SECONDARY
JHS

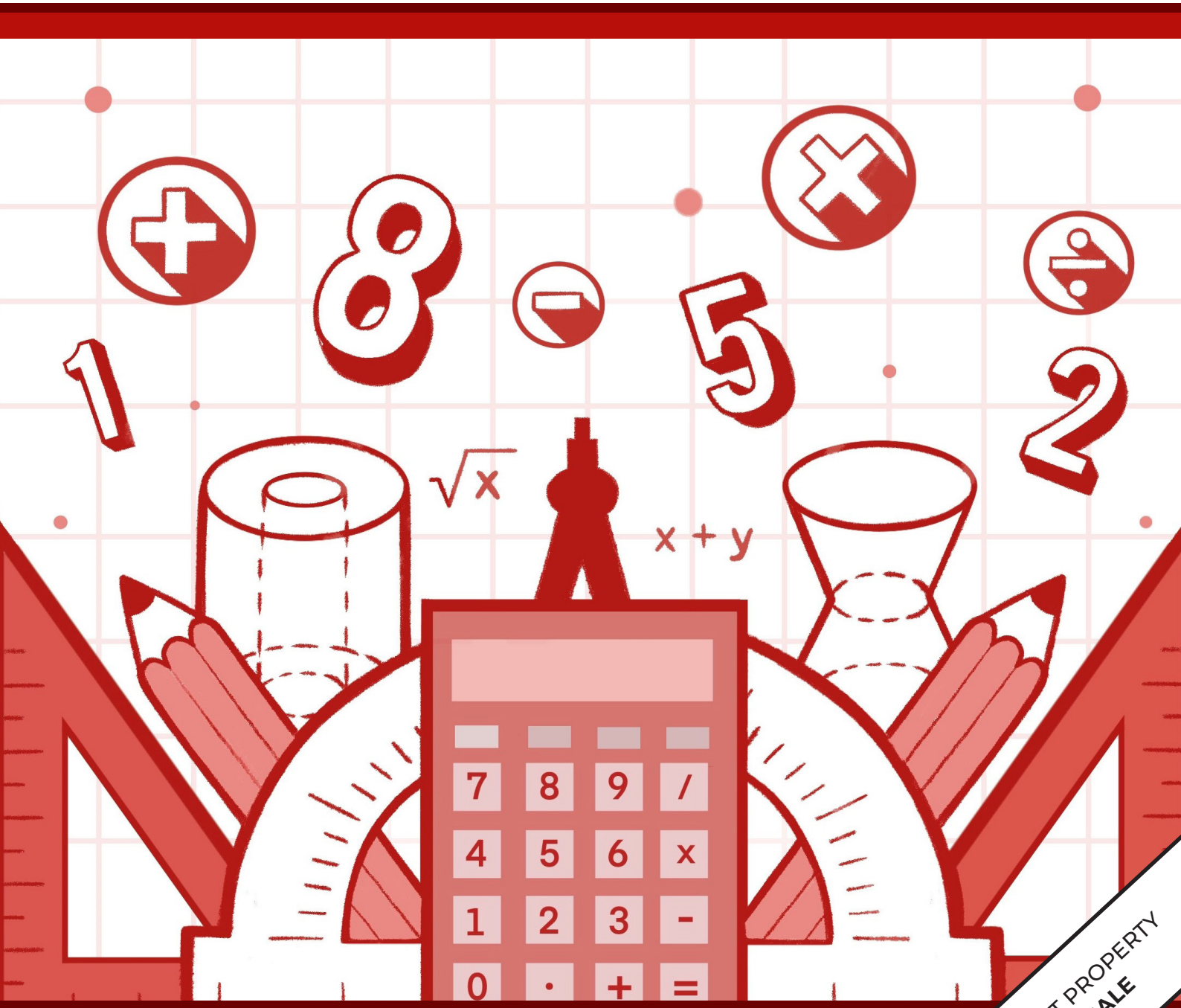
DepED DEPARTMENT OF EDUCATION

ALS Alternative Learning System LIFELONG LEARNING

LEARNING STRAND 3
MATHEMATICAL & PROBLEM-SOLVING SKILLS

MODULE 6: SO THAT'S WHAT NORMAL IS!

ALS Accreditation and Equivalency Program: Junior High School



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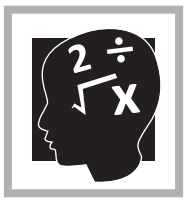
LEARNING STRAND 3



SO THAT'S WHAT NORMAL IS!

MATHEMATICAL AND PROBLEM-SOLVING SKILLS
MODULE 6

ALS Accreditation and Equivalency Program: Junior High School
Learning Strand 3: Mathematical and Problem-Solving Skills
Module 6: So That's What Normal Is!

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User's Guide

For the ALS Learner:

Welcome to this Module entitled So That's What Normal Is! under Learning Strand 3 Mathematical and Problem-Solving Skills of the ALS K to 12 Basic Education (BEC).

This module was designed to provide you with fun and meaningful opportunities for guided and independent learning at your own pace and time. You will be enabled to process the contents of the learning resource while being an active learner.

This module has the following parts and corresponding icons:

 *Let's Get to Know*	This will give you an idea of the skills or competencies you are expected to learn in the module.
 *Pre-assessment*	This part includes an activity that aims to check what you already know about the lesson. If you get all the answers correct (100%), you may decide to skip this module.
 *Setting the Path*	This section provides a brief discussion of the lesson. This aims to help you discover and understand new concepts and skills.
 *Trying This Out*	This comprises activities for independent practice to solidify your understanding and skills of the topic. You may check the answers to the exercises using the Answer Key at the end of the module.
 *Understanding What You Did*	This includes questions that process what you learned from the lesson.
 *Sharpening Your Skills*	This section provides an activity that will help you transfer your new knowledge or skill in real-life situations or concerns.
 *Treading the Road to Mastery*	This is a task which aims to evaluate your level of mastery in achieving the given learning competency.
 *Don't Forget*	This part serves as a summary of the lesson in the module.
 *Explore More*	In this portion, another activity will be given to you to enrich your knowledge or skill of the lesson learned. This also tends retention of learned concepts.
 *Reach the Top*	This part will assess your level of mastery in achieving the learning competencies in each lesson in the module.
Answer Key	This contains answers to all activities in the module.
Glossary	This portion gives information about the meanings of the specialized words used in the module.

At the end of this module you will also find:

References	This is a list of all sources used in developing this module.

The following are some reminders in using this module:

1. Use the module with care. Do not put unnecessary mark/s on any part of the module. Use a separate sheet of paper in answering the exercises.
2. Don't forget to answer the Pre-assessment before moving on to the other activities included in the module.
3. Read the instruction carefully before doing each task.
4. Observe honesty and integrity in doing the tasks and checking your answers.
5. Finish the task at hand before proceeding to the next.
6. Return this module to your ALS Teacher/Instructional Manager/Learning Facilitator once you are through with it.

If you encounter any difficulty in answering the tasks in this module, do not hesitate to consult your ALS Teacher/Instructional Manager/Learning Facilitator. Always bear in mind that you are not alone.

We hope that through this material, you will experience meaningful learning and gain deep understanding of the relevant competencies. You can do it!

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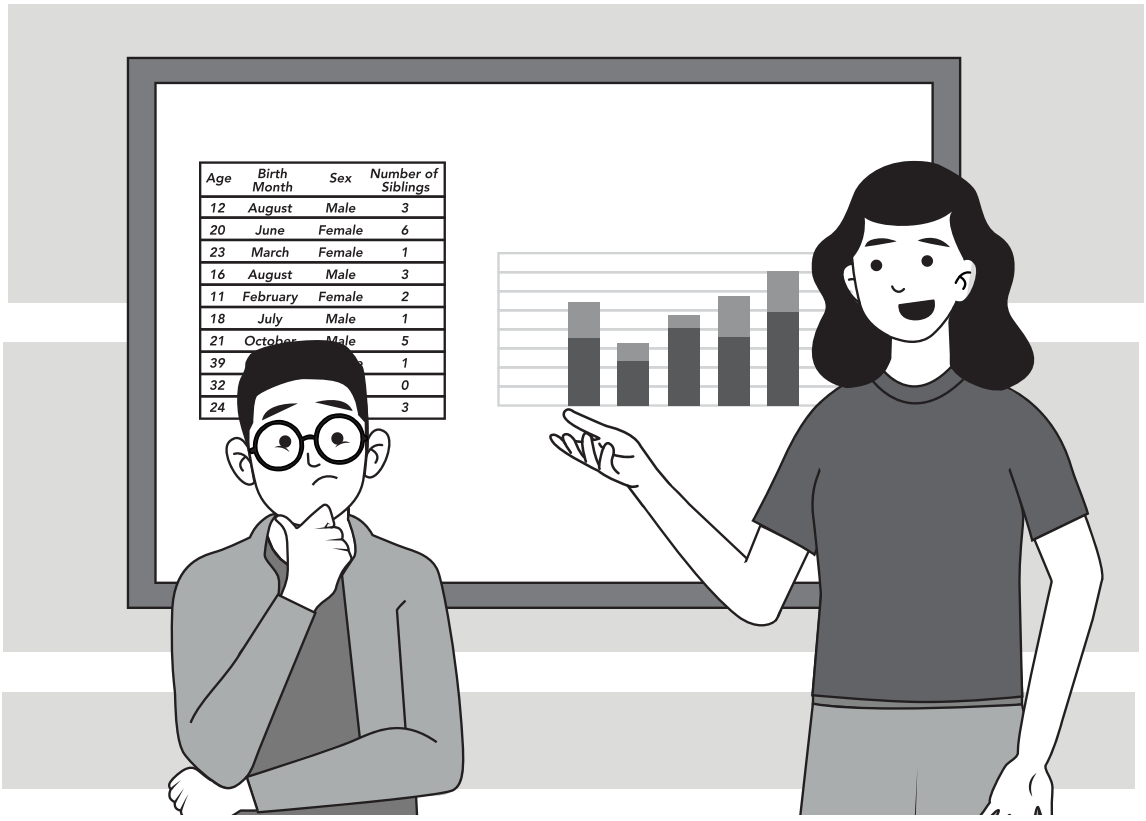
MODULE 6
LET'S GET TO KNOW



Idette was asked by her little brother, Boying, to explain the word "normal" using numbers as he heard from his friends that numbers can tell a lot in describing a situation. Let us help them explore the meaning of "normal" and the different groups of numbers.

MODULE 6
PRE-ASSESSMENT

Choose the letter of the correct answer by writing it on a separate sheet of paper.

1. Which of the following is an example of a continuous variable?

   a. height of a basketball player
   b. number of TV per household
   c. number of pages in a book
   d. number of students in a class

2. The following variables is an example of a qualitative variable, EXCEPT:

   a. gender **b.** hair color **c.** skin type **d.** weight

3. A measure of central tendency is a single value that attempts to describe a set of data by identifying the central position within the set of data. The following valid measures of central tendency, EXCEPT:

   a. mean **b.** median **c.** mode **d.** range

4. It is obtained by summing up the data values divided by the number of data values.

   a. mean **b.** median **c.** mode **d.** range

5. It is obtained by subtracting the highest value to the lowest value of the given data set.

   a. mean **b.** median **c.** mode **d.** range

6. Melissa is a grade 11 student who got 96, 94 and 93, respectively on her three grading periods. What should be her grade on the fourth grading period to attain an average grade of 95?

   a. 94 **b.** 95 **c.** 96 **d.** 97

7. What is the median height of a group of students whose heights are 176, 144.5, 165, 180.7, 169.9, and 159.2 cm?

   a. 165.45 **b.** 166.45 **c.** 167.45 **d.** 268.45

8. In barangay Malibago, 7 of their barangay officials gave contributions in pesos 450, 900, 1100, 1200, 1500, 1950, and 2500 to support a relief distribution program. What is the median contribution?

   a. ₱1,150 **b.** ₱1,175 **c.** ₱1,120 **d.** ₱1,145

9. If the weights in kilogram of a group of employees are 65, 76, 84, 70, 87, and 68, what is the mean weight of these employees?

   a. 73 **b.** 74 **c.** 75 **d.** 76

10. If the range of a set of scores is 27 and the highest score is 56, what is the lowest score?

    a. 28 **b.** 29 **c.** 30 **d.** 31

For items 11–13, refer to the problem below.

A milk tea shop owner wants to find out the sales performance of his three branch stores for the last four months. The table shows their monthly sales in thousands of pesos.

BRANCH A	20	17	23	19
BRANCH B	24	18	25	19
BRANCH C	21	22	19	17

11. What are the average sales in thousands of branches A and C?

    a. 20.15 **b.** 20.25 **c.** 20.35 **d.** 20.45

12. Which branch is best when it comes to sales?

a. branch A **b.** branch B **c.** branch C **d.** both A & B

13. What are the average sales in thousands of the three tea shop branches? Round off if necessary.

a. 20.67 **b.** 21.67 **c.** 22.67 **d.** 23.67

For items 14–15, refer to the data below.

CLASS	FREQUENCY
22–26	1
27–31	3
32–36	4
37–41	5
42–46	4
47–51	3
52–56	2

14. What is the class size?

a. 4 **b.** 5 **c.** 3 **d.** 6

15. What is the value of the median score?

a. 39.5 **b.** 40.5 **c.** 41.5 **d.** 42.5

LESSON 1

SETTING THE PATH

SORTING THROUGH THE NUMBERS

At the end of this lesson, you will be able to:

- organize information collected in a frequency distribution table (LS3MP-SP-PSF-JHS-3); and
- exhibit honesty and accuracy in collecting and reporting mathematical data (LS3MP-NS-PSA-BL/LE/AE/JHS-6).

LESSON 1
TRYING THIS OUT

Your barangay captain is asking for your help in distributing relief goods, but you must first find ten (10) people in your neighborhood and ask permission to get some personal information from them.

Age: _____
Birth month: _____
Sex (Biological): _____
Number of siblings: _____

List the information on a list, like the table below. Do not include their names.

Example:

AGE	BIRTH MONTH	SEX	NUMBER OF SIBLINGS
12	August	Male	3
20	June	Female	6
…	…	…	…

LESSON 1

UNDERSTANDING WHAT YOU DID

VARIABLES AND TYPES OF DATA

The different information that you gathered from people in your neighborhood are called variables. A **variable** is an attribute that can assume different values.

The variables in the activity are *Age, Birth Month, Sex,* and *Number of Siblings.*

> **Data** are the values (measurements or observations) that the variables can assume. A collection of data values forms a **data set.** The list you made has four data sets.

Data are divided into two types: quantitative and qualitative.

- **Qualitative variables** are variables that can be placed into different **categories,** according to some characteristic. Gender is qualitative with two categories male and female. Other examples include religion, hair color, grade level.

- **Quantitative variables** are **numerical** and can be arranged in order or ranked. Age is numerical, and people can be ranked in order according to the value of their ages. Other examples are height, weight, and body temperature.

Examples of Quantitative Variables

In simple terms, qualitative data are **descriptions** of objects, while quantitative data are information that can be **counted** or **measured.**

Let us refer to the sample information list from the activity.

DATA SETS

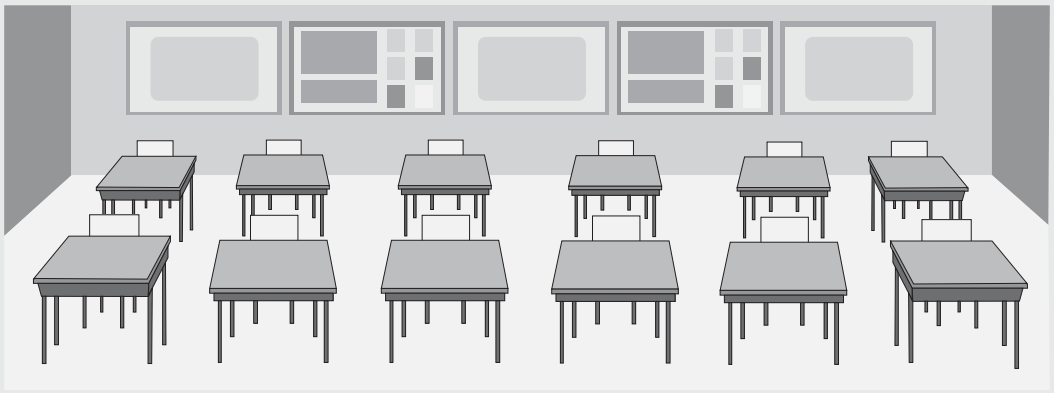
AGE	BIRTH MONTH	SEX	NUMBER OF SIBLINGS
12	August	Male	3
20	June	Female	6
23	March	Female	1
16	August	Male	3
11	February	Female	2
18	July	Male	1
21	October	Male	5
39	June	Female	1
32	August	Male	0
24	November	Female	3

Qualitative : Birth Month, Sex
Quantitative : Age, Number of Siblings

Quantitative variables can be further classified into two groups: discrete and continuous.

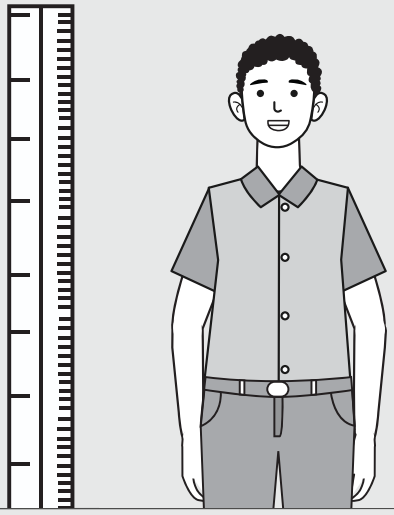
- **Discrete** variables assume values that can be counted by observation.

Examples: number of chairs in a classroom, siblings, fishes caught, picked fruits from a tree, customers in an establishment

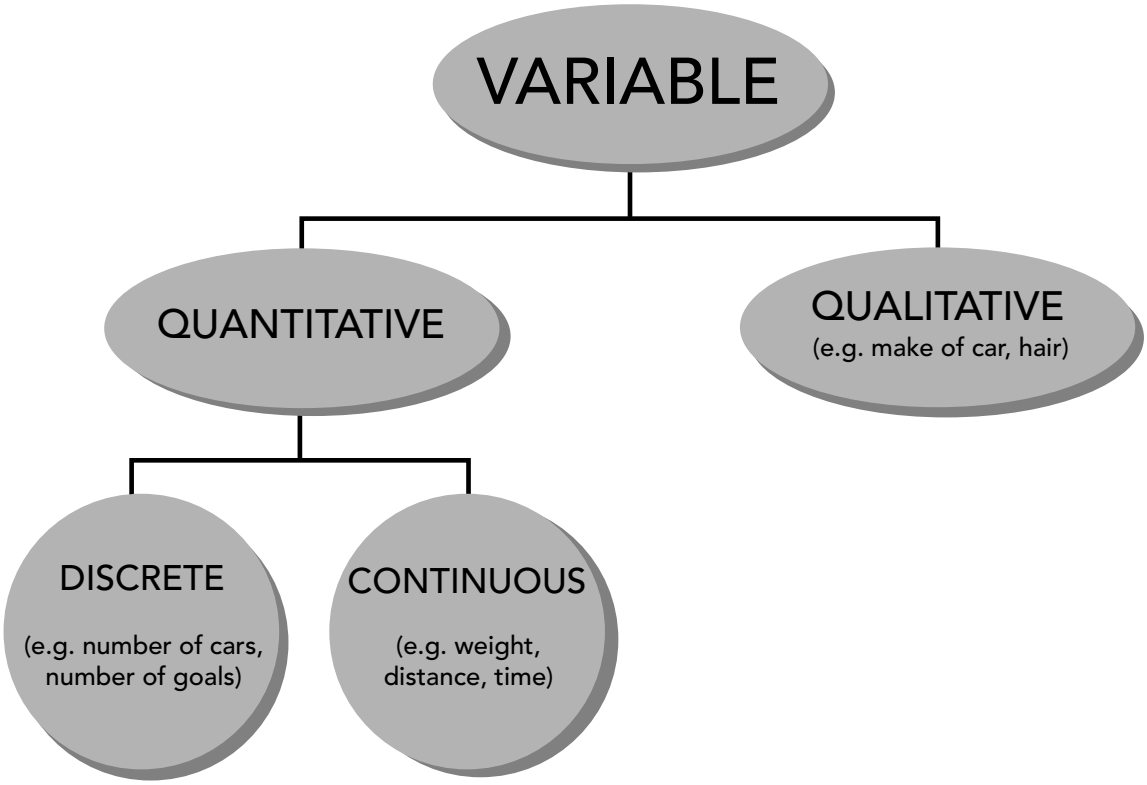


- **Continuous** variables can assume an infinite number of values between any two specific values. They are obtained by measuring and often including fractions and decimals.

Examples: height of a person, weight of palay harvested, and length of lumber measured by a carpenter → ***all needs exact measurement***



Types of variables can be summarized as:



GROUPED AND UNGROUPED DATA

An **ungrouped data** is the raw data that we take from observations and experiments. It is basically a group of numbers listed which is not yet organized in any way. An example is the data set of age.

When an ungrouped data is arranged from lowest to highest (ascending order) and highest to lowest (descending order), it is called an **array**.

Identifying the lowest to highest arrangement gives relative meaning to other numbers on the list.

Example 1. Arrange the data set of ***Age*** in an array.

We list down from the lowest age to the highest age:

array: 11, 12, 16, 18, 20, 21, 23, 24, 32, 39

Example 2. Arrange the data set of ***Age*** in an array.

We list down from the highest age to the lowest age:

array: 39, 32, 24, 23, 21, 20, 18, 16, 12, 11

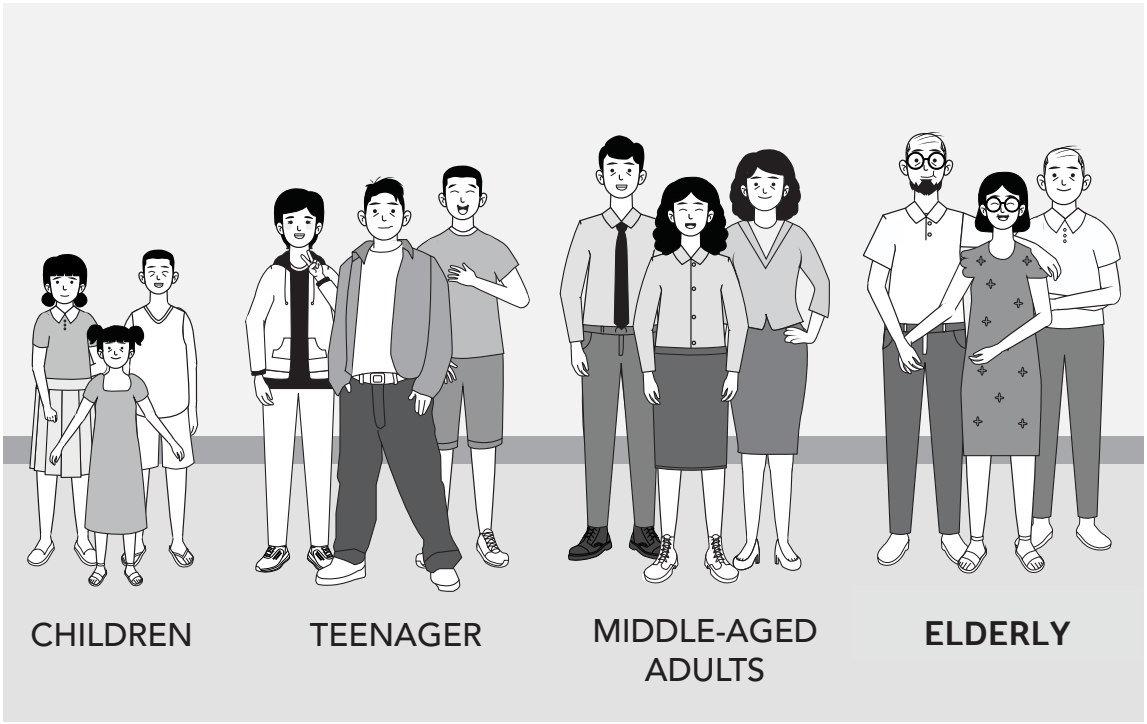
AGE
12
20
23
16
11
18
21
39
32
24

Grouped data is the data that has been bundled together in categories or ranges. Meaning, we tally the numbers according to a fixed range of values.

Transforming Ungrouped to Grouped Data

Having an ungrouped data makes it hard to make sense of what the numbers mean. We transform the ungrouped data into grouped data to show how many objects fall under certain categories.

For example, for age groups, we have ranges for children, teenager, middle-aged adults, and elderly. This helps to easily understand what the given number means.



In transforming ungrouped data into grouped data, we construct a frequency distribution table.

A **frequency distribution table** (**FDT**) is a table form containing the classes (ranges of values) and frequencies. A **class** is a grouping of values. A **frequency** is the number of times each data occurred.

We use an FDT to summarize the raw data into a more useful form as well as to have a visual interpretation of the data.

Example 1. A survey was taken on a certain factory. 30 of its employees were asked of their age. The results were recorded as follows.

Array: 20, 21, 26, 25, 21, 27, 27, 33, 32, 28, 29, 30, 28, 30, 34, 36, 37, 35, 40, 35, 35, 36, 34, 34, 38, 39, 38, 41, 47, 46

Create an FDT for the given data.

TITLE: **THE AGE (IN YEARS) OF 30 EMPLOYEES IN A FACTORY**

AGE	TALLY	FREQUENCY
20 – 26	𝍸	5
27 – 33	𝍸 − ||||	9
34 – 40	𝍸 − 𝍸 − |||	13
41 – 47	|||	3
↑ DATA	↑ TALLY RECORDED AS STROKE MARKS	↑ TALLY IN NUMERICAL VALUE

From the table, we can observe that there are five (5) employees whose age ranges from 20 to 26, nine (9) employees whose age ranges from 27 to 33, thirteen (13) employees from 34 to 40, and only three (3) from 41 to 47.

Before we proceed to constructing a grouped FDT, let us first define important terms.

- **Range** is the difference between the highest value and the lowest value. It can be represented by the formula:

$$R = H - L$$

where H – highest value
L – lowest value

- **Class** or **class interval** is the interval of data values.

- **Class limits** refers to the highest number (upper limit) and the lowest number (lower limit) in a class.

- **Class width** or **class size** is the difference between the upper and lower limits of two consecutive class intervals. To get the class width, we use the formula:

$$\text{class width} = \frac{R}{\text{number of class intervals}}$$

Illustration:

The age (in years) of 30 employees in a factory is presented in a grouped FDT below:

Array: 20, 21, 26, 25, 21, 27, 27, 33, 32, 28, 29, 30, 28, 30, 34, 36, 37, 35, 40, 35, 35, 36, 34, 34, 38, 39, 38, 41, 47, 46

AGE	NUMBER OF EMPLOYEES
20 – 26	5
27 – 33	9
34 – 40	13
41 – 47	3
	30

In this table, we can observe the following:

- The class intervals are 20–26, 27–33, 34–40, and 41–47.
- The upper limit of their respective class intervals are 26, 33, 40, 47.
- The lower limit of their respective class intervals are 20, 27, 34, 41.
- Taking the lower limit of two consecutive class intervals, say, 20 and 27, the class width is:

$$\textbf{class width} = 27 - 20 = 7$$

This means that for every class interval, there are 7 values.

Example 2. Create an FDT for the data set *Age* from the activity. We follow the step-by-step process for constructing an FDT.

AGE
12
20
23
16
11
18
21
39
32
24

◆ **STEP 1.** Get the range $R = H - L$.

$$H = 39$$
$$L = 11$$

$$R = H - L$$
$$= 39 - 11$$
$$R = 28$$

◆ **STEP 2.** Decide on the number of class intervals. We choose 5 class intervals.

◆ **STEP 3.** Find the class width.

$$\text{class width} = \frac{R}{\text{number of class intervals}} = \frac{28}{5} = 5.6$$

Round up to the nearest whole number. Thus, the class width is 6.

◆ **STEP 4.** Set-up the class limits.

Use the lowest data as the lower limit of the first class interval. In this case, 11. Then, use the class width 6 to get the first interval.

$$\underbrace{11, 12, 13, 14, 15, 16}_{\text{6 values}} \quad \rightarrow \quad 11\text{–}16$$

Set-up the next class limits starting with the next number after the upper limits:

17, 18, 19, 20, 21, 22	→	17–22
23, 24, 25, 26, 27, 28	→	23–28
29, 30, 31, 32, 33, 34	→	29–34
35, 36, 37, 38, 39, 40	→	35–40

CLASS INTERVAL	
11 – 16	
17 – 22	
23 – 28	
29 – 34	
35 – 40	

We put these class intervals on the first column of the FDT.

Observe that there are 5 rows, which agrees to the number of class intervals.

◆ **STEP 5.** Tally the number of values in the data set that falls under each class limit to get the second column for frequency.

CLASS INTERVAL	TALLY	FREQUENCY
11 – 16	|||	3
17 – 22	|||	3
23 – 28	||	2
29 – 34	|	1
35 – 40	|	1
		TOTAL = 10

Thus, the frequency distribution table for the age of the 10 people asked is shown on the next page.

CLASS INTERVAL	FREQUENCY
11 – 16	3
17 – 22	3
23 – 28	2
29 – 34	1
35 – 40	1

We can see that most of the answers came from people whose age ranges from 11–22 years old.

We summarize the steps in constructing a frequency distribution table.

7. Get the range: $R = H - L$
8. Decide on the number of class intervals.
9. Find the class width:

$$\text{class width} = \frac{R}{\text{number of class intervals}}$$

10. Set-up the class intervals.
11. Tally the items that fall under each class interval.

Example 3. Construct an FDT based on the given data set with 6 class intervals.

20	6	23	19	9
14	15	3	1	12
10	20	13	3	17
10	11	6	21	9
6	10	9	4	5
1	5	11	7	24

◆ **STEP 1.** Get the range.

Highest value = 39
Lowest value = 11

$$R = H - L$$
$$= 24 - 1$$
$$R = 23$$

◆ **STEP 2.** Number of class intervals = 6

◆ **STEP 3.** Find the class width.

$$\text{class width} = \frac{R}{\text{number of class intervals}} = \frac{23}{6} = 3.83$$

Round off to class width = 4.

◆ **STEP 4.** Set-up the class limits.

Continuation on the next page.

CLASS INTERVAL	
1 – 4	
5 – 8	
9 – 12	
13 – 16	
17 – 20	
21 – 24	

◆ **STEP 5.** Tally the frequency for each class interval.

CLASS INTERVAL	TALLY	FREQUENCY
1 – 4	𝍸	5
5 – 8	𝍸 – I	6
9 – 12	𝍸 – IIII	9
13 – 16	III	3
17 – 20	IIII	4
21 – 24	III	3
		TOTAL = 30

Therefore, the FDT of the data set given is

CLASS INTERVAL	FREQUENCY
1 – 4	5
5 – 8	6
9 – 12	9
13 – 16	3
17 – 20	4
21 – 24	3

LESSON 1

SHARPENING YOUR SKILLS

Write your answers on a separate sheet of paper.

I. Classify each variable as discrete or continuous.

1. Number of doughnuts sold each day by Hapi Haus
2. Water temperatures of 6 swimming pools in Laguna
3. Weight of cats in a pet shop
4. Battery life (in hours) of a power bank
5. Number of cheeseburgers sold every day by Minute Burger
6. Number of wins of a DOTA player
7. Capacity (in gallons) of a water tank

II. Arrange the following in an array, then find the range.

1. Number of OFWs for each region

44	39	36	21	31
170	44	632	30	78

2. Customers in a supermarket

37	66	181	50	82
44	43	250	6	4

3. Test scores of students

12	17	12	14	16
16	18	12	16	17
15	16	12	15	16
12	14	15	12	15
19	13	16	18	16
18	15	16	15	14

4. Temperature of a city for 20 days

7.5	16	23.5	17	22
21.5	19	20	27.1	20
22	20.7	17	28	20
23	18.5	25.3	24	31

LESSON 1

TREADING THE ROAD TO MASTERY

Directions. Transform the given ungrouped data into grouped data using a Frequency Distribution Table with **5 class intervals (rows).**

1. Sacks of rice sold (in kilograms) for a month

88	88	110	88	80	69	102	78	70	55
79	85	80	100	60	90	77	55	75	55
54	60	75	64	105	56	71	70	65	72

2. Number of fishes caught

23	30	20	27	44	26	35	20	29	29
25	15	18	27	19	22	12	26	34	15
27	35	26	43	35	14	24	12	23	31
40	35	38	57	22	42	24	21	27	33

LESSON 2

SETTING THE PATH

WHERE IS NORMAL?

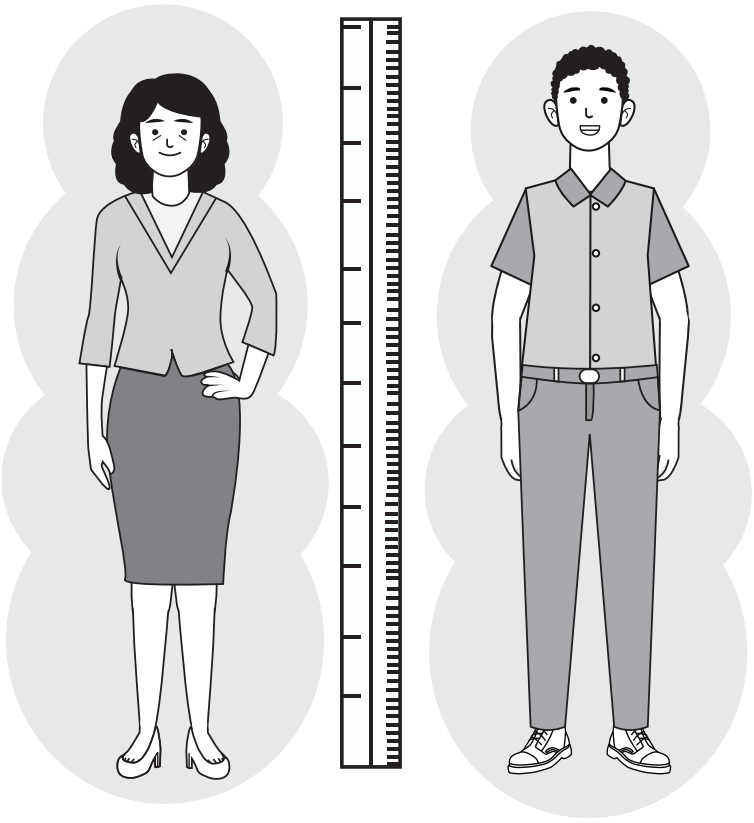
At the end of this lesson, you will be able to:

- illustrate the measures of central tendency (mean, median, mode) of a statistical data (LS3MP-SP-PSF- JHS-23); and
- calculate the measure of central tendency of ungrouped and grouped data (LS3MP-SP-PSF- JHS-24).

LESSON 2

TRYING THIS OUT

Use a measuring tool to get the height (in inches) of boys and girls of 10 to 15 of your friends, classmates or family members whose age are 15–18. Round off each height to the nearest whole number.



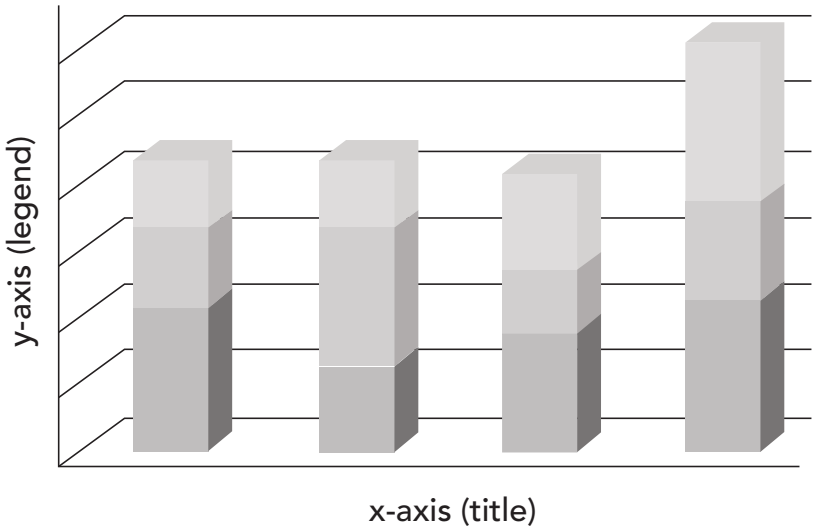
Answer the following questions on a separate sheet of paper.

1. What is the tallest height? What is the shortest height?
2. Compute for the sum of all the heights you listed. Divide the sum by the number of the people you used in the list.
3. If you arrange the values of height in lowest to highest order, what value(s) will be in the middle?
4. What value shows the greatest number of times in the list?

LESSON 1

UNDERSTANDING WHAT YOU DID

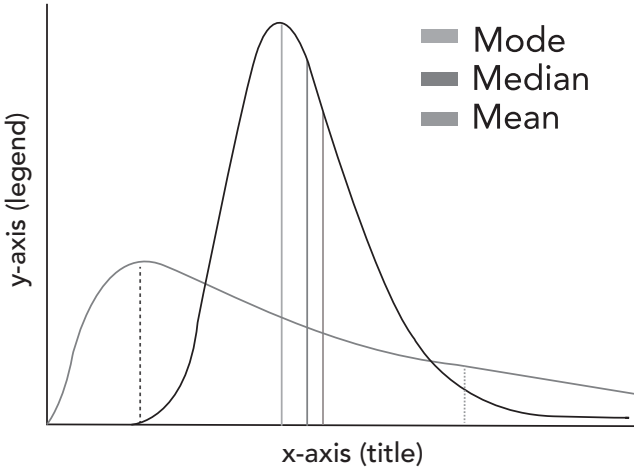
Statistics is the science of conducting studies to collect, organize, summarize, analyze, and draw conclusions from data.



DESCRIPTIVE STATISTICS

The collection, organization, summarization, and presentation of data is called **descriptive statistics.**

A measure of central tendency is a single value that describes the center or central position of a data set.

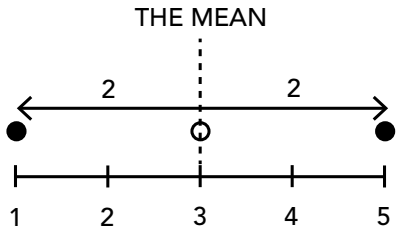


MEASURES OF CENTRAL TENDENCY

There are three measures of central tendency: mean, median, and mode.

Mean ($\bar{x}$)

The mean is also called the **average,** which is obtained by summing up the data values divided by the number of data set. This is a result of balancing out all the values in a data set.



Median ($\tilde{x}$)

The middle value of the data array is called the median. It is obtained by arranging the data sets in ascending or descending order.

Example 1.

1, 3, 3, **6,** 7, 8, 9

Therefore, the median is 6.

If the number of data values are even, there the two middle numbers in the data set. To find the median, get the average of the two middle numbers.

Example 2.

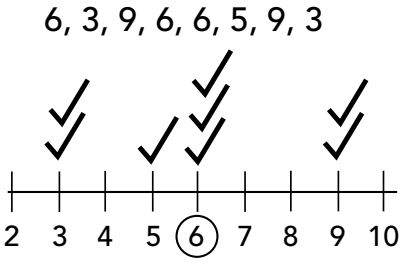
2, 3, 5, **6, 7,** 7, 8, 10

Solution: 6 + 7 = 13 ÷ 2 = 6.5

Therefore, the median is 6.5

Mode ($\hat{x}$)

The mode is the value that occurs most often in a data set.



The computation of the Measures of Central Tendency differs between ungrouped and grouped data.

Measures of Central Tendency of Ungrouped Data

Let us use the sample data set of heights (in inches) of some friends and find its measures of central tendency.

61	61	58	64	63
65	64	60	65	59
64	63	62	61	64

1. **Mean**
   To get the mean, add all the values then divide the sum by the number of values in the data set. We use the formula:

$$\bar{x} = \frac{(x_1 + x_2 + x_3 + \ldots + x_n)}{n} = \frac{(\Sigma x)}{n}$$

where Σx = sum of all the values
n = number of values in the data set

$$\bar{x} = \frac{61 + 61 + 58 + 64 + 63 + 65 + 64 + 60 + 65 + 59 + 64 + 63 + 62 + 61 + 64}{15}$$

$$\bar{x} = \frac{934}{15}$$

$$\bar{x} = 62.3$$

Therefore, the average of this data set is 62.3 inches.

2. Median

To get the median, arrange the data set in an array (ascending order or descending order), then

→ if the number of data values is odd, get the middle number
→ if the number of data values is even, get the two middle numbers then divide by 2

Example 1.

58, 59, 60, 61, 61, 61, 62, 63, 63, 64, 64, 64, 64, 65, 65

$$\tilde{x} = 63$$

Since the data set has 15 values, the middle number is the 8th value in the array. Thus, the median of the set is 63 inches.

Example 2.

23, 29, 30, 31, 33, 33, 34, 44, 44, 54, 55, 55

$$\tilde{x} = \frac{33 + 34}{2}$$

$$\tilde{x} = \frac{67}{2}$$

$$\tilde{x} = \frac{33 + 34}{2}$$

Since the data set has 12 values, the middle numbers are the 6th and 7th value in the array, Thus, the median of the set is 33.5.

3. **Mode**
   To get the mode, tally the number of times each value appeared in the data set, then choose the value that occurred the most.

Example 1.

58 → 1	62 → 1
59 → 1	63 → 2
60 → 3	64 → 4
61 → 1	65 → 2

Since 64 is the most occurring value, the mode is $\hat{x} = 64$,

Example 2.

37 → 1	65 → 1
49 → 4	74 → 2
53 → 3	75 → 4
61 → 1	77 → 2

Since 49 and 75 are the most occurring value, the mode is $\hat{x} = 49$ *and* 75.

→ If there is no value that occurred the most in the given data set then, there is no mode.
→ If there is only one value that occurred the most in the given data set then, the mode is unimodal.
→ If there are two value that occurred the most in the data set then, the mode is bimodal.
→ If there are more than two values that occurred the most in the data set then, the mode is multimodal

Therefore, in example 1, the mode is unimodal and in example 2, the mode is bimodal.

Example. Six customers purchased the following quantity of clothes.

2, 7, 6, 2, 3, 4

Find the measures of central tendency.

1. Mean

$$\bar{x} = \frac{\Sigma x}{n} = \frac{2 + 7 + 6 + 2 + 3 + 4}{6} = \frac{24}{6} = 4$$

2. Median

Arrange in an array: 2, 2, 3, 4, 6, 7

2, 2, 3, 4, 6, 7

Get the average of the two middle numbers:

$$\tilde{x} = \frac{3 + 4}{2} = 3.5$$

3. Mode
The most occurring value is 2. Therefore, the mode is $\hat{x} = 2$.

Measure of Central Tendency of Grouped Data

The measures of central tendencies of a grouped data follow specific formulas that can be solved by adding some important columns in our FDT.

Example. Find the measure of central tendencies of the grouped data for the number of repaired cars for 20 mechanics in a week.

Cars Repaired in a Week

CLASS INTERVAL	FREQUENCY
6 – 10	1
11 – 15	2
16 – 20	3
21 – 25	5
26 – 30	4
31 – 35	3
36 – 40	2
	n = 20

1. Mean

a. Compute for the class midpoint (or class mark).
Class midpoint (X) is the average of the lower and upper class limits of each class interval.

CLASS INTERVAL	FREQUENCY		MIDPOINT (X_m)
6 – 10	1	(6 + 10) ÷ 2	**8**
11 – 15	2	(11 + 15) ÷ 2	**13**
16 – 20	3	(16 + 20) ÷ 2	**18**
21 – 25	5	(21 + 25) ÷ 2	**23**
26 – 30	4	(26 + 30) ÷ 2	**28**
31 – 35	3	(31 + 35) ÷ 2	**33**
36 – 40	2	(36 + 40) ÷ 2	**38**
	n = 20		

b. Multiply the frequency (2nd column) to the midpoint (3rd column).

CLASS INTERVAL	FREQUENCY	MIDPOINT (X_m)		fX
6 – 10	1	8	1 × 8	**8**
11 – 15	2	13	2 × 13	**26**
16 – 20	3	18	3 × 18	**54**
21 – 25	5	23	5 × 23	**115**
26 – 30	4	28	4 × 28	**112**
31 – 35	3	33	3 × 33	**99**
36 – 40	2	38	2 × 38	**76**
	$n = 20$			

c. Add all the entries in the fourth column and divide the sum by the total number of data (n).

$$\bar{x} = \frac{8 + 26 + 54 + 115 + 112 + 99 + 76}{20}$$

$$\bar{x} = \frac{490}{20}$$

$$\bar{x} = 24.5$$

This means that approximately 25 cars are repaired in a week.

2. Median

a. Compute for the class boundaries.
Class boundaries are the halfway points that separate each class interval.

- **Lower class boundary** is obtained by subtracting 0.5 to each lower limit.
- **Upper class boundary** is obtained by adding 0.5 to each upper limit.

CLASS INTERVAL		CLASS BOUNDARIES	
6 – 10	6 – 0.5	5.5 – 10.5	10 + 0.5
11 – 15	11 – 0.5	10.5 – 15.5	15 + 0.5
16 – 20	16 – 0.5	15.5 – 20.5	20 + 0.5
21 – 25	21 – 0.5	20.5 – 25.5	25 + 0.5
26 – 30	26 – 0.5	25.5 – 30.5	30 + 0.5
31 – 35	31 – 0.5	30.5 – 35.5	35 + 0.5
36 – 40	36 – 0.5	35.5 – 40.5	40 + 0.5

b. Construct the cumulative frequency column.
Cumulative frequency (f_x) determines the number that falls above or below a particular data in a data set.

The cumulative frequency is computed by *adding* each frequency to the sum of the frequencies that comes before it.

CLASS INTERVAL	FREQUENCY	CLASS BOUNDARIES	CUMULATIVE FREQUENCY (f_x)
6 – 10	1	~~5.5 – 10.5~~	1
11 – 15	2	10.5 – 15.5	1 + 2 = 3
16 – 20	3	15.5 – 20.5	2 + 3 = 5
21 – 25	5	20.5 – 25.5	
26 – 30	4	25.5 – 30.5	
31 – 35	3	30.5 – 35.5	
36 – 40	2	35.5 – 40.5	
	n = 20		

Continuing the process, the table will look like this:

CLASS INTERVAL	FREQUENCY	CLASS BOUNDARIES	CUMULATIVE FREQUENCY (f_x)
6 – 10	1	5.5 – 10.5	1
11 – 15	2	10.5 – 15.5	3
16 – 20	3	15.5 – 20.5	6
21 – 25	5	20.5 – 25.5	11
26 – 30	4	25.5 – 30.5	15
31 – 35	3	30.5 – 35.5	18
36 – 40	2	35.5 – 40.5	20
	n = 20		

c. Determine the median class.
Median class is the class interval with the smallest cumulative frequency greater than or equal to $\frac{n}{2}$, where n is the number of the data.

Since $\frac{n}{2} = \frac{20}{2} = 10$, the smallest cumulative frequency greater than or equal to 10 is 11, which is the frequency of the 4th class interval. Thus,

CLASS INTERVAL	FREQUENCY	CLASS BOUNDARIES	CUMULATIVE FREQUENCY (f_x)
6 – 10	1	5.5 – 10.5	1
11 – 15	2	10.5 – 15.5	3
16 – 20	3	15.5 – 20.5	6
21 – 25	5	20.5 – 25.5	11
26 – 30	4	25.5 – 30.5	15
31 – 35	3	30.5 – 35.5	18
36 – 40	2	35.5 – 40.5	20
	n = 20		

MEDIAN CLASS

d. Use the formula for the median below:

$$\tilde{x} = L_B + \left(\frac{\frac{n}{2} - f_x(\text{before})}{f_{med}} \right)(i)$$

where $\boldsymbol{L_B}$ - lower boundary of the median class
$\boldsymbol{f_x}$ (before) - cumulative frequency before the median class
$\boldsymbol{f_{med}}$ - frequency of the median class
$\boldsymbol{i}$ - class width
$\boldsymbol{n}$ - number of data

Therefore, using the needed values from the table

$$\begin{aligned}
\tilde{x} &= L_B + \left(\frac{\frac{n}{2} - f_x(\text{before})}{f_{med}} \right)(i) \\
&= 20.5 + \left(\frac{\frac{20}{2} - 6}{5} \right)(5) \\
&= 20.5 + \left(\frac{10 - 6}{5} \right)(5) \\
&= 20.5 + \left(\frac{4}{5} \right)(5) \\
&= 20.5 + \frac{20}{5} \\
&= 20.5 + 4 \\
&= 24.5
\end{aligned}$$

This means that 24.5 is the middle value of the data set.

3. Mode

a. Determine the modal class.
Modal class is the class interval with the highest frequency.

Since 5 is the highest frequency, the class interval 21–25 is the modal class.

CLASS INTERVAL	FREQUENCY	CLASS BOUNDARIES
6 – 10	1	5.5 – 10.5
11 – 15	2	10.5 – 15.5
16 – 20	3	15.5 – 20.5
21 – 25	5	20.5 – 25.5
26 – 30	4	25.5 – 30.5
31 – 35	3	30.5 – 35.5
36 – 40	2	35.5 – 40.5
	$n = 20$	

MODAL CLASS

b. Use the formula for the mode below:

$$\hat{x} = L_B + \left(\frac{d_1}{d_1 + d_1} \right)(i)$$

where
- L_B - lower boundary of the modal class
- d_1 - difference between frequency of modal class and frequency below
- d_2 - frequency of the median class
- i - class width

Since $d_1 = 5 - 4 = 1$ and $d_2 = 5 - 3 = 2$, we have

$$\begin{aligned}
\hat{x} &= L_B + \left(\frac{d_1}{d_1 + d_1} \right)(i) \\
&= 20.5 + \left(\frac{1}{1+2} \right)(5) \\
&= 20.5 + \left(\frac{1}{3} \right)(5) \\
&= 20.5 + \frac{5}{3} \\
&= 20.5 + 1.67 \\
&= 22.17
\end{aligned}$$

This means that 22.17 is the most occurring value in the data set.

As a summary for this example:

→ The average of cars repaired in a week is 25.
→ The halfway mark of the number of cars repaired in total is 24.5.
→ The number of cars repaired that occurs the most is 22.17 or approximately 23.

Remember that for a grouped data presented in a frequency distribution table (FDT), we use the following formulas for the measures of central tendency:

1. **Mean**

$$\bar{x} = \frac{\sum fX}{n}$$

where f - frequency
X - class mark
n - number of data

2. **Median**

$$\tilde{x} = L_B + \left(\frac{\frac{n}{2} - f_x(\text{before})}{f_{med}} \right)(i)$$

where L_B - lower boundary of the median class
f_x (before) - cumulative frequency before the median class
f_{med} - frequency of the median class
i - class width
n - number of data

3. **Mode**

$$\hat{x} = L_B + \left(\frac{d_1}{d_1 + d_1} \right)(i)$$

where L_B - lower boundary of the modal class
d_1 - difference between frequency of modal class and frequency below
d_2 - frequency of the median class
i - class width

LESSON 2

SHARPENING YOUR SKILLS

Write your answers on a separate sheet of paper.

I. Find the measures of central tendency for each data set.

1. The number of vegetables sales (in kilograms) imported from Baguio City:

104	107	109	104	109
111	104	109	112	104
109	111	104	110	109

2. Strength of major earthquakes in the Asia-Pacific region:

7.0	6.2	7.7	6.2
6.4	6.2	7.2	5.4
6.4	6.5	7.2	5.4

3. Salary per hour of employees in different offices:

1303	684	764	1132
656	1133	856	702

II. Add the midpoint, class boundary, and cumulative frequency columns for each table.

1. **Attack Score of Characters in a Game**

CLASS INTERVAL	FREQUENCY
90 – 98	6
99 – 107	22
108 – 116	43
117 – 125	28
126 – 134	9

2. **Employee Efficiency in an Office**

CLASS INTERVAL	FREQUENCY
10 – 20	2
21 – 31	8
32 – 42	15
43 – 53	7
54 – 64	10
65 – 75	3

LESSON 2

TREADING THE ROAD TO MASTERY

Instructions: Find the mean, median, and mode for the given grouped data. Write your answer on a separate sheet of paper.

Price of Rice per Kilogram in Different Stores

CLASS INTERVAL	FREQUENCY
13 – 19	2
20 – 26	7
27 – 33	12
34 – 40	5
41 – 47	6
48 – 54	1
55 – 61	0
62 – 68	2

LESSON 3

SETTING THE PATH

LET ME SHOW YOU

At the end of this lesson, you will be able to:

- interpret the legend in a graph (LS3MP-SP-PSF-JHS-7);
- analyze and draw conclusions from statistical data presented in graphs and tables (LS3MP-NS-PSF-JHS-11);
- construct pictographs, bar graphs, line graphs, and pie/circle graphs to organize, present, and analyze data from everyday life situations (LS3MP-NS-PSF-JHS-12); and
- translate data into graph or chart (LS3MP-NS-PSF-JHS-13).

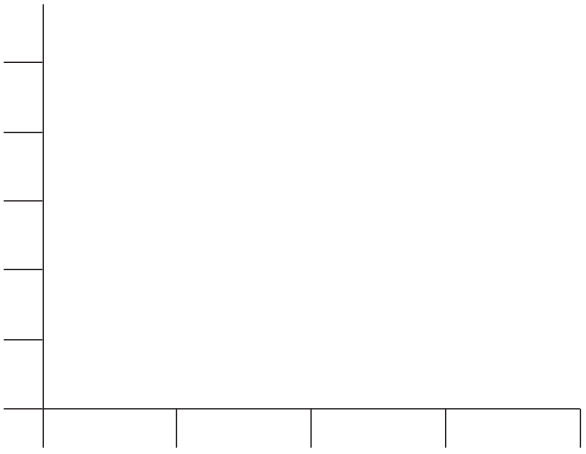
LESSON 3
TRYING THIS OUT

Idette wants to let Boying try and graph some data that they collected from their community (the respondents). Help the two create the appropriate graphs.

1. On a separate sheet of paper, plot the table containing the age of interviewees as a bar graph.

CLASS INTERVAL (age)	FREQUENCY (number of interviewee)
11 – 20	5
21 – 30	3
31 – 40	2

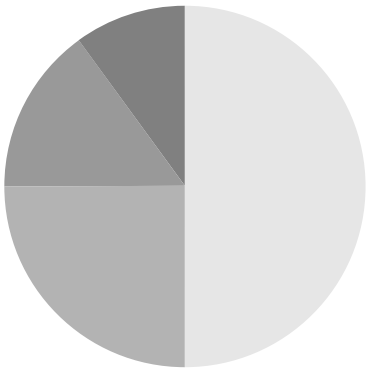
Age of Interviewees in the Community



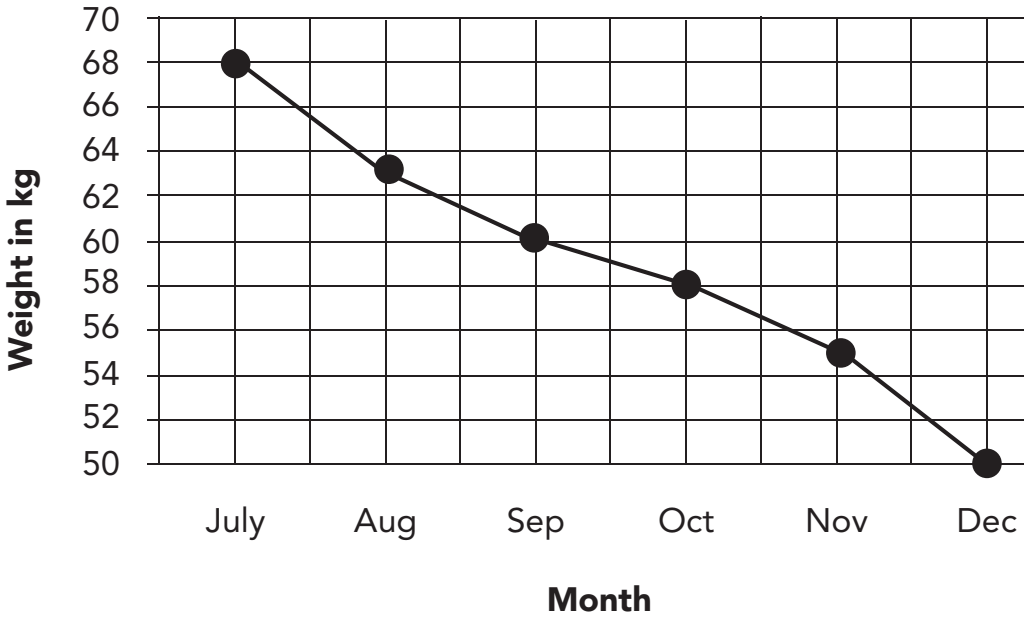
2. Fill the regions of the pie chart with the correct name on the list using their values.

EXPENSES	PERCENTAGE
Food	50%
Electricity	25%
School Allowance	15%
Internet	10%

MONTHLY EXPENSES



3. Use the line graph in answering the questions that follow.



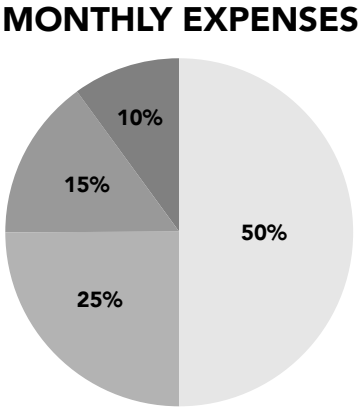
a. How much was Peter's weight in August?
b. In which month was Peter's weight 55 kg?
c. Did Peter's weight increase or decrease over time?
d. What is the difference in Peter's weight between July and December?

LESSON 3

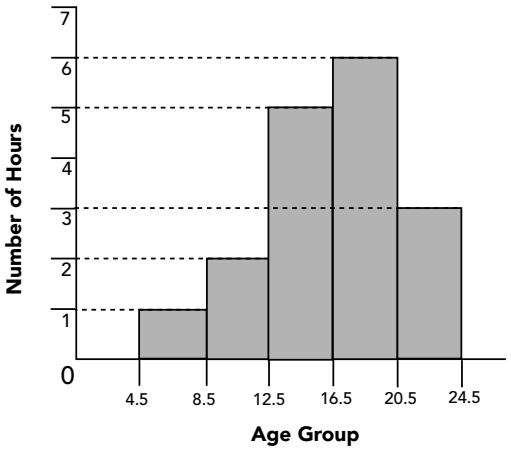
UNDERSTANDING WHAT YOU DID

Statistical graphs are a common method to visually illustrate and to easily describe, summarize, and analyze a data set. These are used to discuss issues, reinforce a point, or discover a trend or pattern over a period of time.

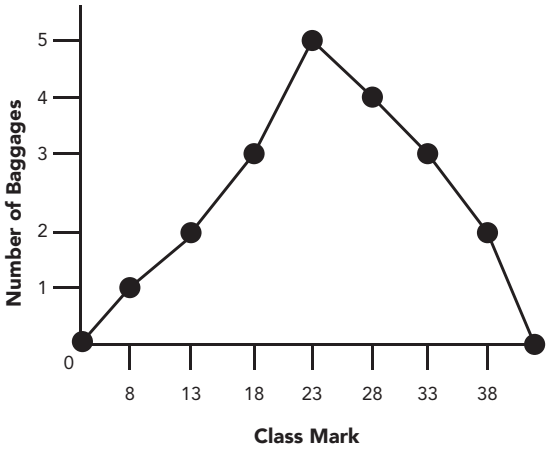
The most commonly used graphs are the following:



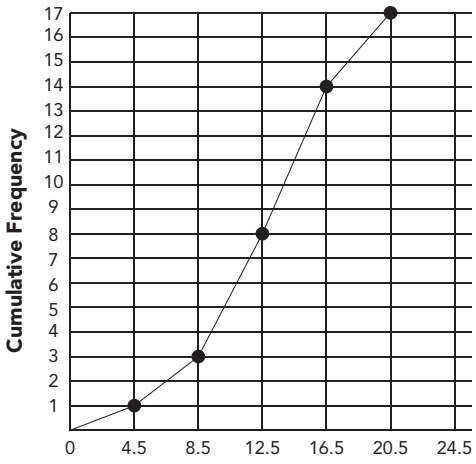
Pie Graph



Histogram



Frequency Polygon



Cumulative Frequency Graph

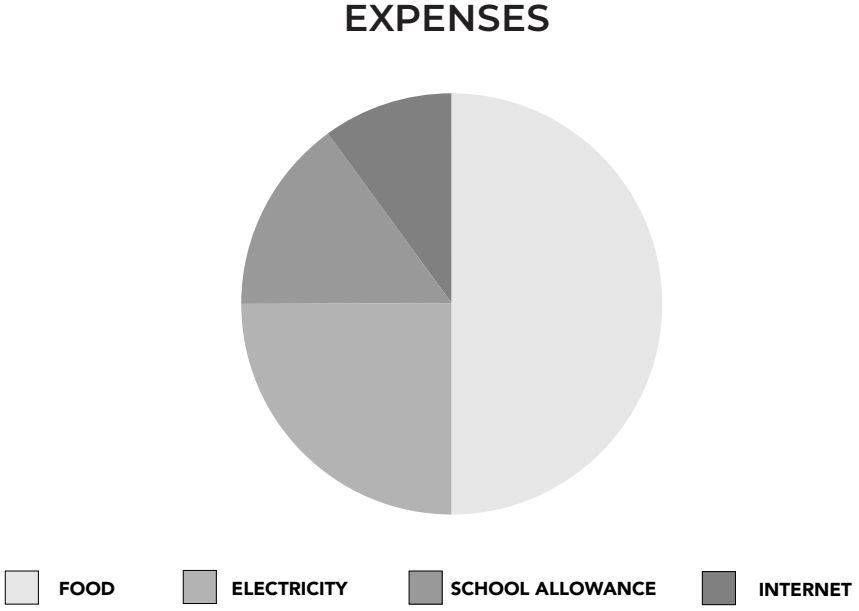
These types of graphs make use of a frequency distribution table (FDT).

PIE GRAPH

Pie graphs are used to show the distribution of frequencies between classes in the FDT. It is also called a circle graph because the graph is in the form of a circle and is divided into slices to show numerical proportions.

An example of a pie graph is the one used in item 2 of the Trying This Out activity.

EXPENSES	PERCENTAGE
Food	50%
Electricity	25%
School Allowance	15%
Internet	10%



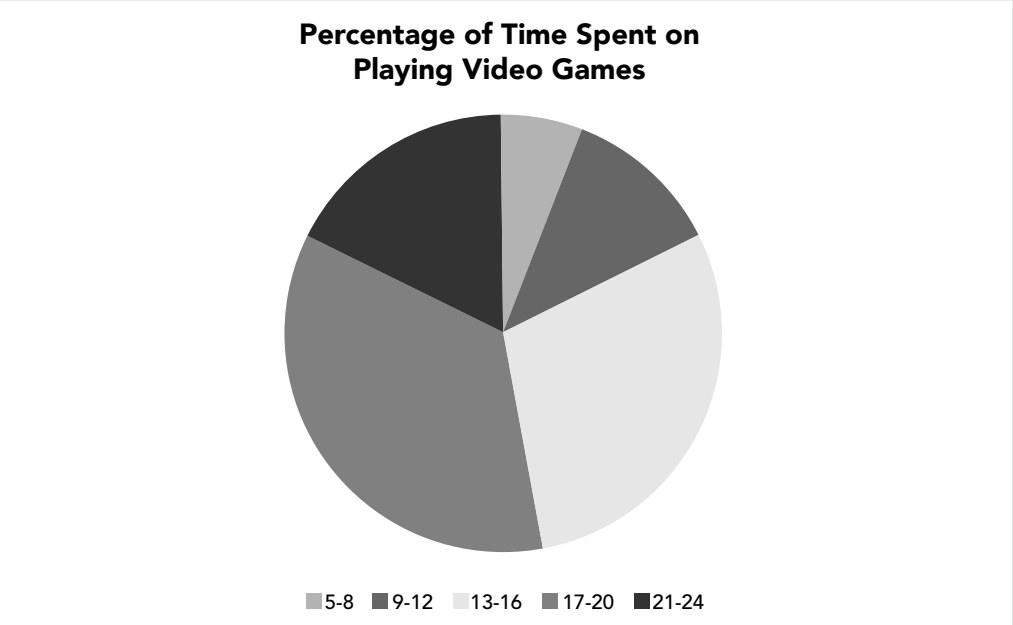
The labels below the graph (food, electricity, school allowance, internet) are called **legends.** A legend is a symbol or text which describes parts of a graph.

Example. Construct a pie chart of the given table for the percentage of time spent on playing video games per age group.

Compute for the percentage distribution for class.

Divide each frequency by the total number of data in the set then multiply by 100.

CLASS INTERVAL (age group)	FREQUENCY (number of hours)		PERCENTAGE
5 – 8	1	$\frac{1}{17} \times 100$	5.88%
9 – 12	2	$\frac{2}{17} \times 100$	11.76%
13 – 16	5	$\frac{5}{17} \times 100$	29.41%
17 – 20	6	6×100	35.29%
21 – 24	3	$\frac{3}{17} \times 100$	17.65%
	$n = 17$		**100%**



HISTOGRAM

A **histogram** is a graph that displays the data by using side-by-side vertical bars (unless the frequency of a class is 0) with **heights equal to the *frequency*** of each class interval.

→ The horizontal axis contains values of the class boundaries from the frequency distribution table.

→ The vertical axis contains the values of the frequencies of the class intervals.

→ Vertical bars are side-by-side each other with heights equal to the frequency of the class interval.

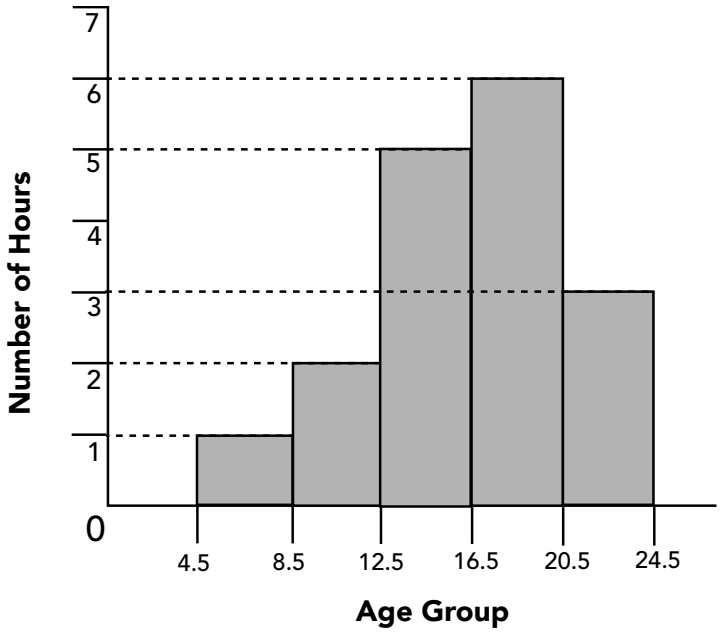
Example 1. Construct a histogram of the given table for the amount of time spent on playing video games per age range. Interpret the graph.

CLASS INTERVAL (age group)	FREQUENCY (number of hours)
5 – 8	1
9 – 12	2
13 – 16	5
17 – 20	6
21 – 24	3
	$n = 17$

Add the column for class boundaries (learned in Lesson 2).

CLASS INTERVAL (age group)	FREQUENCY (number of hours)	CLASS BOUNDARIES
5 – 8	1	4.5 – 8.5
9 – 12	2	8.5 – 12.5
13 – 16	5	12.5 – 16.5
17 – 20	6	16.5 – 20.5
21 – 24	3	20.5 – 24.5
	$n = 17$	

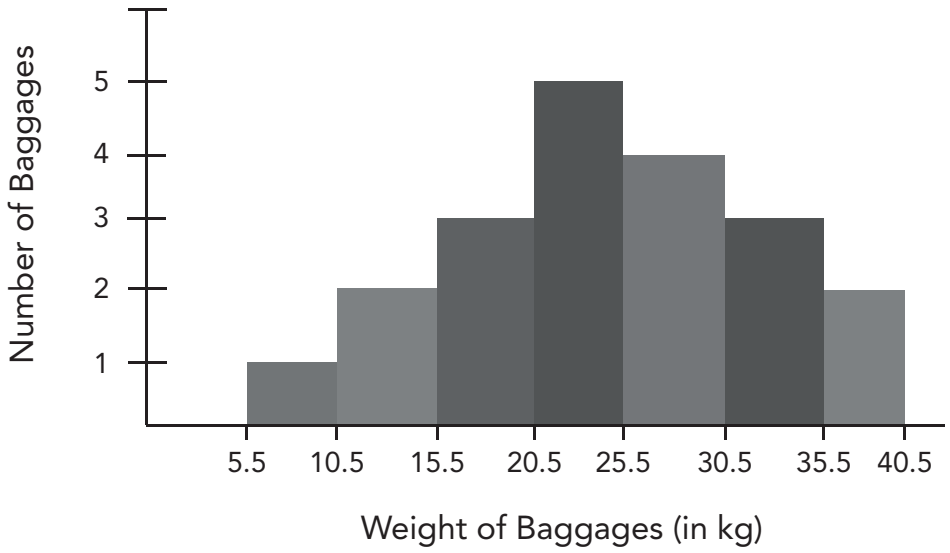
The histogram is shown below.



Using the histogram makes it easier to see that the age group 17–20 has the highest amount of time spent in playing video games with 6 hours, while the age group with the smallest time spent is from 5–9 with 1 hour.

Example 2. Construct a histogram for the weight (in kilograms) of 20 baggages in an airport. Interpret the graph.

CLASS INTERVAL (age group)	CLASS BOUNDARIES	FREQUENCY (number of baggages)
6 – 10	5.5 – 10.5	1
11 – 15	10.5 – 15.5	2
16 – 20	15.5 – 20.5	3
21 – 25	20.5 – 25.5	5
26 – 30	25.5 – 30.5	4
31 – 35	30.5 – 35.5	3
36 – 40	35.5 – 40.5	2



From the graph, we can see that the weight of the baggages with most numbers is 21kg to 25kg. Meanwhile, the lowest number of baggage has a weight of 6kg to 10kg.

FREQUENCY POLYGON

A **frequency polygon** is a graph that displays the data by using lines formed by connecting points plotted for the frequencies at the **midpoints** of the classes. The points have heights equal to the frequency of each class. The frequency polygon shows the development of the data from one class to the next.

→ The horizontal axis contains values of the class midpoints from the frequency distribution table.

→ The vertical axis contains the values of the frequencies of the class intervals.

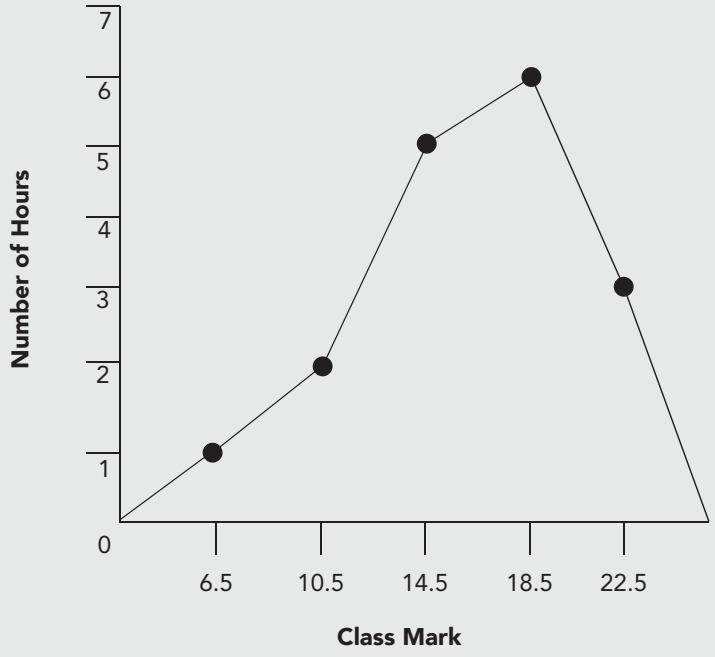
→ Lines are connected by midpoints with heights equal to the frequency of the class interval.

Example 1. Construct a frequency polygon for the given table for the amount of time spent on playing video games per age group. Interpret the graph.

CLASS INTERVAL (age group)	FREQUENCY (number of hours)
5 – 8	1
9 – 12	2
13 – 16	5
17 – 20	6
21 – 24	3
	$n = 17$

Add the column for class mark or midpoint (learned in Lesson 2).

CLASS INTERVAL (age group)	FREQUENCY (number of hours)	CLASS MARK (midpoint)
5 – 8	1	6.5
9 – 12	2	10.5
13 – 16	5	14.5
17 – 20	6	18.5
21 – 24	3	22.5
	$n = 17$	



It can be seen from the graph that there is a gradual increase in the amount of time used in playing video games until 20 years old. Also, the time spent in playing video game changes rapidly (very fast) between the age of 9–12 and 13–16 years old. However, there is a big decline in the time spent playing video games for people more than 20 years old.

Example 2. Construct a frequency polygon for the weight (in kilograms) of 20 baggages in an airport. Interpret the graph.

CLASS INTERVAL (weight, in kg)	FREQUENCY (number of baggages)	CLASS MARK (midpoint)
6 – 10	1	8
11 – 15	2	13
16 – 20	3	18
21 – 25	5	23
26 – 30	4	28
31 – 35	3	33
36 – 40	2	38

It can be seen from the graph that there is a gradual increase in the weights of baggages in the airport up to 25kg. The number of baggages decreases as the weight gets heavier and heavier up to 40kg.

CUMULATIVE FREQUENCY TABLE

The **cumulative frequency table** or **OGIVE (o-jive)** is a graph that represents the progression of the cumulative frequencies for the classes in a frequency distribution table. Since it uses cumulative frequency, Ogive describes how many numbers lie below or above a data.

An Ogive shows the progression of the data set from one class to another. It shows the speed of change from one class to the next.

→ The horizontal axis contains the class boundaries from the frequency distribution table.

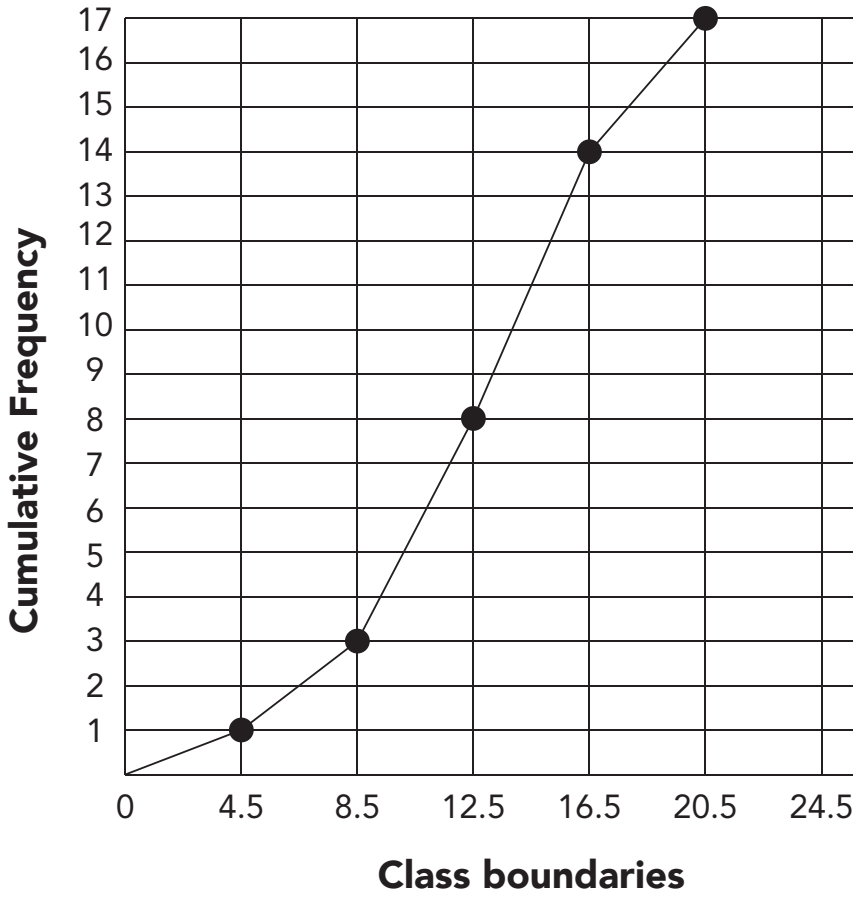
→ The vertical axis contains the values of the frequencies of the class intervals.

Example 1. Construct an Ogive based on the given table for the amount of time spent on playing video games per age group. Interpret the graph.

CLASS INTERVAL (age group)	FREQUENCY (number of hours)
5 – 8	1
9 – 12	2
13 – 16	5
17 – 20	6
21 – 24	3
	$n = 17$

Add the column for class mark or midpoint (learned in Lesson 2).

CLASS INTERVAL (age group)	FREQUENCY (number of hours)	CUMULATIVE FREQUENCY
5 – 8	1	1
9 – 12	2	3
13 – 16	5	8
17 – 20	6	14
21 – 24	3	17
	$n = 17$	



Based from the graph, we see that:

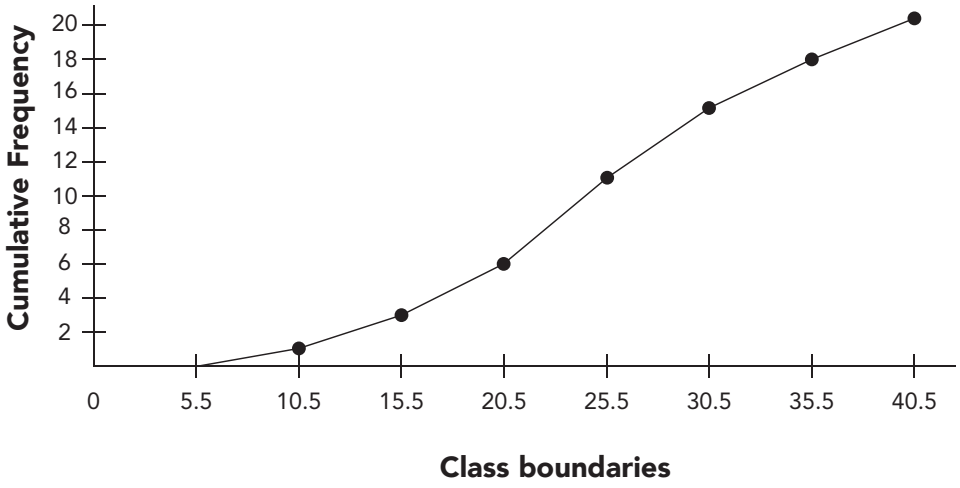
→ There is a constant amount (same amount) of increase in the time spent playing video games between the age groups 5–8 and 9–12 and between the age groups 13–16 and 17–20.

→ There is a rapid (very fast) increase in time spent playing video games between the age groups 9–12 and 13–16.

→ The change in the increase of the time spent playing video games slows down between the age groups 13–16 and 21–24.

Example 2. Construct an Ogive for the weight (in kilograms) of 20 baggages in an airport. Interpret the graph.

CLASS INTERVAL (weight, in kg)	FREQUENCY (number of baggages)	CUMULATIVE FREQUENCY
6 – 10	1	1
11 – 15	2	3
16 – 20	3	6
21 – 25	5	11
26 – 30	4	15
31 – 35	3	18
36 – 40	2	20



Based on the graph, we can see that there is a constant amount of increase from the beginning to end.

Finally, we can use different graphs to create summaries and descriptions of a data set easily, and to get trends and predictions in given situations.

LESSON 3

SHARPENING YOUR SKILLS

Write your answers on a separate sheet of paper.

I. Add the column for the percentage distribution of each frequency then construct a pie graph for each.

1. Price Per Kilogram of Rice

CLASS INTERVAL (price, in peso)	FREQUENCY (number of a kilo of rice)
13 – 19	2
20 – 26	7
27 – 33	12
34 – 40	5
41 – 47	6
48 – 54	1
55 – 61	0
62 – 68	2

2. Monthly Wattage Use of Households

CLASS INTERVAL (usage, in kwh)	FREQUENCY (number of household)
90 – 98	6
99 – 107	22
108 – 116	43
117 – 125	28
126 – 134	9

II. Construct the indicated type of graph.

1. **Ogive**

Employee Efficiency in an Office

CLASS INTERVAL (employee efficiency rating)	FREQUENCY (number of employees)
10 – 20	2
21 – 31	8
32 – 42	15
43 – 53	7
54 – 64	10
65 – 75	3

2. **Frequency Polygon**

Price Per Kilo of Rice

CLASS INTERVAL (price, in peso)	FREQUENCY (number of a kilo rice)
13 – 19	2
20 – 26	7
27 – 33	12
34 – 40	5
41 – 47	6
48 – 54	1
55 – 61	0
62 – 68	2

LESSON 3

TREADING THE ROAD TO MASTERY

Directions. Make a histogram for each of the frequency distribution table. Do this activity on a separate sheet of paper.

1. **Price Per Kilo of Rice**

CLASS INTERVAL (price, in peso)	FREQUENCY (number of a kilo rice)
13 – 19	2
20 – 26	7
27 – 33	12
34 – 40	5
41 – 47	6
48 – 54	1
55 – 61	0
62 – 68	2

2. **Employee Efficiency in an Office**

CLASS INTERVAL (employee efficiency rating)	FREQUENCY (number of employees)
10 – 20	2
21 – 31	8
32 – 42	15
43 – 53	7
54 – 64	10
65 – 75	3

3. **Monthly Wattage Use of Households**

CLASS INTERVAL (usage, in kwh)	FREQUENCY (number of household)
90 – 98	6
99 – 107	22
108 – 116	43
117 – 125	28
126 – 134	9

MODULE 6

DON'T FORGET

- A **variable** is an attribute that can assume different values.
- **Data** are the values (measurements or observations) that the variables can assume. A collection of data values forms a **data set.**
- Two types of data:
  - **Qualitative variables** are variables that can be placed into different **categories**, according to some characteristic.
  - **Quantitative variables** are **numerical** and can be arranged in order or ranked.
- Qualitative data are **descriptions** of objects, while quantitative data are information that can be **counted** or **measured.**
- Two types of quantitative data:
  - **Discrete variables** assume values that can be counted by observation.
  - **Continuous variable**s can assume an infinite number of values between any two specific values. They are obtained by measuring and often including fractions and decimals.

- An **ungrouped data** is the raw data that we take from observations and experiments. It is basically a group of numbers listed which is not yet organized in any way. An example is the data set of age.
    - When an ungrouped data is arranged from lowest to highest (ascending order) it is called an **array.**
- **Grouped data**, on the other hand, is the data that has been bundled together in categories or ranges.
- A **frequency distribution table (FDT)** is a table form containing the classes (ranges of values) and frequencies. A **class** is a grouping of values. **Frequency** is the number of times the data occurred.
- Important parts of an FDT:
    - **Range** is the difference between the highest value and the lowest value. It can be represented by the formula $R = H - L$, where H – highest value and L – lowest value.
    - **Class** or **class interval** is the interval of data values
    - **Class limits** refers to the highest number (upper limit) and lowest number (lower limit) in a class.

- **Class width** or class size is the difference between the upper or lower limits of two consecutive class intervals. To get the class width, we use the formula:

$$\text{class width} = \frac{R}{\text{number of class intervals}}$$

- **Statistics** is the science of conducting studies to collect, organize, summarize, analyze, and draw conclusions from data.

- The collection, organization, summarization, and presentation of data is called **descriptive statistics**.

- A **measure of central tendency** is a single value that describes the center or central position of a data set.

- Three measures of central tendency:

  - The **mean** $\bar{x}$, also called the **average,** which is obtained by summing up the data values divided by the number of a data set. This is a result of balancing out all the values in a data set.
  - The **median** $\tilde{x}$ is the middle value of the data array.
  - The **mode** $\hat{x}$ is the value that occurs most often in a data set.

- Formula for **ungrouped data:**
  - **Mean**

$$\bar{x} = \frac{(x_1+x_2+x_3+...+x_n)}{n} = \frac{(\Sigma x)}{n}$$

where Σx – sum of all the values, n – number of values in the data set

  - **Median**. Arrange the data set in an array (ascending order or descending order), then:

→ if the number of data values is *odd,* the middle number is the median
→ if the number of data values is *even,* the average of the two middle numbers is the median

Mode. Choose the value that is most occurring

- Formula for **grouped data:**
  - **Mean**

$$\bar{x} = \frac{\Sigma fX}{n}$$

where f – frequency, X – class mark,
n – number of data

- **Median**

$$\tilde{x} = L_B + \left(\frac{\frac{n}{2} - f_x(\text{before})}{f_{med}} \right)(i)$$

where L_B – lower boundary of the median class, f_x (before) – cumulative frequency before the median class, f_{med} – frequency of the median class, i – class width, n – number of data

- **Mode**

$$\hat{x} = L_B + \left(\frac{d_1}{d_1 + d_1} \right)(i)$$

where L_B – lower boundary of the modal class, d_1 – difference between frequency of modal class and frequency below, d_2 – difference between frequency of modal class and frequency above, i – class width

- **Statistical graphs** are a common method to visually illustrate and to easily describe, summarize, and analyze a data set. These are used to discuss issues, reinforce a point, or discover a trend or pattern over a period of time.

- **Pie graphs** are used to show the distribution of frequencies between classes in the FDT. It is also called a circle graph because the graph is in the form of a circle and is divided into slices to show numerical proportions.

- A **histogram** is a graph that displays the data by using side-by-side vertical bars (unless the frequency of a class is 0) with heights equal to the frequency of each class interval.

- A **frequency polygon** is a graph that displays the data by using lines formed by connecting points plotted for the frequencies at the midpoints of the classes. The points have heights equal to the frequency of each class. The frequency polygon shows the development of the data from one class to the next.

- The **cumulative frequency** table or **OGIVE (o-jive)** is a graph that represents the progression of the cumulative frequencies for the classes in a frequency distribution table. Since it uses cumulative frequency, Ogive describes how many numbers lie below or above a data.

MODULE 6
EXPLORE MORE

If you wish to study further, here are some additional materials you can refer to:

"**Mean, Median, and Mode Activity with Playing Cards**!"
https://www.youtube.com/watch?v=MoMxSK_kHZU

"**Central Tendency of Grouped Data**"
https://www.youtube.com/watch?v=pd1A_HWA24k

"**What is a Histogram?**"
https://www.youtube.com/watch?v=YLPDPglvePY

"**Learning About Line Graphs**"
https://www.youtube.com/watch?v=n2YkbdNORp8

Histogram Maker
https://www.socscistatistics.com/descriptive/histograms/

"Measure of Central Tendency"
https://statistics.laerd.com/statistical-guides/.measyres-central-tendency-mean-mode-median.php

MODULE 6
REACH THE TOP

Instructions: Choose the letter of the correct answer by writing your answers on a separate sheet of paper.

1. The following is an example of a discrete variable, EXCEPT

   a. number of TV per household
   b. height of a basketball player
   c. number of pages in a book
   d. number of students in a class

2. The following are examples of a quantitative variable, EXCEPT

   a. hair color **b.** height **c.** temperature **d.** weight

3. There are ten (10) groups of students who joined an online quiz, two groups of participants got a score of 89, three groups got 93, and 5 groups got 95. Find the average scores of the ten groups?

   a. 92.2 **b.** 93.2 **c.** 94.2 **d.** 95.2

4. Given the scores of nine students 11, 11, 12, 14, 13, 16, 18, 15, 18. What is the mode?

   a. 11 *and* 12 **b.** 12 *and* 14 **c.** 11 *and* 18 **d.** 12 *and* 18

For items 5–9, refer to the table below.

CLASS INTERVAL	FREQUENCY
17 – 21	1
22 – 26	3
27 – 31	5
32 – 36	7
37 – 41	4
42 – 46	5
47 – 51	3

5. What is the class size?

a. 4 **b.** 5 **c.** 3 **d.** 6

6. What is the value of the mean score?

a. 33.61 **b.** 34.61 **c.** 35.61 **d.** 36.61

7. What is the value of $\sum fX$?

a. 996 **b.** 997 **c.** 998 **d.** 999

8. What is the modal class?

a. 27–31 **b.** 32–36 **c.** 37–41 **d.** 42–6

9. What is the value of the median score?

a. 35.07 **b.** 36.07 **c.** 37.07 **d.** 38.07

For items 10–12, refer to the problem below.

The table below is the frequency distribution of the scores in the Math class of 40 students of Grade 10 - Rizal

SCORES	NUMBER OF STUDENTS
48 – 51	9
52 – 55	7
56 – 59	14
61 – 65	10
66 – 70	8

10. What is the class size?

a. 4 **b.** 5 **c.** 6 **d.** 7

11. What is the value of the median score?

a. 55.79 **b.** 56.79 **c.** 57.79 **d.** 58.79

12. What is the value of the mode?

a. 56.95 **b.** 57.95 **c.** 58.95 **d.** 59.95

13. What is the mean age of a group of farmers whose ages are 49, 38, 48, 50, 56, 46, and 47 years?

a. 45.61 **b.** 46.61 **c.** 47.71 **d.** 48.71

14. What is the range of the given set of values if the lowest value is 179 and the highest value is 192?

a. 10 **b.** 11 **c.** 12 **d.** 13

15. Which of the following graph displays data by using lines formed by connecting points plotted for the frequencies at the midpoints of the class?

a. pie graph
b. Ogive
c. histogram
d. frequency polygon

ANSWER KEY

PRE-ASSESSMENT

PAGE 1

1. a
2. d
3. d
4. a
5. d
6. d
7. c
8. c
9. c
10. b
11. b
12. b
13. b
14. b
15. a

LESSON 1: SORTING THROUGH THE NUMBERS

SHARPENING YOUR SKILLS

PAGE 24

ACTIVITY I

1. discrete
2. continuous
3. continuous
4. continuous
5. discrete
6. discrete
7. continuous

ACTIVITY II

1. 21, 30, 31, 37, 39, 44, 44, 78, 170, 632 — **range** = 611
2. 4, 6, 37, 43, 44, 50, 66, 82, 181, 250 — **range** = 246
3. 12, 12, 12, 12, 12, 12, 13, 14, 14,15, 15, 15, 15, 16, 16, 16, 16, 16, 16, 16, 17, 17, 18, 18, 19 — **range** = 7
4. 7.5, 16, 17, 17, 18.5,19, 20, 20, 20, 20.7, 21.5, 22, 22, 23, 23.5, 24, 25.3, 27.1, 28, 31 — **range** = 23.5

ANSWER KEY

TREADING THE ROAD TO MASTERY

1. **Range** = 110 – 54 = 56

   Class Size = $\frac{56}{5}$ = 11.2 → 12 (round up)

CLASS INTERVAL	*f*
54 – 65	9
66 – 77	8
78 – 89	8
90 – 101	2
102 – 113	3

2. **Range** = 57 – 12 = 45

   Class Size = $\frac{45}{4}$ = 9 → 10

CLASS INTERVAL	*f*
12 – 21	10
22 – 31	18
32 – 41	8
42 – 51	3
52 – 61	1

ANSWER KEY

LESSON 2: WHERE IS NORMAL?

SHARPENING YOUR SKILLS

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ACTIVITY I

1. **Mean** = 107.7 **Median** = 109 **Mode** = 104, 109
2. **Mean** = 6.5 **Median** = 6.4 **Mode** = 6.2
3. **Mean** = 903.75 **Median** = 810 **Mode** = No mode

ACTIVITY II

1.

CLASS BOUNDARIES	MIDPOINT (X)	CUMULATIVE FREQUENCY (f_c)
89.5 – 98.5	94	6
98.5 – 107.5	103	28
107.5 – 116.5	112	71
116.5 – 125.5	121	99
125.5 – 134.5	130	108

2.

CLASS BOUNDARIES	MIDPOINT (X)	CUMULATIVE FREQUENCY (f_c)
9.5 – 20.5	15	2
20.5 – 31.5	26	10
31.5 – 42.5	37	25
42.5 – 53.5	48	32
54.5 – 64.5	59	42
64.5 – 75.5	70	45

ANSWER KEY

TREADING THE ROAD TO MASTERY

PAGE 45

CLASS BOUNDARIES	MIDPOINT (X)	CUMULATIVE FREQUENCY (f_c)
12.5 – 19.5	16	2
19.5 – 26.5	23	9
26.5 – 33.5	30	21
33.5 – 40.5	37	26
40.5 – 47.5	44	32
47.5 – 54.5	51	33
54.5 – 61.5	58	33
61.5 – 68.5	65	35

Mean = 33.8

Median = 31.5

Mode = 30.6

ANSWER KEY

LESSON 3: LET ME SHOW YOU

SHARPENING YOUR SKILLS

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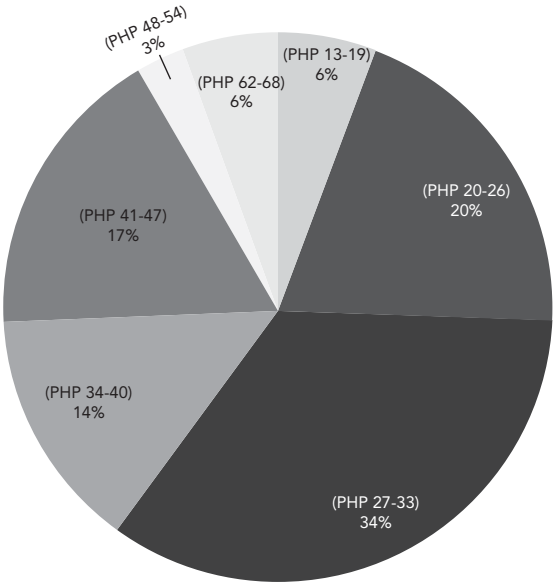
ACTIVITY I

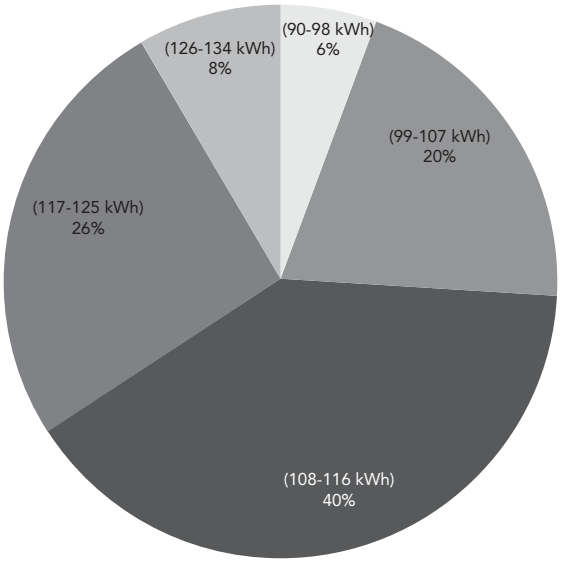
1. Price per Kilo of Rice

CLASS INTERVAL	PERCENTAGE
13 – 19	6%
20 – 26	20%
27 – 33	34%
34 – 40	14%
41 – 47	17%
48 – 54	3%
55 – 61	0%
62 – 68	6%



2. Monthly Wattage Use of Households

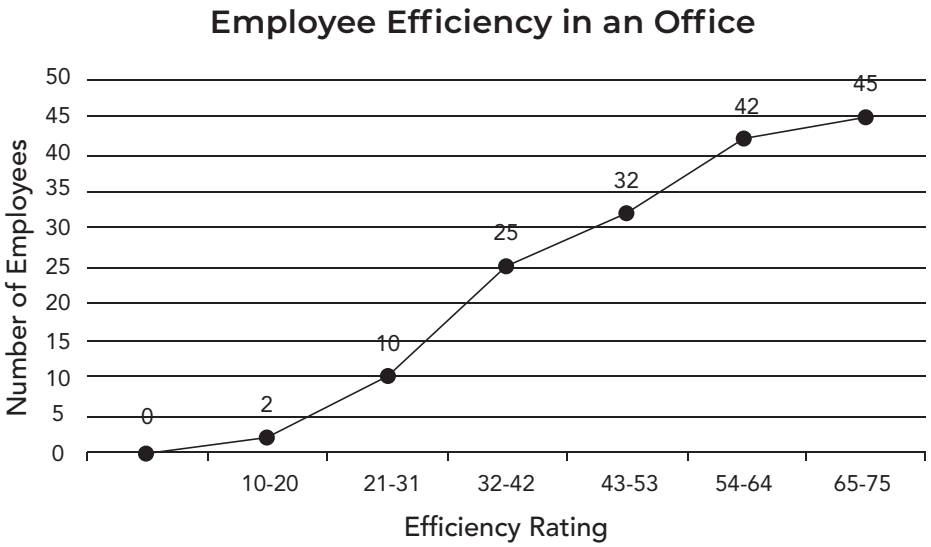
CLASS INTERVAL	PERCENTAGE
90 – 98	6%
99 – 107	20%
108 – 116	40%
117 – 125	26%
126 – 134	8%



ANSWER KEY

ACTIVITY II

1.



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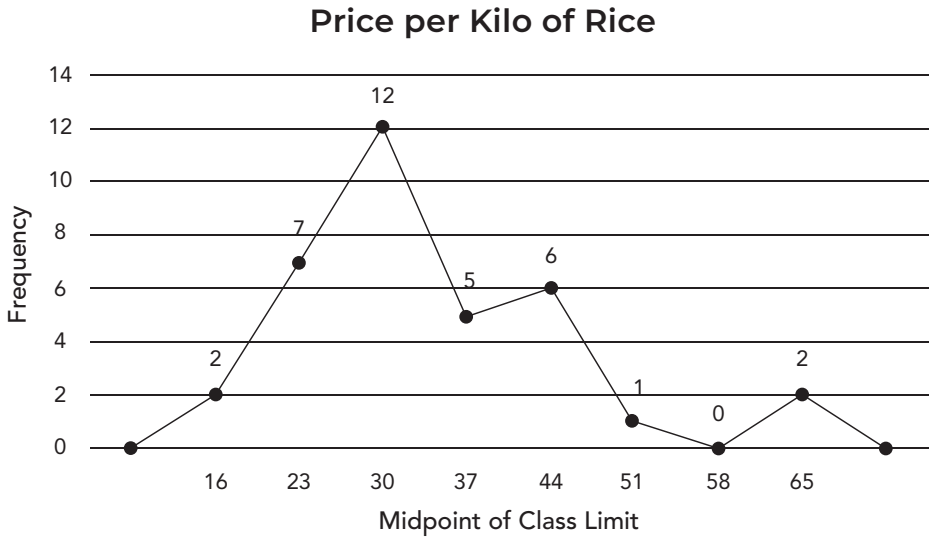
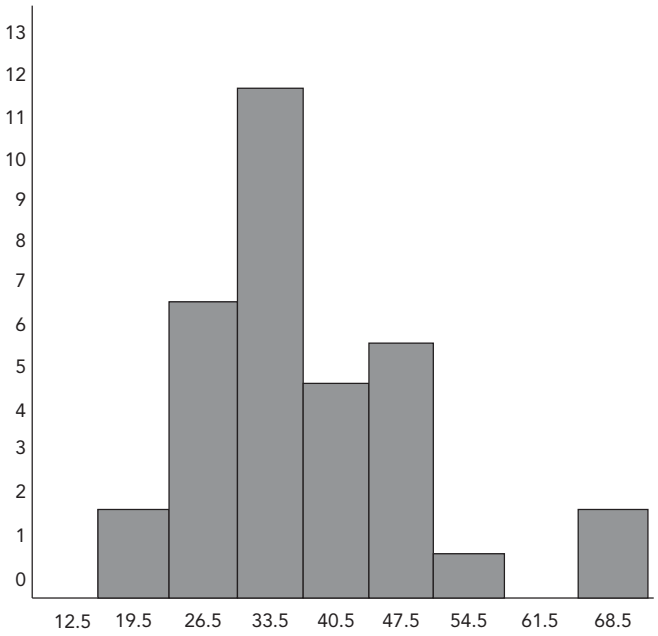


ANSWER KEY

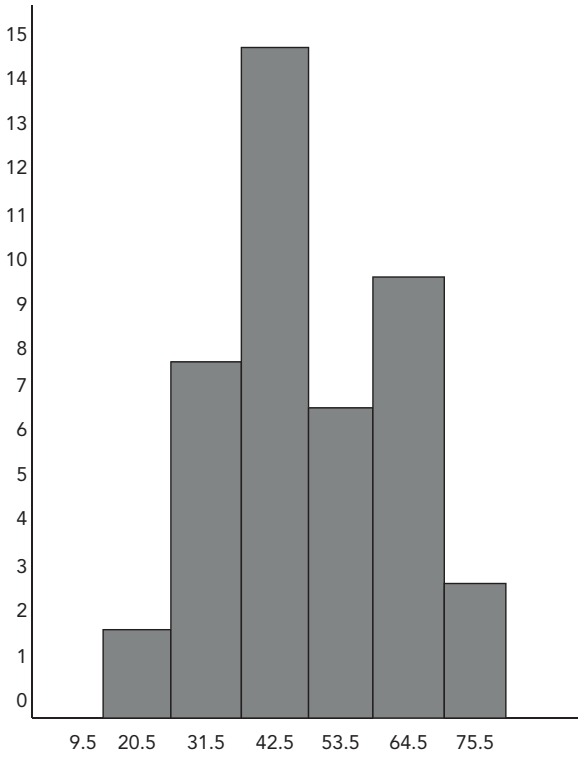
TREADING THE ROAD TO MASTERY

PAGE 64

1.

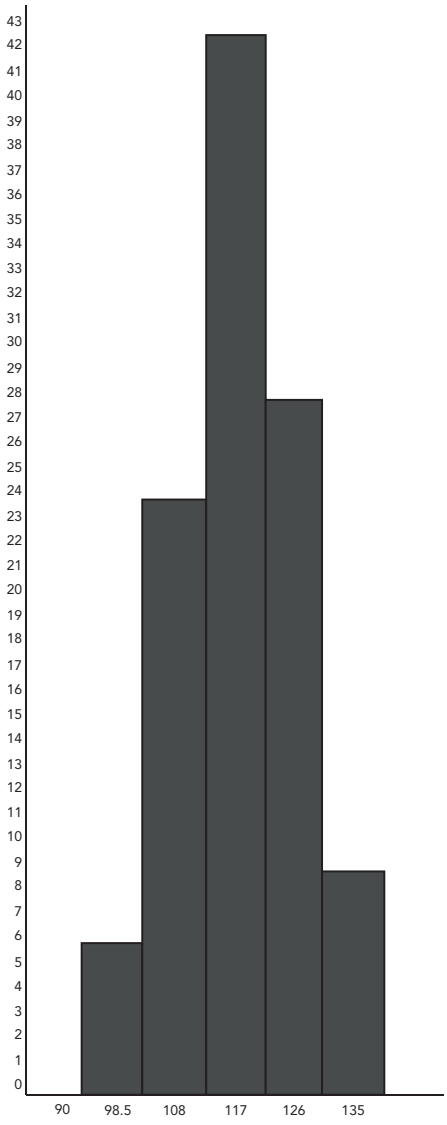


2.



ANSWER KEY

3.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4
3
2
1
0
90
98.5
108
117
126
135

GLOSSARY

Array	Arrangement of ungrouped data in ascending order.
Class (Class Interval)	Grouping/interval of data values in a frequency distribution table
Class Boundaries	Halfway points that separate each class interval.
Class Limit	Highest number (upper limit) and lowest number (lower limit) in a class.
Class Midpoint (Class Mark)	Average of the lower and upper class limits of each class interval.
Class Width (Class Size)	Difference between the upper or lower limits of two consecutive class intervals.
Continuous Variable	A variable that can assume an infinite number of values between any two specific values.
Cumulative Frequency	Number that falls above or below a particular data in a data set
Cumulative Frequency Table (OGIVE)	A graph that represents the progression of the cumulative frequencies for the classes in a frequency distribution table.
Data	Values (measurements or observations) that the variables can assume.

GLOSSARY

Data Set	Collection of data values
Descriptive Statistics	Branch of statistics that deals with the collection, organization, summarization, and presentation of data.
Discrete variable	A variable that can assume values and can be counted by observation.
Frequency	Number of times a data occurred
Frequency Distribution Table (FDT)	A table that summarizes the data and its frequencies.
Frequency Polygon	A graph that displays the data by using lines formed by connecting the midpoints of the classes
Grouped data	Data that has been bundled together in categories or ranges.
Histogram	A graph that displays the data by using side-by-side vertical bars (unless the frequency of a class is 0) with heights equal to the frequency of each class interval.
Legend	A symbol or text which described parts of a graph.

GLOSSARY

Mean (Average)	Most common measure of central tendency.
Measure of Central Tendency	A single value that describes the center or central position of a data set.
Median	Middle value of the data array.
Median Class	Class interval with the smallest cumulative frequency greater than or equal to $\frac{n}{2}$, where n is the number of data.
Modal Class	Class interval with the highest frequency
Mode	Value that occurs most often in a data set
Pie Graph (Circle Graph)	A graph that shows the distribution of frequencies in the form of a circle with sectors to show numerical proportions.
Qualitative Variable	A variable that can be placed into different categories according to some characteristic.
Quantitative Variable	A variable that can be arranged in order or rank.
Range	Difference between the highest value and lowest value.

GLOSSARY

Statistical Graph	A graph used to illustrate and easily describe, summarize, and analyze a data set.
Statistics	Science of conducting studies to collect, organize, summarize, analyze, and draw conclusions from a data.
Ungrouped Data	A raw data taken from observations and experiments which are not yet organized in any way
Variable	An attribute that can assume different values.
x-axis	The horizontal number line in the rectangular coordinate system

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