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DepED
DEPARTMENT OF EDUCATION

Mathematics

Quarter 4 – Module 33
Measures of Position of
Ungrouped Data

ALTERNATIVE DELIVERY MODE
ADM

10

Mathematics
Quarter 4 – Module 33
Measures of Position of Ungrouped Data

DepED

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 is designed and written with you in mind. It is here to indulge you in understanding measures of position specifically of ungrouped data. 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 you.

This module is all about measures of position of ungrouped data, and is sub-tasked into:

1) Quartiles

2) Deciles

3) Percentiles

After going through this module, you are expected to:

1. illustrate the following measures of position: quartile, decile, and percentile,

2. calculate a specified measure of position (e.g. 90th percentile) of a set of data;

3. interpret measures of position; and

4. solve problems involving measures of position.

1
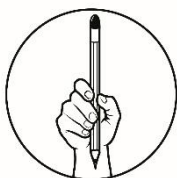
What I Know

PRE-ASSESSMENT

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

1. The median of a given data set is also the _____.

   A. first quartile   C. second quartile
   B. seventh decile   D. None of the above.

2. What measure divides the distribution into ten equal parts?

   A. Median   B. quartile   C. decile   D. percentile

3. The first quartile of the data set is equal to the _____.

   A. 5th decile   C. 50th percentile
   B. 25th percentile   D. 75th percentile

4. What is the median of the scores 6, 8, 11, 25, 15, 10, 2, 8, 16?

   A. 2   B. 6   C. 8   D. 10

5. Using Tukey's Method, what is the first quartile of the following set of values: 12, 15, 22, 23, 34, 8, 19, 17,18

   A. 12   B. 12.5   C. 13.5   D. 15

6. From the given data set in item #5, which number is greater than the third quartile?

   A. 18   B. 19   C. 22   D. 23

7. In the 2019 National Career Achievement Examination (NCAE), Aileen's score in the Mathematics Ability Test is at 90th percentile. What does this mean?

   A. Aileen's score is 90 points.
   B. Aileen scored higher than 89% of the examinees.
   C. Aileen is the 90th in position among all the examinees.
   D. Aileen scored higher than the other 90% of the examinees.

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For items 8 to 12, refer to the table below.

Leading Countries Based on Facebook Usage

Country	Number of users (in millions)
Myanmar	25
Nigeria	27
Germany	28
Argentina	30
Italy	30
France	32
Columbia	35
Turkey	37
United Kingdom	37
Bangladesh	38
Pakistan	38
Egypt	42
Thailand	50
Vietnam	64
Philippines	76
Mexico	89
Brazil	130
Indonesia	140
United States	190
India	290

8. What is the fifth decile of the number of FB users?

   A. 37 million   B. 38 million   C. 38.5 million   D. 40 million

9. What is the 80th percentile of the number of FB users?

   A. 76 million   B. 89 million   C. 130 million   D. 140 million

10. Which country has greater number of users compared to the country in the 40th percentile?

   A. Bangladesh   B. Columbia   C. Turkey   D. United Kingdom

11. Which country has greater number of users compared to the country in the 40th percentile?

   A. Bangladesh   B. Columbia   C. Turkey   D. United Kingdom

12. Which country has lower number of users compared to the country in the 7th decile?

   A. Vietnam   B. Philippines   C. Mexico   D. Brazil

13. Based on the 2018 Family Income Survey in the Philippines on the average annual income of families per region (arranged in ascending order), the third quartile is 308 thousand. What does it mean if the average annual income of families in the Cordillera Administrative Region (CAR) is 354 thousand?

   A. Families in CAR have the highest average annual income among the 17 regions.

   B. Families in CAR earn an average annual income that is higher than at least 13 regions.

   C. Families in CAR earn an average annual income that is higher than at most 13 regions.

   D. Families in CAR earn an average annual income that is less than at least 13 regions.

14. Among the list of top ten countries with the fastest internet speed (arranged in ascending order), Taiwan's internet speed 85.02 Mbps is the ninth decile. What does this mean?

   A. Taiwan has the fastest internet speed.

   B. Another country has the fastest internet speed.

   C. Taiwan has the slowest internet speed among the ten countries.

   D. Taiwan's internet speed surpassed only one country's internet speed.

15. Among the list of selected forty-five countries (arranged in ascending order), UK's social media usage penetration which is 66% is the fifth decile. United States' 70% social media penetration is the sixth decile. The Philippines has 67% social media usage penetration. What does this mean?

   A. The Philippines' percent of social media penetration is higher than 22 counties.

   B. The Philippines' percent of social media penetration is higher than at least 22 counties.

   C. The Philippines' percent of social media penetration is higher than 23 counties.

   D. The Philippines' percent of social media penetration is higher than at least 23 counties.

<table>
<tr><td>**Lesson**
1</td><td>**Illustrates the following measures of position: quartiles, deciles and percentiles**</td></tr>
</table>

What's In

Activity 1

Do you know the most popular Chinese zodiac legend?

According to this legend, the Jade Emperor made an order to designate animals as the calendar signs. The twelve animals that arrive first in the banquet shall be selected. On that day, the rat got up early and rushed to the banquet. On his way, he met the ox and asked the ox to carry him on his back. As the two were approaching the site, the rat slid in front of the ox, and became the first lucky animal of the Chinese zodiac.

Following rat and ox are tiger, rabbit, dragon, snake, horse, sheep, monkey, rooster, dog, and pig.
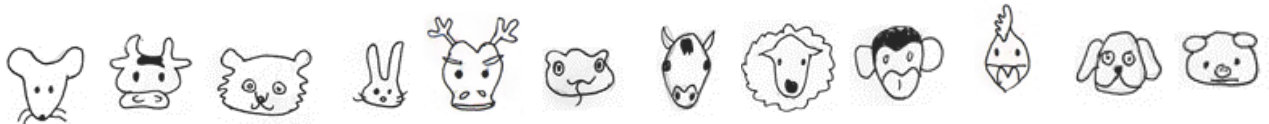
rat   ox   tiger   rabbit dragon snake horse sheep monkey rooster dog   pig

Answer the following questions based on the story.

1) Which of the following belongs to the first 50% that arrived earlier than the rest of the group?

   A. tiger   B. rabbit   C. dragon   D. all of the above

2) Which of the following belongs to the second 50% that arrived later than the rest of the group?

   A. horse   B. snake   C. dragon   D. none of the above

3) Which of the following represents the median?

   A. dragon   B. snake   C. horse   D. none

4) Which of the following belongs to the first 25% that arrived earlier than the rest of the group?

   A. tiger   B. rabbit   C. dragon   D. snake

5) How many percent of the animals arrived later than the tiger?

   A. 25%   B. 50%   C. 75%   D. 100%

Measure of position is a measure by which the position of a data is determined through its value.

From the previous activity, we observed that each animal has a position. Take for example the tiger.

- The tiger belongs to the first 50% or top 50% of the group that arrived earlier than the rest of the animals.

-

rat   ox   tiger   rabbit dragon snake horse sheep monkey rooster dog   pig

50%
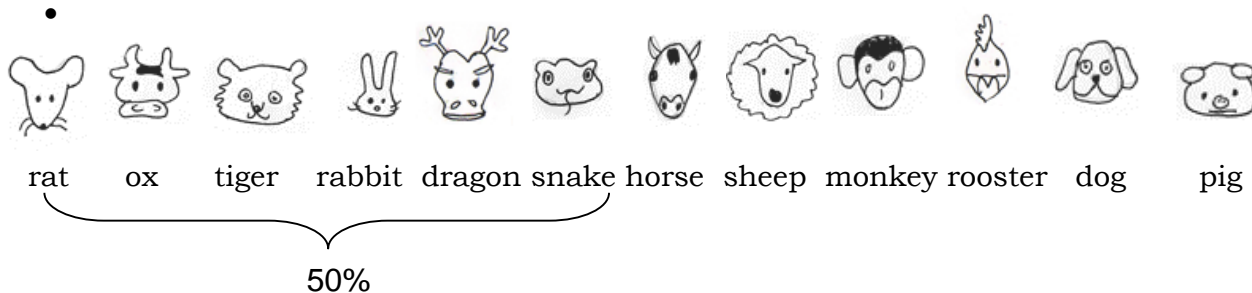
- The tiger belongs to the first 25% or top 25% of the group that arrived earlier than the rest of the animals.

rat   ox   tiger rabbit dragon snake horse sheep monkey rooster dog   pig

25%
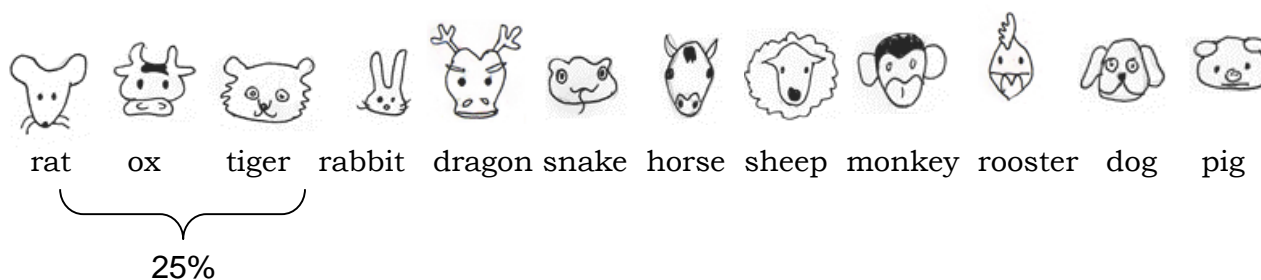
- The tiger arrived earlier than 75% of the animals.

rat   ox   tiger   rabbit dragon snake horse sheep monkey rooster dog   pig

75%
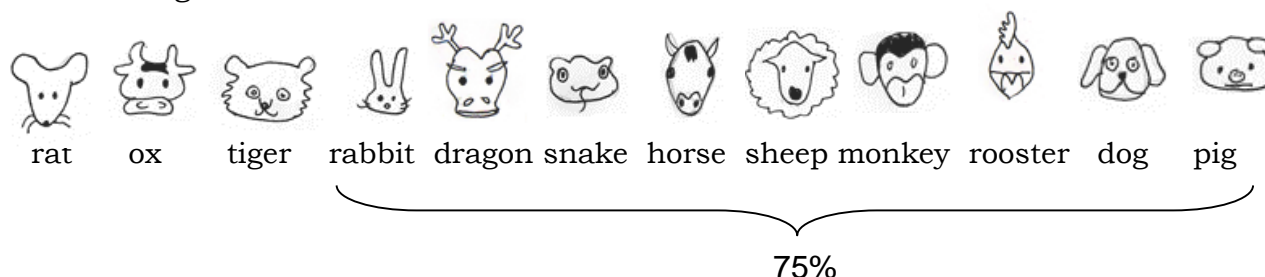
Interestingly, based on this example, we can say that there are several measures that can be used to describe the position of the tiger.

One measure that you had discussed when you were in Grade 7 and Grade 8 was the **median**.

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In applying the concept of median, you arrange all the observations/scores/data in either ascending or descending order. This ordered set is then div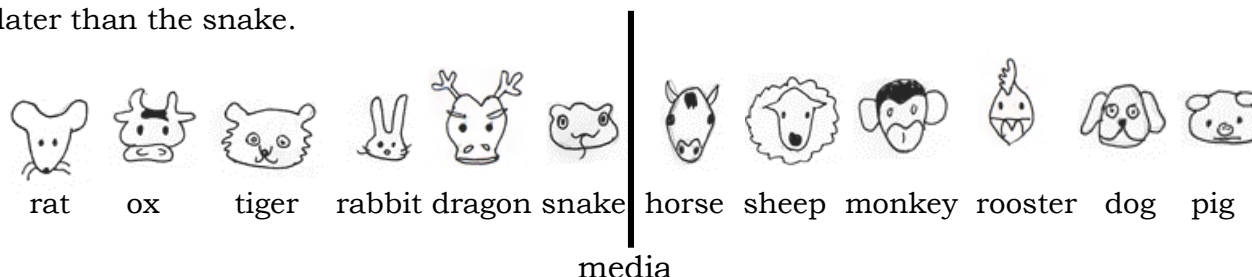ided into two equal parts. The **median** then is the *middle number* that divides the data into two equal parts. Fifty percent of the data is below the median (lower half).

In the story, the median is the snake because 50% of the animals arrived later than the snake.

rat ox tiger rabbit dragon snake | horse sheep monkey rooster dog pig

media

The animals that belong to the first fifty percent of the group that arrived earlier are rat, ox, tiger, rabbit, dragon, and snake. The animals that belong to the fifty percent of the group that arrived later are the horse, sheep, monkey, rooster, dog, and pig.

Let us have a recap on the concept of median. Let us first consider a data set with odd number of values.

Example:

A. In their Physical Education class, seven students practiced shooting the basketball ball from the free throw line for twenty times. Below is the list of the successful shots done by the seven students.

9, 3, 5, 6, 8, 10, 11

Find the median of the data set.

Solution:

First, let us arrange the values in ascending order:

3, 5, 6, 8, 9, 10, 11

Then, find the middle number. Since there are 7 values, the middle is the 4th value counting from either left of right.

3, 5, 6, (8,) 9, 10, 11

Therefore, the median is 8. This means that about 50% of the group has a lower number of successful shots than 8 and about 50% of the group has a higher number of successful shots than 8.

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Let us proceed in finding the median of a data set with even number of values.

Example:

A. In their Physical Education class, eight students participated in throwing the shot put. Below is the list of how far the shot put reached per student.

17, 7, 5, 9, 11, 3, 13, 15

Find the median of the data set.

Solution:

First, let us arrange the values in ascending order:

3, 5, 7, 9, 11, 13, 15, 17

Then, find the middle number. Since there are 8 values, then the middle values are the 4th value from the left and the 4th value from the right.

3, 5, 7, ⑨ ⑪ 13, 15, 17

The median is the mean of the two values.

$$\frac{9 + 11}{2} = \frac{20}{2} = 10$$

Therefore, the median is 10 meters. This means that 50% of the group threw shorter than 10 meters and 50% of the group threw longer than 10 meters.

Say, Hero is one of the students who threw the shot put and his throw reached 15 meters. This means that Hero belongs to the group that threw the shot put farther than 10 meters.

Activity 2

Try this. Below is a table containing the list of fruits high in sugar.

Fruit	Sugar per Cup (in grams)
Apples	13
Passion Fruit	26
Grapes	15
Mangoes	23
Lychee	29
Cherries	20
Bananas	18
Nectarines	11
Pomegranate	24
Kiwifruit	16
Papaya	11
Pears	15
Oranges	17
Peaches	13

Find the median fruit then describe the position of pears.

What's New

Were you able to find the median and the fruit that represents the median in the previous activity?

In the previous activity, we only divided the data set into two equal parts, but we may also divide the data set into more parts of equal sizes such as into four, ten, or even hundred parts. Doing this will require us to compute for **quartiles, deciles, and percentiles,** respectively.
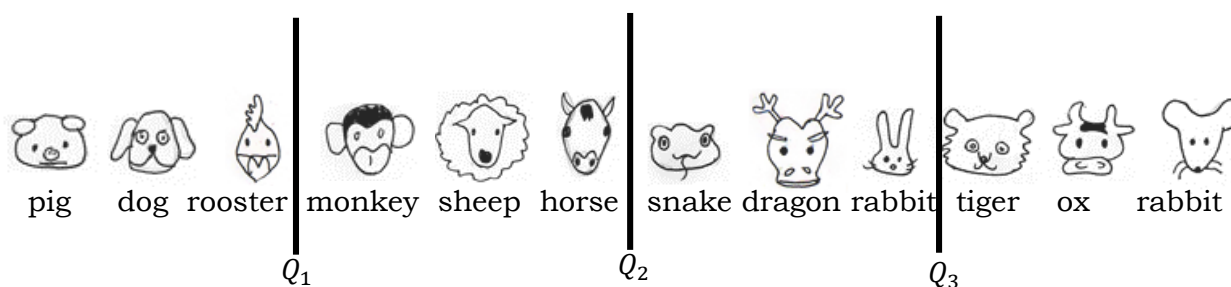
The **quartiles** are values which divide a list of ordered numbers into four equal parts. There are three quartiles which are denoted as Q_1, Q_2, and Q_3.
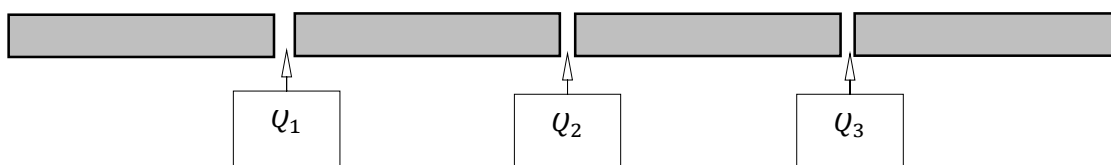
If the data are arranged in ascending order, the second quartile, Q_2, is the median of the data set. This means that 50% of the numbers in the data set lie below Q_2.

The first quartile, Q_1 is the median of the lower half of the data set. This means that 25% of the numbers in the data set lie below Q_1.

The third quartile, Q_3 is the median of the upper half of the data set. This means that 75% of the numbers in the data set lie below Q_3.

| pig | dog | rooster | monkey | sheep | horse | snake | dragon | rabbit | tiger | ox | rabbit |

Q_1 Q_2 Q_3

The quartiles can be interpreted in several ways. For Q_1, we can claim that the pig, dog, and rooster belong to the 25% of the group that arrived latest in the group. The pig, dog, rooster, monkey, sheep, horse, snake, dragon, and rabbit belong to the 75% group that arrived later than the rest of the group.

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Here is an activity for you to discover how to find for the quartiles.

Activity 1

Follow the steps to find the different quartile values.

Eleven students recorded the number of laps of swimming they were able to do in a twenty-five-meter pool. Below is the number of laps they did.

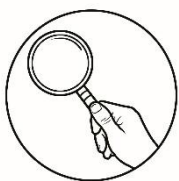6, 8, 5, 4, 3, 2, 2, 6, 1, 9, 7

1. Arrange the values in ascending order.

   _____

2. Identify the median. This is Q_2. $Q_2 =$ _____

3. Identify the lower half of the values.

4. Identify the median of the lower half of the values. This is Q_1.

$$Q_1 = \text{\_\_\_\_}$$

5. Identify the upper half of the values.

6. Identify the median of the upper half of the values. This is Q_3.

$$Q_3 = \text{\_\_\_\_}$$

What is It

The Quartiles for Ungrouped Data

Were you able to accurately determine the different quartiles of the previous activity?

Since Q_2 is equal to the median, the steps in finding for the median of the data set is the same. To find Q_1, we get the median of the lower half. To find Q_3, we get the median of the upper half. This is called the **Tukey's Method**.

Let us try some examples.

Examples:

A. Averina, a shoe store owner, wanted to compare the different brands of shoes. The table below shows her record of the number of pairs of shoes bought from each of the brands in one week. Find Q_1, Q_2, Q_3.
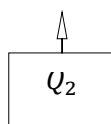
Brand	Quantity
A	8
B	17
C	19
D	21
E	9
F	11
G	18
H	14
I	10
J	5
K	15

1. Arrange the numbers of pairs of shoes in ascending order.

$$5, \ 8, \ 9, \ 10, \ 11, \ 14, \ 15, \ 17, \ 18, \ 19, \ 21$$

2. Identify the median of the number of pairs of shoes. This is Q_2.

$$5, \ 8, \ 9, \ 10, \ 11, \ 14, \ 15, 17, \ 18, \ 19, \ 21$$

$$Q_2$$

$$\therefore Q_2 = 14$$

3. Identify the lower half of the number of pairs of shoes.

$$5, \ 8, \ 9, \ 10, \ 11, \ 14, \ 15, 17, \ 18, \ 19, \ 21$$

$$Q_2$$
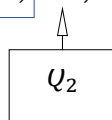
4. Identify the median of the lower half of the number of pairs of shoes. This is Q_1.

$$5, \ 8, \ 9, \ 10, \ 11, \ 14, \ 15, 17, \ 18, \ 19, \ 21$$
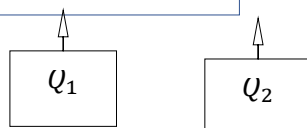
$$Q_1 \qquad Q_2$$

$$\therefore Q_1 = 9$$

5. Identify the upper half of the number of pairs of shoes.
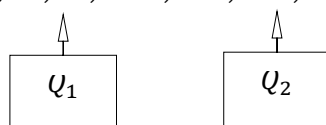
$$5, \ 8, \ 9, \ 10, \ 11, \ 14, \ 15, \ 17, \ 18, \ 19, \ 21$$

$$Q_1 \qquad Q_2$$

6. Identify the median of the upper half of the number of pairs of shoes. This is Q_3.

$$5,\ 8,\ 9,\ \ 10,\ 11,\ 14,\ \boxed{15,\ 17,\ 18,\ 19,\ 21}$$

| Q_1 | Q_2 | Q_3 |

$$\therefore Q_3 = 18$$
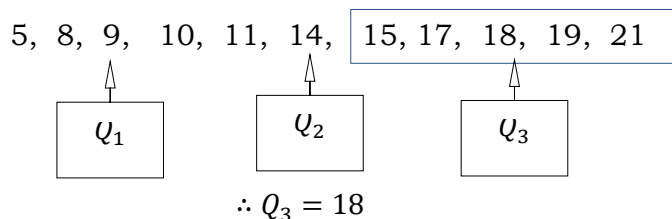
B. Alice wanted to compare the fruits with high water to substitute water to hydrate the body and found the following data. Find Q_1, Q_2, Q_3.

Fruit	Amount of water per cup (in mL)
Watermelon	141
Strawberries	151
Grapefruit	209
Pineapple	142
Peaches	137
Apples	107
Mangoes	138
Papaya	128

1. Arrange the amounts of water per cup in ascending order.

$$107, 128, 137, 138, 141, 142, 151, 209$$

2. Identify the median of the amounts of water per cup. This is Q_2.

$$107, 128, 137, 138, 141, 142, 151, 209$$

Q_2
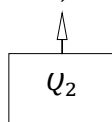
$$Q_2 = \frac{138 + 141}{2} = \frac{279}{2} = 139.5$$

3. Identify the lower half of the amounts of water per cup.

$$\boxed{107, 128, 137, 138,}\ 141, 142, 151, 209$$

Q_2

4. Identify the median of the lower half of the amounts of water per cup. This is Q_2.

$$\boxed{107, 128, 137, 138,}\ 141, 142, 151, 209$$

$$Q_1 \qquad Q_2$$

$$Q_1 = \frac{128 + 137}{2} = \frac{265}{2} = 132.5$$

5. Identify the upper half of the amounts of water per cup.

$$107, 128, 137, 138,\ \boxed{141, 142, 151, 209}$$

$$Q_1 \qquad Q_2$$
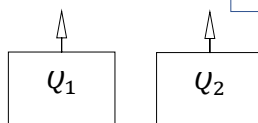
6. Identify the median of the upper half of the amounts of water per cup. This is Q_3.

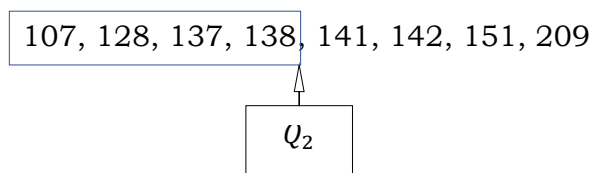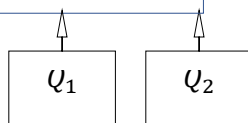$$107, 128, 137, 138,\ \boxed{141, 142, 151, 209}$$

$$Q_1 \qquad Q_2 \qquad Q_3$$
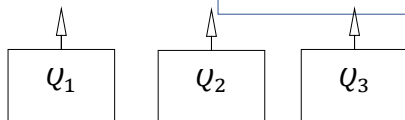
$$Q_3 = \frac{142 + 151}{2} = \frac{265}{2} = 146.5$$

Another method of finding quartiles is the **Mendenhall and Sincich Method**. Given a data set with n number of values, first, we arrange the data in ascending order. Next, we find the position of Q_1, L, in the data set:

$$L = Position\ of\ Q_1 = \frac{1}{4}(n + 1)$$

Then round UP to the nearest integer. Finally, look for the value of the Lth value in the data set.

To find the position of Q_3, the U, in the data set use the formula:

$$U = Position\ of\ Q_3 = \frac{3}{4}(n + 1)$$

Then round UP to the nearest integer. Then look for the value of the Uth value in the data set.

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Example:

Alucard, a coffee shop owner, recorded the number of orders of the different coffee drinks in a day.

Coffee Variation	Number of Orders
Americano	5
Black Coffee	8
Café Au Lait	10
Espresso	9
Double Espresso	2
Latte	5
Macchiato	6
Long Black	7
Cortado	3

1. Arrange the values in ascending order.

    2, 3, 5, 5, 6, 7, 8, 9, 10

2. Locate the position of Q_1 using the formula $\frac{1}{4}(n+1)$ and round up to the nearest integer.

    Since there are 9 values in the data set, n=9.

    $$L = \frac{1}{4}(n+1)$$

    $$= \frac{1}{4}(9+1)$$

    $$= \frac{1}{4}(10)$$

    $$= 2.5$$

    The computed value 2.5 becomes 3 after rounding up.

3. Find the Lth value in the data set.

    Since Q_1 is the 3rd data element,

    2, 3, 5, 5, 6, 7, 8, 9, 10
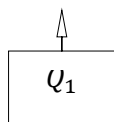
    $\therefore Q_1 = 5.$

4. Locate the position of Q_3 using the formula $\frac{3}{4}(n+1)$ and round up to the nearest integer. We are determining the Q_3, therefore, we make sure that the percentage below the Q_3 that we get should not be less than 75%. That is why, whatever mixed number value of U that you get, it must always be rounded UP.

$$U = \frac{3}{4}(n+1)$$
$$= \frac{3}{4}(9+1)$$
$$= \frac{3}{4}(10)$$
$$= 7.5$$

The computed value 7.5 becomes 8 after rounding up.

5. Find the Uth value in the data set.

Since Q_3 is the 8th data element,

2, 3, 5, 5, 6, 7, 8, 9, 10

Q_3
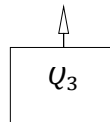
$\therefore Q_3 = 9$.

This method makes sure that by rounding up, the values of Q_1 and Q_3 are actual values from the data set.

The Deciles for Ungrouped Data

The median divides the data set into two equal parts. Quartiles divide the data set into four equal parts. **Deciles**, on the other hand, are values that divide the data set into ten equal parts. There are nine deciles which are denoted as D_1, D_2, D_3,..., D_9.

| D_1 | D_2 | D_3 | D_4 | D_5 | D_6 | D_7 | D_8 | D_9 |
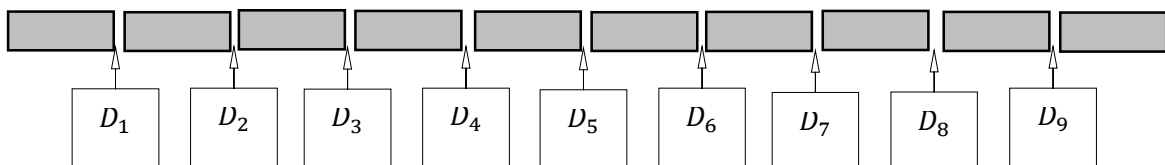
If the data are arranged in ascending order, D_1 would mean that 10% of the data lie below it. D_2 would mean that 20% of the data lie below it.

Deciles are computed in the same way as the quartiles. First, we arrange the data in ascending order. Next, locate the position of the deciles in the data set. To do this, we use the following formula:

$$Position\ of\ D_i = \frac{i}{10}(n + 1)$$

and round UP to the nearest integer. Finally, find the value that corresponds to the computed position.

Example:

A. Mr. Ling is an English teacher. He is interested in the reading speed of his students. The following are the numbers of words his students can read in one minute.

50, 25, 23,30,42, 20, 13, 16,16, 10, 12, 11, 11,11, 19

Find the seventh decile.

1. Arrange the numbers of words read by the students in one minute in ascending order.

10, 11, 11, 11, 12, 13, 16, 16, 19, 20, 23, 25,30,42, 50

2. Locate the position of D_7 using the formula $D_7 = \frac{i}{10}(n + 1)$ and round up to the nearest integer. Since there are 15 values in the data set, then $n = 15$ and we are looking for D_7, then $i = 7$.

$$Position\ of\ D_i = \frac{i}{10}(n + 1)$$
$$Position\ of\ D_7 = \frac{7}{10}(15 + 1)$$
$$= \frac{7}{10}(15 + 1)$$
$$= \frac{7}{10}(16)$$
$$= \frac{112}{10}$$
$$= \frac{112}{10}$$
$$= 11.2$$

The computed value 11.2 becomes 12 after rounding up to the nearest integer.

3. Find the *12th* value in the data set.

10, 11, 11, 11, 12, 13, 16, 16, 19, 20, 23, 25, 30, 42, 50

$$D_7$$
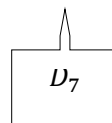
$$\therefore D_7 = 25.$$

B. In Mr. Ling's class, Guinevere finished her exam in just 30 minutes. The time Guinevere spent in answering the test is the 8th decile. What does this mean?

Explanation: So, if the time spent by Guinevere in taking the exam is the 8th decile, it means that 80% of her classmates finished the same test by spending the same amount of time or longer time than her. Or 80% of her classmates answered the test same time as hers or were slower than her.

The Percentiles for Ungrouped Data

The median divides the data set into two equal parts. Quartiles divide the data set into four equal parts. Deciles divide the data set into ten equal parts. Percentiles, on the other hand, divide the data set into one hundred equal parts. There are ninety-nine percentiles which are denoted as P_1, P_2, P_3,..., P_{99}.

| P_{10} | P_{20} | P_{30} | P_{40} | P_{50} | P_{60} | P_{70} | P_{80} | P_{90} |
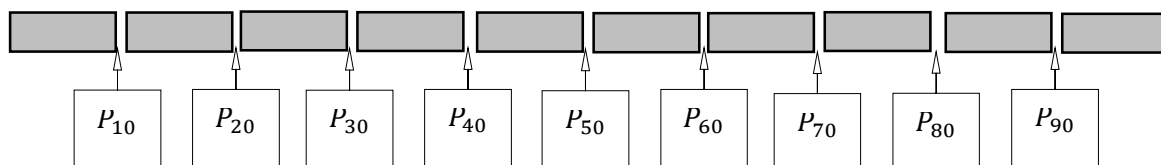
If the data are arranged in ascending order, P_1 would mean that 1% of the data lie below it.

Percentiles are computed in the same way as the quartiles and the deciles. First, we arrange the data set in ascending order. Next, locate the position of the percentiles in the data set. To do this, we use the following formula:

$$Position\ of\ P_i = \frac{i}{100}(n+1)$$

and round UP to the nearest integer. Finally, find the value that corresponds to the calculated position.

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Example:

A. The table below shows the list of the most endangered animals on earth.

Animal	Estimated Maximum Number
Amur Leopard	84
Javan Rhinoceros	68
Northern Right Whale	350
Vaquita	10
Tapanuli Orangutan	800
Mountain Gorilla	1000
Cross River Gorilla	300
Siberian Tiger	562
Little Dodo Bird	380
Tooth-billed Pigeon	70
Gharial	300
Kakapo	140
Fiji Petrel	50
Black Rhinoceros	2500
Malayan Tiger	340

Find the 70th percentile of the numbers of endangered animals.

1. Arrange the values from the least endangered to the most endangered using their given numbers.

 2,500, 1,000, 800, 562, 380, 350, 340, 300, 300, 140, 84, 70, 68, 50, 10

2. Locate the position of P_{70} using the formula $P_{70} = \frac{i}{100}(n + 1)$ and round UP to the nearest integer. Since there are 15 values in the data set, then $n = 15$ and we are looking for P_{70}, then $i = 70$.

$$Position\ of\ P_{70} = \frac{i}{100}(n + 1)$$
$$Position\ of\ P_{70} = \frac{70}{100}(15 + 1)$$

$$= \frac{70}{100}(16)$$

$$= \frac{1,120}{100}$$

$$= 11.2$$

The computed value 11.2 becomes 12 after rounding up to the nearest integer.

3. Find the 12th value in the data set from the left.

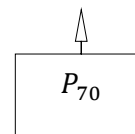2,500, 1,000, 800, 562, 380, 350, 340, 300, 300, 140, 84, 70, 68, 50, 10

$$\therefore P_{70} = 70.$$

P_{70}

This means that the Tooth-Billed Pigeon is more critically endangered compared to 70% of the group of endangered animals.
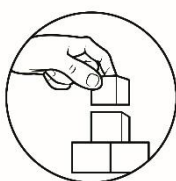
What's More

Let's check your understanding of the lesson. In case you do not know what to do, just go over the discussions in the "What is It" section of this module.

Assessment 1

Below is a table containing the Annual Expenditure per family in the different regions of the Philippines.

Region	Average Expenditure per Family (in thousands)
National Capital Region (NCR)	369
Cordillera Administrative Region (CAR)	230
Region I (Ilocos Region)	205
Region II (Cagayan Valley)	174
Region III (Central Luzon)	270
Region IV-A (CALABARZON)	305
Region IV-B (MIMAROPA)	175
Region V (Bicol Region)	193
Region VI (Western Visayas)	202
Region VII (Central Visayas)	204
Region VIII (Eastern Visayas)	179
Region IX (Zamboanga Peninsula)	162
Region X (Northern Mindanao)	175
Region XI (Davao Region)	189
Region XII (SOCCSKSARGEN)	181
Region XIII (Caraga)	187
Autonomous Region in Muslim Mindanao (ARMM)	127

A. Calculate the following. For Quartiles, use the Mendenhall and Sincich Method.

1. Q_1	2. Q_3	3. D_4
4. D_7	5. P_{45}	6. P_{80}

B. Find, describe, then interpret the position of CAR using percentiles.

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What I Have Learned

Here are the important learnings that you must have to remember in this module:

Measure of position is a measure by which the position of a data is determined through its value.

The measures of position discussed in this module are quartiles, deciles, and percentiles.

Quartiles divide the ordered set of data into four equal parts.

Deciles divide the ordered set of data into ten equal parts.

Percentiles divide the ordered set of data into 100 equal parts.

In finding for the measures of position of a given data set, we always start by arranging the data in either ascending order or descending depending on the variable under study.

Two methods are discussed in finding for Quartiles: Tukey's method and Mendenhall and Sincich Method.

Measures of position are computed in similar manner.
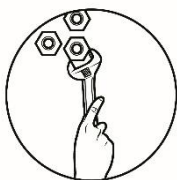
What I Can Do

Activity 1: There is Math Around Us

There are a lot of examples that show how the measures of position are applied in real-life situations. Give utmost 5 examples of real-life situations that use the measures of position. Make sure to briefly explain how these situations use the measures of position.

Assessment

Directions: Read and answer each of the following items accurately. Write the letter
of the correct answer on a separate sheet of paper.

1. Which measure divides the data set or distribution into one hundred equal
   parts?
   A. Median   B. Quartile   C. Decile   D. Percentile

2. The second quartile of the data set is equal to the _____.
   A. Fourth decile   C. 50th percentile
   B. 25th percentile   D. 75th percentile

3. Using Tukey's method, what is the first quartile for the following set of scores?

   9, 11, 8, 9, 9, 14, 6, 5, 3, 16

   A. 5   B. 5.5   C. 6   D. 7

4. From the given data set in item#3, using Mendenhall and Sincich Method, what
   is the first quartile?
   A. 5   B. 5.5   C. 6   D. 6.5

5. Which of the following measures where exactly 25% of the distribution or data
   set are below it?
   A. First Quartile   C. Third Quartile
   B. Second Decile   D. Seventh Decile

For items 6 to 9, refer to the following set of scores obtained by the students in a
Mathematics test.

45, 50, 23, 34, 67, 81, 45, 11, 99, 86, 78, 17, 45, 34, 87, 56, 45

6. What is the D_1 in the distribution?
   A. 11   B. 17   C. 23   D. 34

7. How many scores are higher than the D_3?
   A. 5   B. 8   C. 11   D. 12

8. How many scores are lower than the D_7?
   A. 5   B. 6   C. 11   D. 12

9. What is the P_{36} in the distribution?
   A. 34   B. 45   C. 50   D. 56

10. How many scores are lower than the P_{60}?

    A. 10   B. 11   C. 12   D. 13

For items 11 to 14, refer to the table below.

Countries with the Highest Number of Covid-19 Cases as of July 30, 2020

Country	Total Corona Virus Cases
South Africa	471,123
Brazil	2,555,518
Iran	298,909
Russia	620,333
United States	4,567,750
Mexico	261,457
Peru	395,005
Italy	246,488
Spain	327,690
United Kingdom	301,455
India	1,021,611
Pakistan	276,288
Chile	349,800
Colombia	267,385
Saudi Arabia	270,831

11. What is the Upper Quartile or third quartile of the data?

    A. 261,457   B. 471,123   C. 620,333   D. 1,021,611

12. What is the fifth decile of the data?

    A. 261,457   B. 327,690   C. 395,005   D. 471,123

13. What is the 80th percentile of the data?

    A. 471,123   B. 620,333   C. 1,021,611   D. 2,555,518

14. Which country has a higher number of Covid-19 cases compared to the country in the 40th percentile?

    A. Iran   C. United Kingdom

    B. Pakistan   D. Spain

15. In the 2019 National Career Achievement Examination (NCAE), Esmeralda's score in the Mathematics Ability Test is at 99th percentile rank. What does this mean?

    A. Esmeralda scored the highest.

    B. Esmeralda's score is 99 points.

    C. Esmeralda is the 99th in position among all the examinees.

    D. Esmeralda scored higher than the other 99% of the examinees.

Additional Activities

Here is another activity for you to apply what you have learned. Make an online survey with your classmates. Think of a question that will prompt you and your classmates to give a quantitative data. Find Q_3, D_{10}, and P_{99}. Find your position based on the data values and make an interpretation.

Answer Key

What I Know	What's In	What's New	What's More
1. C	Activity 1	1. 1,2,2,3,4,5,6,7,8,9	**Assessment**
2. C	1. D	2. 5	A.
3. B	2. A	3. 1,2,2,3,4	1. 175 (R-IV-B/R-X)
4. D	3. B	4. 2	2. 230 (CAR)
5. C	4. A	5. 6,6,7,8,9	3. 187 (R-XIII)
6. D	5. C	6. 7	4. 205 (R-I)
7. D			5. 189 (R-XI)
8. B	Activity 2		6. 270 (R-III)
9. B	Orange is the median		
10. C	while pears belong to		B. The average annual
11. A	the lower 50% of the		expenditure of families
12. A	fruits that contain		in CAR is at the 77th
13. B	amount of sugar per		percentile. This means,
14. A	cup."		families in CAR spend
15. C			more compared to 77%
			of the regions.

Assessment

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

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