make conclusions about a population. | TSWBAT identify populations & samples of populations, and use a sample to make conclusions about a population by passing the assigned iReady lesson titled "Understand Random Sampling. " | -Identify populations and samples of populations.<br>-Use a sample to make conclusions about a population. |
| 2/28 W | How will I analyze and correct a graded assessment to fine-tune my mathematical skills? | TSWBAT use the UNRAVEL strategy to solve assessment real-world problems in order to clear up any misconceptions. | -Use the UNRAVEL strategy to solve challenging problems.<br>-Rework the most missed problems.<br>-Develop an understanding of why mistakes were made on the MPT 3.5. |
| 2/29 TH | How will I use proportional reasoning to make inferences about a population from a single sample? | TSWBAT use iReady to enrich and remediate 7th grade math standards by passing all lessons assigned by the teacher. | Use proportional reasoning to make inferences about a population from a single sample |
| 3/1 F | Compare two populations using measures of center and measures of variability for their random samples.<br><br>Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities.<br><br>Calculate and use a multiple of a measure of variability to describe the difference between two populations. | TSWBAT use iReady to enrich and remediate 7th grade math standards by passing all lessons assigned by the teacher. | Compare two populations using measures of center and measures of variability for their random samples.<br><br>Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities.<br><br>Calculate and use a multiple of a measure of variability to describe the difference between two populations. |

**5 minutes + 2 minute Review**

One year on Venus is equivalent to 224.7 days on Earth. How many days on Earth, in decimal form, are equivalent to $9\frac{1}{2}$ years on Venus?

# ANTICIPATORY SET

How vowels are in our state's name?

**Hook**

**What is your favorite dessert?**

# Hook

Who was the first president of the United States?

# Hook

How do you spend your time away from school?

**Hook**

Australia is wider than the moon. True or False?

**Hook**

**What is your favorite holiday?**

Did you notice a difference between these 6 questions I just asked you?

# Domain: Statistics & Probability

**Essential Question:** How can I use data from random samples to gauge the variation in estimates and predictions?

**Focus Question:** How will I use samples to gain information about a population?

## Lesson Goals

**I will...**
- ❏ Provide examples of statistical and non-statistical questions.
- ❏ Explain the difference between bias and representative samples.
- ❏ Describe how a population and its representative sample is alike and different.

# Importance/Relevance
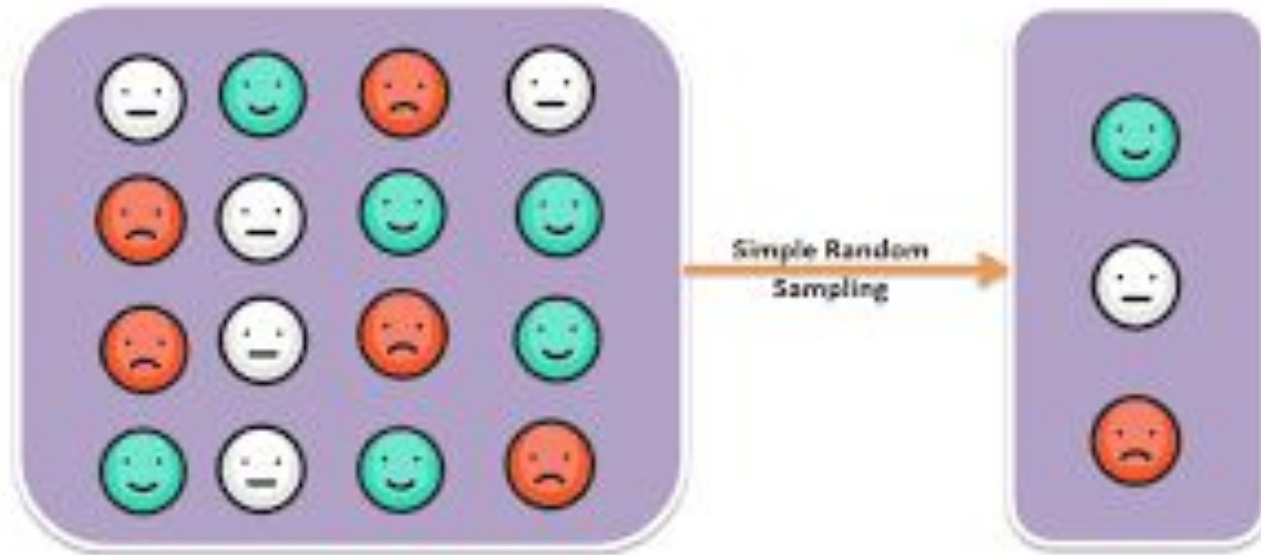


**Random sampling** is a part of the sampling technique in which each sample has an equal probability of being chosen.

# Teacher Input

**biased** verses **unbiased**

# **biased** sample **verses** **representative** sample

- In a biased sample, certain people are more likely to be chosen than others, making the sample a bad representation of a population.

- In a random sample, each person has an equal chance of being chosen, making it a good representation of a population.

Suppose you want to find which supermarket people in your town prefer. You can survey a sample of people to predict the preference of the entire town.

- You get a biased sample if you ask people who are exiting a particular supermarket.

- You get a random sample if you use a list of town residents and ask every fifth person on the list.

**LESSON 22**

Understand Random Sampling

## Dear Family,

This week your student is exploring random samples.

Sometimes you want to gather information from a group, or a **population**. Depending on the size of the population, it can be very difficult, or even impossible, to survey every member of the group. It is more practical to survey a smaller subset, or a **sample**, of the group. When you select a sample, you want it to be as much like the entire population as possible. That way, any conclusions you draw from the data are more likely to be true for the whole population.

In a **random sample**, every member of the population has an equal chance of being selected for the sample. A random sample is more likely to be representative of a population than other types of samples. So, you can use a random sample to draw conclusions about the entire population.

Your student will be exploring problems like the one below.

> A dance school director wants to know what type of dance the students at her school like best. Describe how the director could select a random sample of students to survey.

➤ **ONE WAY** to take a random sample is to pull names from a bowl.
- Write the names of all students on slips of paper.
- Put all the slips in a bowl and mix them up.
- Choose slips until you have reached the number of students you want to survey.

➤ **ANOTHER WAY** is to use an alphabetized list.
- List all students in alphabetical order.
- Roll a number cube to select a number 1–6.
- Start with the person on the list with that number. Then select every sixth name on the list.

Using either approach, the dance school director will get a random sample because each student has an equal chance of being chosen for the sample.

LESSON

**22**

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Using either approach, the dance school director will get a random sample because each student has an equal chance of being chosen for the sample.

**Random sample:**

Determine a method to create a random sample.

- Write the names of all current dance students on slips of paper.

- Place all of the slips of paper in a large bowl.

- Mix the slips all around and choose one slip.

- Repeat until you have reached the number of students that you want to survey.

- Ask the students whose names you chose to name their favorite type of dance.

This is a random sample of students because each student has an equal chance of being chosen.

**NOT IN YOUR BOOK!**

**Biased sample:**

Determine a method to create a biased sample.

- Ask all students exiting the ballet class what their favorite type of dance is.

This is a biased sample because it includes only students who are enrolled in ballet class. It is more likely that they will choose ballet over other types of dance. All students do not have an equal chance of being chosen using this sampling method.

NOT IN YOUR BOOK!

LESSON 22 | SESSION 1 ■ □ □

**?** UNDERSTAND: How can you use samples to gain information about a population?

**Explore** Sampling

## Model It

➤ **Complete the problems about populations and samples.**

**1** Deon and Angela each analyze a set of shapes. Whose set of shapes appears to be arranged randomly? Explain.

Deon's Shapes

Angela's Shapes

**2** Each set of shapes is a **population**. A population is the entire group being studied. Sometimes it can be difficult or take too much time to collect data from every member of a population. In these cases, you can collect data from a **sample**, or smaller set, of the population. The circled group of shapes in each set is a sample.

**a.** How are the populations of shapes the same?

**b.** How are the samples the same? How are they different?

**c.** A sample that is representative of a population has similar characteristics to the population. Which sample is more representative of the population? Why?


Deon's Shapes


Angela's Shapes

**DISCUSS IT**

*Ask:* How are a population and a sample related?

*Share:* I think Deon's sample would be more representative of the population if . . .

**Learning Target**   SMP 2, SMP 3, SMP 7
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.

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## Model It

➤ **Complete the problems about representative samples.**

**3** Issay's school plans to add one of three new elective classes next year: *teen leadership, fashion design,* or *robotics.* Issay wants to know which class the students at his school want most. He plans to survey a sample of the population. Will each approach result in a sample that is representative of the population? Explain.

**Elective Class Choices**

🎗 Teen Leadership ☐

👗 Fashion ☐

🤖 Robotics ☐

**a.** surveying all the teachers at the school

**b.** surveying all of the students on the student council

**c.** surveying five students in each math class

**DISCUSS IT**

*Ask:* Which approach do you think Issay should use? Why?

*Share:* I think another way Issay could get a representative sample is to ...

**d.** surveying every fifth student who buys lunch on a certain day

# Develop Understanding of Random Sampling

## Model It: Selecting Random Samples

➤ **Try these two problems involving random samples.**

① The students at Carlos's middle school will attend a brand-new high school once they reach ninth grade. Carlos plans to survey a **random sample** of the students at his middle school about what the mascot of the new high school should be. With a random sample, every member of a population has an equal chance of being selected.

BEAR

BULLDOG

EAGLE

HIPPO

WILDCAT

   **a.** Suppose Carlos lists every student's name on a slip of paper and mixes the slips in a hat. Then he pulls 20 names out of the hat without looking. Why is this sample a random sample?

   **b.** Suppose Carlos selects all the members of the school's basketball team for his sample instead. Why is this not a random sample?

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**2** Is each approach likely to result in a random sample of the students at Carlos's school? Explain.

**a.** letting students volunteer to take an online survey

**b.** spinning a spinner to select one of the first 10 names in the school directory and then selecting every 10th name after that

**c.** assigning each student a number, using a computer program to produce 30 numbers at random, and selecting the students with those numbers

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# Model It: Drawing Conclusions from Random Samples

➤ **Try this problem about drawing conclusions from random samples.**

**3** Carlos surveys a random sample of 40 students at his school about the mascot they want. The table shows his results.

a. Based on the sample, should Carlos conclude that there are probably more students at his school who want an eagle mascot than a wildcat mascot? Explain.

| Mascot | Number of Votes |
|--------|-----------------|
| Bear | 4 |
| Bulldog | 10 |
| Eagle | 16 |
| Hippo | 1 |
| Wildcat | 9 |

b. Of the students surveyed, 25% voted for a bulldog. Should Carlos conclude that exactly 25% of the students at his school would vote for a bulldog? Explain.

**DISCUSS IT**

*Ask:* Why can taking a random sample of a population be useful?

*Share:* I think Carlos could also use his sample data to conclude that ...

➤ **Complete the problems below.**

4 Conclusions about a population are more likely to be correct when they are based on random samples than on samples that are not random. Why?

5 A farmer plants 50 orange trees. How could the farmer select a sample of 5 trees that is likely to be representative of the population of 50 trees?

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## Lesson Vocabulary

**random sample** a sample in which every element in the population has an equal chance of being selected.

**population** the entire group considered for a survey.

**biased sample** a sample that does not represent the whole population.

**representative sample**

The manager of a bagel shop wants to add some new flavors that will appeal to his customers.

Which surveying method is most likely to produce a representative sample of the bagel shop's customers?

A   surveying any customer who is over the age of 20

B   surveying every fifth customer who enters the bagel shop

C   surveying all men and women between the ages of 18 and 20

D   surveying every fifth female customer who enters the bagel shop

# February 27, 2024 (Tuesday)

**Directions:**
- Login to iready (Math).
- Choose the lesson titled, **"Understand Random Sampling" and PASS!**
- **Complete another lesson ON YOUR PATH.**
- **Get 45 minutes MINIMUM!**

Please do not disturb the teacher unless it is an emergency.
(GRADING IN PROGRESS)

Mr. Stein is purchasing 2.25 pounds of meat that costs $2.80 per pound. How much change should Mr. Stein receive if he gives the cashier $20.00?
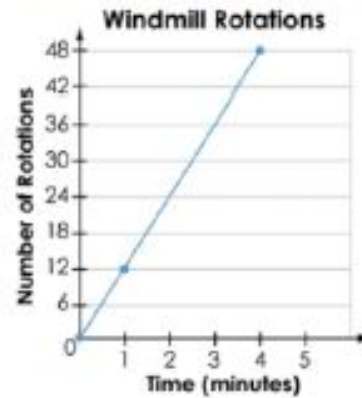
F   $6.30

G   $13.70

H   $14.95

J   $2.52

# REVIEW MPT 3.5

1) An energy company graphs the average number of rotations that a windmill makes each minutes for 4 minutes.

**Windmill Rotations**



Which statement describes what the point (1, 12) means in terms of rotations and minutes? (7.RP.1)

    **A)** 1 rotation occurs every 12 minutes

    **B)** $\dfrac{1}{12}$ of a rotation occurs every minute.

    **C)** The windmill rotates 12 times in 1 minute.

    **D)** The windmill rotates 12 times in 12 minutes.

**2) Which expression is equivalent to** $2(3x - 1) - 3x + 4$? (7.EE.1)

A) $3x + 2$

B) $9x + 6$

C) $3x + 6$

D) $9x + 2$

3) If a cube has a surface area of $150\ in^2$, what is the area of one face of the cube? (7.G.6)

A) $25\ in^2$
B) $37.5\ in^2$
C) $450.25\ in^2$
D) $900\ in^2$

**4)** The distance of one lap around a school track is $\frac{1}{4}$ miles. Sherrie walks 5 laps around the track. How many more laps must Sherrie walk to reach a total distance of $3\frac{1}{2}$ miles? (7.NS.3)

A) $1\frac{1}{4}$ mi

B) $2\frac{1}{4}$ mi

C) $4\frac{3}{4}$ mi

D) $8\frac{3}{4}$ mi

**5)** Mary goes to the bakery with $35. She purchases 2 loaves of bread for $3 each and a cake for $15. She plans to spend the remainder of her money on cookies that cost $1.25 each. What is the greatest number of cookies that Mary can buy?(7.EE.4)

  A) 11
  B) 12
  C) 13
  D) 14

6) The figure on the left represents a scale drawing of the figure on the right. What is the scale factor? (7.G.1)



2 in.          5 yd
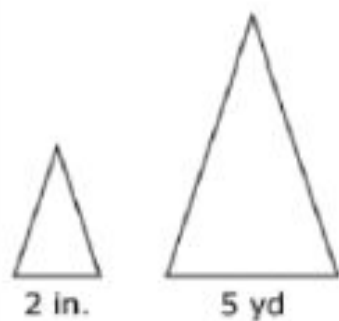
A) $\frac{2}{5}$

B) ) $1\frac{1}{4}$

C) $2\frac{1}{2}$

D) $3\frac{3}{4}$

7) A baker mixes $8\frac{3}{4}$ cups of white flour with $2\frac{1}{2}$ cups of rye flour for a bread recipe. How many cups of white flour does the baker mix for every 1 cup of rye flour? (7.RP.1)

A) $3\frac{1}{2}$

B) $5\frac{1}{4}$

C) $11\frac{1}{2}$

D) $12\frac{1}{4}$

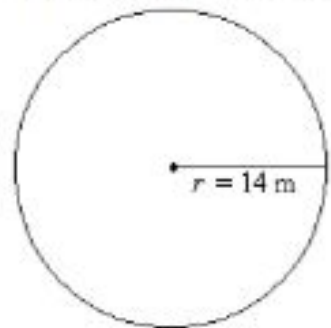8) Which expression is equivalent to $-8(10x - 3)$? (7.EE.1)
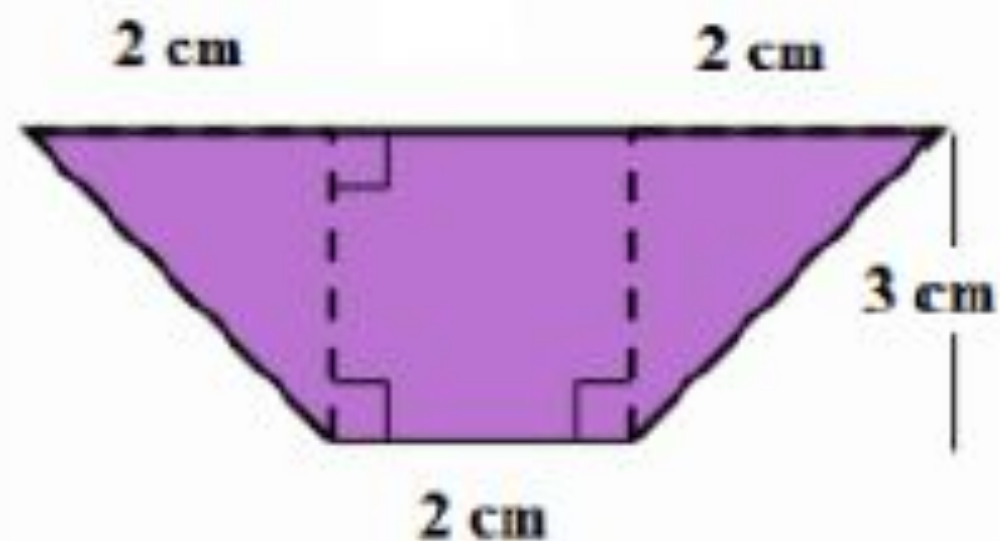
A) $-80x + 24$

B) $-80x - 24$

C) $-80x - 3$

D) $-80x + 3$

9) Find the area of the circle. Use $\pi = 3.1.4$ and round your answer to the nearest hundredth. (7.G.4)



$r = 14\ m$

A) $7\ m^2$

B) $28\ m^2$

C) $43.96\ m^2$

D) $87.92\ m^2$

E) $615.44\ m^2$

# 10) Find the area of the shape shown below. (7.G.6)



A)  10 7 $cm^2$

B)  12 $cm^2$

C)  14 $cm^2$

D)  18 $cm^2$

# Remediation & Enrichment

| | Monday | Wednesday |
|---|---|---|
| **B25** | **Activity:** TTW incorporate questions that increase in difficulty or are repetitive to ensure understanding. **Teachers:** *Mrs. Breazeale* & *Ms. DeBlanc* | **Activity:** TTW pull individual students & ask guided questions about the assigned workbook pages for the day. (What is this problem about? What are you trying to find out? What information is important?) **Teacher:** *Ms. DeBlanc* |
| **Bubbles** | **Activity:** TTW TW incorporate questions that increase in difficulty or are repetitive to ensure understanding. Students will be asked to paraphrase parts of the math textbook. **Teachers:** *Mrs. Breazeale* & *Ms. DeBlanc* | **Activity:** TTW pull individual students frequently scoring below 50% on MPTS. Ask guided questions about the assigned workbook pages for the day. (What is this problem about? What are you trying to find out? What information is important?) **Teacher:** *Mrs. Breazeale* & *Ms. DeBlanc* |
| **T25** | **Activity:** TTW incorporate questions that increase in difficulty and require creativity within their answers. Students will be asked to recreate similar questions like the ones in the workbook. **Teachers:** *Mrs. Breazeale* & *Ms. DeBlanc* | **Activity:** While the teacher is pulling individual students frequently scoring below 50% on MPTs, use them to explain concepts in a different way when needed. **Teacher:** *Mrs. Breazeale* |

# MPT 3.5 Student Results

|  | 1st Period | 3rd Period | 4th Period | 5th Period | 7th Period |
|---|---|---|---|---|---|
| **Rubies**<br>**0 - 40%** |  |  |  |  |  |
| **Amethyst**<br>**41 -60%** |  |  |  |  |  |
| **Emeralds**<br>**61-70%** |  |  |  |  |  |
| **Sapphires**<br>**71-100%** |  |  |  |  |  |

Mrs. Breazeale will be off campus on February 29th & March 1st.

# February 29, 2024 (Thursday)

**Directions:**
- Login to iready (Math).
- Choose the lesson titled, "**Making Inferences about Populations Using Samples**" and PASS!
- **Complete any past due lessons.**

# March 1, 2024 (Friday)

**Directions:**
- Login to iready (Math).
- Choose the lesson titled, "**Compare Populations**" and **PASS!**
- Choose the lesson titled, "**Medians & Quartiles**" and **PASS!**

# REMEDIATION

Random Samples

## Lesson 26 👥 Introduction
7.SP.1

# Understand Random Samples

### 💭 Think It Through

**How can you use samples to get information about a population?**

A food service company supplies meals for 12 different schools. How might the company get information about students' favorite lunches? Surveying every student in every school would take a lot of time and effort. It would be more efficient to survey a **random sample** that represents the whole group, or **population**. What makes a sample representative of the population?

Each rectangle below contains squares, circles, and triangles. The rectangle on the left shows the shapes scattered randomly. The rectangle on the right shows the shapes somewhat grouped. The circled group in each rectangle represents a sample.

A sample that selects items from an evenly distributed group is representative of the population.

A sample that looks at the group from a sorted, uneven mix may not be representative of the population.

### Think How do you find a random sample for a population?

In order for a sample to be considered random, every object or event has to have an equal chance of being selected. If a survey is given to the sample group, the ratio of each response to the sample size should be approximately equal to the ratio of each response to the size of the entire population. So, the percentage of people giving each response in the sample should be about equal to the percentage of people who would give each response in the entire population.

Look at the picture of the jar, which contains names of all students at Center School.

**Underline** the sentence that explains why selecting ten names from the top of the jar might be considered a biased sample.

248 Lesson 26 Understand Random Samples
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Suppose you pick ten slips of paper from the top of the jar. Maybe the slips at the top belong to the last class that put their names in the jar. Selecting from the top does not give the names at the bottom of the jar an equal chance. This would be a **biased sample** because it does not represent the whole population.

Suppose, instead, that you put your hand in and mix the slips all around each time you pick a name. With this method, all names get an equal chance of being selected. This is a random sample.

Here are some ways to select a representative random sample.

• Use a pattern, such as selecting every fourth person who enters the cafeteria.

• Use a method, such as drawing names out of a hat, where everyone has an equal chance of being selected.

• Divide the population into groups, such as by grade level, and randomly select people from each group.

Here are some ways of selecting a sample that might result in a biased sample.

• Let people volunteer to take a survey.

• Choose people who are easy to reach, such as the students who happen to be in the cafeteria when you are available to give surveys.

• Choose people as a group, such as students on the honor roll.

### Think How can you use data collected from a random sample?

If the sample is random, then the ratio of each answer on a survey to the number of people in the sample group should be proportional to the ratio of each answer in the entire population. You can use data from a random sample to generalize about a population. Maybe about half of the students in the sample say that pizza is their favorite school lunch. You might predict that about half the population has the same preference. The data collected from the sample might be used for making menu choices and for determining food orders.

### ▶ Reflect

**1** What do you think would be a good way to select a random sample of all the students at the 12 schools in the school district mentioned on the previous page?

_____

_____

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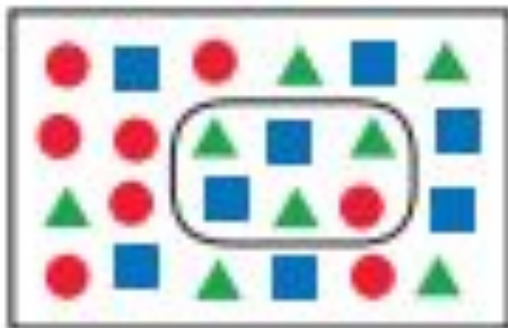Lesson 26 Understand Random Samples 249

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**Lesson 26(Ready-MS): Understand Random Samples**
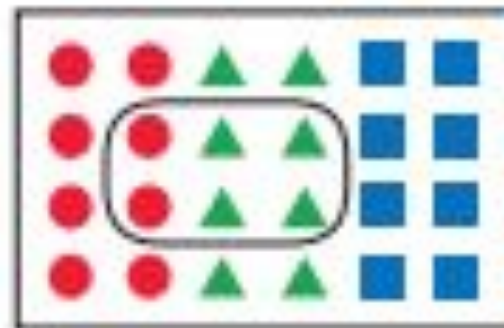**Pages 248-249**

## How can you use samples to get information about a population?

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▸ **Reflect**

1 What do you think would be a good way to select a random sample of all the students at the 12 schools in the school district mentioned on the previous page?

_____

_____

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▸ **Reflect**

**1** What do you think would be a good way to select a random sample of all the students at the 12 schools in the school district mentioned on the previous page?

Possible answer: Survey every 10th student that enters the cafeteria at

each school.

Carla has a list of all 720 students in her middle school. She writes the name of each student on a slip of paper and puts each slip in a box. Then she pulls 30 names from the box to decide who she will survey about the upcoming school election.

**2** How many students are in Carla's sample? _____

How many students are in the population? _____

**3** If 5 students in Carla's sample say they plan to vote for James in the school election, how many students in the entire school do you expect will vote for James? Explain how you found your answer.

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**A graphing calculator or spreadsheet can be used to create a list of random numbers.**

| 12 | 164 | 47 | 598 | 306 | 702 |
|-----|-----|-----|-----|-----|-----|
| 92 | 7 | 99 | 388 | 141 | 85 |
| 584 | 163 | 414 | 373 | 627 | 417 |
| 121 | 71 | 549 | 480 | 154 | 90 |
| 35 | 419 | 88 | 660 | 279 | 349 |

4 Describe one way you could use this list of numbers to choose the students for a sample.

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5 Does using random numbers generated by a calculator to decide who to survey give everyone in the population an equal chance of being selected? Why or why not?

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## Let's Talk About It

**Solve the problems below as a group.**

**6** One of Carla's friends suggests that she survey only eighth-graders because they are the oldest and probably know more about the election than younger students. Do you think this suggestion creates a random sample? Explain.

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**7** Another one of Carla's friends suggests that she make the sample larger and survey 100 students. Which sample size is more likely to represent the population? Explain.

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## ▶ Try It Another Way Work with your group to decide if the methods for selecting a sample are fair or biased. Give reasons for your answers.

**8** The events committee wants to survey students about a school dance. The committee is meeting in the gym, where the girls' basketball team is practicing. They survey the players on the girls' basketball team.

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**9** A store owner wants to survey customers about the products he sells. He programs the computer to select 100 customers from the mailing list and sends them each a survey.

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