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UNIFIED SUPPLEMENTARY LEARNING MATERIALS
(USLeM)

MATHEMATICS 10
Quarter 4 – Weeks 6&7

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UNIFIED SUPPLEMENTARY LEARNING MATERIALS
Grade 10 Mathematics

I. Expectations:

After going through this module, you are expected to formulate statistical mini-research applying measures of position.

II. Pre – Test:

Directions: Choose the letter of the answer that you think best answers the questions.

1. Branch of Mathematics that deals with the collection, organization, presentation, analysis and interpretation of data.
   A. Geometry B. Statistics C. Algebra D. Trigonometry

2. The set of scores 14, 17,10,22, 19,24,8,12 and 19, the median score is
   A. 17 B. 15 C. 16 D. 13

3. Suppose that 100 test takers took an examination. If 75 students scored lower than 82 and 6 students scored exactly equal to 82, then the percentile rank of the score equal to 82 is
   A. 81% B. 83% C. 85 D. 87%

For items 4-6, please refer to the table below:

Score	Frequency	Cumulative Frequency	Cumulative Percentage (%)
40-45	6	18	100.00
35-39	5	12	66.67
30-34	3	7	38.89
25-29	4	4	22.22

4. In solving for the 60^{th} percentile, the lower boundary to use is
   A.34 B. 34.5 C. 39 D. 39.5

5. What cumulative frequency should be used in solving for the 35^{th} percentile?
   A. 4 B. 7 C. 12 D. 18

6. The 45^{th} percentile is
   A. 33.4 B. 32.7 C. 30.8 D. 35.6

7. The first quartile of the ages of 150 Grade 10 students is 16 years. Which of the following statements is true?
   A. most of the students are below 16 years old
   B. 75% of the students are above 16 years old
   C. 25% of the students are 16 years old
   D. 50 of the students are younger than 16 years

8. A student discovers that his grade on a recent test was 72th percentile. If 90 students took the test, then approximately how many students received a higher grade than he did?
   A. 65 B. 25 C. 72 D. 18

9. If a given score is at the 30^{th} percentile for reference group A and the 60^{th} percentile for reference group B, which of the following is most likely true?
   A. Individuals in reference group B generally performed better on the test than those in group A
   B. A person at the 15^{th} percentile with group A will be at the 30^{th} percentile with group B
   C. A person at the 80^{th} percentile with reference group B will be at the 50^{th} percentile with group A
   D. Individuals in reference group B generally scored lower on the test than those in reference group A

10. If Jocy's score in the National Achievement Test is 150 and is at 67th percentile. The data means
    A. she has answered 67% of the questions correctly on the test
    B. knows 68% of the material covered by the examination
    C. has earned a score better than 67 test takers
    D. has earned a score better than 66% of the persons in his class

11. The number of games won by a famous basketball team each year from the year 2010 to the year 2019 ;20, 25, 20, 45, 35, 50, 35, 45, 30, and 35. Find the difference of the lower quartile and the upper quartile of the data set.
    A. 21.25 B. 26.75 C. 35.50 D. 39.45

12. The rate of an article changed in six consecutive months. Its rate each Month was 16, 13, 11, 8, 18, 3. Find the lower and the middle quartile in the data set.
    A. 8, 12 B. 16, 12.75 C. 6.75, 12 D. 12, 6

13. The owner of a supermarket recorded the number of customers who came into his store each hour in a day. The results were 11, 7, 9, 6, 14, 2, 5, 6, 11, 7 and 8. Find the lower quartile and upper quartile from the data.
    A. 6, 11 B. 9, 12 C. 11, 15 D. 7, 10

14. What is the position of the middle quartile of an ordered data set of 17 values?
    A. 8 B. 10 C. 9 D. 7

15. Find the first quartile for the following ungrouped data set. 88.03, 94.50, 94.90, 95.05, 84,60.
    A. 88.03 B. 89.03 C. 94.50 D. 95.90

III. Looking Back:

Directions: Fill in the blanks with the best answer.

1. _____are values that divide a rank-ordered set of elements into 4 equal parts.
2. When a distribution is divided into ten equal parts, each score point that described the distribution is called a _____.
3. The second quartile or Q_2 is also the _____ for the given set of scores.
4. _____ is the value that divides the ordered data into one hundred parts with the same size.
5. Quartile, decile and percentile are all considered as measures of _____.

IV. Brief Introduction:

Writing a statistical mini research is quite challenging and interesting because the sources of data for statistical analysis are quite numerous. Doing such mini-research will help you appreciate the application of the different measures of position in real life situations.

Some may think that writing a research in Math can be dull, but we to have remember that the world of Mathematics is vivid and wonderful. Mathematics is the universal language that can describe everything and anything; from music to galaxies orbiting each other.

Here are some guidelines that will help you master the task:

1. **Select the topic** – obviously, work can't be written without a topic. Therefore, it is essential to come up with the theme that promises interesting statistics and a possibility to gather enough data for the research.
2. **Data collection** – creating a rough draft of the paper is your chance to save some time and nerves. Once you've done it, you get a clear picture of what to write about and what points should be worked through.
3. **Methodology** – establish the methods of data collection and the results of it. Usually, all main graphs or charts, tables are placed here as a way to convey the results.
4. **Conclusion** – requires only several sentences where you summarize the findings and highlight the importance of the research. You may also include suggestions/recommendations on how to continue or deepen the research of the issue.
5. **Recommendation** - based on the results of your research and indicate the specific measures or directions that can be taken. This is always supported by a strong statistical significance and correlations of results from your research keeping in view the shortcoming of the study.

Example:

Topic: The Mathematical Ability Among Selected Grade 10 Students of XY School for School Year 2020-2021

I – Introduction

This mini-research is about the results of an achievement test in Mathematics given to selected Grade 10 students before the end of the school year. The researchers wanted to know whether the said students were able to pass the given test or not. It is also the purpose of this study to determine the number of students who were able to reach in the 75th percentile.

II – Problem

1. Achievement test of selected Grade 10 students in Mathematics for SY 2020-2021
   a. What is the performance of the selected grade ten students in the given achievement test?
   b. How many students passed the achievement test if the passing score belongs to the 75th quartile?
   c. How many students did not pass the achievement test?

III - Presentation and Discussion of Data

Table 1: Frequency Distribution on the Scores of Selected Gr.10 Students

Score	Tally	F	<cf	CB
90-99	III	3	40	89.5-99.5
80-89	IIII	4	37	79.5 – 89.5
70-79	𝍸 -I	6	33	69.5-79.5
60-69	𝍸- 𝍸-I	11	27	59.5-69.5
50-59	𝍸-III	8	16	49.5-59.5
40-49	𝍸	5	8	39.5-49.5
30-39	III	3	3	29.5-39.5

It can be gleaned from the table that the highest score is 99 and the lowest score is 30. In order to determine the number of students who belong to the 75th percentile, we to have to construct first the frequency distribution table as shown above.

Table 2: Passing Score that Belongs to the 75th percentile

Percentile Class	No. of Students	Lower Boundary	$<cf_b$	Frequency of Percentile class	Class size	75th Percentile
30	40	69.5	27	6	10	74.5

Based from the table, it turned out that the 75th percentile of the given data is 74.5 which imply that 75% of the scores are below 75 and only 25% of the scores are above 75.

IV - Conclusion

Based from the results, it affirmed that the selected Grade10 students' Performance in the given achievement test got a low percent of mastery level because most of the students were not able to be a part in the upper quartile or in the 75th percentile or 75% mastery level.

V - Recommendation

It is therefore recommended to all students to improve their mathematical performance by studying their lessons well, allocate extra time in studying when needed, seek the help of their teachers for clarification of the lesson and the teacher should also be patient enough to extend his/her assistance to his/her students especially these students who were left behind in the given lesson.

V. Activities:

The table shows the scores of 60 students in a 90-item Performance test in Mathematics

SCORES	FREQUENCY	LOWER CLASS BOUNDARY	<cf
81-90	7		
71-80	10		
61-70	15		
51-60	4		
41-50	12		
31-40	6		
21-30	3		
11-20	2		
1-10	1		

1.Complete the table by filling in the values of lower boundaries and less than cumulative frequency. Explain how you arrived at your answers.

2.Find the 3rd quartile. Interpret the result.

VI. Remember:

Recalling the different measures of position and understanding its importance is very much helpful in order to analyze and interpret the given problems precisely and easily.

VII. Check Your Understanding:

A. Let's Try!

Directions: Refer to the given set of data then answer the following questions that follow.

Find the 40^{th} Percentile of the following set of data:

62 52 61 43 57
68 39 56 41 65

Solution:

1. Arrange the data in increasing order:
   _____ , _____, _____, _____, _____, _____, _____, _____, _____, _____
2. Position of P_{40} = _____
3. P_{40} = _____
4. This means that _____

B. Based from Research!

The data on the distances traveled by 150 participants in the fund-raising marathon "Helping Hands-All for Love" is given by the following table.

Distance (in km)	Frequency (f)
19-21	12
16-18	17
13-15	26
10-12	32
7-9	29
4-6	18
1-3	16

Directions: Formulate a mini-research by solving for the value of the 3^{rd} decile and 85^{th} percentile. Interpret the results comprehensively.

The contents of your mini-research should consist of the following:

1. Title
2. Introduction
3. Problem
4. Presentation and discussion
5. Conclusion
6. Recommendation

Points will be based from the given rubric:
The rubric should be well discussed by the teacher.

TEACHER'S RUBRIC IN ASSESSING STUDENTS' PERFORMANCE

Criteria	Proficient (4)	Approaching Proficient (3)	Developing (2)	Beginning (1)
Integration of knowledge	The paper demonstrated that the students fully understand and have applied concepts learned in the course. The writers provide concluding remarks that show analysis and synthesis of ideas	The paper demonstrated that the students for the most part understand and have applied concepts learned in the course. Some of the conclusions however, are not supported in the body of the paper.	The paper demonstrated that the students, for a certain extent, understand and has applied concepts learned in the course.	The paper did not demonstrate that the students have fully understood and applied concepts learned in the course.
Topic Focus	The topic is focused narrowly enough for the scope of this assignment. The research study provides direction for the paper, either by statement of a position or hypothesis.	The topic is focused but lacks direction. The paper is about a specific topic but the writers have not established a position.	The topic is too broad for the scope of this assignment	The topic is not clearly defined.
Depth of Discussion	In-depth discussion is evident in all sections of the paper.	In-depth discussion is evident in most sections of the paper.	The students have omitted pertinent content.	The paper lacks in-depth discussion in all sections of the paper.
Cohesiveness	Ties together information from all sources. Paper flows from one issue to the next without the need for the headings.	For the most part, ties together information from all sources. Paper flows with only some disjointedness.	Sometimes ties together information from all sources. Paper did not flow, disjointedness is apparent.	Does not tie together information. Paper does not have a good flow.
Spelling and Grammar	No spelling/ or grammar mistakes	Minimal spelling/or grammar mistakes.	Noticeable spelling or grammar mistakes.	Unacceptable number of spelling and/or grammar mistakes.

VIII. Post-test

Direction: Read each item carefully. Choose the letter that you think best answers the question.

1. Measures of position that are natural extension of the median that divide a distribution into four equal parts.
   A. Quantiles B. Quartiles C. Deciles D. Percentiles

2. The set of scores 19, 24, 8, 12 ,19,14,17, 22 and 10, the median score is
   A. 13 B. 15 C. 16 D. 17

3. In a group of 55 students taking the 50-item test, Liza obtained a score of 38. This implies that her score is
   A. Below the 3rd decile C. at the upper quartile
   B. Below the 50th percentile D. the 40th percentile

   For items 4-6, please refer to the table below:

   Scores of 30 Students in a Math Test

Score	Frequency	<cf
70-79	2	30
60-69	3	28
50-59	2	25
40-49	7	23
30-39	9	16
20-29	7	7

4. In solving for the 3rd decile, the lower boundary to use is
   A.29.5 B. 30.5 C. 39.5 D. 40.5

5. What cumulative frequency should be used in solving for the first decile?
   A. 7 B. 16 C. 23 D. 25

6. The 68th percentile is
   A. 100.36 B. 101.36 C. 102.36 D. 103.36

7. In a 70-item test, Arus got a score of 50 which is the third quartile. This means that
   A. His score is higher than 25% of her classmates
   B. He surpassed 75% of her classmates
   C. 75% 0f the class did not pass the test
   D. He got the highest score

8. A student discovers that his grade on a recent test was 73th percentile. If 90 students took the test, then approximately how many students received a higher grade than he did?
   A. 65 B. 25 C. 72 D. 18

9. The median score is also the _____.
   A. 1st Quartile C. 50th Percentile
   B. 3rd quartile D. 3rd decile

10. David's score in a 75-item test was the median score. What is his percentile rank?
    A. 25th B. 35th C. 45th D. 50th

11. The 50th percentile is equivalent to _____.
    A. Mean score C. 5th decile
    B. 2nd quartile D. all of the above

12. The rate of an article changed in six consecutive months. Its rate each month was 19,16, 13, 11, 8, 18, 3. Find the lower and the middle quartile in the data set.
    A. 8, 13 B. 16, 12.75 C. 6.75, 13 D. 13, 6

For numbers 13-15. Refer to the given table below.

Class Boundaries	Frequency	<cf
85.5-90.5	6	6
90.5-95.5	4	10
95.5-100.5	10	20
100.5-105.5	6	26
105.5-110.5	3	27
110.5-115.5	1	30

13. what is the cumulative frequency below for the second quartile?
    A. 6 B. 12 C. 10 D. 20

14. What is the value of Q_2?
    A. 98 B. 90 C. 88 D. 101

15. what is the value of the first decile?
    A. 98 B. 90 C. 88 D. 101

ANSWER KEY:

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

PRE -TEST					
1.	B	6.	C	11.	D
2.	D	7.	B	12.	A
3.	C	8.	B	13.	C
4.	A	9.	C	14.	A
5.	A	10.	D	15	C
Looking Back			Check Your Understanding		
1.	Quantiles		1.	39,41,43,52,56,57, 61,62,65,68	
2.	Deciles				
3.	Median		2.	4.4	
4.	Percentile		3.	54	
5.	position		4.	40% of the data falls below 54.	