



Mathematics

Quarter 4 – Module 35 **Analyzing and Interpreting Research Data**



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Mathematics

Quarter 4 – Module 35 Analyzing and Interpreting Research Data



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-bystep 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. Also, the scope of this module permits it to be used in many different learning situations. The arrangement of the lessons follows the standard sequence of the course. But the pacing in which you read the contents and answer the exercises in this module is dependent on your ability.

This module is here to indulge you in using statistical methods in research data. It will help you identify what descriptive statistics you discussed since Math 7 is appropriate in analyzing and interpreting research data. After going through this module, it is expected that you will be able to:

- 1. identify the level of measurement of a variable, and
- 2. identify which descriptive measure is appropriate to use in analyzing data.
 - a. Measures of Central Tendency,
 - b. Measures of Dispersion or Variation, and
 - c. Measures of Position



What I Know

Directions: Choose the letter of the correct answer in each item and write it on a separate sheet of paper.

- 1. Which of the following describes the term 'frequency'?
 - a) It indicates the chance of occurrence of a data in a distribution.
 - b) It tells how many times a particular data occurs in the whole distribution.
 - c) It is the sum of the frequencies from the bottom up to the frequency of a certain category.
 - d) It is the sum of the frequencies from the top down to the frequency of a certain category.
- 2. Which of the following illustrates a frequency?
 - a) Salary increase.
 - b) Rate of interest of an investment.
 - c) Number of students enrolled in a statistics class.
 - d) Areas of specialization for sophomore students.
- 3. It was reported that two schools have equal reading performance since they have equal number of learners who are independent readers in oral reading, silent reading and listening comprehension. Which of the following can justify if the report is valid or not?
 - a) The report is valid since the two schools have equal number of learners who are independent readers.
 - b) The report is only valid if the number of independent readers in each school is at least 1,000 learners.
 - c) The report is invalid because the basis of comparison is frequency and not the percentage of independent readers.
 - d) The report is invalid since the exact numbers of independent readers from the two schools are not mentioned in the report.
- 4. Which of the following levels of measurement has a "true zero" value?a) Nominalb) Ordinalc) Intervald) Ratio

5.	Which of the foll	owing levels of measur	rement can assign	a quantitative value	in
	each observation	with no natural order	?	-	
	a) Nominal	b) Ordinal	c) Interval	d) Ratio	

- 6. Which of the following is NOT an example of a ratio variable?
 a) amount of money
 b) temperature in °F
 c) shoe size
 d) distance
- 7. Which of the following sets of data has an outlier?a) 7, 8, 9, 10, 11b) 7, 8, 9, 10, 30c) 7, 8, 9, 10, 12d) 6, 7, 8, 9, 10
- 8. Which of the following measures of central tendency is appropriate for nominal variables?

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a) Mean b) Median c) Mode d) None of these
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- 9. Which of the following uses mean for its average?a) math 10 final gradesb) internet providerc) blood typed) military rank
- 10. Which of the following is a CORRECT statement about measures of variability?
 - a) Lower variability means individual data is lower as compared to the average of the data.
 - b) Lower variability in quiz scores means lower performance.
 - c) Lower variability means more consistent data.
 - d) Lower variability means not good result.
- 11. What does a standard deviation of 2 units indicate?
 - a) The values in the set of data are close to each other.
 - b) The values in the set of data are 2 standard deviation units away from the central value.
 - c) The values in the set of data are at most 2 standard deviation units to the right from the central value.
 - d) The values in the set of data are at most 2 standard deviation units away from the central value.
- 12. The following are the means and the measures of variability of the math scores of 3 randomly picked learners in their formative tests during the third quarter of a school year. Which of the following could be the best interpretation of the data?

	Mean	Range	Variance	Standard Deviation
Student A	6.8	5	3.16	1.78
Student B	6.8	2	0.56	0.75
Student C	6.8	9	6.96	2.64

a) Student A performed more consistently that student B.

- b) Student B is the most consistent among the three students.
- c) Student C is the most consistent among the three students.
- d) Scores of the students in their formative tests are exactly equal.
- 13. Which of the following is a CORRECT statement about measures of position?
 - a) 50% is equivalent to the mean.
 - b) 25% is equivalent to the 1st quartile.
 - c) 95% is equivalent to the 95^{th} percentile.
 - d) 75th percentile means 75% of the data are below it.
- 14. John's percentile rank in the General Scholastic subtest in the NCAE is 85th. What does this mean?
 - a. There are 85% of the examinees who scored lower than John in the General Scholastic subtest.
 - b. There are 84% of the examinees who scored lower than John in the General Scholastic subtest.
 - c. John answered 85% of the items in the General Scholastic subtest correctly.
 - d. John answered 84% of the items in the General Scholastic subtest correctly.
- 15. It is recorded in your health card that your height falls in the 90th percentile among the Grade 10 learners. What does it mean?
 - a. You are taller than 90 Grade 10 learners.
 - b. You are taller than 89 Grade 10 learners.
 - c. You are taller than 90% of the Grade 10 learners.
 - d. You are taller than 89% of the Grade 10 learners.

Lesson 1

Descriptive Measures



What's In

Have you ever encountered persons who periodically visit your house asking questions such as: How many are you living in your house? How many persons are employed in your family? If yes, have you wondered where will they use your answers?

If these persons are from the Philippine Statistics Authority (PSA), they are statistical researchers conducting censuses. The collected data will be given to the statisticians to be treated, analyzed, and interpreted. This is the basis of PSA in the statistical information they publish. This statistical information relates to the country's economic, social, demographic, and general activities and condition of Filipinos. This statistical information will also be the basis of many agencies in their decision making during their planning on the improvement of our country.

These are examples of statistical information published by the PSA:

- 1. The average Filipino annual family income as of 2018 is PhP 313,000.00.
- 2. The employment rate of Philippines as of April 2020 is 82.3%

Do you know how statisticians treat or analyze collected data? Yes, they are using statistical measures. Do you think you can help them in their analysis and interpretation? Yes, you can. You apply your acquired knowledge on statistical measures and additional knowledge you will gain from this module. But what are these statistical measures? Do Activity 1 and Activity 2 for you to be refreshed with these statistical measures.

Activity 1: Can you still Remember Me?

Recall and enumerate the statistical measures under the different categories that you discussed in statistics since Math 7. Write your answer in the corresponding cell in the table below. One example in each statistical measure was done for you.

Measures of Tendency	Central	Measures of Variability	Measures of Position
Example: Mean		Example: Variance	Example: Decile

The statistical measures in Activity 1 are also called **Descriptive Measures**. From the term descriptive measures, this helps us describe a data in a meaningful way. This will help us characterize a set of data based on its properties, which allows us to interpret a data in simpler way.

Under the Descriptive Measures, Relative frequency is also discussed in this module. Therefore, in this module, we will consider 4 Descriptive Measures. Specifically,

• Relative Frequency,

- Measures of Variability
- Measures of Central Tendency
- Measures of Position

Do Activity 2 for you to review the description or definition of the different descriptive measures.

Activity 2: Match It to Me

Match each description to the corresponding statistical measure below. Write the letter of the correct answer on your answer sheet.

Descriptions		
1. It describes how spread out or scattered the data are in a distribution .		
2. It is the difference between the highest and the lowest values in a data set.		
3. It is the measure of the degree of spread in a data set.		
4. It is the sum of the data divided by the number of data.		
5. It shows how often a data occurs in a distribution.		
6. It is the number of times a data occurs in a distribution.		
7. It is the ratio of the frequency of a category to the total frequency in a distribution.		
8. The average amount of variation or dispersion or variability of the data in a distribution.		
9. The data which occurs most frequently in a distribution		
10. The middle data when the data are arranged in increasing or decreasing order.		
11. The score or value where all the score values in a distribution tend to cluster.		
12. These are points that divide a distribution into ten equal parts.		
13. These are points that divide a distribution into four equal parts.		
14. These are points that divided a distribution into 100 equal parts.		
15. It describes a data in terms of the percentage of the data that fall below it.		
Statistical Methods		
(A) Decile (B) Frequency (C) Mean (D) Measures of central tendency		
(E) Measures of position (F) Measures of variability (G) Median		
(H) Mode (I) Relative Frequency (J) Percentile (K) Quartile (L) Range		
(M) Standard Deviation (N) Variance		

How did you do in the activities? If you obtained a high score, then you are ready to proceed in this lesson. Otherwise, you need to review your notes on different descriptive measures.



What's New

In this module, we will not discuss how to solve the different Descriptive Measures. We will concentrate more on determining what descriptive measure is appropriate to use analyzing a set of data.

Consider first the following cases. In each case, there are questions posted. Write your answer in your notebook.

Case A: The table summarizes the number of learners who are independent readers in School R and School P. Can we say that School R and School P have equal reading performance since the two schools have equal number of independent readers in all of the categories?

Category	School R	School P
Oral Reading	150	150
Silent Reading	200	200
Listening Comprehension	250	250

Case B: From the different Measures of Central Tendency, can we conclude that mean was used to solve for the average Math performance? Or was it median? Or mode?

Congratulations Schools Division of ABC for obtaining a performance rating of 85% in Mathematics 10!

Case C: The table shows the means, ranges, variances, and standard deviations of the scores in Math tests of 3 randomly picked learners. Can we conclude that the learners have equal performance since they have equal means?

	Mean	Range	Variance	Standard Deviation
Student A	6.8	5	3.16	1.78
Student B	6.8	2	0.56	0.75
Student C	6.8	9	6.96	2.64

Case D: Research showed that 99% of the top 5% examinees in the College Entrance Examination in University XYZ have a very satisfactory grade in all subjects in College. Thus, the university decided to give full scholarship to the top 5% examinees in the Examination with the condition that they will not fail in any subject. If you answered 95% of the items in the College Entrance Examination correctly, does this qualify you for full scholarship in the university?

To know if you answered the questions posted in Cases A to D correctly, proceed to the next part of this module



What is It

Frequency and Relative Frequency

Frequency is the number of times a datum occurs in a distribution, while relative frequency is the ratio of a frequency of a datum/category to the total frequency in a distribution.

Considering **Case A**, we can't compare the reading performance of the two schools by just simply considering the frequencies of independent readers in the two schools. School R and School P will only have equal performance in reading comprehension if they have equal number of learners enrolled. In case that School R has more learners than School P, then School R has a lower performance in reading comprehension.

Since the total number of students in each school is not provided then, relative frequency is more appropriate to use to compare the performance of the two schools in terms of independent readers.

We use frequency in presenting data when we are interested with the number of occurrences per datum/category while relative frequency is used when we want to compare the number of occurrence/s per datum to the whole data in the distribution. For further understanding, consider the following examples.

- Situations that require frequency:
 - a. Number of customers to buy product A so that the store manager will have a basis on the number of product A to stock.
 - b. Number of patients who seek medical help for a particular sickness in a month for the DOH to have a basis on the amount of medicine to purchase.
 - c. Number of enrollees per grade level who prefer an offline mode of delivery of lessons to determine the number of modules to be printed.
- Situations that require relative frequency
 - a. Rate of increase or decrease of COVID 19 cases per day to determine if the efforts of the government to eradicate COVID -19 is effective or not.
 - b. Rate of customers who were satisfied in the services given by an online seller for his customers to have a basis to buy or not to buy products from the seller.

Measures of Central Tendency

Characteristics of the data are needed to be able to identify which among the measures of central tendency is more appropriate to use to compute for the average. To identify the characteristics, we need to learn first the different levels of measurement.

There are four levels of measurement, namely nominal, ordinal, interval, and ratio. These levels of measurement are described individually in the discussion that follows.

Levels of Measurement

1. **Nominal** – This level of measurement allows one to label or categorize or classify objects, events, or people. The labels assigned to objects, events, or people have no quantitative value. Numbers can be assigned to objects or people, but they have no natural order. The numbers are only used to classify or to label the objects or people.

Some examples of nominal variables are strands in the senior high school curriculum, areas of specialization, gender, brands of cars, subjects enrolled, etc. Senior high school students can be classified according to their chosen strand, but they cannot be ranked based on their chosen strand.

2. **Ordinal** - This level of measurement allows one not only to label or categorize or classify objects, events, or people, but also to rank them. The labels assigned to objects of people have natural order, but no quantifiable difference between values. This means that there is an ordered relationship between or among the objects but there is no equivalent distance between them.

Some examples of ordinal variables are military rank, values of a color, grade levels, teachers' position, etc. Students can be classified according to their grade levels where they are in and at the same time, they can be ranked based on their grade levels.

3. **Interval** – This scale allows one to label objects or people with natural order and have exact difference between values. In addition, interval variables do not have a "true zero point" or the zero does not represent an absence of something. Zero in this level of measurement is used as an arbitrary value or a placeholder. Zero denotes a meaning.

Some examples of interval data are scores obtained in a test, temperature, grades earned within a grading period, etc. In a math test, the scores of students A, B, and C are 5, 8, and 0, respectively. Students can be classified and ranked according to their scores. A quantitative difference can be obtained between any two scores like the scores 8 and 5 with a difference of 3. In a test, the amount of learning gained from instruction or teaching is usually expressed in terms of the obtained score. Zero as the obtained score of student C does not mean complete absence of learning. Student C may have learned something from the teacher's instruction, but what student C learned was not included in the test, which made him got zero. So, zero in this example is arbitrary or is used as a placeholder.

4. **Ratio** - This scale allows one to label objects or people with natural order and have exact difference between values. In addition, ratio variables have a "true zero" value. Zero in this level of measurement is used as an absolute value. Absolute zero means complete absence or non-existence.

Some examples of ratio variables are numbers of vowel and consonants in the word RHYTHM, weights of students, length of segments, earnings or income, etc.

Students can be classified and ranked according to their weights. Consider 45 kg and 52 kg as the respective weights of students P and Q, a quantitative difference can be obtained which is 7 kg.

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In the word RHYTHM, the number of vowel is zero. Zero in this case is a real zero or absolute which means that there is a complete absence of vowel in the word RHYTHM.

Under ratio variable, we can add, subtract, multiply or divide the numbers at the real scale for comparisons.

Activity 3: Match It to Me Once More!

Based on the descriptions of the four levels of measurements, classify each of the variables listed below whether it is nominal, ordinal, interval, or ratio. Write your answer in the corresponding cell in the table that follows.

Variables		
*population	*temperature in °C	
*shoe size	*height	
*grades described as F, S, VS	*brands of shoes	

Nominal	Ordinal	Interval	Ratio

How did you find Activity 3? Do you think you were able to identify the level of measurement of each given variable correctly? To further understand the levels of measurement, use the flow chart that follows.



Did you find the flowchart easier to follow? It does not really matter if you use the description given or the flowchart in identifying what level of measurement your data are. What is important is your answer in Activity 3 should be as follows.

Nominal	Ordinal	Interval	Ratio
*Type of shoes	*Grades described as F,	*Temperature in °C	*population
	S, VS	*Shoe size	*height

Now, how are you going to use the knowledge or skill in identifying the level of measurement of the variable in relation to the measures of central tendency? The discussion that follows gives us tips on what measure of central tendency is appropriate to use to a particular variable.

Measures of Central Tendency

A point in the distribution where the scores or data tend to cluster.

1. Mean

The mean is used for interval or ratio variable. It is known as the balance point because it is the equal weight of all the scores or values in the distribution. It is the most reliable measure of central tendency, because in computing the mean, every observation or data is considered. It is best for symmetrical distributions. It is easily affected by an extreme value (outlier). Mean is the sum of all the scores, or values divided by the number of scores/values. Consider the following sets of numbers then solve for the mean, \overline{X} (X bar).

Set A - 7, 8, 9, 10, 11	Let \bar{X}_A be the mean of Set A,
	$\bar{X}_A = \frac{7+8+9+10+11}{5} = 9$
Set B - 7, 8, 9, 10, 12	Let \bar{X}_B be the mean of Set B,
	$\bar{X}_B = \frac{7+8+9+10+12}{5} = 9.2 \approx 9$
Set C - 7, 8, 9, 10, 30	Let \bar{X}_c be the mean of Set C,
	$\bar{X}_C = \frac{7+8+9+10+30}{5} = 12.8 \approx 13$

All the numbers in each set are the same except for the last numbers. 11 in Set A and 12 in Set B are not significantly different from the other numbers in their corresponding set. While 30 in Set C is significantly higher than the other values in the set. Another that should be noted is $\bar{X}_A \approx \bar{X}_B \neq \bar{X}_C$. The example shows that 30 in Set C has an impact with the mean. Do you think this is also true to significantly lower value?

A number which is significantly higher or lower than the other values in a set of data is called an <u>outlier</u>. With the given example, we can see that mean is sensitive to outliers. Thus, the mean is best to use when the data are symmetrically distributed or a set of data with no outliers.

2. Median

The median is used for ordinal, interval, or ratio variable. Median is a point in the distribution such that 50% of the scores or values are below it. It is not affected by extreme values or outliers; therefore, it is best for asymmetrical distributions. Do you think median is also sensitive to an outlier like the mean? Let's try to figure it out by comparing if there is a difference of the median of Set A, Set B and Set C given in the discussion of the mean. The median, \tilde{X} , (X curl) of the sets.

Set A - 7, 8, 9, 10, 11 $\tilde{X}_A = 9$ Set B - 7, 8, 9, 10, 12 $\tilde{X}_B = 9$ Set C - 7, 8, 9, 10, 30 $\tilde{X}_C = 9$

The median in all of the sets is 9, even if Set C has an outlier. This shows that the median is not sensitive to an outlier or the median is immune to an outlier. Since both mean and median can be used in finding the average of interval or ratio variable, then it would be recommended that if there is no outlier use the mean otherwise use the median.

3. Mode

Mode is the only measure of central tendency we can use with nominal variables. It can also be used for interval or ratio data. Mode is the most frequent data in the distribution. It is known as the measure of popularity because it depends on the highest frequency. It is the measure of central tendency with the lowest reliability.

Activity 4: Identify Me!

For each variable described below indicate which measure of central tendency would be the most appropriate to find for its average. A variable can have more than one appropriate measure of central tendency.

1) Math 10 final grades3) Internet provider2) Shoe size4) Rank of Performance 5) Allowance

How did you identify which measure of central tendency is appropriate for each variable? Again, you need to identify first what the level of measurement the data is before identifying the measure of central tendency that is appropriate to use. The table that follows summarizes the answer of Activity 4.

Data	Level of Measurement	Appropriate Measure of
		Central Tendency
1.Math 10 final grades	Interval	Mean or Median
2.Shoe size	Interval	Mode
3.Internet Provider	Nominal	Mode
4.Rank of Performance	Ordinal	Median
5.Allowance	Ratio	Mean or Median

In addition, to obtain a correct answer in Activity 4, we should be guided in our discussion that mean should be used for interval or ratio variable, median should be used for ordinal, internal or ratio variable and mode can be used for any data. But for shoe size in item 2, what do you think is the reason why mode is more appropriate even if it is an interval variable? In choosing an appropriate statistical measure to use, we should also consider the purpose why those data were collected. In item 2 of Activity 4, manufacturer/seller/ donor of shoes is interested on a report of shoe sizes of target users. This is their basis on the number of shoes to produce/sell/ purchase. Thus, if the mode of shoe size is 7.5, then they will manufacture/ stock more shoes of size 7.5.

Going back to **Case B**, can we directly say what measure of central tendency was used in computing for the average Math performance? Math performance is an interval variable. However, we must remember that for an interval variable mean or median could be used. Mean is recommended to use when there is no outlier, while median is recommended to be used when there is an outlier. Since we are not sure if there is an outlier or none, we can assume that the average was obtained using either mean or median.

Measures of Variability

In conducting a research, measures of variability are also of great help. If average describes the center of a distribution, the variability describes the spread of the data. Lower variability means more consistent or closer values in the distribution, conversely, higher variability means the values or scores are farther or more scattered in the distribution.

Considering **Case C**, the three students really have equal typical performance in Mathematics since they have equal mean. However, if we include their measures of variability, we will have additional interpretation.

The ranges tell us that the distances between the highest and lowest scores of Student A, Student B and Student C are 5, 2, and 9, respectively. This implies that the scores of Student B are closer to each other as compared to the scores of Student A and the scores of Student C.

For both variance and standard deviation, Student B has the lowest value and student C has the highest value. This means that the individual scores of Student B are closer from the mean as compared to the individual scores of Student A and Student C. The individual scores of Student C are farther from the mean as compared to the individual scores of Student A and Student B. This implies that among the three students, Student B has the most consistent scores as compared to the scores of Student A and the scores of Student C.

Another that we should note regarding measures of variability is that the **range** is used if one desires to have a rough estimate measure of variability with the quickest possible time for a set of data. **Standard deviation** is the measure of the spread of the scores in the distribution. It is the most reliable measure of dispersion or variability. Also, **variance** and **standard deviation** are closely related values. *The key difference is the standard deviation has the same unit with the unit of the original values*. With this, a standard deviation of 3 indicates that a data/value in the distribution is at most 3 standard deviation units away from the mean.

Measures of Position

Measures of position can give us a way to see where a value in a distribution of data falls. In **Case D**, answering 95% of the test items correctly does not automatically mean that you belong to the top 5% examinees or your percentile rank is 95. A 95-percentile rank means that 95% of the examinees obtained scores equal to or lower than your score.

In addition, a percentile rank is normally utilized in standardized tests. It is used to identify the percentage of examinees who scored below a standard. For instance, learners who will enroll in STEM strand, Sports track, and arts and designs strand utilize the NCAE results. One criterion set by DepEd for entry in the STEM Strand for Senior High School is to obtain at least 85 percentile rank in the STEM subtest. While at least 51 percentile rank in the corresponding subtest for Sports track, and arts and designs track.

Lastly, measures of position can tell us whether a value is near the average, unusually high or unusually low. For instance, an employer can make an analysis on the status of the latest annual performance of his employees. He can compare the latest ratings of his employees with the annual performance ratings of employees in the previous years. If he is interested with the 50% of the employees with performance rating which is either high or low, then the 1st and 3rd quartiles of the ratings must be computed. But if what is desired is the 20% of the employees with extremely high or extremely low performance ratings, then the ninth decile or 90th percentile and the first decile or 10th percentile must be computed.

After which, he can interpret the current ratings using the 1st and 3rd quartiles as bases. In the event that there are ratings far above the 3rd quartile, then we can say that there are employees who showed an outstanding performance. However, if there are ratings far below the 1st quartile, then there are employees who showed an unsatisfactory performance.



Here are some of the applications of the different descriptive measures. In case you do not know what to do, just go over the discussions in the "What is It" section of this module and your notes.

As a statistician, your immediate supervisor wants you to describe the data on surveys or reports from different agencies. Your little sister is willing to help you compute as long as you identify what descriptive measure to use. Thus, you need to identify what appropriate descriptive measure to be used on the following survey results. A. Determine what data are used in making the following reports. Choose whether frequency or relative frequency.

1. Report on smartphones with the least satisfactory rating so that the seller has a basis on what phone to sell.

2. Report on enrollees per grade level in DepEd Schools to be used as a basis of each Schools Division Office on the number of modules to be distributed.

3. Report on COVID-19 cases per province so that the National Government will have a basis on how to divide a budget for COVID -19 cases to different provinces.

B. Determine which measure of central tendency is appropriate to use in making the following reports.

4. Daily Meal Allowance of learners in a school to be used by the canteen manager to plan for a daily menu.

5. Daily waste material of a community during the month of January.

6. Daily profit of a company for each month from March to December 2020 to determine the least productive month during the COVID-19 pandemic.

7. Answers of learners on the survey whether they prefer something sweet/salty/bland taste for their snacks. This will be used by the canteen manager on what snack to prepare.

C. Determine which measure of variability is appropriate to use in making the following reports.

8. Variation of the daily profits of a company during the first quarter of a year.

9. A rough estimate of the variation of the allowances of 10 students in your section.

D. Determine which measure of position is appropriate to use in the following cases.

10. Report on the specific ranks of billionaires worldwide.

11. Creating homogenous sections for the 350 incoming grade 10 students with ideal number of students per section.

12. Determining the cut-off point or score of 50 applicants if only 14 of them are to be hired.



What I Have Learned

Complete the table by identifying the specific descriptive measure described by each of the following statements.

Purpose	Descriptive Measure		
1. It describes how often a value occurs in the distribution.			
2. It is the typical value of the data in the distribution.			
3. It describes how far the data/ values are in the distribution.			
4. It is point in the distribution that is described in terms of the percentage of the scores that fall below it.			
5. A measure of central tendency that is best for asymmetrical distribution.			
 A measure of position that divides the distribution into ten equal parts. 			
7. It is known as the measure of popularity.			
8. It is a measure of central tendency with the lowest reliability.			
9. It is known as the center of gravity of the distribution.			
10.It is the square root of the average of the squared deviations that are usually take from the mean.			
11.It indicates the chance of the occurrence of a data in the distribution.			

12.It gives a rough estimate of the spread of the data in the distribution.	
13.A measure of central tendency that is possible to use for any level of measurement except the nominal variable.	
14.A measure of central tendency that gives each score equal weight.	
15.It is the average of the squared deviations that are usually take from the mean.	
16.A measure of central tendency that depends on the highest frequency.	
17.A measure of position that divides the distribution into four equal parts.	
18.It is used in comparing two or more groups in terms of typical performance.	



What I Can Do

There are a lot of examples that show how descriptive measures are applied in real-life situations. For instance, your school is making a report on the Final Grades of learners enrolled in a school year. The report can be used as one of the indicators on the achievement of the school.

To give you an idea how your school uses your Final Grades, do the activity that follows.

There is Math Around Us

The following are Final Grades of Grade 10 learners of Section A and Section B.

Section A Final Grades	90, 85, 90, 88, 82, 91, 89, 90, 91, 83
Section B Final Grades	82, 94, 84, 87, 90, 90, 92, 93, 81, 86

- 1. Solve for the average of the Final Grades of the learners in a. Section A? b. Section B?
- Compute the standard deviation of the learners' Final Grades in a. Section A
 b. Section B.
- 3. Based on the results of items 1 and 2, which section performed better? Why? Which section performed more consistently? Why?



Directions: Read and answer each item carefully then write the letter of the correct answer on your answer sheet.

- 1. Which of the following statements is INCORRECT?
 - a) Relative frequency is the ratio of the number of the occurrence of a data to the total number of occurrences of all data in the whole distribution.
 - b) Frequency is commonly used as a basis in determining the mode of the distribution.
 - c) Frequency is randomly picked number assigned to data in a distribution.
 - d) Frequency is the number of the occurrence of data in the distribution.
- 2. Which of the following uses relative frequency to present a data?
 - a) Report on the out of school youth in a barangay. This will be the basis of DSWD on what projects to propose.
 - b) Report on the male and female children per age in a Lingap Center to be given to interested donors.
 - c) Report on the satisfactory rating of internet service providers for reference of users.
 - d) Report on preferred mode of learning in preparation for the opening of classes.
- 3. Which of the following is NOT recommended in dealing with the academic achievement?
 - a) Use mean in finding the average grades of learners if there are no outliers.
 - b) Use median in finding the average grades of learners if there are outliers.
 - c) Use mode in reporting the number of academic achievers.
 - d) Use mode in finding the average grades of learners.
- 4. Which of the following is CORRECT about the levels of measurement?
 - a) Zero in the ratio level is used as a placeholder.
 - b) Data in a nominal variable follow definite order.
 - c) Zero in the interval level represents non-existence of something.
 - d) Data in an ordinal variable can be classified aside from being ordered.

- 5. Which of the following levels of measurement allows data to be arranged in an increasing or decreasing order but there is no quantitative distance between them?a) Nominalb) Ordinalc) Intervald. Ratio
- 6. Which of the following is NOT an example of a nominal variable?
 - a) Gender b. occupation c) age d. blood type
- 7. Which of the following sets of data appropriately uses median in computing the average?

aj	17, 10, 19, 20, 21	CJ 21, 20, 29, 29, 25
b)	70, 80, 90, 100, 800	d) 36, 37, 38, 39, 40

- 8. Which of the following measures of central tendency is best to use in computing the average age of grade 10 students in a certain school?a) meanb) medianc) moded) none of these
- 9. Which of the following uses mean to find for its average?a) waistlineb) rankc) colord) civil status
- 10. Which of the following is an INCORRECT statement about measures of variability?
 - a) Lower variability means more consistent data.
 - b) Standard deviation is the average distance of the data in a distribution.
 - c) Variance is the negative distance of individual values around the mean.
 - d) Range is the distance between the lowest and highest values in a distribution.
- 11. What does a standard deviation of 1 unit indicate?
 - a) The values in the distribution are near to each other.
 - b) The values in the distribution are 1 unit away from the central value.
 - c) The values in the distribution are at most 1 standard deviation unit away from the central value.
 - d) The values in the distribution are at most 1 standard deviation unit to the right of the central value.
- 12. The following table presents the summary of the delivery time in minutes of 3 randomly picked pizza sellers. Which could be the best interpretation one can draw from the given data?

Mean	Range	Variance	Standard Devi	ation
А	10	5	3.16	1.78
В	10	2	0.56	0.75
С	10	9	6.96	2.64

- a) A delivered as fast as B but with more time variation than C.
- b) B delivered as fast as A or C and with the least time variation.
- c) The three sellers delivered pizza consistently at the same time.
- d) C delivered the fastest because it has the highest measures of variability.

13. Which of the following statements is always TRUE?

- a) 99% is equivalent to the 99th percentile.
- b) 99th percentile corresponds to the highest score in the distribution.
- c) 50th percentile is equivalent to the mean of the scores of the examinees.
- d) The score with the 99th percentile means equal to or higher than the 99% of all the scores in the distribution.

- 14. Your College Entrance Examination score is at the 70th percentile. What does this mean?
 - a) You answered 70% of the items correctly.
 - b) You failed in the College Entrance Examination.
 - c) 70% of the examinees scored equal to or lower than your score.
 - d) 69% of the examinees scored equal to or lower than your score.
- 15. It is recorded in your health card that your weight falls in the 6th decile among the Grade 10 learners. What does this mean?
 - a) Your weight is not normal.
 - b) You have a normal weight.
 - c) You are heavier than 60% of the Grade 10 learners.
 - d) You are heavier than 59% of the Grade 10 learners.



Here is another activity for you to apply what you learned about descriptive measures.

Your house is in a community where for a certain reason, has many cases of fire. One action made by the government is to put two fire stations far from each other. Your purok leader asked you to suggest on what station to contact first in cases of emergency. Since the two stations are of equal distances from your purok, you computed for the average response times since the two stations fully operate. Coincidentally, their average response times are equal. Thus, you cannot use this as your basis to report to the purok leader. Your next option is to use the standard deviation, but how will you use it?

	Assessment 1.C 2.C 3.D 12.B 6.C 13.D 14.C 13.D 14.C 13.D 14.C 13.D 14.C 13.D 14.C 13.D 14.C	Additional Activities The station with lower standard deviation of response time is a better choice.	ie learners in ve more ademic than Section B.	hat I Can Do a. 87.9 b. 87.9 b. 87.9 b.4.61 b.4.61 Section A hav Section A hav Section A hav section A hav performance	N 3.
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Answer Key

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