

7

Lesson Exemplar for Mathematics

Quarter 3

Lesson

1

Lesson Exemplar for Mathematics Grade 7
Quarter 3: Lesson 1 (Week 1)
SY 2024-2025

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MATHEMATICS / QUARTER 3 / GRADE 7

I. CURRICULUM CONTENT, STANDARDS, AND LESSON COMPETENCIES	
A. Content Standards	The learners should have knowledge and understanding of data collection and sampling techniques.
B. Performance Standards	By the end of the quarter, the learners are able to collect data and apply knowledge in sampling techniques. (DP)
C. Learning Competencies and Objectives	The learners investigate different data collection and sampling techniques. 1. understand the importance of data collection. 2. explain the data collection process. 3. demonstrate knowledge of sampling. 4. investigate different data collection and sampling techniques. 5. apply knowledge in data collection and sampling techniques in practical life settings.
D. Content	Data Collection • Types of Data Sampling Technique • Types of Sampling
E. Integration	Market Research • understanding customer needs • estimating market size and potential • identifying trends and opportunities • determining pricing strategies • analyzing strengths and weaknesses
II. LEARNING RESOURCES	
Pierce, R. (2022). Sampling. <i>Math is Fun</i>. Retrieved 20 December 2023 from https://www.mathsisfun.com/data/sampling.html StatisticsHowTo.com. (2023). <i>Sampling in Statistics: Different Sampling Methods, Types & Error</i>. Retrieved 19 December 2023 from https://www.statisticshowto.com/probability-and-statistics/sampling-in-statistics	

III. TEACHING AND LEARNING PROCEDURE			NOTES TO TEACHERS																																												
A. Activating Prior Knowledge	DAY 1 1. Short Review Review the concept of sets. Give emphasis on the connection between Sets and Data Collection such as: 1. Defining Data Sets: Connection: In data collection, each piece of information gathered forms a data point, and collectively, they constitute a data set. 2. Types of Sets in Data: Connection: In data collection, a sample may represent a finite set of observations and the entire population may be considered an infinite set. 3. Sampling as Subsets: Connection: In sampling, the data collected represents a subset of the entire population, and the process involves selecting a representative portion for analysis. 2. Feedback (Optional)		Emphasize the connections of Sets and Data Collection.																																												
	B. Establishing Lesson Purpose	1. Lesson Purpose Warm-up Activity. “Knowing Me, Knowing You” Ask 10 learners from the class to supply the needed information in the table below. The table will be posted on the blackboard. <table><tr><th>Student Name</th><th>Gender</th><th>Favorite Food</th><th>Weight (kg)</th></tr><tr><td>Juan</td><td>Male</td><td>Adobo</td><td>30</td></tr><tr><td>Pedro</td><td>Male</td><td>Tinola</td><td>35</td></tr><tr><td>Maria</td><td>Female</td><td>Spaghetti</td><td>25</td></tr><tr><td>Magdalena</td><td>Female</td><td>Ice Cream</td><td>28</td></tr><tr><td>5</td><td></td><td></td><td></td></tr><tr><td>6</td><td></td><td></td><td></td></tr><tr><td>7</td><td></td><td></td><td></td></tr><tr><td>8</td><td></td><td></td><td></td></tr><tr><td>9</td><td></td><td></td><td></td></tr><tr><td>10</td><td></td><td></td><td></td></tr></table> Define the term "data" as information, facts, or numbers collected for analysis. Engage students in a brief discussion about why data is important. Encourage		Student Name	Gender	Favorite Food	Weight (kg)	Juan	Male	Adobo	30	Pedro	Male	Tinola	35	Maria	Female	Spaghetti	25	Magdalena	Female	Ice Cream	28	5				6				7				8				9				10			
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			The teacher may use other variables like Age, Daily Allowance, Favorite Movie, Number of Members in the Family, Favorite Subject, Religion, etc.																																												
			From this activity, after accomplishing the table, the teacher will now introduce the concept of data collection.																																												

	them to share their thoughts on how data influences decision-making and its significance in our day-to-day encounters. For more understanding, let the learners give more examples of data. 2. Unlocking Content Area Vocabulary Statistics is a branch of mathematics that deals with collecting, organizing, and interpreting data to address a certain phenomenon. <i>Example:</i> Marketing strategists use statistics to see the current market trend and devise solutions on how companies could sell more of their products. Population is the set of all possible cases from which data are collected. <i>Example:</i> A study regarding the average height of students in a school requires the set of all students studying in that school as its population. Sample is a subset of the population under study. <i>Example:</i> A study regarding the average height of students in a school may focus only on the sample set of students in a single grade level studying in that school. Variables are characteristics that vary over time from subject to subject. <i>Example:</i> Consider a study regarding the influence of social media on students' preferences in choosing a student leader. In this study, a researcher may include the number of social media accounts per sample student as one of the variables. The researcher can also choose the gender of the sample student as another variable. Qualitative Variable is a type of variable that focuses on the quality or characteristics of each experimental unit. <i>Example:</i> Civil Status, Gender, Color, Favorite Movie Quantitative Variable is a type of variable that measures a numerical quantity on each experimental unit. <i>Example:</i> Age, Height, Weight, Daily Allowance Data Collection is the process of gathering data such as surveys, interviews, etc. Sampling is the process of selecting subset of the population.	
C. Developing and Deepening Understanding	SUB-TOPIC 1: TYPES OF DATA 1. Explicitation Begin the discussion by going back to the previous output on the activity "Knowing Me, Knowing You". Introduce the terms "qualitative data" and "quantitative data". Define qualitative data as descriptive information that cannot	

be measured numerically and quantitative data as numerical information with measurable units.

Examples:

Qualitative: Favorite colors, types of fruits, feelings

Quantitative: Ages, temperatures, number of siblings

Discuss each example, asking students to identify whether it is qualitative or quantitative.

2. Worked Example

For each scenario or statement below, identify whether the data provided is qualitative (L) or quantitative (N).

1. Identifying the color of each car in the parking lot.
2. Determining the number of students in each class.
3. Rating a movie as “excellent”, “good”, or “poor”.
4. Measuring the temperature in degrees Celsius.
5. Describing the taste of different ice cream flavors.
6. Counting the total pages in a book.
7. Categorizing books based on their genres.
8. Recording the time it takes to complete a race.
9. Identifying the types of animals in a zoo.
10. Noting the sizes of shoes in a store.

3. Lesson Activity **Scavenger Hunt**

Instruct students to explore the classroom or school environment individually or in small groups. Each student/group should find at least three examples of qualitative data and three examples of quantitative data. Examples can include anything from classroom posters (qualitative) to counting the number of chairs in the room (quantitative). Once students have collected their examples, have them write each example on a sticky note or index card. Ask students to place their examples on the board under the appropriate category (qualitative or quantitative). Encourage discussion among students as they categorize their findings, ensuring they understand the distinction between the two types of data.

Answer for Worked Example:

1. L (Qualitative)
2. N (Quantitative)
3. L (Qualitative)
4. N (Quantitative)
5. L (Qualitative)
6. N (Quantitative)
7. L (Qualitative)
8. N (Quantitative)
9. L (Qualitative)
10. N (Quantitative)

DAY 2

SUB-TOPIC 2: METHODS OF DATA COLLECTION

1. Explicitation

Begin the lesson by sharing with the learners the importance of data collection, specifically in research projects. Enumerate and discuss the different methods of collecting data.

a. Surveys and Questionnaires:

Description: Surveys involve asking individuals a set of predetermined questions, often in written form, to gather information about their opinions, behaviors, or characteristics.

Application: Used in social sciences, market research, and public opinion polls

Advantages: Cost-effective, can reach a large audience, standardized format

Challenges: Response bias, limited depth of information

b. Interviews:

Description: Interviews involve direct interaction between a researcher and a participant, where questions are asked and responses are recorded.

Application: Common in qualitative research, case studies, and in-depth investigations

Advantages: Allows for in-depth exploration, flexibility in questioning, and clarification of responses

Challenges: Time-consuming, potential for interviewer bias

c. Observations:

Description: Researchers directly observe and record behavior, events, or phenomena without direct interaction with the participants.

Application: Used in naturalistic studies, ethnography, and behavioral research

Advantages: Provides firsthand information and minimizes response bias

Challenges: Observer bias, limited insight into underlying motivations

d. Experiments:

Description: Researchers manipulate variables to observe the effect on the outcome. Controlled conditions help establish cause-and-effect relationships.

Application: Common in natural sciences, psychology, and medicine

Advantages: Allows for causal inference, high internal validity

Challenges: Artificial settings may limit generalizability, ethical concerns

e. Case Studies:

Description: In-depth examination of a single case or a small number of cases to gain insights into complex phenomena.

Application: Common in psychology, medicine, and social sciences

Advantages: Rich, detailed information, suitable for complex or unique cases

Challenges: Limited generalizability, potential for researcher bias

2. Worked Example

Instructions: For each scenario provided, identify the most suitable data collection method to be used.

Scenario 1: Researchers want to investigate the impact of a new teaching method on student learning outcomes in a specific subject. They manipulate the teaching approach and compare the results with a control group.

Scenario 2: A researcher is interested in exploring the experiences and perceptions of individuals who have successfully overcome a specific phobia. The focus is on obtaining in-depth, qualitative insights into their personal journeys.

Scenario 3: An organization is conducting a market research study to understand consumer preferences for a new product. They distribute a set of standardized questions to a large sample of potential customers.

Scenario 4: A social scientist is investigating the communication patterns within a specific community. The researcher spends extended periods in the community, silently monitoring interactions and taking field notes.

Scenario 5: Scientists are conducting a study to test the effectiveness of a new drug in treating a medical condition. Participants are randomly assigned to either the treatment group or the control group, and the outcomes are measured.

3. Lesson Activity

DATA COLLECTION SIMULATION

Step 1. Simulation Station Set-up

Set up five different stations in the classroom, each representing one data collection method.

For example:

- Station 1 (Interview): Create a scenario where students role-play as interviewers and interviewees discussing a specific topic.
- Station 2 (Questionnaire/Survey): Provide a sample questionnaire for students to fill out, simulating a survey scenario.

Answer for Worked Example:

1. Experiment
2. Interview
3. Questionnaire/Survey
4. Observation
5. Experiment

	• Station 3 (Observation): Set up a scene or activity for students to observe and record data. • Station 4 (Experiment): Design a simple experiment that students can conduct and measure outcomes. • Station 5 (Case Study): Provide a case study for analysis and discussion. Step 2. Rotation and Data Collection • Divide the class into small groups and assign each group to a starting station. • Each group spends a designated time (e.g., 5-7 minutes) at each station, actively participating in or observing the simulated data collection method. • Encourage students to take notes, record their experiences, and collect data as they move through each station. Step 3. Reflection and Discussion • After completing the rotations, reconvene as a class. • Have each group share their experiences at each station, discussing the challenges faced, observations made, and any insights gained. • Facilitate a class discussion on the advantages and limitations of each data collection method. • Discuss the importance of choosing the suitable method based on research objectives. Step 4. Group Presentation • As an extension, assign each group one data collection method. • Ask them to prepare a short presentation on their assigned method, highlighting its characteristics, suitable scenarios, and potential challenges. • Groups present their findings to the class, fostering peer-to-peer learning. DAY 3 SUB-TOPIC 3: SAMPLING TECHNIQUES 1. Explicitation Begin with a brief discussion on the challenges of collecting data from an entire population. Ask students if they think it's practical to survey or collect data from everyone in the class. Encourage the learners to participate. Define sampling as the process of selecting a subset of individuals or elements from a larger population for study. Discuss the advantages of sampling, such as cost-effectiveness and time efficiency. Introduce three common sampling techniques: simple random sampling, stratified sampling, and systematic sampling.	
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Briefly explain each technique:

- a. **Simple Random Sampling:** Every individual in the population has an equal chance of being selected.
- b. **Stratified Sampling:** Dividing the population into subgroups (strata) and then randomly sampling from each subgroup.
- c. **Systematic Sampling:** Selecting every n th individual from the population after a random start.

2. Worked Example

Example of Simple Random Sampling: Conducting a Classroom Survey

Scenario: Imagine you are a teacher, and you want to conduct a survey to understand the opinions of students in your school regarding a new extracurricular activity. The total student population in the school is 500.

Steps in Simple Random Sampling:

- 1) Identify the Population:
In this case, the population is all the students in the school, totaling 500.
- 2) Assign a Number to Each Individual:
Assign a unique number to each student in the school. For simplicity, let's number them from 1 to 500.
- 3) Determine the Sample Size:
Decide on the sample size you want for your survey. Let's say you want a sample size of 50 students.
- 4) Use a Random Selection Method:
To randomly select the sample, you can use various methods. One simple way is to use a random number generator or draw names from a hat. For the sake of illustration, let's use a random number generator. Generate 50 random numbers between 1 and 500. These 50 numbers represent the students who will be part of your survey. Examples of random numbers can be 27, 142, 305, 48, 219, ..., 498.
- 5) Select the Chosen Individuals:
Identify the students corresponding to the randomly generated numbers. In our example, students with the numbers 27, 142, 305, 48, 219, ..., 498 are part of the selected sample.
- 6) Invite the Selected Individuals to Participate:
Reach out to the selected students and invite them to participate in your survey on the new extracurricular activity.

Example of Stratified Sampling: Assessing Academic Performance in a School
Scenario: Suppose you are a researcher interested in understanding students' academic performance in a junior high school. The school has a total population of 800 students, and you want to ensure that your sample is representative across different grade levels (Grade 7, Grade 8, Grade 9, and Grade 10).

Steps in Stratified Sampling:

1) Identify the Population:

The population, in this case, is all the students in the high school, totaling 800.

2) Define Strata:

Divide the population into strata based on the characteristics of interest. In this example, the strata are the different grade levels: Grade 7, Grade 8, Grade 9, and Grade 10.

3) Determine the Sample Size:

Decide on the overall sample size you want and the proportion of the sample from each stratum. Let's say you want a total sample size of 100 students, with the goal of representing each grade level proportionally.

Sample size allocation:

Grade 7: 25 students

Grade 8: 25 students

Grade 9: 25 students

Grade 10: 25 students

4) Randomly Select Within Strata:

Use random sampling within each stratum to select the specified number of students. You can use methods like random number generators or a random sampling technique. For example, if you are using a random number generator, generate 25 random numbers for each grade level.

5) Select the Chosen Individuals:

Identify the students corresponding to the randomly generated numbers within each stratum. These students make up your final sample.

Example of Systematic Sampling: Surveying Customers in a Shopping Mall

Scenario: Imagine you are conducting a survey to gather feedback from customers in a busy shopping mall. The mall has a total population of 500 customers, and you want to systematically survey a representative sample.

Steps in Systematic Sampling:

1) Identify the Population:

The population is all the customers present in the shopping mall during a specified time, totaling 500 individuals.

2) Determine the Sample Size:

Decide on the overall sample size you want. Let's say you want to survey 50 customers.

3) Calculate the Sampling Interval (k):

Determine the sampling interval (k) by dividing the total population by the desired sample size.

$$k = \frac{\text{Total Population}}{\text{Sample Size}} = \frac{500}{50} = 10$$

In this case, every 10th customer will be surveyed.

4) Random Start:

Choose a random starting point within the first k individuals. For example, randomly select the 3rd customer as your starting point.

5) Select the Chosen Individuals:

Survey every 10th customer from the randomly chosen starting point until you reach the desired sample size. Starting from the 3rd customer, survey the 13th, 23rd, 33rd, and so on until you've surveyed 50 customers

3. Lesson Activity

Instructions: For each scenario provided, choose the appropriate sampling technique to be employed.

Scenario 1: You are conducting a survey to understand the preferences of students in a large university. To ensure representation from each academic department, you decide to sample 20 students from each department.

Scenario 2: In a city park, you want to survey visitors to gather feedback on park facilities. To make the survey process efficient, you decide to survey every 10th visitor who enters the park.

Scenario 3: You are conducting a study on the reading habits of students in a high school. To ensure a diverse sample, you randomly select 30 students from the entire school population.

Scenario 4: You want to understand the opinions of employees in a large company about a new workplace policy. The company has three main departments, and you decide to sample 15 employees from each department.

Answer for Lesson Activity:

1. Stratified Sampling
2. Systematic Sampling
3. Simple Random Sampling
4. Stratified Sampling
5. Simple Random Sampling

	Scenario 5: In a music festival, you want to survey attendees about their favorite music genres. To capture a random cross-section of the crowd, you decide to randomly select individuals throughout the day without any specific pattern.	
D. Making Generalizations	1. Learners' Takeaways Guide the students to make generalization about data collection and sampling techniques and how it may relate to real life. A. On Data Collection: "Collecting data is like gathering puzzle pieces. Each piece, no matter how small, helps us see the bigger picture. It's not just about numbers; it's about creating a story that makes sense." B. On Sampling Techniques: "Sampling is like tasting a spoonful from a well-stirred soup; when done right, that small bite represents the rich flavor of the whole. Choose your spoonful wisely, and your understanding of the entire dish will be both accurate and satisfying." 2. Learners' Reflection Are there any challenges or misconceptions you encountered while studying the lesson? If there are, what are those?	

IV. EVALUATING LEARNING: FORMATIVE ASSESSMENT AND TEACHER'S REFLECTION		NOTES TO TEACHERS
A. Evaluating Learning	DAY 4 1. Formative Assessment A. Classify the following examples into qualitative or quantitative data. Discuss your reasoning within the group. - Determining the heights of students in a class. - Classifying fruits as "tropical" or "temperate". - Counting the number of flowers in a garden. - Describing the texture of different fabrics. - Measuring the weight of bags in a grocery store. - Categorizing books based on their authors. - Rating a restaurant's service on a scale of 1 to 5. - Identifying the types of clouds in the sky. - Giving the ages of family members in a household. - Describing the mood of a piece of music.	Answers: A. - N (Quantitative) - L (Qualitative) - N (Quantitative) - L (Qualitative) - N (Quantitative) - L (Qualitative) - N (Quantitative) - L (Qualitative) - N (Quantitative) - L (Qualitative)

- B. True or False. Write True if the statement is correct. Otherwise, write False.
1. Simple random sampling ensures that every individual in the population has an equal chance of being selected.
 2. Systematic sampling involves dividing the population into subgroups and then randomly selecting individuals from each subgroup.
 3. In stratified sampling, the population is first divided into strata, and then individuals are randomly selected from each stratum.
 4. Simple random sampling is advantageous when there is a need to guarantee representation from different subgroups or strata within the population.
 5. Systematic sampling assures that every individual in the population is equally likely to be included in the sample.
 6. In stratified sampling, the goal is to have each individual in the population included in the sample at least once.
 7. Simple random sampling is more efficient than systematic sampling when the population is already ordered in a systematic way.
 8. Systematic sampling involves selecting individuals at regular intervals from a randomly chosen starting point.
 9. Stratified sampling is often used when significant differences exist between subgroups within the population.
 10. Simple random sampling is the most complex and time-consuming of the three sampling techniques mentioned.

C. Match Column A with the most appropriate method of collecting data in Column B.

Column A	Column B
1. It involves gathering detailed information about a particular individual, group, or phenomenon through a comprehensive and in-depth examination.	a. Observation
2. It is employed when researchers systematically manipulate one or more variables to observe the effect on another variable.	b. Interview
3. A method that involves the systematic gathering of information through direct interaction with participants, allowing for a personalized and in-depth exploration of their experiences and perspectives.	c. Case Study
	d. Experiment
	e. Questionnaire

- B.
1. True
 2. False
 3. True
 4. False
 5. False
 6. False
 7. False
 8. True
 9. True
 10. False

- C.
1. Case Study
 2. Experiment
 3. Interview
 4. Questionnaire
 5. Observation

	4. It is a structured set of questions designed to gather information from a large number of respondents, often used for statistical analysis. 5. The most appropriate method if researchers want to collect data by watching and recording behaviors or events as they naturally occur without interference.			
	2. Homework (Optional) The teacher may give Learning Activity Sheet 2 to the learners.			
B. Teacher's Remarks	<i>Note observations on any of the following areas:</i>	Effective Practices	Problems Encountered	The teacher may take note of some observations related to the effective practices and problems encountered after utilizing the different strategies, materials used, learner engagement, and other related stuff. Teachers may also suggest ways to improve the different activities explored/lesson exemplar.
	strategies explored			
	materials used			
	learner engagement/ interaction			
	others			
C. Teacher's Reflection	<i>Reflection guide or prompt can be on:</i> <u>principles behind the teaching</u> What principles and beliefs informed my lesson? Why did I teach the lesson the way I did? <u>students</u> What roles did my students play in my lesson? What did my students learn? How did they learn? <u>ways forward</u> What could I have done differently? What can I explore in the next lesson?			Teacher's reflection in every lesson conducted/facilitated is essential and necessary to improve practice. You may also consider this as an input for the LAC/Collab sessions.