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DepED
DEPARTMENT OF EDUCATION

Mathematics

Quarter 4 – Module 1

Real-Life Problems that can be Solved by Statistics

ALTERNATIVE DELIVERY MODE
ADM

Mathematics – Grade 7
Alternative Delivery Mode
Quarter 4 – Module 1: Real-Life Problems that can be Solved by Statistics
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Mathematics

Quarter 4 – Module 1:
Real-Life Problems that can be Solved by Statistics

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Introductory Message

This Self-Learning Module (SLM) is prepared so that you, our dear learners, can continue your studies and learn while at home. Activities, questions, directions, exercises, and discussions are carefully stated for you to understand each lesson.

Each SLM is composed of different parts. Each part shall guide you step-by-step as you discover and understand the lesson prepared for you.

Pre-tests are provided to measure your prior knowledge on lessons in each SLM. This will tell you if you need to proceed on completing this module or if you need to ask your facilitator or your teacher's assistance for better understanding of the lesson. At the end of each module, you need to answer the post-test to self-check your learning. Answer keys are provided for each activity and test. We trust that you will be honest in using these.

In addition to the material in the main text, Notes to the Teacher are also provided to our facilitators and parents for strategies and reminders on how they can best help you on your home-based learning.

Please use this module with care. Do not put unnecessary marks on any part of this SLM. Use a separate sheet of paper in answering the exercises and tests. And read the instructions carefully before performing each task.

If you have any questions in using this SLM or any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator.

Thank you.

What I Need to Know

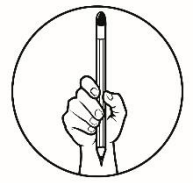
This module was designed and written with you in mind. It is here to help you master the Real-Life Problems that can be Solved by Statistics. The scope of this module permits it to be used in many different learning situations. The language used recognizes the diverse vocabulary level of students. The lessons are arranged to follow the standard sequence of the course. However, the order in which you read them can be changed to correspond with the textbook you are now using.

The module is divided into two lessons, namely:

- Lesson 1 – Poses Real-Life Problems that can be Solved by Statistics
- Lesson 2 – Formulates Simple Statistical Instrument

After going through this module, you are expected to:

1. identify statistical and non-statistical question;
2. identify numerical (discrete or continuous) and categorical data sets;
3. pose real-life problems that can be solved by statistics; and
4. formulate simple statistics instrument.



What I Know

DIRECTIONS: Choose the letter of the correct answer. Write the chosen letter on a separate sheet of paper.

1. What is a query that can be answered by collecting data that may vary?
    A. Categorical data set
    B. Numerical data set
    C. Statistics
    D. Statistical question

2. Which type of numerical data set can be counted in a finite matter?
    A. Categorical data
    B. Continuous data
    C. Discrete data
    D. NONE OF THE ABOVE

3. Which of the following is/are the basic step/s of solving problems involving statistics?
    A. Defining the problem
    B. Collecting the data
    C. Analyzing the data
    D. All of the above

4. It is the branch of applied mathematics dealing with data collection, organization, analysis, interpretation and presentation.
    A. Algebra
    B. Trigonometry
    C. Statistics
    D. Geometry

5. It is a type of data that can be expressed in numbers.
    A. Categorical data set
    B. Numerical data set
    C. Statistics
    D. Statistical question

6. It is a collection of information that can be divided into groups.
    A. Categorical data set
    B. Numerical data set
    C. Statistics
    D. Statistical question
7. Which among the statements is not an example of statistical question?
    A. Who is my favorite Korean Drama star?
    B. What is the favorite Korean Drama of the grade 7 students?
    C. What is the typical age of the grade 7 Mathematics teachers?
    D. How many brothers and sisters does my classmates have?

8. Which of the following is an example of categorical data set?
        i. Ages of grade 7 students.
        ii. Favorite flavor of ice cream for each of 6^{th} graders.
        iii. Internet browsing hours spent of grade 7 students.
        iv. My favorite Milktea flavors.
    A. ii and iii
    B. ii and iv
    C. ii only
    D. iii only
9. Which of the following is an example of statistical question?
    A. How many gadgets does your best friend have?
    B. How many events does your section won as champion?
    C. How many flavors of Milktea does my teacher have already tasted?
    D. How many tourist spot destinations does my teachers have been through?

10. The question "How old is my Mathematics teacher?" is an example of non-statistical question. Which of the following makes it as statistical question?
    A. How old is my teacher?
    B. What is the typical age of the grade 7 Mathematics teachers?
    C. How old is your Mathematics teacher?
    D. NONE OF THE ABOVE

11. Which of the following is an example of discrete data?
    A. Average daily temperature
    B. Number of Facebook likes
    C. Number of litters of milk in a gallon
    D. Volts of electricity

12. It is a used to determine changes in the attitude, characteristics and behavior of people by watching them.
    A. Interviews
    B. Focus Group Discussion
    C. Observation
    D. Survey Data

13. The following are examples of continuous data **EXCEPT**,
    A. Number of minutes to board the plane
    B. Number of votes in an election
    C. Water temperature
    D. Wind speed

14. What type of data is the time duration of ~~a~~ film?
    A. Categorical data
    B. Continuous data
    C. Discrete data
    D. All of the above

15. These are questions that requires the respondent to elaborate their points in a free form manner?
    A. Closed questions
    B. Open-ended questions
    C. Multiple – choice questions
    D. None of the above

Lesson 1 Real -Life Problems that can be Solved by Statistics

What's In

Have you ever been an officer in your class? Let's say you've been the class President. How were you determined as a class president? If an election was conducted, did they tally the results in order for you to know if you won or not? Let's say you wanted to lead the entire student body and you want to be the SSG President. How many should vote for you to be declared as the SSG President? Is it different from the time you were voted as the class president?

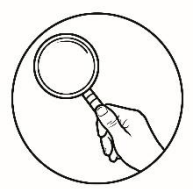
What's New

A. Determine whether or not the question is a *statistical question*.

1. Who is my favorite Korean Drama star?
2. What are the favorite Korean Darma of the grade 7 students?
3. How many Covid-19 positive cases are there in Koronadal City?
4. What is the typical age of the grade 7 Mathematics teacher?
5. How many brothers and sisters does my classmates have?

B. Identify each of the following data sets as *categorical* **(C)** or *numerical* **(N).**

1. Ages of grade 7 students
2. Favourite flavour of ice cream for each of 6^{th} graders
3. Internet browsing hours spent of grade 7 students
4. My favourite Milktea flavors
5. Number of students in each section



What is It

Statistics is a branch of Applied Mathematics specializing in procedures for *collecting, organizing, presenting, analyzing, and interpreting data* from observations.

Statistics involves much more than simply drawing graphs and computing averages.

- In education, it is frequently used to describe test results.
- In science, the data resulting from experiments must be collected and analyzed.
- Manufacturers can provide better products at reasonable costs through the use of statistical quality control techniques.
- In government, many kinds of statistical data are collected all the time.
- A knowledge of statistics can help you become more critical in your analysis of information; hence, you will not be misled by manufactured polls, graphs, and averages.

A **statistical question** is one that can be answered by collecting data that vary. There are two types of data: numerical and categorical. **Numerical data set** are those in numerical form which are either continuous or discrete. **Discrete data** are those that can be counted in a finitely while **continuous data** are measurements that can take any value from an ~~is~~ infinite range. **Categorical data** take non-numerical values, such as colors, information or questions that are answerable by YES or NO, labels, etc. (example: large, medium, and small)

The 4 steps below can be followed to solve real life problems using statistics

1. Pose the question that can be answered by data.
2. Determine a plan to collect data.
3. Organize and summarize the data.
4. Interpret the results and answer the question posed in Step 1 using the organized and summarized data.

Example of Statistical Questions:

1. How many hours does the grade 7 students spend time in studying? (Summarizing question)

2. Do the grade 7 students spend more time in social media than studying? (Comparing question)

3. Do students who spend more time in studying do better in exam? (Relationship question)

Example of Non-Statistical Questions:

1. How old are you?
2. What is your favorite subject?
3. How many siblings does Elise have?

Take note that each example of non-statistical question above has definite answer and do not need data to be gathered.

Examples of Categorical Data

1. Since our country is infected with Corona Virus, do you follow the health protocols given by the Department of Health?
2. Wintermelon is my favorite milktea flavor.
3. Blue signifies calmness, tranquility, relaxation and peace.

Examples of Numerical Data

A. Discrete Data

1. Number of boys and girls in grade 7 per section ~~Sunflower~~
2. The result of rolling 3 dice
3. The number of books in the shelves

B. Continuous Data

1. The heights of ~~all~~ grade 7 students
2. Age of ~~a~~ persons
3. Distance travelled by an airplane overtime~~.~~

Sample problem:

On January 20, 2020, the first case of COVID-19 was reported in the Philippines.* This event was followed by the declaration of the COVID-19 outbreak as a global pandemic by the WHO on March 11, 2020.** To solve this problem, data are gathered to answer the following statistical questions.

1. How many people on every province of the country are being infected by the virus, daily?
2. What sectors of the society are severely affected by the pandemic?
3. Among age groups of people in the country who are most vulnerable to be infected by the virus?
4. How long do people recover from the virus?

**WHO Philippines Corona Virus Disease (COVID-19) Situation Report 1*
***National Library of Medicine – National Center for Biotechnology Information*

Observe that the data needed to answer the statistical questions above have different nature. The number of people infected by the virus is a discrete data. The time it takes for people to recover from the virus is a continuous data. The sectors of the society that are severely affected by the pandemic & the people who are most vulnerable to be infected by the virus are categorical data.

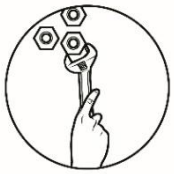
How do you think gathering data to answer the statistical questions above can solve the problem on COVID-19 Pandemic? What other statistical questions and data are needed to address the problem.

What I Have Learned

A. Determine whether the question is a statistical question or not.
1. What time did I woke up this morning?
2. What are the heights of grade 7 Dalya students?
3. What were the high temperature of the regions in Mindanao yesterday?
4. How old am I?
5. Do students want face to face classes than online classes?

B. Identify whether the following ~~if it~~ is categorical, discrete or continuous data.

1. The volume of a prism
2. Hours of sleep of a high students
3. The weight of a sack of rice
4. The height of a pineapple plants
5. Eye color of my pets
6. Brand of the ball pens in a class
7. The number of students in a class
8. Number of languages spoken by Jose Rizal
9. Lists of SSG officers
10. The results of rolling two dices



What I Can Do

A. Identify whether the question is statiscal or not. Explain you answer.

1. What are the colors of my shoes?
   _____

2. How many hours of sleep do the grade 7 students need every night?
   _____

B. Identify the following data set as categorical or numerical. Explain your answer.

1. Type of juices drunk by the students in the canteen
   _____

2. Weigth of Alexander's dog
   _____

C. Write at least 5 statistical questions that can be answered by collecting data from your class.

1. _____
2. _____
3. _____
4. _____
5. _____

Lesson 2 Formulates Simple Statistical Instruments

This lesson contains exciting activities in formulating simple statistical instrument. Good luck dear!

What's In

Activity 1

Directions. Fill in the blank with the correct information.

Student Data

Name: _____ Grade Level and Section: _____
Age: ____ Sex: _____ Date of Birth: _____ Place of Birth: _____
Height (cm):_____ Weight (kg):_____ Mother Tongue: _____
Address: _____
Mother's Name: _____ Occupation: _____
Father's Name: _____ Occupation: _____
Guardian's Name: _____ Occupation: _____
Do you have any brothers and sisters? _____ How many? _____
Health Concerns: _____

Emergency Contacts:
Name: _____ Phone Number: _____
Address: _____ Relationship: _____

Activity 2

Your teacher wants to know more about you. The questions below were prepared. Kindly answer honestly the following questions.

1. What are your hobbies? _____
   _____
2. What subject do you find the most difficult and Why? _____
   _____
3. What do you do when you're having a hard time in a subject?
   _____
   _____
4. What achievement are you proudest of?
   _____
5. How would you describe yourself?
   _____
   _____

What's New

This lesson is a continuation of the concepts on posing real-life problems that can be solved by statistics.

Data are collected from different sectors such as business, education, medicine, etc. Below is an instrument that is used by a leading newspaper who conducted a survey on honesty.

HOW HONEST CAN YOU BE?

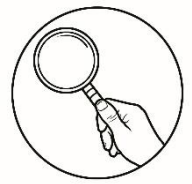
1. You found someone's wallet in the cafeteria, what would you do?
   a. Return the wallet to the owner.
   b. Return the wallet but keep the money
   c. Keep the wallet and the money

2. You are mistakenly given Php 50.00 extra change when you buy a notebook from the school's book store, what would you do?
   a. Return the Php 50.00 extra change to the cashier
   b. Keep the money

3. An extra ten points mistakenly added to your score in the examination that made you pass the test. Would you report it to your teacher?
   a. Yes b. No

4. You know that your teacher is not that strict during examination. Would you cheat on the exam?
   a. Yes b. No

5. Are you honest most of the time?
   a. Yes b. No



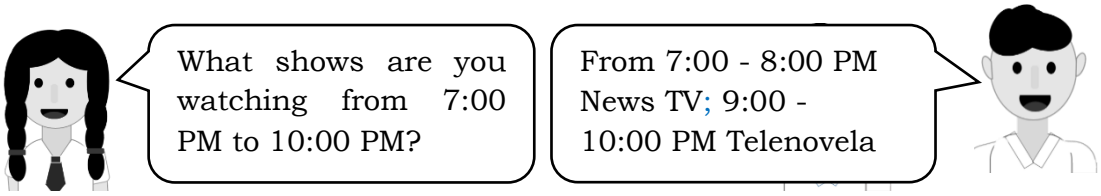
What is It

There are different statistical instruments that can be formulated and used to gather data depending on the needs. Listed below are some of the statistical instruments.

Observation- it focuses in determining the changes in the attitude, characteristics and behavior of people or other subjects. This technique includes watching and recording actions and behaviours.

Interviews- it is being performed through personally asking questions to people who have the authority or expertise to say something about the data needed.

The person gathering the data is called the interviewer, while the person supplying the data is the interviewee.



Focus Group Discussion (FGD) - it is used to know the thinking, feeling or opinion, about a certain phenomenon, idea and etc. FGD is conducted with a small group of people with common knowledge and common field (usually 6 to 8 people).

Questionnaire- if you have big number of sample, it is the most practical way to use. You gather data through writing. However, you must be careful presenting your questions, since we need to consider the culture, and characteristics of the respondents. You may use email, letter, or personally give your questionnaire to your respondents.

Using different questions, and approaches to questioning, can allow us access to the information we require. Questionnaires usually are comprised of a number of questions that can either be closed questions, open-ended questions, or multiple-choice.

Types of Questions

1. Closed questions

These are questions which can be answered with "Yes" or "No," or they have a limited set of possible answers (such as: A, B, C, or All of the above). For example, 'Do you wear glasses?' the respondent either does (responding 'yes') or doesn't (responding 'no') wear glasses.

2. Open-ended questions

These are questions that allow someone to give a free-form answer. Example, "How did you answer the modules?"

3. Multiple-choice questions

These are questions that provide a certain number of specific response options as possible answers. An example of multiple-choice question would be:

"How do you spend your free time?".

a. reading c. surfing the internet

b. listening to radio d. watching TV e. others (please specify: __)

Survey – in a national level, surveys are usually covered by the government and other form of surveying organization such as National Statistics Office (NSO). A survey can also be done in small scale (i.e. a class of 25 students can be surveyed)

Examples of Forms Used as Statistics Instruments

1.

Please fill in the blank with the correct information.

1. Name: _____
2. Age: _____
3. Birthday: _____
4. Height (cm): _____
5. Weight (kg): _____
6. The subject you spend most time studying in class: _____
7. The number of pets at home: _____
8. The number of siblings in the family: _____

Please encircle the letter that best applies to you.

9. The kind of book you prefer to read

   a. fiction c. mystery e. others (please specify) _____

   b. novel d. comic

10. The way you travel to school

    a. by foot c. by bicycle e. others (please specify) _____

    b. by car d. by bus

2.

RRQ CHICKEN WINGS RESTAURANT

Customer Satisfaction Survey

1. How was your recent dining experience at RRQ chicken wings?

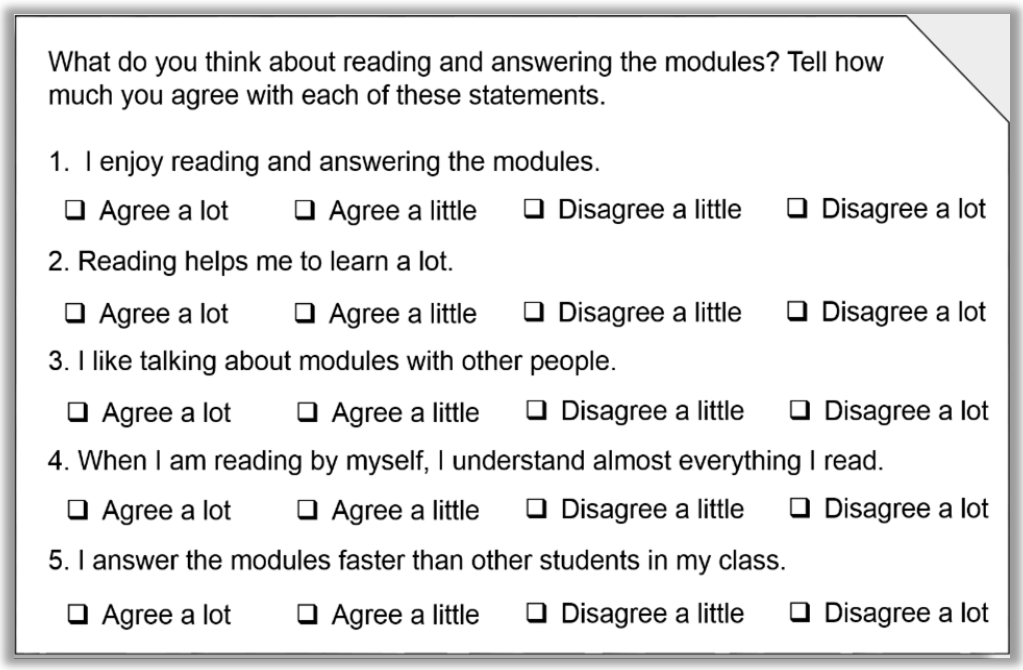
❑ Excellent ❑ Good ❑ Neither Good nor Bad ❑ Bad ❑ Terrible

2. The quality of the food from RRQ chicken wings was good?

❑ Strongly Agree ❑ Agree ❑ Neither Disagree Nor Agree

❑ Disagree ❑ Strongly Disagree

3.



What do you think about reading and answering the modules? Tell how much you agree with each of these statements.

1. I enjoy reading and answering the modules.

❑ Agree a lot ❑ Agree a little ❑ Disagree a little ❑ Disagree a lot

2. Reading helps me to learn a lot.

❑ Agree a lot ❑ Agree a little ❑ Disagree a little ❑ Disagree a lot

3. I like talking about modules with other people.

❑ Agree a lot ❑ Agree a little ❑ Disagree a little ❑ Disagree a lot

4. When I am reading by myself, I understand almost everything I read.

❑ Agree a lot ❑ Agree a little ❑ Disagree a little ❑ Disagree a lot

5. I answer the modules faster than other students in my class.

❑ Agree a lot ❑ Agree a little ❑ Disagree a little ❑ Disagree a lot

4.

Student Observation Form

Student's Name: _____ Date: _____

Grade Level and Section: _____ Teacher: _____

Reason for Observation: _____

_____

Notes

Record observation notes below.

_____

_____

_____

_____

5.

Examples of Interview Question

What are some of your academic strengths?
What are your weaknesses?
Why do you want to study here?
What do you expect to be doing ten years from now?
What subject in high school did you find most challenging?

What's More

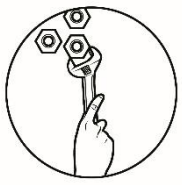
You want to know the favorite subjects of your classmates. Formulate a sample questionnaire for this.

What I Have Learned

Directions: Fill in the missing word in the blank. Choose the correct answer from the box.

Interview	**Closed Question**	**Open-ended Question**
Attitude	**Questionnaire**	**Survey**

1. The most useful statistical instrument to be used with big number of respondents is _____.
2. _____ is being carried out through personally asking questions to knowledgeable people about the data needed.
3. The question "Do you prefer answering Self Learning Modules (SLMs) than workbooks?" is an example of _____.
4. The changes in characteristics, behavior and _____ of the people observed are the focus of observation.
5. _____ is a type of question that allows someone to give a free-form answer.



What I Can Do

Now, you will apply what you have learned about formulating statistical instrument. Use a separate answer sheet.

Directions. Perform as directed.

1. Identify a real-life problem that you are interested.
2. Form a statistical question about the problem you identified.
3. Formulate your own simple statistical instrument that can be used to answer your statistical question.

Great work! You did a good job in applying what you have learned.

Assessment

I hope you had a good time going over this module. For you to determine how much you've learned, please answer the questions below.

DIRECTIONS: Read each item carefully and choose the letter of the correct answer. Write your answer on your answer sheet.

1. It is a question that can be answered by gathering data from subjects or respondents whose responses may vary.
   A. Categorical question
   B. Hypothetical question
   C. Numerical question
   D. Statistical question

2. Which type of statistical data is measurable or countable?
   A. Categorical data set
   B. Numerical data set
   C. Population
   D. Sample

3. It is a type of question which requires more thought and more than a simple one-word answer.
   A. Closed question
   B. Open-ended question
   C. Multiple-choice question
   D. None of the above

4. A type of statistical data that can take non-numerical values, such as name of colors, labels, etc.
   A. Categorical data set
   B. Numerical data set
   C. Statistics
   D. Statistical question

5. It is a type of question which provides the respondents with multiple answer options.
    A. Closed question
    B. Open-ended question
    C. Multiple-choice question
    D. None of the above

6. Which of the following is an example of statistical question?
    A. How old are the students in Grade 7?
    B. What did Larra eat for dinner?
    C. What time did you get up this morning?
    D. How many pairs of shoes does my best friend have?

7. Which of the following statements/questions is an example of open-ended question?
    A. Are you feeling better today?
    B. Should I date her?
    C. What are the challenges you faced during this time of pandemic?
    D. Will you please do me a favor?

8. What type of question is this “Have you finished your homework?” ?
    A. Closed question
    B. Open-ended question
    C. Multiple-choice question
    D. None of the above

9. Which of the following is a closed question?
    A. How did you and your girlfriend meet?
    B. How do you manage to raise your children alone?
    C. May I please have a bite of that cassava melts?
    D. What makes the chameleon camouflage?

10. The question “What is your favorite ice cream flavor and why?” is an example of_____.
    A. Closed question
    B. Open-ended question
    C. Multiple-choice question
    D. None of the above

11. It is a type of question which can be answered by a simple yes or no.
    A. Closed Question
    B. Open-ended question
    C. Multiple-choice question
    D. None of the above

12. Which of the following is NOT a statistical question?
    A. How much time do you spend browsing internet last week?
    B. How many minutes do grade 7 students typically spend browsing internet each week?
    C. What do grade 8 students prefer to eat for breakfast?
    D. What is the typical number of pets owned by students in my class?

13. Which of the following is not an example of categorical data set?
    i. Ages of grade 7 students.
    ii. Favorite flavor of ice cream for each of 6th graders.
    iii. Internet browsing hours spent of grade 7 students.
    iv. My favorite Milktea flavor.
    A. i only
    B. i and iv
    C. ii and iv
    D. iii and iv

14. The question "How old is my student?" is an example of non-statistical question, which of the following makes it as statistical question?
    A. How old is my student, Larra?
    B. How old are the students in my classroom?
    C. How old is your classmate?
    D. None of the above

15. Which of the following is an example of open-ended question?
    i. What are you planning to buy today at the grocery store?
    ii. What is your unforgettable experience during childhood?
    iii. What were the major effects of COVID-19 in your life?
    iv. How could you present yourself better?

    A. i only
    B. ii only
    C. i, ii and iii
    D. i, ii, iii and iv

Answer Key

What I Know

1. D
2. C
3. D
4. C
5. B
6. A
7. A
8. B
9. D
10. B
11. B
12. C
13. B
14. B
15. B

Lesson 1
What I have Learned

A.

1. Non-statistical
2. Statistical
3. Statistical
4. Non-Statistical
5. Statistical

B.

1. Continuous
2. Continuous
3. Continuous
4. Continuous
5. Categorical
6. Categorical
7. Discrete
8. Discrete
9. Categorical
10. Discrete

Lesson 1
What's New

1. Non- statistical
2. Statistical
3. Non- statistical
4. Statistical
5. Statistical

B.

1. N
2. C
3. N
4. C
5. N

Lesson 2
What I have
Learned

1. Questionnaire
2. Interviews
3. Closed question
4. Attitude
5. Open-ended question

Assessment

1. D
2. B
3. B
4. A
5. C
6. A
7. C
8. A
9. C
10. B
11. A
12. A
13. B
14. B
15. D

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