Republic of the Philippines
Department of Education
NATIONAL CAPITAL REGION
Misamis Street, Bago-Bantay, Quezon City

UNIFIED SUPPLEMENTARY LEARNING MATERIALS
(USLeM)

MATHEMATICS 10
Quarter 4 – Week 8&9

DEVELOPMENT & EDITORIAL TEAM
Writer: Dr. Felisa G. Basijan
Editor: Krystelle R. Dumlao
SDS: Dr. Dominico C. Idanan
ASDS: Dr. Nerissa R. Lomeda
CID Chief: Madeline Ann L. Diaz
SDO EPS (Math): Dr. Emelita D. Bautista
SDO LR: Dr. Gina U. Urquia

UNIFIED SUPPLEMENTARY LEARNING MATERIALS
Grade 10 Mathematics

I. Expectations:

After going through this module, you are expected to use appropriate measures of position and other statistical methods in analyzing and interpreting research data.

II. Pre – Test:

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

1. When you are considering large sets of data, such as thousands of Junior High School entrance exam scores, it is often helpful to separate the data into four equal parts, what do you called this measure of position to be used?
   A. quartiles B. deciles C. percentile D. median

2. The score of Alfred in 9 examinations were 84, 86, 90, 94, 86, 88, 78, 88, and 85. Find the value of Q_2
   A. 88 B. 87 C. 86 D. 85

For numbers **3-5**. The ages of randomly selected teachers in a certain school are:
40, 42, 38, 46, 55, 34, 49, 61, 55, 31, 28, 65, 50, and 27.

3. Find the upper quartile.
   A. 44 B. 46 C. 55 D. 61

4. what is the value of the lower quartile?
   A. 44 B. 34 C. 31 D. 27

5. The value of the interquartile range is ___.
   A. 21 B. 26 C. 34 D. 31

6. Consider the given sets of data:33, 25, 42, 25, 31, 37, 46, 29, 38
   What is the value of the 3rd decile?
   A. 25 B.29 C.40 D.46

7. The median is equivalent to…
   A. The middle quartile (Q_1) C. The sixth decile (D_6)
   B. The 50th percentile (P_{50}) D. The 75th percentile

8. What measures of position divides the distribution into 10 equal parts?
   A. Quartiles B. Deciles C. Percentiles D. Range

9. How many percent corresponds to D7 if you will interpret it?
   A.25% B.50% C.70% D.100%

10. How many percentiles are there in each decile?
    A. 50 B.100 C.10 D.2

11. The measures of location or position are called a/an
    A. quantiles B. quartiles C. variability D. skewness

12. Consider the following data: 15, 13, 6, 5, 12, 22, 50, 18. Determine Q_2
    A. 3 B. 9 C. 14 D. 20

13. The first quartile of the ages of 145 Grade 9 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

14.In an 80-item test, the passing mark is the 3rd quartile. What does it imply?
A. The students should answer at least 60 items correctly
B. The students should answer at least 40 items correctly
C. The students should answer at most 60 items correctly
D. The students should answer at most 40 items correctly

15.Raquel receives a salary of 7th decile. Should she be pleased with her salary? Explain.
A. yes, because most of the employees receive the salary less than hers
B. no, because the salary is not sufficient to her needs
C. yes, because only 30% of the employees receiving salary greater than hers
C. no, because 50% of the employees are receiving the same salary as hers.

III. Looking Back

Directions: Fill in the blanks with the best answer.

1._____ is ninety-nine score points which divide a distribution into one hundred groups so that each group represents 1/100 of the data set.

2.The score points which divide a distribution into four groups is called _____.

3. In quartiles, twenty five percent of the distribution fall below the _____.

4. _____ is the nine score-points which divide a distribution into ten groups.

5. In quartiles, seventy five percent of the distribution fall below the _____ .

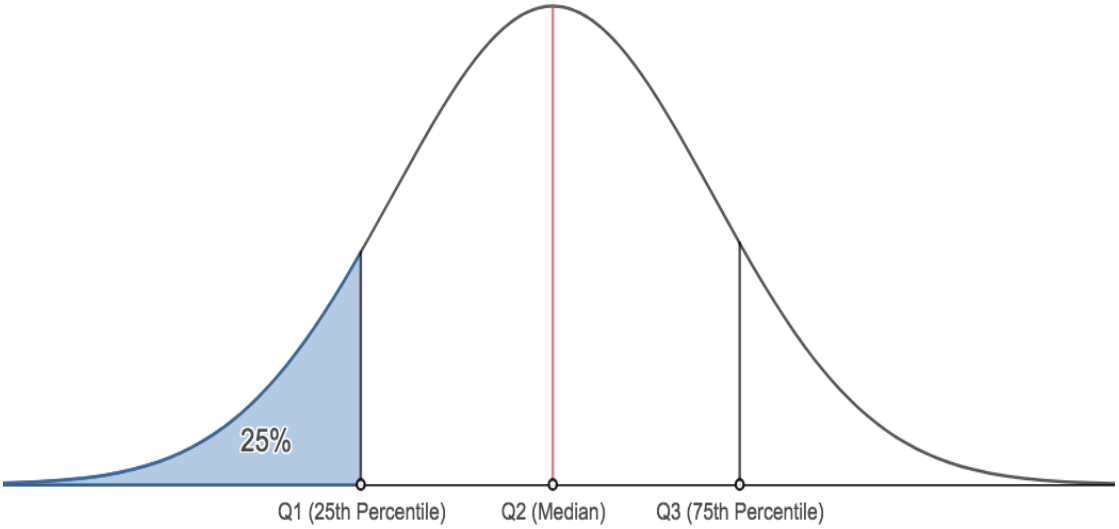
IV. Brief Introduction:

Measures of position give us a way to see where a certain data point or value falls in a sample or distribution. A measure can tell us whether a value is about the average, or whether it's unusually high or low. Measures of position are used for quantitative data that falls on some numerical scale. Sometimes, measures can be applied to ordinal variables— those variables that have an order, like first, second…fiftieth. Measures of position give a range where a certain percentage of the data fall.

A common application of percentiles is their use in determining passing or failure cutoffs for standardized exams. If you have a 95th percentile score then you are at or above 95% of all test takers.

The median is the value where fifty percent or the data values fall at or below it. Therefore, the median is the 50th percentile.

We can find any percentile we wish. There are two other important percentiles. The 25th percentile, typically denoted, Q1, and the 75th percentile, typically denoted as Q3. Q1 is commonly called the **lower quartile** and Q3 is commonly called the **upper quartile**.



Example #1. The final exam scores of 18 students are 24, 58, 61, 67, 71, 73, 76, 79, 82, 83, 85, 87, 88, 88, 92, 93, 94, 97. Find the five-number summary of the final exam scores. Interpret the values.

Minimum score: 24
Maximum score: 97
$Q_1 = 70$
Median = 82.5
$Q_3 = 89$

Interpretations:
25% of the students scored a 70 or below.
50% of the students scored above 82.5
75% of the students scored 89 or below. We can also say that
25% of the students scored at least an 85.

Example #2. Trisha's teacher summarized the achievement test results of her class. If Trisha belongs to this class and her score is 76, does she belong to the upper 25% of her class?

Score	Frequency	<cf
90-99	3	40
80-89	4	37
70-79	6	33
60-69	11	27
50-59	8	16
40-49	5	8
30-39	3	3

To determine whether Trisha belongs to the upper 25% of her class, we must find Q_3, which is the value below which 75% of the scores fall.

Since($\frac{k}{4}$) $n = (\frac{3}{4})$ 40 = 30, then the 3rd quartile class is the interval 70-79.

We then substitute the values $LB_k = 69.5$, $cf_b = 27$, $f_k = 6$ and I = 10 into the

Formula for quartiles;

$$Q_3 = 69.5 + \left[\frac{30-27}{6}\right](10)$$

$$= 69.5 + 5$$

$$Q_3 = 74.5$$

This means that 75% of the scores are less than 74.5, Since Trisha's score

Is 76, she belongs to the upper 25% of her class.

V. Activities:

A. The ages of the best actress winners for the last 25 years are listed below.

25, 26, 28, 30, 30, 30, 31, 32, 32, 32, 33, 35, 35, 36, 37, 40, 40, 41, 41, 44, 48, 48, 60, 73, 80

Answer the following:

1. What is the range of the given data?

2. What is the middle age of the award winners?

3. Find the value of the upper quartile or the median of the upper half of the ages?

4. What is the lower quartile or the median of the lower half of the ages?

B. The table below shows the scores of 110 students in an achievement test

Score	Frequency	<cf
50-54	10	10
55-59	3	13
60-64	8	21
65-69	13	34
70-74	17	51
75-79	19	70
80-84	22	92
85-89	13	105
90-94	4	109
95-99	1	110

5.what is the frequency of the thirty fifth percentile?

6. what is the class size of the given distribution?

7. what is the thirty fifth percentile?

8. interpret your results.

VI. Remember:

1. Percentiles are measures of position, denoted $P_1, P_2, \ldots, P_{99}$ which divide a set of data into 100 groups with about 1% of the values in each group.

2. Quartiles are measures of position or location, denoted Q_1, Q_2, and Q_3 which divide a set of data into four groups with about 25% of the values in each group.

3. Deciles are measures of position, denoted $D_1, D_2, \ldots, D_9$ which divide a set of data into ten groups with about 10% of the values in each group.

VII. Check Your Understanding:

Answer the following:

1. The frequency distribution presented below gives the ages of the members of the families in Barangay 143.

Ages	Frequency
81-90	7
71-80	4
61-70	13
51-60	17
41-50	27
31-40	16
21-30	43
11-20	35
1-10	38

a. How many members comprise Barangay 143?

b. What value divides the members into two groups of ages?

c. In which decile or percentile do we find 30% of the members in terms of their ages?

d. If Carlos is one of the members of the community and his age is 56, does he belong to the upper 20% age group?

2. Listed below are recorded speeds (in mi/h) of randomly selected cars travelling on a section of C5 in Metro Manila. That section has a posted speed limit of 65 mi/h. traffic engineers often establish speed limits by using the "85th percentile rule," whereby the speed limit is set so that 85% of drivers are at or below the speed limit.

68 68 72 73 65 74 73 72 68 65 65 73 66 71 68 74 66 71 65 73

59 75 70 56 66 75 68 75 62 72 60 73 61 75 58 74 60 73 58 75

a. Find the 85th percentile of the listed speeds

b. Given that speed limits are usually rounded to a multiple of 5, what speed limit is suggested by these data? Explain your choice.

c. Does the existing speed limit on C5 conform to the 85% percentile rule?

VIII. Post-test

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

1. Deciles are nine partitional values of the data or the given set of observation into ten equal parts. These 9 values are represented by
   A. $D_1, D_2, D_3, D_4, D_5, D_6, D_7, D_8$ and D_9
   B. $Q_1, Q_2, Q_3, Q_4, Q_5, Q_6, Q_7, Q_8$ and Q_9
   C. $P_1, P_2, P_3, P_4, P_5, P_6, P_7, P_8$ and P_9
   D. $B_1, B_2, B_3, B_4, B_5, B_6, B_7, B_8$ and B_9

For items # 2-4. Use the given table below to answer the following questions.

Class	Frequency
2-4	3
5-7	4
8-10	2
11-13	1

2. Calculate the value of the 7th decile
   A.6.5 B.7.5 C.8.5 D.9.5

3. what is the lower boundary of the 7th decile class?
   A.4.5 B. 7.5 C. 10.5 D. 13.5

4. The frequency of the 7th decile class is ___
   A. 3 B. 4 C. 2 D. 1

5. If you were to divide your neighbors' income levels into deciles, which results would be in the 10th decile?
   A. The highest income levels
   B. The average income levels
   C. The lowest income levels
   D. Below average

6. If the student is ranked eight out of ten in a competition, what is the student percentile rank?
   A.20 B.8 C. 80 D.2

7. Find the 85th percentile score in the ff. test results: 98,88,70,75,83,70,66,91,68,76,82
   A.85 B.91 C.88 D.93

8. In a litter of nine kittens, the only orange kitten weighs more than three in the litter and less than the other remaining five. What is the percentile of the orange kittens' weight in comparison to the litter?
   A.55% B.44% C.33% D.22

9. A person who scores the second-highest score of people taking a given exam would be assigned which percentile rank score?
   A. 90% B.85% C.80% D.75%

10. Percentile represents which kind of scale.
    A. ordinal B. interval C. nominal D. ratio

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 middle quartile in the data set.
    A. 12 B. 16 C. 6.75 D. 6

13. The owner of a super market 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 B. 12 C. 11 D. 7

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. Determine the 35th percentile of the scores 7,3,12,15,14,4 and 20.

A. 5.5 B. 4.5 C. 5.5 D. 6.5

ANSWER KEY:

PRE -TEST						POST-TEST						Looking Back	
1.	A	6.	B	11.	A	1.	A	6.	A	11.	A	1.	Percentiles
2.	C	7.	B	12.	C	2.	B	7.	B	12.	A	2.	Quartiles
3.	C	8.	B	13.	C	3.	A	8.	B	13.	A	3.	Q_1
4.	B	9.	C	14.	A	4.	B	9.	C	14.	C	4.	Deciles
5.	A	10.	C	15	A	5.	A	10.	A	15.	A	5.	Q_3
ACTIVITIES				CHECK YOUR UNDERSTANDING									
1.	55	5.	17	1.a.	200	2.a.	74mi/h						
2.	35	6.	5	b.	26.78	b.	A speed of 75mi/h is the multiple of 5closest to P_{85}, but it is probably safer to round down, so that a speed of 70mi/h is the closest multiple of 5 below the 85th percentile						
3.	42.5	7.	70.82	c.	D_3=16.78								
4.	30.5	8.	35% below 70.82	d.	yes	c.	The existing speed limit of 65mi/h is below a speed limit determined by 85th percentile rule, so the existing speed limit does not conform to the 85th percentile rule.						