7

Mathematics

Quarter 4 – Week 3 – Module 3
Presenting Data Using Graphs

AIRs - LM

Mathematics Grade 7

Quarter 4 – Week 3 Module 3: Presenting Data Using Graphs

First Edition, 2021

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Target

Statistics is very useful to the life of mankind. Many activities that directly affect the lives of people requires serious study. Our government carefully makes decision and formulate programs through an actual statistical number. This numbers undergo a series of process from the collection of right data, analyze the data wisely and the formation of meaningful interferences and conclusions.

The presentation of information was given an equal importance for this will convey messages to the readers.

After going through this module, you are expected to:

Learning Competency:

uses appropriate graphs to represent organized data: pie chart, bar graph, line graph, histogram, and ogive. **(M7SP-IVd-e-1)**

Subtask

1. illustrate the different graphs to represent organized data
2. construct the different graphs

Before going on, check how much you know about this topic. Answer the pretest that follows in a separate sheet of paper.

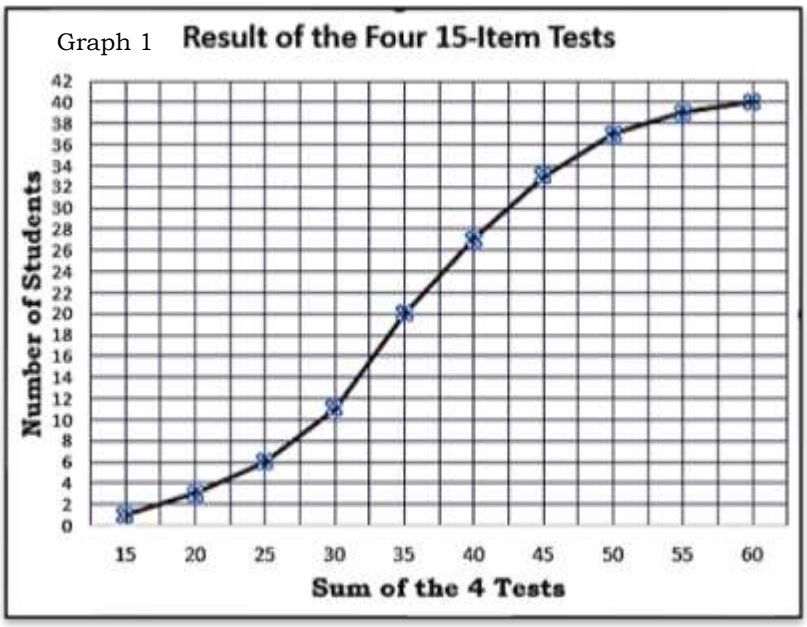
Pre-assessment

Answer what is asked, describe or defined and write the letter of your choice in your answer sheet.

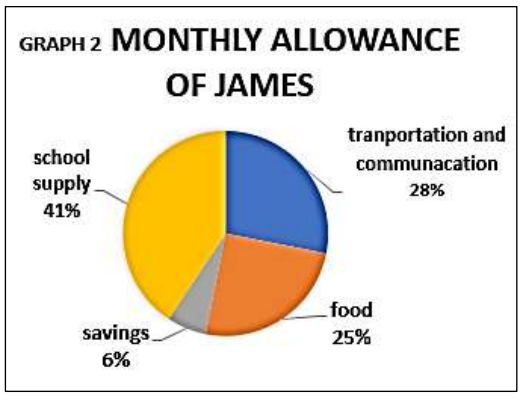
1. What statistical chart is used to show cumulative frequencies.?
   A. bar graph B. line graph C. ogive chart D. pie graph
2. It is the most commonly used graph in showing frequency distributions. What graph is it?
   A. histogram B. line graph C. ogive chart D. pie graph
3. Which of these graphs used to show percentage or proportionality of data?
   A. histogram B. line graph C. ogive chart D. pie graph
4. What part of a graph is the horizontal line?
   A. scale B. title C. x – axis D. y – axis
5. Which statistical graph gives a quick analysis of the data and time?
   A. bar graph B. histogram C. line graph D. ogive chart

6. What information does the horizontal line in graph 1 provide the reader?
   A. Number of students
   B. Result of the four 15-item tests
   C. Sum of the four tests
   D. Frequency of the tests
7. In graph 1, how many students got a total of not more than 45?
   A. 11
   B. 20
   C. 27
   D. 33

Graph 1 **Result of the Four 15-Item Tests**



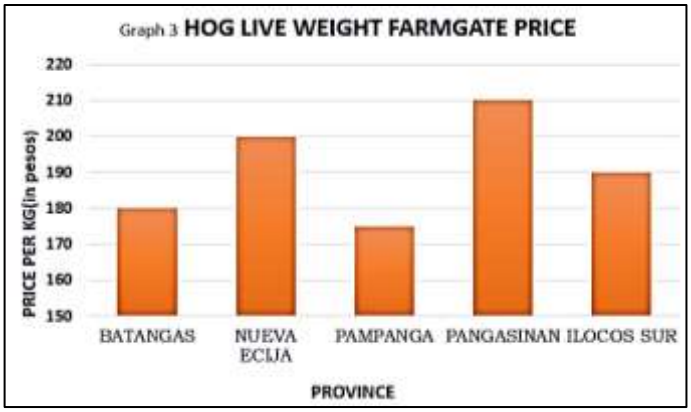
8. Which part of the monthly allowance does James allot less budget?
   A. Food
   B. Savings
   C. School supply
   D. Transportation and communication
9. If James' allowance is Php 10 000.00, how much is allotted for food?
   A. Php 2,500.00
   B. Php 2,800.00



C. Php 4,100.00
D. Php 10,000.00

10. What province has the lowest farm gate price per kilogram?
    A. Batangas
    B. Ilocos Sur
    C. Pampanga
    D. Pangasinan

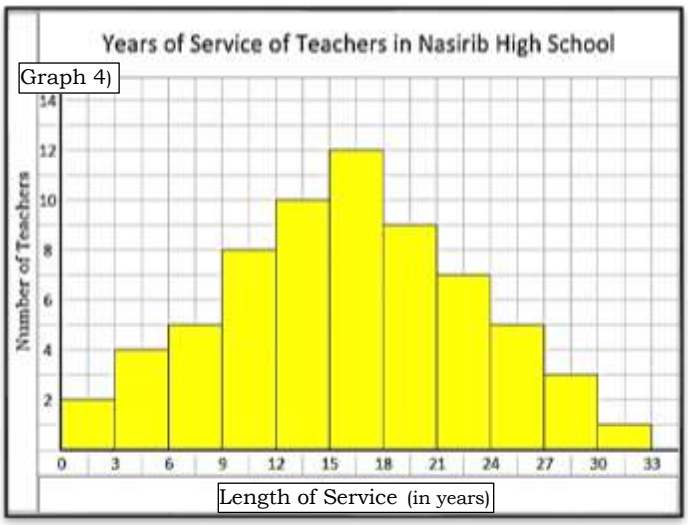
11. What is the hog farm gate price in Ilocos Sur?



A. Php 175 B. Php 180 C. Php 190 D. Php 200

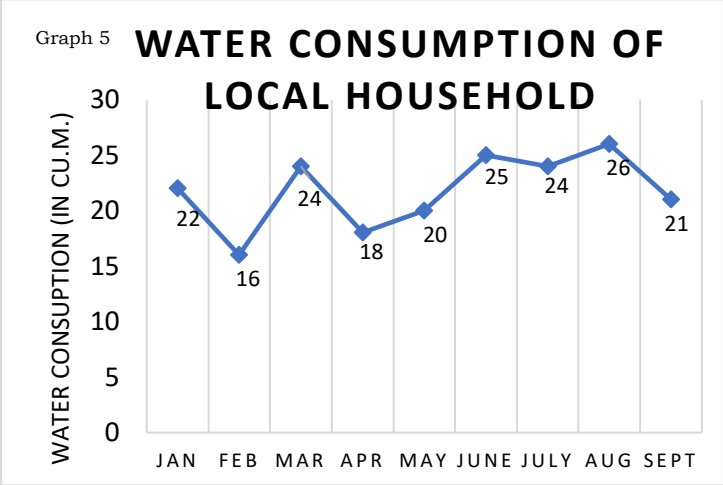
12. What does the vertical line in graph 4 represent?
    A. Length of service
    B. Number of teachers
    C. Years of service of teachers
    D. Name of the school

13. How many teachers serves for not more than 6 years in graph 4?
    A. 2
    B. 4
    C. 6
    D. 8



14. In graph 5, how much is the increase of water consumption, in cubic meter, in the period of February to March?
    A. 2
    B. 5
    C. 6
    D. 8

15. In what month does the household have the least water consumption?
    A. April
    B. August
    C. February
    D. Ma



For you to understand the lesson well, do the following activities.
Have fun and good luck!

Module 3

Presenting Data Using Graphs

Once data has been collected, it is sometimes a good idea to present the data graphically for clearer to understand. Most people find 'pictures' much more helpful than 'numbers' in the sense that, in their opinion, they present data more meaningfully.

Jumpstart

Pre-activity

School Bubble Sports Skills Training

Mr. Norman Padilla, the school's sports coordinator, needs to know what sports he will propose to the principal for the School Bubble Sports Skills Training. He conducted a survey to collect the data and ask the students to answer the online questionnaire posted in the school page.

The result of the online survey shows as follows:

Sports	Number of Students
Athletics	45
Badminton	50
Basketball	25
Chess	10
Gymnastics	18
Soccer	30

What do you think is the best graphical presentation of his data and why?

Discover

Graph is a diagram showing the relation between variable quantities, typically of two variables, each measured along one of a pair of axes at right angles. Graphs are a great way to visualize data and display statistics. They highlight the salient features of the data. They can show relationships that are not obvious from studying a list of numbers. They can also provide a convenient way to compare different sets of data.

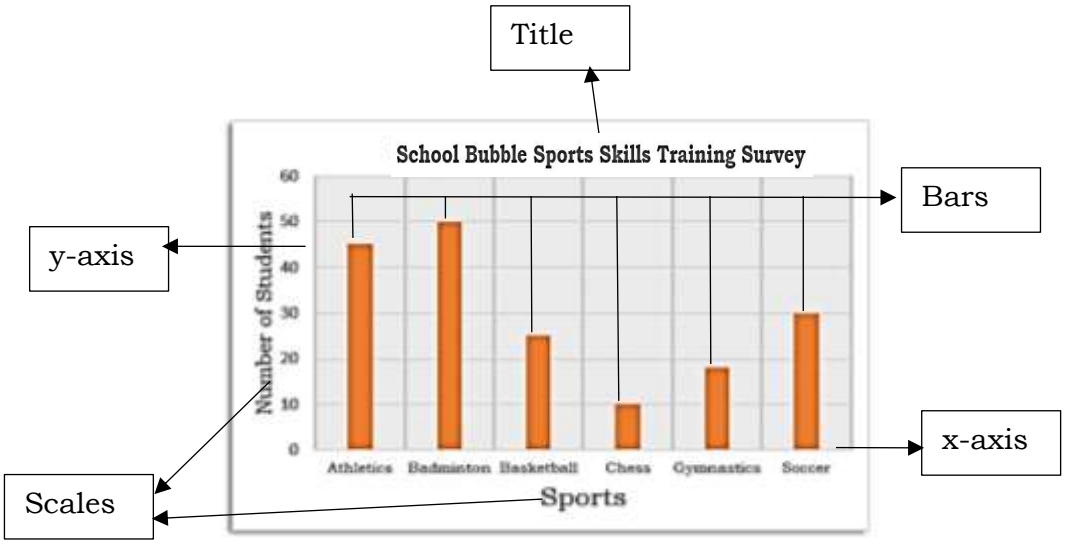
Different Graphs Used in Statistics

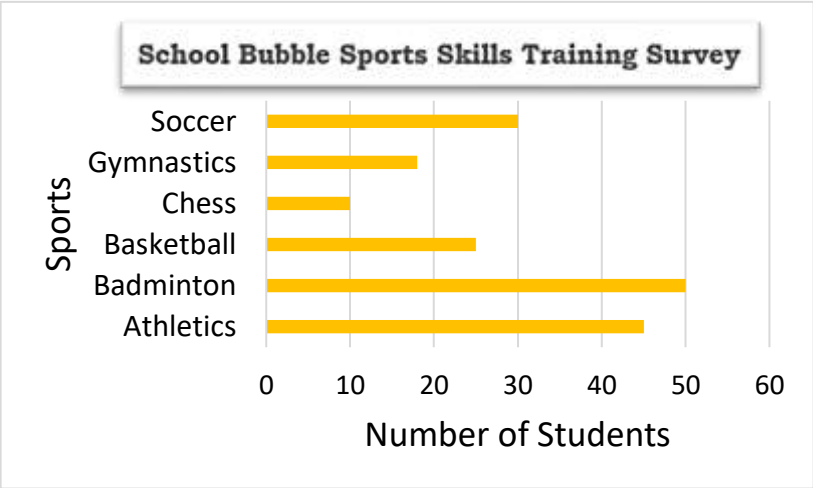
BAR GRAPH

A **bar graph** is a visual tool that uses bars to **compare data among categories**. A bar graph may run horizontally or vertically. The important thing to know is that the longer the bar, the greater its value. Bar graphs consist of two axes.

Used to:

- compare data at a particular time
- show increase or decrease in values
- for displaying data that is classified into nominal or ordinal categories.





Steps in constructing a bar graph?

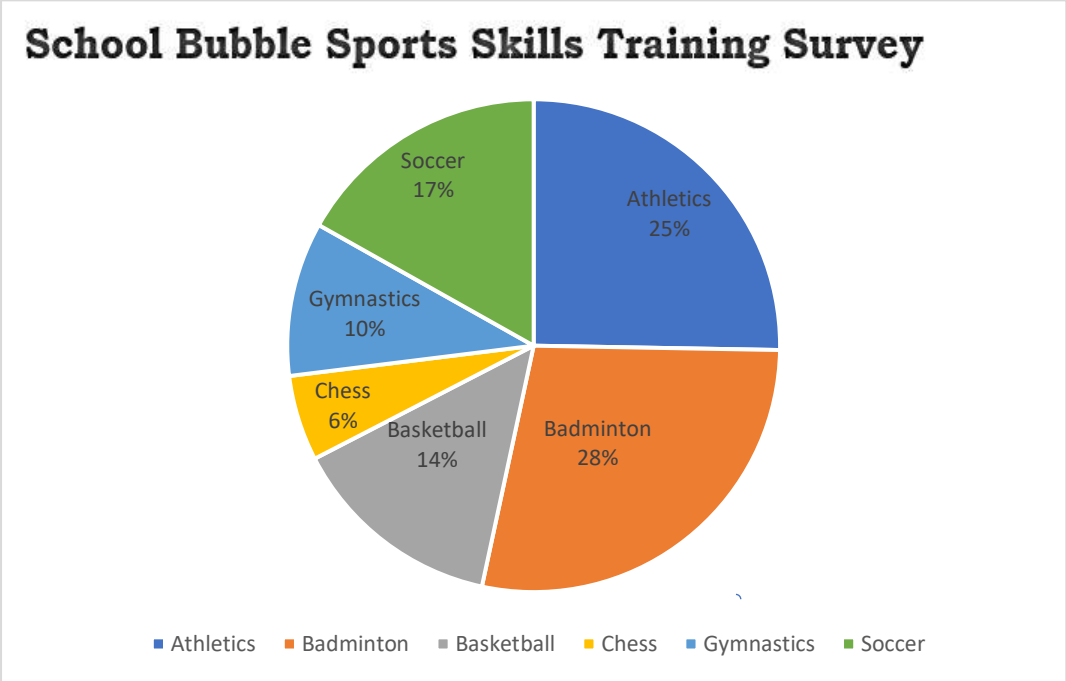
1. Draw two perpendicular lines intersecting each other at a point O.
2. Choose a suitable scale to determine the height of each bar.
3. On the horizontal line, draw the bars at equal width with corresponding heights of each category.
4. The space between the bars should be equal.

PIE CHART

A **pie chart or pie graph** is represented by a circle divided into parts. It shows the relationship among parts as well as the relationship of the part to the whole.

Used to:

- show percentage or proportional data
- compare categorized grouped data or data



Steps in constructing a pie graph

1. Draw a circle of any radius.
2. Draw a horizontal radius.
3. Starting with the horizontal radius, draw radii, making central angles corresponding to the values of respective components.

   The angle at the center corresponding to the particular observation component is given by

$$\frac{value\ of\ the\ component}{total\ value}\ x\ 360°$$

Example. For athletics, the central angle is

$$\frac{45}{178}\ x\ 360° = 90.01°\ = 91°$$

Repeat the process for all the components.

4. Now, shade the sectors with different colors to denote various components.
5. Thus, we obtain the required pie chart.
6. To get the percentage of a particular observation component is given by

$$\frac{value\ of\ the\ componet}{total\ value}\ x\ 100\%$$

The table shows the computed value of the central angle and percentage of each components.

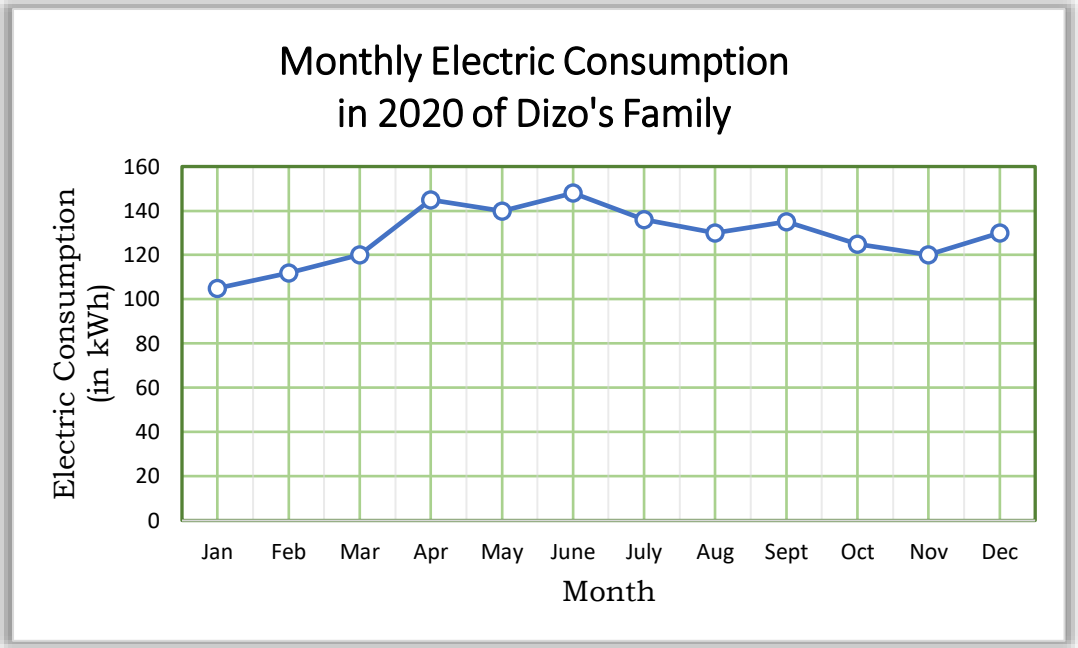
Sports	Number of Students	Central angle	Percentage of a particular component
Athletics	45	$\frac{45}{178}\ x\ 360° = 90.01° = 91°$	$\frac{45}{178}$ x 100% - 25%
Badminton	50	$\frac{50}{178}\ x\ 360° = 101.12° = 101°$	$\frac{50}{178}\ x\ 100\% = 28\%$
Basketball	25	$\frac{25}{178}\ x\ 360° = 50.56° = 51°$	$\frac{25}{178}\ x\ 100\% = 14\%$
Chess	10	$\frac{10}{178}\ x\ 360° = 20.22° = 20°$	$\frac{10}{178}\ x\ 100\% = 6\%$
Gymnastics	18	$\frac{18}{178}\ x\ 360° = 36.4° = 36°$	$\frac{18}{178}\ x\ 100\% = 10\%$
Soccer	30	$\frac{30}{178}\ x\ 360° = 60.67° = 61°$	$\frac{30}{178}\ x\ 100\% = 17\%$
TOTAL	178	360°	100%

LINE GRAPH

A **line graph** is a series of data points connected by straight line segments on two axes. Line graphs are drawn so that the independent data are on the horizontal a-axis (e.g. time) and the dependent data are on the vertical y-axis. Points are plotted based on the relationship of the quantities and these points are connected by a line. Line graphs gives a quick analysis of data.

Used to:

- show relationship between variable
- show trends and changes of data over a period of time
- compare variables



Steps in constructing a line graph

1. Find the range in values. There are two sets of values. The month ranges from January to December and monthly electric consumption ranges from 104 to 148.
2. Determine a scale. Start with the horizontal scale. If you are using graph paper, let 1 unit on the graph paper equal 1 unit of the values you are graphing. Determine whether the greatest value will fit on the graph. If it doesn't, then change the scale and try again. Now repeat this process for the vertical scale.
3. Label the graph. Mark each unit across the horizontal scale and along the vertical scale. Label the marks by the units they represent.
4. Plot the points and connect them.
5. Give the graph a title

HISTOGRAM

A **histogram** is used to summarize discrete or continuous data. In other words, it provides a visual interpretation of numerical data by showing the number of data points that fall within a specified range of values (called "bins"). It is similar to a vertical bar graph. However, a histogram, unlike a vertical bar graph, shows no gaps between the bars.

Histograms can display a large amount of data and the frequency of the data values.

Used to:

- display the distribution of information or data over a continuous time period

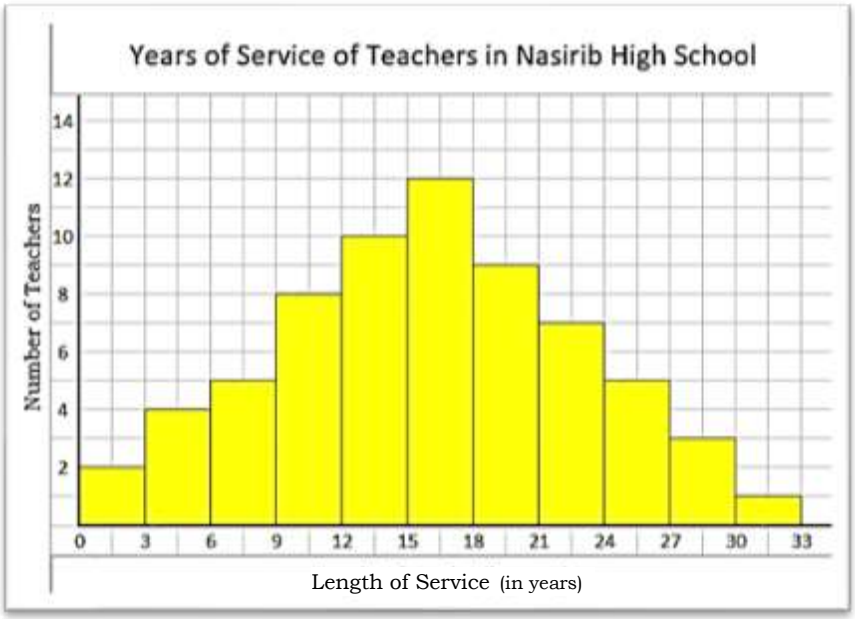
- plot the frequency of variable occurrences in continuous data

Making a Histogram Using a Frequency Distribution Table

1. Draw the horizontal axis. Place the lower value of each interval. The first-class interval is 0 – 2, followed by 3 – 5 and so on, thus, the interval of each class is 3.
2. Place evenly spaced marks along this line that correspond to the classes.
3. Label the marks so that the scale is clear and name the horizontal axis as the length of service
4. Draw the vertical axis just to the left of the lowest class.
5. Choose a scale for the vertical axis that will accommodate the class with the highest frequency.
6. Label the marks so that the scale is clear and name the vertical axis. As the number of teachers.
7. Construct bars for each class. The height of each bar should correspond to the frequency of the class at the base of the bar.

Years of Service of Teachers in Nasirib High School

Length of service	Number of Teachers
0 – 2	2
3-5	4
6-8	5
9-11	8
12-14	10
15-17	12
18-20	9
21-23	7
24-26	5
27-29	3
30-32	1



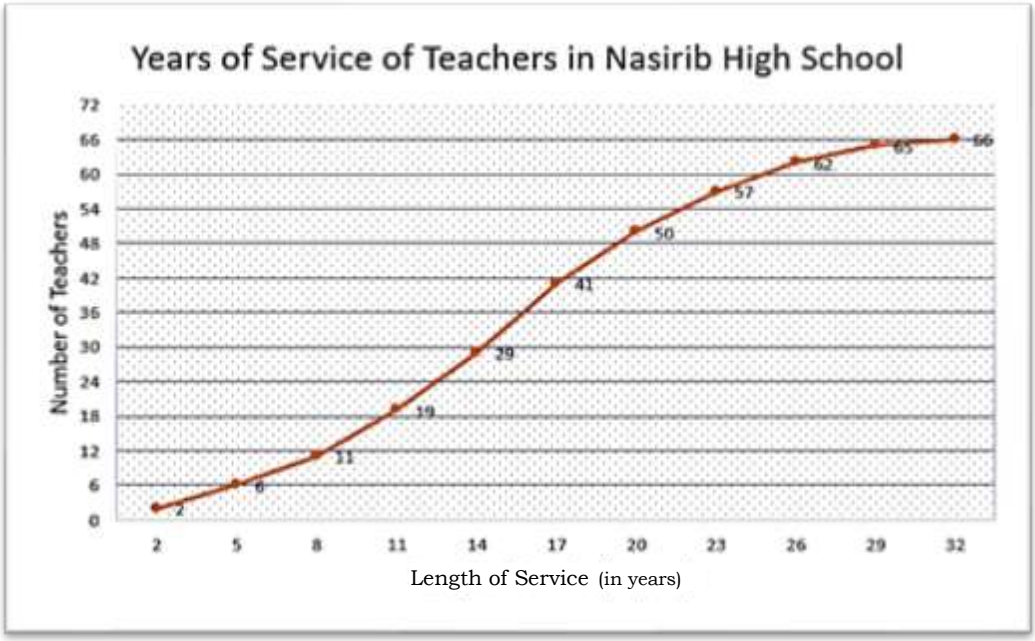
This histogram shows the number of years of service of teachers in Nasirib High School. The greatest number of teachers is serving 15 – 17 years.

OGIVE GRAPH

An **ogive graph** is statistical chart used to show cumulative frequencies. It allows the reader to quickly estimate the number of observations that are less than or equal to a particular value. It is usually easier to create this kind of graph from a frequency table.

Used to:

- determine how many data values lie above or below a particular value in a data set

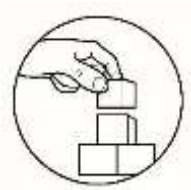


Constructing an Ogive Graph

1. Add a third column and cumulate (add up) the frequencies in column 2, going down from top to bottom. For example, the second entry is the sum of the first row and the second row in the frequency column (2 + 4= 6), and the third entry is the sum of the first, second, and third rows in the frequency column (2 + 4 + 5 = 11):. Continue until you reach the bottom.

Length of service (class limit)	Number of Teachers (frequency)	Cumulative frequency
0 – 2	2	2
3-5	4	6
6-8	5	11
9-11	8	19
12-14	10	29
15-17	12	41
18-20	9	50
21-23	7	57
24-26	5	62
27-29	3	65
30-32	1	66

2. Draw and mark the horizontal and vertical axes.
3. Take the cumulative frequencies along the y-axis (vertical axis) and the upper-class limits on the x-axis (horizontal axis).
4. Against each upper-class limit, plot the cumulative frequencies.
5. Connect the points with a continuous curve.
6. Data label may also be included.



Explore

Activity 1: Build Me!

Directions: Using the data in tabular form, construct a statistical graph stated and answer the questions that follows.

A.1. Use bar graph to represent the data.

Club	Number of Students
Performing Art	24
Visual Art	12
Culinary	20
Sports	32
Online Gaming	16

Questions:

1. Which interest club preferred most?
2. How many students choose performing art than visual art?
3. How many students are there in all the clubs?
4. What information does the graph provide the reader?

A.2. Pepito, a Grade 7 student, still receives weekly allowance amidst the covid-19 pandemic. He budgets it as shown in the table. Use pie graph to show how Pepito spends his weekly allowance.

Category	Budget
CP prepaid load	Php 100
Drinks and Chips	Php 120
School Supplies	Php 50
Savings	Php 20

Questions:

1. What percent of Pepito's budget is cp prepaid load?
2. By how many percent is the budget for drinks and chips greater than the savings?
3. What is the angle measure of the sector for school supplies?
4. What information can you observe in the graph?

A.3. In the Municipal Isolation Facility (MIF), the record section keeps the important details of the persons who are subject for quarantine. One of the former isolated persons have fever during his stay in the facility but tested negative from covid-19. Construct a line graph for his temperature record taken every four hours as shown in the table.

	Day 1					Day 2				
Time	6 am	10 am	2 pm	6 pm	10 pm	2 am	6 am	10 am	2 pm	6 pm
Temp (in ^{0}C)	37.8	38.3	37.9	38.8	39.0	38.0	37.8	38.1	37.5	37.3

Questions:

1. What set of values is found along the horizontal axis? along the vertical axis?
2. In what time was the highest temperature recorded?
3. Between which two periods was the increase in temperature greatest?
4. Between which two periods was the decrease in temperature greatest?

A.4. Make a histogram for the frequency distribution table below.

Frequency Distribution of the Sum of Four 15-Item Tests Result

Class Interval	**Tally**	**Number of students (Frequency *f*)**
56 – 60	|	1
51 – 55	||	2
46 – 50	||||	4
41 – 45	𝍸 |	6
36 – 40	𝍸 ||	7
31 – 35	𝍸 ||||	9
26 – 30	𝍸	5
21 – 25	|||	3
16 – 20	||	2
11 – 15	|	1

Questions:

1. How many students got a total of not more than 41 but not lesser than 36?
2. What was the interval in each category in the graph?
3. How many students were involved in the test?
4. In what class interval has the highest frequency?

A.5. Construct an ogive graph for Frequency Distribution of the Sum of Four 15-Item Tests Result.

Questions:

1. What does the horizontal line represent?
2. What does the vertical line represent?
3. How many of the takers are got at most 40?
4. How many students got a total of greater than 40 points?

Great job! You have understood the lesson.
Are you now ready to summarize?

Deepen

Activity 2: Draw Me!

Draw the stated statistical graph in presenting the following table of data.

Graph A

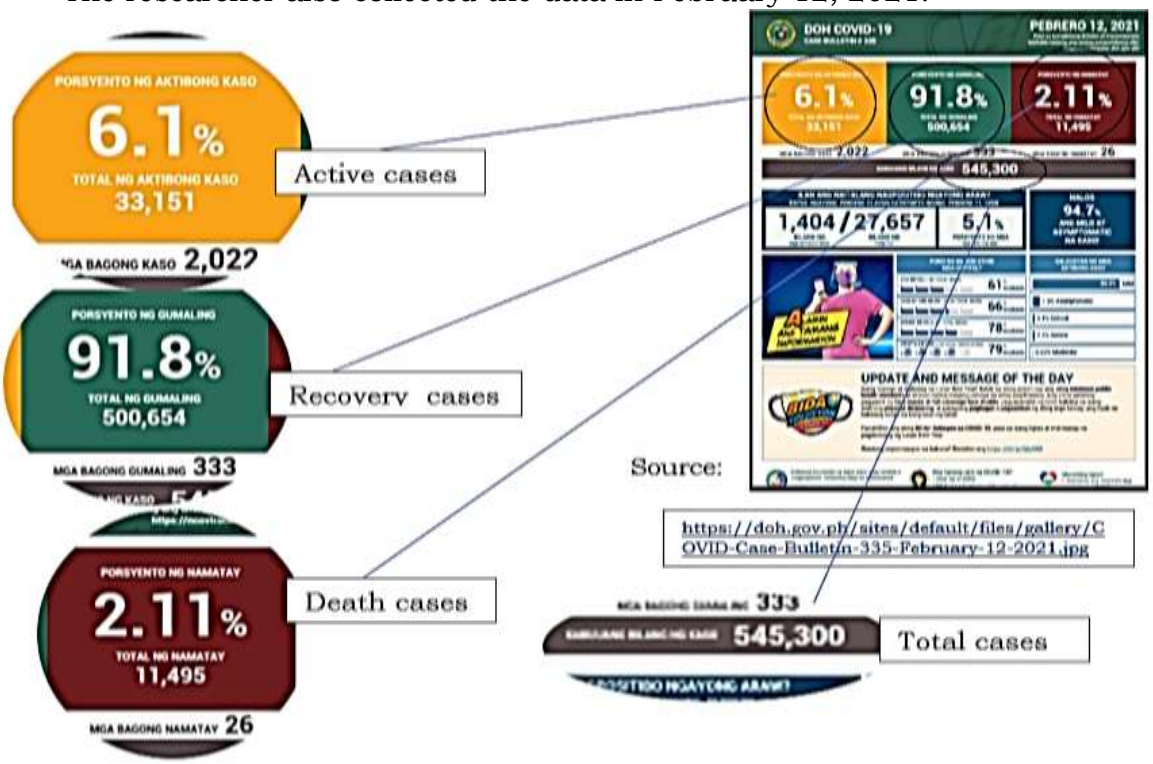
A researcher wants to make a bar graph for the first six weeks of 2021 regarding the patients recovered from covid-19 in the Philippines. He gathered data from Department of Health bulletin – BIDA+Solusyon sa COVID19. He recorded it as follows:

Date	Jan 1-Jan 7	Jan 8-Jan 14	Jan 15-Jan 21	Jan 22-Jan 28	Jan 29-Feb 4	Feb 5-Feb 11
Actual Total Recovery	9 308	10 074	8 416	8 376	12 361	13 127
				Source: https://doh.gov.ph/bulletin		
Recovery (rounded in hundreds)	9 300	10 100	8 400	8 400	12 400	13 100

Make a bar graph using the rounded data.

Graph B

The researcher also collected the data in February 12, 2021.



Make a pie chart showing the relation among and between the Recovery, Active and Death cases from the total cases recorded. Note: to compute the angle of the sector, multiply the percentage by 360^0.

Graph C

The researcher collected the daily positive rate of covid19 for the first week of February, 2021 and recorded in a table.

Date	Feb 1	Feb 2	Feb 3	Feb 4	Feb 5	Feb 6	Feb 7
Number of Persons Tested	23,521	25,848	24,802	24,691	27,942	29,519	26,109
Number of Confirmed Positive	1,046	1,545	1,405	1,428	1,415	1,400	1,343
Daily Rate of Confirmed Positive	4.4	6.0	5.7	5.8	5.1	4.7	5.1

Source: https://doh.gov.ph/bulletin

Make a line graph showing the daily rate of confirmed positive of covid19 from February 1 to February 7, 2021.

Graph D.

Make a histogram for the length of service of teachers in Casingpetan Integrated School.

Years of Service of Teachers in Casingpetan Integrated School

Length of service	Number of Teachers
0 - 4	7
5 – 9	9
10 – 14	18
15 – 19	13
20 – 24	10
25 – 29	16
30 – 34	8

Graph E

Using the data of Casingpetan Integrated School, make an ogive graph to show the cumulative frequency of the services of teachers.

In making the graphs, consider the scoring Rubric.

Score	Description
5	The graph is made in a very informative, organize, and artistically simple
4	The graph is made in an informative, organize, and artistically simple
3	The graph is made in an informative and organize

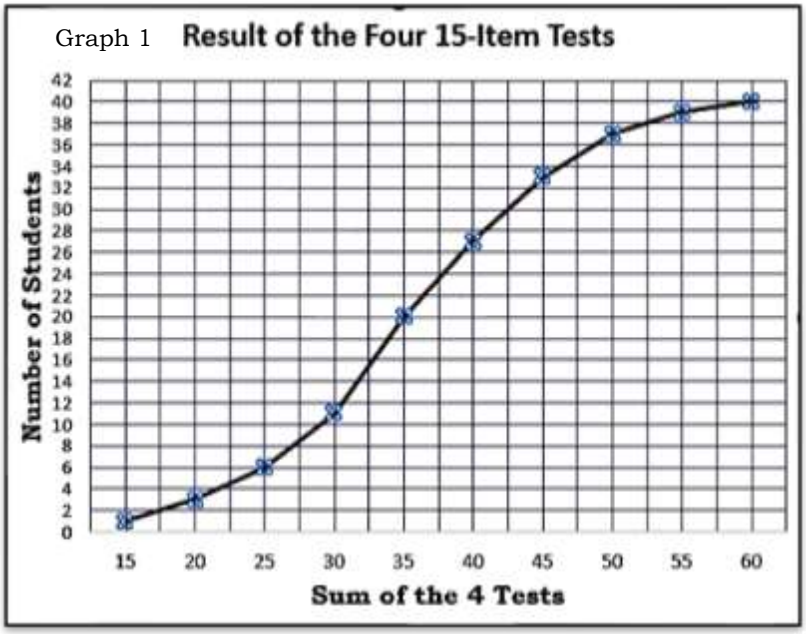
Gauge

Assessment

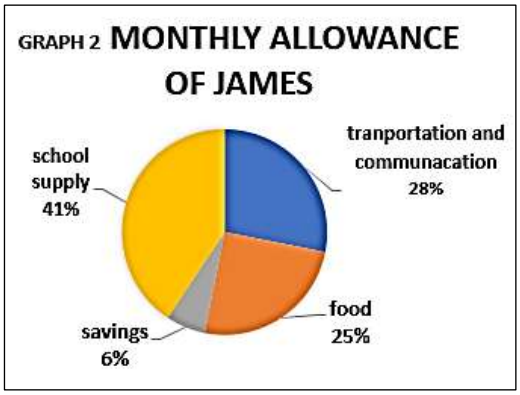
Answer what is asked, describe or defined and write the letter of your choice in your answer sheet.

1. Which of these graph shows the relationship among parts as well as the relationship of the part to the whole?
   A. bar graph B. line graph C. ogive chart D. pie graph
2. Which statistical graph gives a quick analysis of the rising and falling trend of data over a period of time?
   A. bar graph B. line graph C. ogive chart D. pie graph
3. What chart is similar to s-shaped Gothic ogival arch?
   A. histogram B. line graph C. ogive chart D. pie graph
4. What part of a graph provides information about it?
   A. scale B. title C. x – axis D. y – axis
5. It is a graph drawn as a sequence of vertical rectangles. What graph is it?
   A. bar graph B. histogram C. line graph D. ogive chart
6. What information does graph 1 provide the reader?
   A. Number of students
   B. Result of the four 15-item tests
   C. Sum of the four tests
   D. Frequency of the tests
7. In graph 1, how many students got a total of not more than 35?
   A. 11
   B. 20
   C. 27
   D. 33

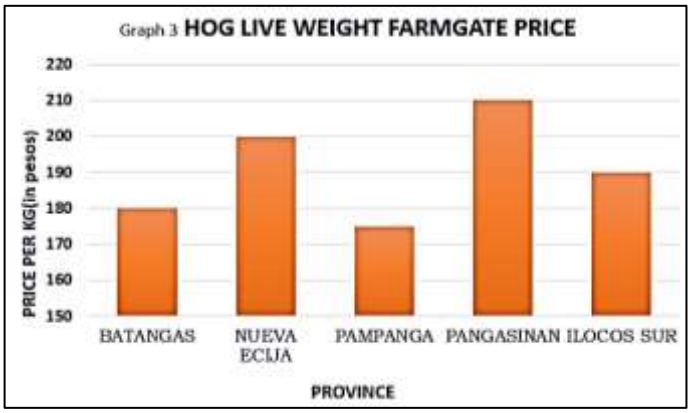
Graph 1 **Result of the Four 15-Item Tests**



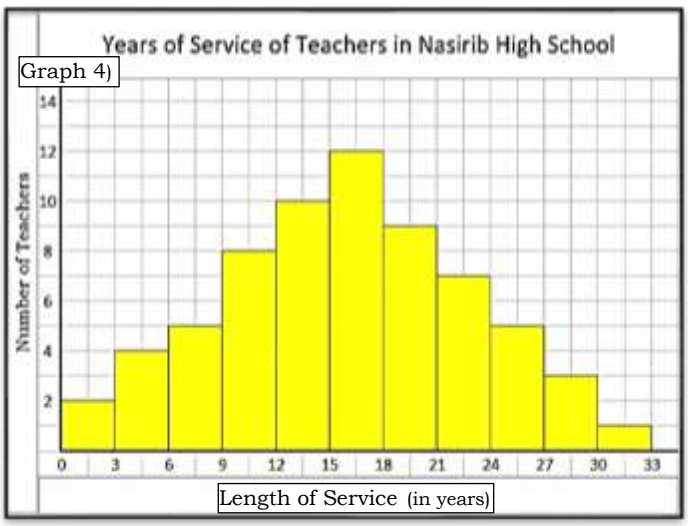
8. In graph 2, which part of the monthly allowance does James spend more?
   A. Food
   B. Savings
   C. School supply
   D. Transportation and communication
9. If James' allowance is Php 20 000.00, how much is allotted for food?
   A. Php 1,200.00
   B. Php 5,000.00
   C. Php 5,600.00
   D. Php 8,200.00



10. What province has the highest farm gate price per kilogram?
    A. Batangas
    B. Ilocos Sur
    C. Nueva Ecija
    D. Pangasinan



11. What is the farm gate price in Pampanga?
    A. Php 175 B. Php 180 C. Php 190 D. Php 200
12. What does the horizontal line represent in graph 4?
    A. Length of service
    B. Number of teachers
    C. Years of service of teachers
    D. Name of the school
13. How many teachers serves for not less than 24 years?
    A. 3
    B. 5
    C. 7
    D. 9



14. How much is the decrease of water consumption, in cubic meter, in the period of January to February?
    A. 2
    B. 5
    C. 6
    D. 8
15. In what month does the household have the greatest water consumption?
    A. April
    B. August
    C. January
    D. March

Graph 5