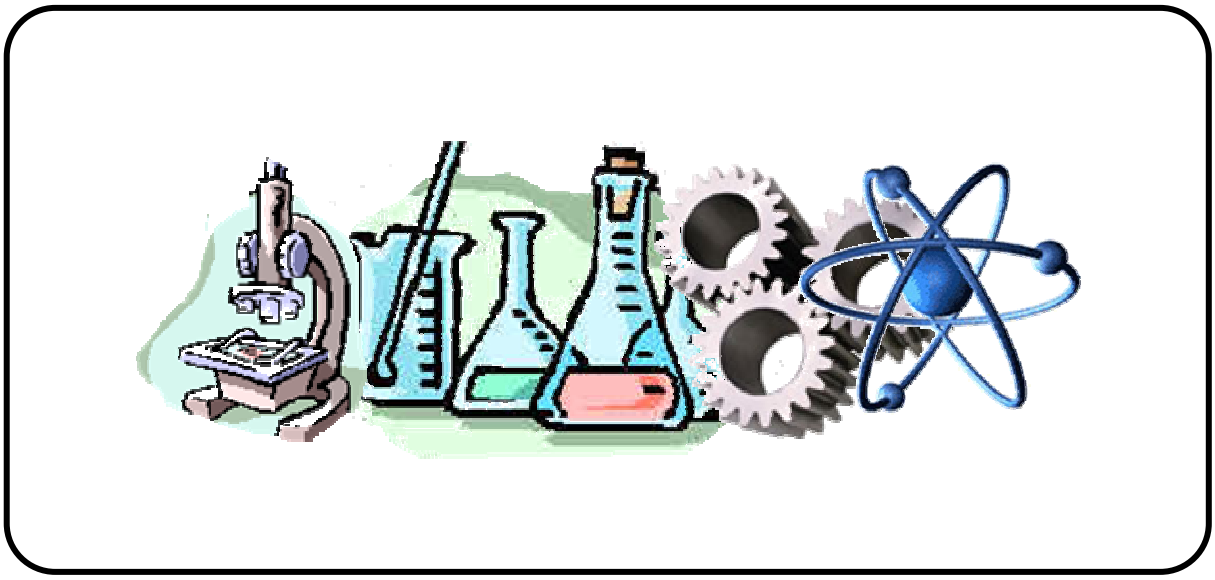
Project EASE

(Effective and Alternative Secondary Education)

INTEGRATED SCIENCE I



MODULE 2

BUREAU OF SECONDARY EDUCATION
Department of Education
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Module 2
Basic Science Processes

What this module is about

There are things around us that we take for granted. For example, if you will be asked to describe your favorite school bag, most likely you can only describe its general physical appearance but not the exact size and the type of materials used. In other words, you cannot readily give the exact description of the object.

This module will guide you on how to be more observant of the things around you. Keen observation is one way of understanding science processes like measuring, computing, inferring, generalizing and drawing conclusions. These science processes can help you acquire and develop higher order thinking skills.

This module contains some activities that can help you enhance your basic science processes. Remember that through these science processes, you can improve your problem solving capability.

This module has five lessons:

- **Lesson 1 - Observations and Inferences**
- **Lesson 2 - Describing Observations**
- **Lesson 3 - Conversion of Units**
- **Lesson 4 - Metric System of Measurement**
- **Lesson 5 - Interpretation of Data**

What you are expected to learn

After going through this module, you are expected to:

1. differentiate observation from inference;
2. describe observations qualitatively and quantitatively;
3. compute the area and the volume of a regularly shaped material;
4. convert measurements from a given unit to a desired unit using the appropriate conversion factor; and

5. organize, compare, interpret data and present conclusions in the form of charts, tables or graphs.

How to learn from this module

To achieve the objectives of this module, do the following:

- Take your time reading the lessons carefully.
- Follow the directions and/or instructions in the activities and exercises diligently.
- Answer all the given tests and exercises.
- Familiarize yourself with the following terms:

Term	Definition
Convert	- to change
Conversion Factor	- a ratio or factor used to convert units
Inference	- interpretations based on observations
Observations	- actual perceptions of the senses
π	- read as “pi” having a value of 3.1416
Qualitative Observation	- an observation based on quality only
Quantitative Observation	- an observation based on quantity only
X-axis	- the horizontal line in a graph representing independent variable
Y-axis	- the vertical line in a graph representing dependent variable
Water Displacement Method	- way of determining the volume of an irregular solid through the volume of its displaced liquid
Least Count	- is the smallest value that a measuring device could measure

What to do before (Pretest)

Multiple Choice. Encircle the letter of the best answer.

For question numbers 1-3, refer to the following situation:

A piece of candle was observed by a first year class before, during and after it was lighted. The observations were tabulated as follows:

Before Lighting	While Lighting	After Lighting
1. The candle is white and cylindrical.	1. The candle burns without a sound.	1. The flame of the candle was put off after 30 minutes.
2. It is 15 cm long.	2. The length is steadily decreasing.	2. Smoke was produced when the flame was put off.
3. Its wick is white.	3. The wick of the candle turns black.	3. The wick of the candle became 1 cm long.
4. The wick is made up of 3 pieces of thread.	4. There are 3 colors in the flame of the candle.	4. The final length of the candle is 3 cm long.

1. Which of the statements in the first column are qualitative observations?

    a. 1 and 3 only
    b. 2 and 4 only
    c. 1 and 4 only
    d. 2 and 3 only

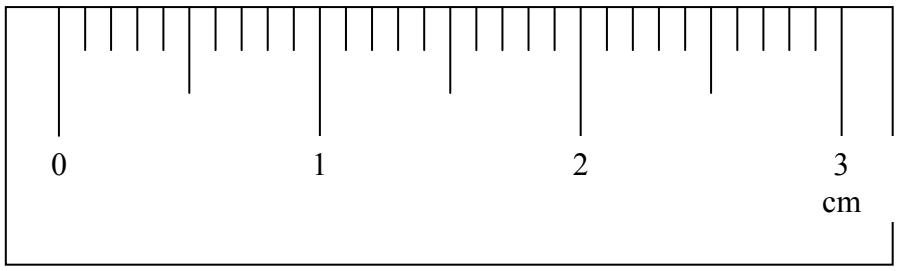
2. Which of the statements in the last column are quantitative observations?

    a. 1 and 2 only
    b. 3 and 4 only
    c. 1 and 3 only
    d. 2 and 4 only

3. Which of the statements in the second column are ”not” qualitative observations?

    a. 1 and 2 only
    b. 3 and 4 only
    c. 1 and 3 only
    d. 2 and 4 only

4. How many small lines are there from 0 to 1 cm? Refer to the illustration below



    a. 4 lines
    b. 6 lines
    c. 8 lines
    d. 10 lines

5. If 1/4 means 1 out of 4 equal parts, 1/10 means 1 out of how many equal parts?

    a. 4 parts
    b. 6 parts
    c. 8 parts
    d. 10 parts

6. Which of the following values represents 1/10?

    a. 0.001
    b. 0.01
    c. 0.1
    d. 1.0

7. If 10 millimeters is equal to 1 centimeter, then how many millimeters are there in 35 centimeters?

    a. 0.35 mm
    b. 3.50 mm
    c. 35.0 mm
    d. 350.0 mm

For questions 8-9, refer to these data on the mass and dimension of the aluminum block.

length, L = 90 cm **width, W = 50 cm**
mass, m = 24 g **thickness, T = 20 cm**

8. What is the volume of the aluminum block?
   a. 1000 cc c. 4500 cc
   b. 1800 cc d. 90000 cc

9. The density of the aluminum block is___
   a. 0.00026 g/cc c. 0.026 g/cc
   b. 0.0026 g/cc d. 0.26 g/cc

10. Rita poured 20 cc of water in a graduated cylinder. She dropped a piece of stone into it. The level of water in the graduated cylinder rose to 28 cc. How much is the volume of the stone?
    a. 10 cc c. 6 cc
    b. 8 cc d. 4 cc

11. Sally is assigned to make 9 pieces of bouquet for her sister's wedding. If one bouquet needs 0.3 m of ribbon, how many centimeters of ribbon is she going to buy?

    a. 240 cm
    b. 250 cm
    c. 270 cm
    d. 280 cm

For question numbers 12-18, refer to the situation and the table below:

The students are performing an experiment on displacement method to find out the relationship between the mass of washers against its volume. The data gathered are the following: mass of washer = 8 g; volume of 1 washer = 2 cc; initial volume of water in the graduated cylinder is 20 cc.

No. of washers	Mass(g)	Volume of Water (cc)
1	8	22
2	16	24
3	24	26
4	32	28
5	40	30

12. If they add one more washer to make 6 washers, what will be the new mass and volume?

    a. 48 g and 32 cc
    b. 48 g and 30 cc
    c. 56 g and 28 cc
    d. 56 g and 26 cc

13. Which variables do they need to use if they are going to plot the data on a graph?

    a. Number of washers and mass
    b. Mass of washers and volume of water
    c. Volume and number of washers
    d. None of the above

14. Which variable is to be placed on the x axis?

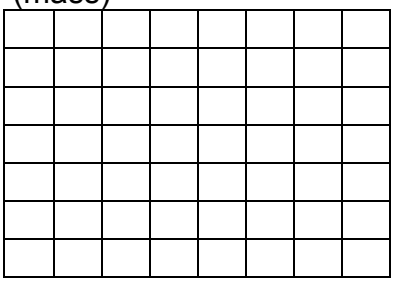
    a. number of washers c. volume of water
    b. mass of washer d. volume of washer

15. Which variable is to be placed on the y axis?

    a. mass of washer
    b. volume of washer
    c. volume of water
    d. number of washers

16. Plot the values of the mass of washers against the volume of water. Describe the graph.

y (mass)



x (volume)

17. What happens to the volume of water as the mass of washer decreases?

    a. Increases
    b. Decreases
    c. Remains the same
    d. Undetermined

18. Which of the following interpretations best describes the graph line?

    a. As the mass increases, the volume decreases
    b. As the mass increases, the volume increases
    c. As the mass increases, the volume remains the same
    d. As the volume increases, the mass remains the same

For numbers 19-20, answer the following questions briefly.

19. Why is the SI system more acceptable than the English system?

20. What is the difference between observation and inference?

Key to answers on page 27

Lesson 1 Observations and Inferences

There are many things around us that need a closer look. It is when we take a long, hard look that we are actually observing. **Observation** involves all of your basic sense organs: the eyes, nose, ears, tongue, and hands. In an observation, you do not only look, you have to **stare**; you don't only hear, you **listen**, you don't only taste and smell, you **savor**; and you don't only touch, you **feel**.

Most of the time however, you think you are observing when in fact you are inferring. While observation is actually seeing, smelling, hearing, tasting and touching, inferring is making interpretations based on your past observations or experiences. You call this an **inference**. To help you differentiate between observation and inference, let us do an activity.

What you will do

Activity 1.1 When do you observe and when do you infer

Read the situation in the box, and then write your observations and inferences on the table below.

You noticed a group of 3 boys and 3 girls talking, laughing and eating on a table. One boy wears a coat and tie while the other 2 boys dress casually. One of the girls wears a gown, while the other girls wear ordinary dresses. As they talk, the boy with the coat and tie places his right arm over the shoulder of the girl wearing the gown. The two other boys shake hands with the two other girls. Suddenly, one of the girl cries, while the boys dressed ordinarily argue in high tones. The pair who wore formal attire talks to the boys. Then they all walk away from each other in pairs.

Observations	Inferences
Ex. A group of 3 boys and 3 girls are talking, laughing and eating on the table.	Ex. These 3 boys and 3 girls are best friends.
1.	1.
2.	2.
3.	3.
4.	4.
5.	5.

Key to answers on page 27

What you will do

Self-Test 1.1

Tell whether the given statement is an observation or an inference.

1. The cloud is clear. _____
2. There are fruits in the basket. _____
3. They are rich because they wear plenty of jewelry. _____
4. Jenny's eyes are red because she has sore eyes. _____
5. The boy is sad because his father went away. _____

Key to answers on page 28

Lesson 2 Describing Observations

When making observations, it is preferable to express these in quantifiable manner. "There are 3 boys and 3 girls" is a much better observation than "There is a group of boys and girls". **Qualitative observations** merely describe quality while **quantitative observations** express the exact quantity referred to. To have a better understanding of what qualitative and quantitative observations are, try activity 2.1.

What you will do

Self-Test 2.1 Differentiating Quantitative Observations from Qualitative Observations

On the right side column of the table below, write the quantitative observation relevant to the qualitative observation given.

Qualitative Observation	Quantitative Observation
1. There is a small amount of water in the beaker.	Example: The amount of water in the beaker is 30 ml.
2. She uses a large amount of baking powder.	
3. There are many people joining the protest rally.	
4. Enough amount of salt is added.	
5. He boils a small amount of the substance.	

Key to answers on page 28

What you will do

Self-Test 2.1

Determine whether the given statement is a qualitative observation or a quantitative observation.

1. There are six girls eating in the canteen.
2. They are smart because they are honor students.
3. The boys are attending their Science 1 class.
4. Ten of the basketball players are studying at Ateneo de Manila.
5. Jose is the tallest among his classmates.

When you quantify your observations, you need to use some mathematical concepts like measurement and formulas for determining the area and volume of objects.

Key to answers on page 28

Measurement

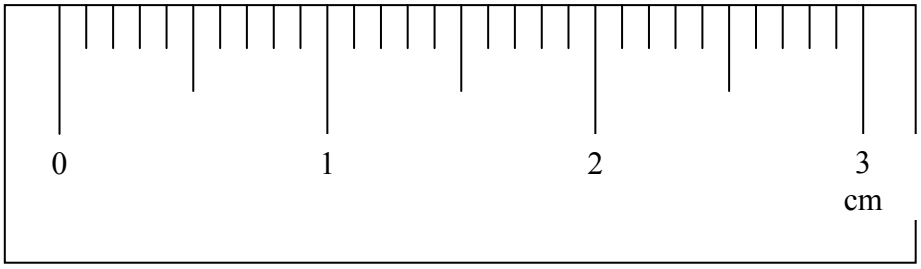
The development of science processes starts from the very simple process of observing to the most complex process of experimenting. Some processes like measuring, computing, predicting and interpreting data will help you develop your mathematical skills.

Try to perform the succeeding activities that will enhance your mathematical skills.

What you will do

Activity 2.2 Accuracy of a Ruler

1. Get a ruler and compare its calibration with the illustration given below.



Observation:

_____
_____
_____

2. How many smaller lines are there in one centimeter? One line is equal to one millimeter. How many millimeters are there in one centimeter?

_____
_____

3. Look at your ruler again. What is the smallest length that your ruler could measure?

_____
_____

Key to answers on page 28

Length is actually the distance between two points. Width, height and thickness are also the measured distance between 2 points.

The area and the volume of regularly shaped solids are measured using any of the devices for length. Let's say, if the solid is rectangular in shape, its area is found by getting the product of its length and width (A = Length x Width) and its volume is determined by getting the product of its length, width, and thickness (V = Length x Width x Thickness). The final answer for the measured area and volume is based on the minimum number of significant digits required. Therefore, rounding off of numbers to a certain place value applies.

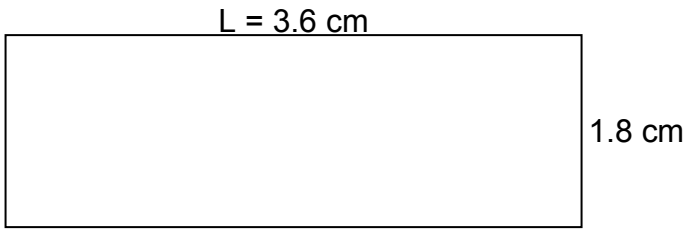
For example: Compute the area of a metal block 4.7 mm long and 3.1 mm wide.

Area = length x width
= 4.7 mm x 3.1 mm
= 14.57 or 14.6 mm^2

Formulas for the Area of Objects with the Following Shapes

Area of a Rectangle

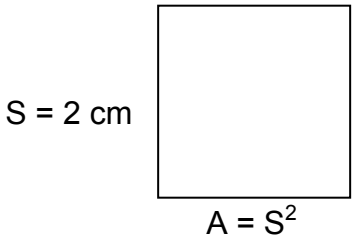
The area of the rectangle is equal to the product of the length (L) and width (W) or A = LW. Example: Solve for the area of the rectangle with the given dimensions.



A = L x W
A = 3.6 cm X 1.8 cm
A = 6.48 cm^2
A = 6.5 cm^2

Area of a Square

The area of the square is equal to the square of the side or $A = s^2$ as shown below.



$A = 2\ cm \times 2\ cm$
$A = 4\ cm^2$

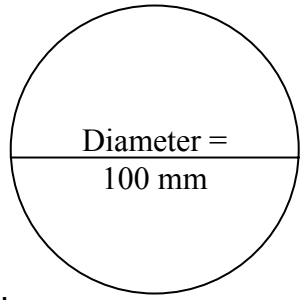
Area of a Circle

The area of a circle is equal to pi times the square of the radius or $A = \pi r^2$. The value of pi (π) is equal to 3.14 while a radius is one-half of a diameter.

For example: Solve for the area of the circle with the diameter of 100 mm. Obviously, the radius is 50 mm.

$A = \pi r^2$
$= 3.14 \times (50\ mm)^2$

$= 3.14\ (2500\ mm^2)$
$= 7850\ mm^2$

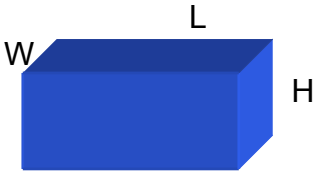


Areas are always expressed in square units.

Formulas for the volume of objects with the following shapes:

Volume (V) of a rectangle

V = length (L) x width (W) x height (H) or
= L x W x H



Example:

Find the volume of a rectangular metal block 4.7 mm long, 3.1 mm wide and 0.9 mm thick.

Volume = L x W x H
V = 4.7 mm x 3.1 mm x 0.9 mm
V = 13.113 mm^3
V = 13.1 mm^3

Volume of a Cube

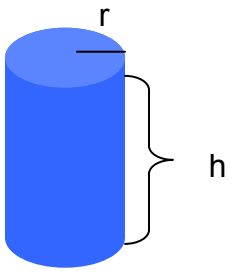
V = side x side x side
= s^3

Volume of a Cylinder

V = 3.14 x radius^2 x height or V = $\pi r^2 h$.

The units for volume are always expressed in cubic units.

Ex. cubic mm (mm^3).



The mass of an object is measured using beam, platform, or triple beam balances. The accuracy of the mass of an object is based on the least count that the device could give.

For example, the platform balance has a least count of a tenth of a gram, thus, the final answer for the measured mass is up to one decimal place of a gram.

For example: What is the total mass of the object if the readings of the riders in a platform balance show 15.0 g and 4.3 g respectively?

Solution:

$$\begin{array}{r} 15.0\ g \\ +\ 4.3\ g \\ \hline 19.3\ g \end{array}$$

What you will do

Self-Test 2.2

Solve the following.

1-2. A rectangular box has the following measurements: length 25 cm, width 10 cm and height 5 cm. Find its area and its volume.
3. The diameter of a circle is 10 cm. Compute for its area.
4. What is the side of the square if its area is 16 cm^2?
5. The mass of the three books is 2.5 kg. What is the total mass in g?

Key to answers on page 28

Lesson 3 Conversion of Units

Before computations are done, make sure that the values given are of the same units. If the quantities have different units, we should convert any of the two or more values involved using a conversion factor so that all quantities will have the same unit. The conversion factor is the equivalent of one unit in another unit. It is expressed in fraction form.

For example, if 10 mm = 1 cm you may write the conversion factor using any one of the following forms:

a. Form 1 factor → 1 cm/10 mm
b. Form 2 factor → $\frac{10\text{ mm}}{1\text{ cm}}$

Consider these examples:

1. Convert 125 mm to cm

$$125\text{ mm} \times \frac{1\text{ cm}}{10\text{ mm}} = \frac{125}{10} \text{ or } 12.5\text{ cm}$$

In this case, form 1 factor is used because the desired unit is centimeter.

2. Convert 35 cm to mm

$$35\text{ cm} \times \frac{10\text{ mm}}{1\text{ cm}} = \frac{350}{1} \text{ or } 350\text{ mm}$$

In this case form 2 factor is used because the desired unit is millimeter.

What you will do

Activity 3.1:

In this activity, you will be given equivalences. Write the corresponding conversion factors on the proper column. Use the two forms which are discussed earlier.

Example: 7 days = 1 week

Form 1: $\frac{7 \text{ days}}{1 \text{ week}}$

Form 2: $\frac{1 \text{week}}{7 \text{ days}}$

Conversion Factor	Form 1	Form 2
1 cm = 10 mm		
1 cg = 10 mg		
1 inch = 2.54 cm		
30 days = 1 month		
1 week = 7 days		
1 kilogram = 1000 g		
100 cm = 1 m		

1000 m = 1 km

Key to answers on page 29

What you will do

Activity 3.2

Convert the following units using the conversion factors in the preceding discussion:

Examples:

1. Change 125 kilograms to grams

$$\frac{125\ \text{kg}}{} \times \frac{1000\ \text{g}}{1\ \text{kg}} = 125000\ \text{g}$$

2. Change 275 grams to kilograms

$$275\ \text{g} \times \frac{1\ \text{kg}}{1000\ \text{g}} = 0.275\ \text{kg}$$

1. Convert 250 millimeters to meters
2. Convert 8000 minutes to seconds
3. Convert 5000 grams to centigrams
4. Convert 120 years to minutes
5. Convert 500 milligrams to kilograms

Key to answers on page 29

What you will do

Self-Test 3.1

Convert the following values to the desired values using the conversion factors discussed earlier:

1. 90 days = _____ months
2. 20 mg = _____cg
3. 12 km = _____ m
4. 5 min = _____ s
5. 60 m = _____ mm

Key to answers on page 29

Lesson 4 Metric System of Measurement

Measurement is the process of comparing the unknown quantity with a known quantity. There are 2 systems of measurement: **The English System**, and the **Metric System** or **International System** of units (**SI)**.

The scientific world has recognized the metric or the SI as the more acceptable system than the English System because of its convenience in changing the given unit to the desired unit. The metric system uses prefixes as shown in the table below.

Table 4.1 – Prefixes

Prefixes	Equivalent
Mega	10^{6} or 1000000
Kilo	10^{3} or 1000
Hecto	10^{2} or 100
Deka	10^{1} or 10
Deci	10^{-1} or 0.1
Centi	10^{-2} or 0.01
Milli	10^{-3} or 0.001
Micro	10^{-6} or 0.000001

These prefixes are used in expressing the metric units of the different physical quantities. Below are examples of physical quantities that could be expressed using these prefixes.

a. Unit of Length

10 millimeters = 1 centimeter
10 centimeters = 1 decimeter
10 decimeters = 1 meter

b. Unit of Mass

1000 milligrams = 1 gram
1000 grams = 1 kilogram

Sample Conversions:

Conversion factors:
1000 g/ 1 kg
1000 mm/1 m

Change:

a. 35 g to kg = 35 ~~g~~ x $\frac{1\ kg}{1000\ ~~g~~}$ = $\frac{35}{1000}$ = 0.035 kg

b. 6.9 m to mm = 6.9 ~~m~~ x $\frac{1000\ mm}{1\ ~~m~~}$ = 6900 mm

What you will do

Self-Test 4.1

Change each given unit to the desired unit.

1. 0.75 m to cm =
2. 84 g to kg =
3. 500 cm to mm =
4. 20 days to hours =
5. 5 hours to seconds =

Key to answers on page 30

Scientific Notation

The SI system of measurement is expressed in scientific notation or power of ten notation.

In science, scientists are concerned with small and big numbers, say for instance this number 9,450,000,000,000 can be written using power- of- ten notation such as 9.45×10^{12} while this very small number 0.00000000000036 can be written as 3.6×10^{-13}.

The use of power-of- ten notation in the writing of numbers is also called **exponential notation**. Such number follows the standard form:

$$N = a \times 10^{b}$$

where N is the given number, *a* is the number having a single nonzero digit to the left of the decimal point and *b* is the positive or the negative exponent.

What you will do

Self-Test 4.2

Express the following numbers using scientific notation.

1. 0.00055
2. 350000000
3. 0.00000000078
4. 5075
5. 4000000000000

Key to answers on page 30

Lesson 5 Interpretation of Data

All data in any experiments should be well organized for easy and objective analysis. The data can be tabulated, plotted on a graph or shown in diagrams and charts.

Below is an example of tabulated data.

Table 5.1 – Circumference vs. Diameter of the Can

Circumference (cm)	Diameter (cm)
1	5
2	10
3	15
4	20

When the above data on circumference vs. diameter are plotted, a line graph could be illustrated as shown below.

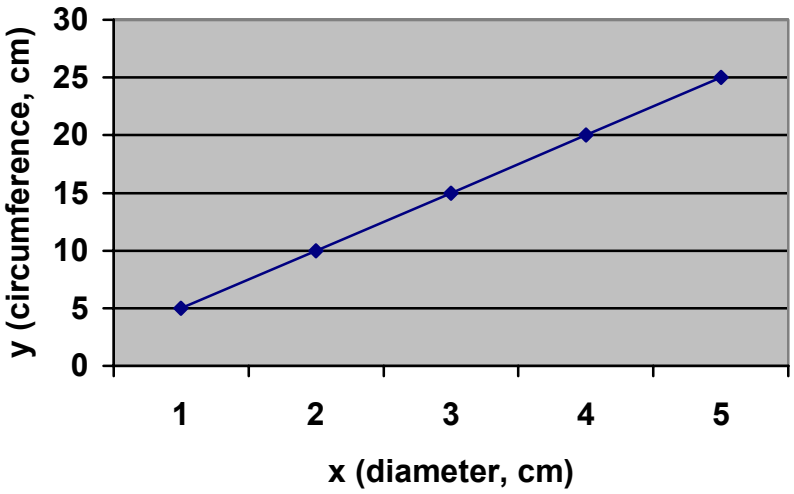
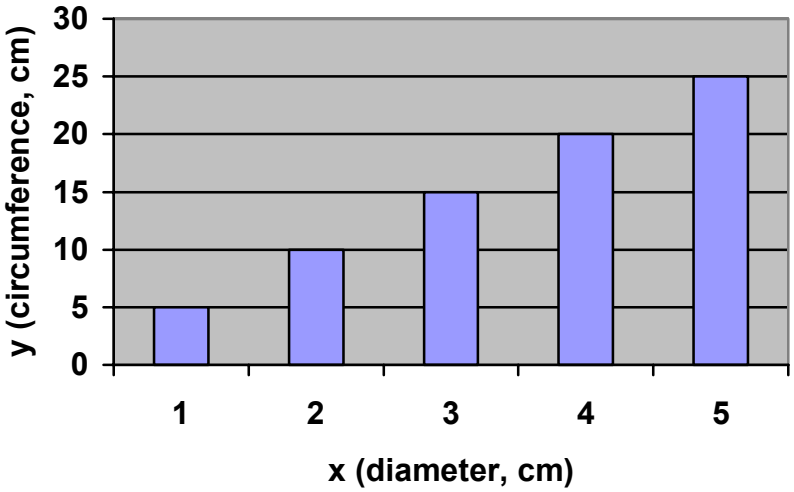


Figure 5.1 Circumference Against the Diameter of Cylindrical Can

Study Figure 1 and interpret the data presented. How is the circumference of the can related to its diameter? What happens to the circumference of the can as the diameter of the can decreases?

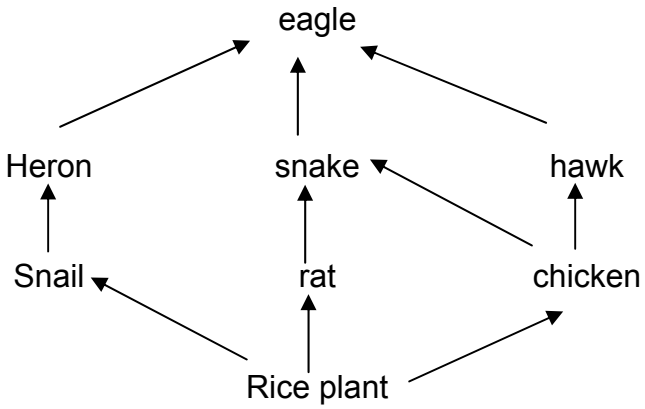
As the diameter of the can increases, the circumference increases and as the diameter decreases, the circumference decreases also.

Figure 5.1 can also be plotted using a bar graph as shown below.



There are topics in Science like Water Cycle, Food Web and Rock Cycle that can be understood better if presented in diagrams and charts.

Below is an example of a flowchart about the food web.



What you will do

Self-Test 5.1

Gather information in your Barangay Health Center on the number of patients treated for several ailments during the last twelve months. Plot the data using a line graph and a bar graph. Label y-axis as the number of patients treated and x-axis as the number of months.

Key to answers on page 30

Let's summarize

1. Observation involves the use of five senses in describing things or events while inference is making interpretations on the observations or experiences made.

2. Qualitative observations merely describe quality while quantitative observations express the exact quantity of the things/ events observed.

3. Some of the common measuring devices for length are ruler, meter stick, and yardstick while for mass of objects, the devices include the platform balance, and triple beam balance.

4. Any measuring device could measure things accurately up to the smallest value or the least count that this device could give. A ruler for example can measure the length of an object accurately up to the tenth of a centimeter.

5. The area of an object is determined by getting the product of its two dimensions. For example, the area of an object, which is rectangular in shape, is length times width (L x W). The area is always expressed in square units.

6. The Volume of an object is determined by getting the product of its three dimensions. For example, the volume of any rectangular object is equal to the product of its length, width and thickness (L x W x T). It is always expressed in cubic units.

7. The conversion factor is the equivalent of one unit in another unit. It is expressed in fraction form.

8. The Metric System or the SI is the more acceptable system than the English System because of the convenience it gives in the conversion of one unit to a desired unit.

9. In writing very small or very big numbers using power- of- ten notations, the standard form used is $N = a \times 10^{b}$.

10. Scientific data could be presented in the form of a graph, a diagram or a chart for better analysis and interpretation.

Posttest

Multiple Choice: Encircle the letter of the best answer.

For Questions 1-2, refer to the following statements:

A. The house of Pablo is painted green.
B. It has ten windows.
C. It has a very beautiful landscape.
D. The house has two guestrooms.

1. Which of the statement(s) is/are qualitative observations?
   a. A and C c. A and B
   b. B and D d. C and D

2. Which of the statement(s) is/are quantitative observations?
   a. A and C c. A and B
   b. B and D d. C and D

3. All of the following are quantitative observations except:
   a. It is 6 cm thick c. There is only one student in the classroom
   b. There are 10 students in the canteen d. The sky is blue

4. If 1/5 would mean there are 5 equal parts in one, how many equal parts are there in 1/8?
   a. 5 parts c. 8 parts
   b. 6 parts d. 10 parts

5. Which of the following values represent 1/100?
   a. 0.001 c. 0.1
   b. 0.01 d. 1.0

6. Which of the following values represents 1/100?
   a. 0.1 c. 0.001
   b. 0.01 d. 0.0001

7. If 100 centimeters is equal to 1 meter, then how many centimeters are there in 5 meters?
   a. 500 cm c. 350 cm
   b. 400 cm d. 300 cm

8. The length of the table is 5 m, its width is 3 m and its thickness is 0.1 m. Find its area.
   a. 150 m^3 c. 1.5 m^3
   b. 15 m^3 d. 0.15 m^3

9. What is the density of a certain metal whose mass is 30 g and has a volume of 5 cc?
    a. 150 g / cc c. 6 g x cc
    b. 150 g x cc d. 6 g / cc

10. Rita poured 20 cm^3 of water in a graduated cylinder. She dropped a piece of stone into it. The water level rose to 30 cm^3. What is the volume of the stone?
    a. 5 cm^3 c. 20 cm^3
    b. 10 cm^3 d. 30 cm^3

11. Sally is assigned to make 10 pieces of bouquet for her sister's wedding. If one bouquet needs 0.2 m of ribbon, how many centimeters of ribbon is she going to buy?
    a. 200 cm c. 50 cm
    b. 150 cm d. 10 cm

For Questions 12-18, Refer to the situation below:

The class of Ms. Fajardo is performing an experiment on the relationship between the mass and the volume of washers when placed in the graduated cylinder with water. They used displacement method to determine the volume of the washers. The following data were obtained:

Mass of 1 washer = 5 g
Volume of 1 washer = 2 cc
Initial volume of graduated cylinder with water = 25 cc

Other related data on the experiment are shown in the table below.

No. of washers	Mass (g)	Volume of Water (cc)
1	5	27
2	10	29
3	15	31
4	20	33
5	25	35

12. If the class adds one more washer in the graduated cylinder making it six, what would be the total mass of the washers and the volume of water?
    a. 30 g 35 cc c. 35 g 37 cc
    b. 30 g 37 cc d. 35 g 39 cc

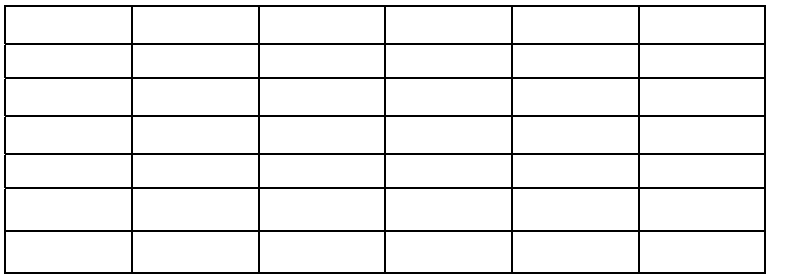
13. What are the variables that are needed to plot the data on a graph?
    a. Number of washers and Mass
    b. Mass of washers and volume of water
    c. Volume and number of washers
    d. None of the above

14. What is the variable plotted in the X-axis?
    a. Number of washers
    b. Mass of washers
    c. Volume of water
    d. Volume of washers

15. Which variable is to be plotted in the Y-axis?
    a. Mass of washers
    b. Volume of washers
    c. Volume of water
    d. Number of washers

16. Plot the mass of washer against the volume of water. Describe the Graph line.

y



x

17. What happens to the volume of water as the mass of water increases?
    a. increases
    b. decreases
    c. remains the same
    d. undetermined

18. Which of the following interpretations best describes the graph line?
    a. As the mass increases, the volume decreases
    b. As the mass decreases, the volume decreases
    c. As the mass increases, the volume remains the same
    d. As the volume decreases, the mass remains constant.

For numbers 19-20, answer the following questions briefly.

19. Give the reason why the Metric System is more acceptable that the English System.

20. Differentiate observation from difference.

Key to answers on page 30

Key to Answers

What to do before (Pretest)

1. a
2. b
3. d
4. d
5. d
6. c
7. d
8. d
9. a
10. b
11. c
12. a
13. b
14. b
15. c
16. A straight graph line
17. b
18. b
19. Metric or the SI system has been recognized as the acceptable system of measurement because of its convenience in changing one unit to another.
20. We observe things that are actually perceived by the senses. We infer when observations made are interpreted.

Activity 1.1

Observations	Inferences
1. A boy wears a coat and tie 2. Two boys dress casually 3. On of the girls cries 4. One of the boys argues in higher tones 5. The pair who wore formal attire talks to the boys	1. This boy is the partner of the girl who wears a gown 2. The two boys will not attend the party 3. One of the boys quarrels with this girl 4. This boy gets mad with his partner 5. The pair was able to settle the argument with the pair who dressed casually

Note for the teacher: Inferences to the observation may vary from one student to author.

Self-Test 1.1

1. Observation
2. Observation
3. Inference
4. Inference
5. Inference

Activity 2.1

Qualitative Observation	Quantitative Observation
6. There is a small amount of water in the beaker.	
7. She uses a large amount of baking powder.	
8. There are many people joining the protest rally.	
9. Enough amount of salt is added.	
10. He boils much amount of the substance.	

Activity 2.2

1. Observation: The calibration is the same.

2. There are ten smaller lines in one centimeter. One centimeter is equivalent to ten millimeters. The ruler could measure up to one-tenth of a centimeter.

Self-Test 2.1

1. A = 250 cm^2
2. V = 1250 cm^3
3. A = 78.50 cm^2
4. s = 4 cm
5. 2500 g

Activity 3.1

Conversion Factor	Form 1	Form 2
1 cm = 10 mm	1 cm/10 mm	10 mm/1 cm
1 cg = 10 mg	1 cg/10 mg	10 mg/1 cg
1 inch = 2.54 cm	2.54 cm/1 in	1 in/2.54 cm
30 days = 1 month	30 days/1 mo	1 mo/30 days
1 week = 7 days	7 days/1 week	1 week/30 days
1 kg = 1000 g	1 kg/1000 g	1000 g/1 kg
100 cm = 1 m	100 cm/1 m	1 m/100 cm
1000 m = 1 km	1000 m/1 km	1 km/1000 m

Self-Test 3.1

1. 90 days= 3 months
2. 20 mg = 2 cg
3. 12 km = 12 000 m
4. 5 min = 300 s
5. 60 m = 60000 mm

Self-Test 3.2

1. 0.25 meters
2. 480 000 seconds
3. 500 000 centigrams
4. 63 072 000 minutes
5. 0.0005 kg

Self-Test 4.1

1. $0.75 \text{ m} \times \frac{100 \text{ cm}}{1 \text{ m}} = 75 \text{ cm}$

2. $84 \text{ m} \times \frac{1 \text{ km}}{1000 \text{ m}} = \frac{84}{1000} = 0.084 \text{ km}$

3. $50 \text{ dm} \times \frac{10 \text{ cm}}{1 \text{ dm}} = 500 \text{ cm}$

4. $20 \text{ da} \times \frac{24 \text{ h}}{1 \text{ da}} = 480 \text{ h}$

5. $5 \text{ h} \times \frac{3600 \text{ s}}{1 \text{ h}} = 18000$

Self-Test 4.2

1. 5.5×10^{-4}
2. 3.5×10^{8}
3. 7.8×10^{-10}
4. 5.075×10^{3}
5. 4×10^{12}

Self-Test 5.1

Note: The teacher is given the option to check students' responses. Their answers may vary.

Key to Corrections (Posttest)

1. a
2. b
3. d
4. c
5. b
6. b
7. a
8. c
9. d
10. b
11. a
12. b
13. b
14. b
15. c
16. a straight graph line
17. a
18. b
19. The Metric System is more acceptable than the English System because of its convenience in changing one unit to another.
20. Observation involves all the basic sense organs while inference is making interpretations based on your past observations or experiences.

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