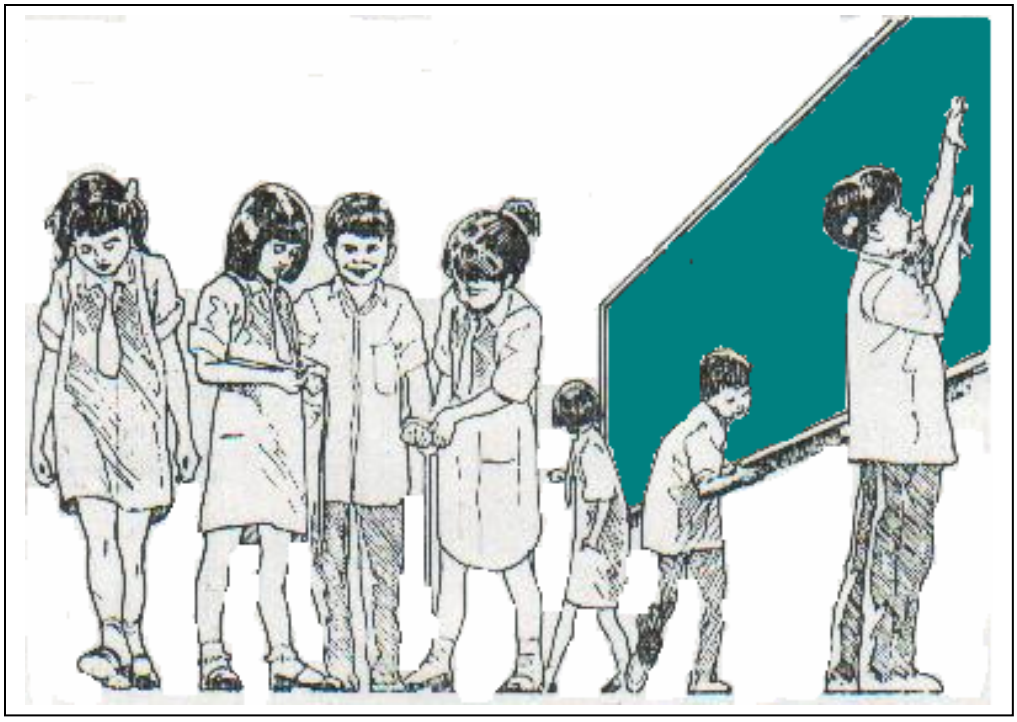
BUREAU OF SECONDARY EDUCATION
DEPARTMENT OF EDUCATION

DISTANCE LEARNING MODULE
MATHEMATICS 1

MEASUREMENTS AND SCIENTIFIC NOTATION



UNIT II

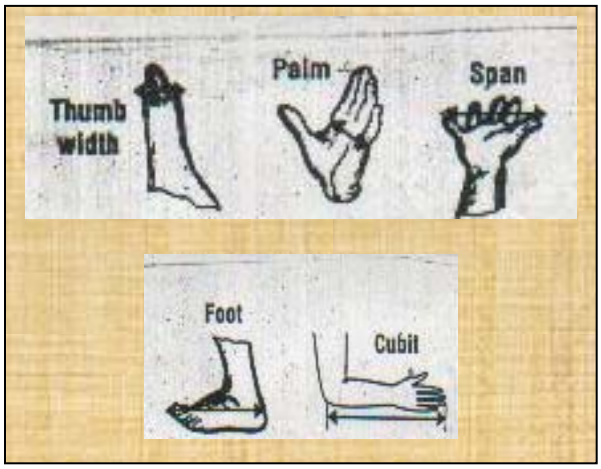
The picture shows that students are learning to measure. Each student measures a particular object by means of a different unit. What do they use to measure the blackboard? Their heads and waists?

Measurement is very important in our daily life. We need to answer questions that begin with how long, how far, how much, and so on. All these questions require some kind of measurement before they can be answered.

The unit of measure used depends on the quantity or item to be measured. You buy gasoline by the liter, mangoes by the dozen, and ice cream by the gallon. You get the distance between two buildings in meters and that between two cities or towns in kilometers.

Did you know that the British were the first to have a standardized system of measurements?

However, this system dates back to the time of the Babylonians and Egyptians when measurements were made in terms of body parts. For example an *arm* was used as the unit of length. A ***finger*** or digit was the width of a finger. A ***palm*** was the width of four fingers. A span was the width of three palms. A ***cubit*** was the distance from the tip of an elbow to the tip of a finger.



But the use of the body parts in determining lengths was not very reliable since people vary greatly in size. The English system of measurement was also adopted in the United States.

However, the English system of measurement did not gain much acceptance because there was no definite scheme for remembering the relationships between the units. Besides, the computations were often difficult.

The Metric System

In 1970, the French Academy of Science was asked to establish and develop a new standard and logical system of measurement and thus, was born the original metric system.

A present, in our country, two systems of units are generally used, the English system and the metric system. However, the metric system is the only system of measurement prescribed by law through P.D. #187 issued on May 10, 1973 which was superseded P.D. #187. (Math Time Journal, vol. VIII-No. 1, July, 2005).

Our present systems of measurements are based on measurement standards which make everything consistent. The real advantage of using the metric system lies on the ease and convenience of conversion from one unit of measurement to another.

Approximation of Measurements Types of Measurement

Measures of Length

Meter (m) is the basic unit of length.

We use the unit of length when measuring the length, width and thickness of objects. Also in getting the distance.

Let's Do It

Measure the following.

1. Length of a small paper clip
2. Width of a room
3. Length of a ten-peso bill
4. Thickness of a Math book
5. Length of your pencil
6. Length of your pants
7. Width of a table
8. Thickness of your notebook
9. Distance between your bedroom and the living room
10. Distance from the kitchen to the comfort room.

Measures of Weight

Gram (g) is the basic metric unit of weight. Weight is actually caused by the pull of the Earth on an object. However, in our daily life, it is weight that we measure. Before, rice used to be bought by the "salop". But nowadays, it is bought by the "kilo," the popular name for kilogram (kg). Thus, we buy 5 kilos of rice, one or two kilos of mangoes, etc.

Let's Do It

Get the weight of the following objects in your house.

_____ 1. a glass
_____ 2. a spoon
_____ 3. a cup
_____ 4. a pair of shoes
_____ 5. a can of milk

Write the unit (mg, g, kg, t) one should use to measure the weight of each of the following.

_____ 1. a car
_____ 2. a grain of salt
_____ 3. a loaf of bread
_____ 4. a fork
_____ 5. an onion

Measures of Capacity

Liter (L) is the basic Metric unit for measuring capacity. ***Liquid measures*** are ***measures of volume***. The ***dry measure*** is used for measuring grains, fruits, vegetables, etc.

You can use the unit of liter if you are getting the capacity of the objects.

Let's Do It

Get the measures of capacity of the following objects in your house.

_____ 1. amount of milk in a carton container
_____ 2. amount of liquid in an eye dropper
_____ 3. a glass of water
_____ 4. a cup of coffee
_____ 5. a can of coke
_____ 6. a bottle of softdrinks
_____ 7. a can of pineapple juice
_____ 8. a can of root beer
_____ 9. a sachet of shampoo
_____ 10. a pack of tomato sauce

Although the Philippines uses the Metric System as prescribed by P.D. 187,

there are still some commodities or goods which are measured in English units. It is necessary therefore, for you to know how to see the measures of the English System.

An **inch** (in) is the basic unit of length.

An **ounce** (oz) is the basic liquid and mass measure.

Pretend that you want to estimate in each situation below. Decide how close your estimate should be. Encircle the best answer.

1. You want to mail a pair of tennis shoes in a shoe box. You would estimate the weight to the nearest
   a. 5 ounce
   b. 0.5 ounce
   c. 50 ounce

Answer: 5 ounce is the most appropriate measure.

You want to sew expensive lace around the bottom of a skirt. You would estimate the amount of the lace you need to the nearest:
   a. 1 mm
   b. 1 m
   c. 1 km

Answer: 1 m is the most appropriate measure

Let's Do It

Measure the following.

_____ 1. Your height in feet
_____ 2. Your weight in pounds
_____ 3. Weight of a can of paint
_____ 4. length of paint brush in inches
_____ 5. length of a ruler in feet

Let's practice for mastery 11

Choose the most sensible measure.

_____ 1. Length of a small paper clip	31 mm	31 cm	31 m
_____ 2. Distance around a racetrack	2 m	2 km	2 cm
_____ 3. Length of a tennis racket	68 cm	68 m	68 mm
_____ 4. weight of a dog	8 kg	8 mg	8 g
_____ 5. a can of beans	453 mg	453 g	453 kg
_____ 6. an egg	54 mg	54 g	54 kg
_____ 7. a math book	1.8 mg	1.8 g	1.8 kg
_____ 8. a can of juice	165 mL	165 L	165 kL
_____ 9. a cup of coffee	200 mL	200 L	200 cL
_____10. a bathtub	400 mL	400 L	400 kL

Let's check your understanding 11

Choose the most sensible measure.

_____ 1. The thickness of a 25 centavo coin	1 mm	1 cm	1 m
_____ 2. Length of a safety pin	26 mm	26 cm	26 m

_____ 3. Long-distance run	10,000 cm	10,000 m	10,000 km
_____ 4. a can of soup	305 mg	305 g	305 kg
_____ 5. a sewing needle	380 mg	380 g	380 kg
_____ 6. a pencil	5 mg	5 g	5 kg
_____ 7. a paper clip	515 mg	515 g	515 kg
_____ 8. a glass of milk	250 mL	250 L	250 cL
_____ 9. a bottle of orange	500 mL	500 L	500 cL
_____10. a coffeepot	2 mL	2 L	2 cL

- *After answering the Test, check your answers with those on the answer key page.*
- *If your score is 7 or higher, you may proceed to the next lesson; otherwise, read the lesson once more for the missed items.*

Conversion of Units of Measure

To change from one metric unit to another, we multiply or divide by a power of ten.

Unit of Length (meter)
- 10 mm = 1 cm
- 10 cm = 1 dm
- 10 dm = 1 m
- 10 m = 1 dkm
- 10 dkm = 1 hm
- 10 hm = 1km

Unit of Weight (gram)
- 10 mg = 1 cg
- 10 cg = 1 dg
- 10 dg = 1 g
- 10 g = 1 dkg
- 10 dkg = 1hg
- 10 hg = 1 kg

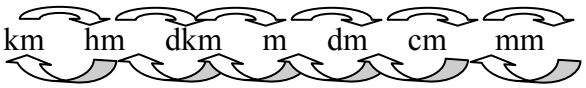
Unit of Capacity (Liter)
- 10 mL = 1 cL
- 10 cL = 1 dL
- 10 dL = 1 L
- 10 gL= 1 dkL
- 10 dkL = 1hL
- 10 hL = 1 kL

1. Multiply when changing from a larger unit to a smaller unit.

2. Divide when changing from a smaller unit to a larger unit.

We can also make a converter diagram to simplify the changing of units of length, as shown below.

Multiply by 10



Divide by 10

Example 1: Convert 5.43 meters to centimeters.

Solution 1:

1. There are 100 cm in a meter.
2. You multiply because a meter is larger than a centimeter.

5.43 x 100 = 543cm

Solution 2:

To convert meter to centimeter count the spaces from m to cm in the diagram and move the decimal point in the same direction as many spaces as are indicated in the diagram. In this case, 2 spaces to the right.

m dm cm m

Move 2 spaces to the right. Therefore:
5.43 m = 543 cm.

Example 2: Convert 6,500 meters to kilometers.

Solution 1:

1. There are 1000 m in 1 km.
2. You divide because meter is smaller than kilometer.
   6,500 ÷ 1000 = 6.5 km

Solution 2:

km hm dkm m

Move 3 spaces to the left.

Therefore:
6,500 m = 6.5 km

Let's practice for mastery 12

Compare the measurements. Write >,< or = for each box.

1. 1000 km ☐ 1000 mm
2. 100 cm ☐ 1 m

Change each of the following to the indicated unit.

3. 924 cm = _____ m
4. 3m = _____ mm

Example 3: Write the missing unit:
8,523 m = 85.23 _____

Solution:

The decimal point was moved 2 spaces to the left. Therefore, the missing unit is *hectometer*.

km hm dkm m

Example 4: How many pieces of string can be cut from a ball of twine 9-m long if each piece is 4.2 cm long?

Solution:

9 m = 900 cm 9 x 100 = 900 cm

Then you divide 900 cm by 4.2 cm
900 ÷ 4.2 = 214.285

Therefore, you can cut around 214 pieces of 4.2 cm string from a 9 m twine.

5. 8,643 dm = _____ m

Solve.

6. A coin has a diameter of 23 mm. How many pieces of coins can be arranged such that one coin is on top of another that would measure 1 meter?

Let's check your understanding 12

Compare the measurements. Write >,< or = for each box.

1. 1m ☐ 10 mm
2. 100 hm ☐ 10 km

Change each of the following to the indicated unit.

3. 421 cm = _____ km
4. 758 mm = _____ m
5. 0.4 m = _____ cm

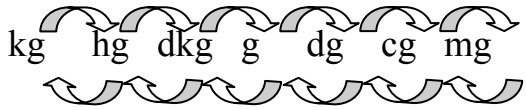
Solve.

6. A 100 m length of rope is cut into 75-cm pieces. How many pieces can be cut?

- *After answering the Test, check your answers with those on the answer key page.*
- *If your score is 4 or higher, you may proceed to the next lesson; otherwise, read the lesson once more for the missed items.*

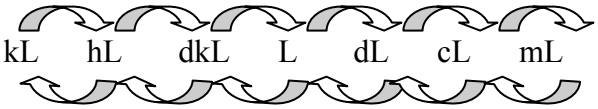
Converter Diagram for Weight

Weight



Converter Diagram for Capacity

Capacity



Let's practice for mastery 13

Give the missing units.

1. The capacity of a pail of water is about 575 _____.
2. The capacity of a glass of juice is about 150 _____.
3. The weight of a cotton a 1.2 _____.
4. The weight of a ground pork is 2 _____.

Change each of the following to the indicated unit.

5. 3,840 L = _____ kL
6. 0.5 L = _____ cL
7. 85 cg = _____ mg
8. 6.5 kg = _____ g

Solve the following problems.

9. Sarah drinks 5 glasses of water everyday. Each glass holds 375 mL. How many liters of water does Sarah drink each day?

10. A key weighs about 10 g. How many keys are there in a bag of keys weighing 2 kg?

Let's check your understanding 13

Give the missing units.

1. The capacity of a mineral water is about 45 _____.
2. The capacity of water in a swimming pool is 5000 _____.
3. The weight of a loaf bread is 454 _____.
4. The weight of a baby is 3.2 _____.

Change each of the following to the indicated unit.

5. 29 L = _____ mL
6. 200 cL = _____ L
7. 28 g = _____ kg
8. 15 mg = _____ g

Solve the following problems.

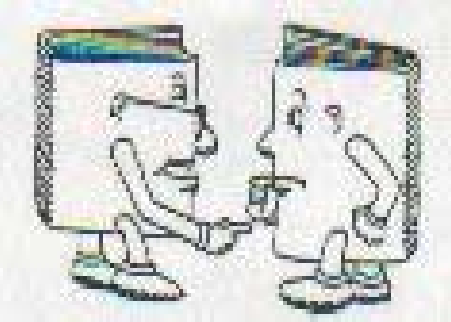
9. It takes 4,500 liters of water to manufacture 1 ton of cement. How many kiloliters of water is this?

10. What is the weight of a baby 15 kg in grams?

- *After answering the Test, check your answers with those on the answer key page.*
- *If your score is 7 or higher, you may proceed to the next lesson; otherwise, read the lesson once more for the missed items.*

Let's practice for mastery 14

What did one book say to the other?



Match the columns. Then write the letters that match the numbers on the correct lines to solve the riddle.

1. _____	10 mm	E	1 L
2. _____	1 km	Y	5 m
3. _____	1,000 mg	A	5,000 g
4. _____	1,000 mL	R	48 mo
5. _____	1 mm	B	0.1 cm
6. _____	4 km	H	100 cm
7. _____	1 kg	S	0.001 cm
8. _____	500 cm	M	1 m
9. _____	3.086 km	I	5.23 mL
10. ____	5 kg	O	1,000 g
11. ____	4 yr	D	1,000 m
12. ____	5 m, 23 cm	V	1 g
13. ____	1,000 mm	L	3,000 m, 8,600 cm
14. ____	1 m	P	4,000 m

___	___	___		___	___		___		___	___	___	___
5	7	8		2	7		12		1	10	3	4

___	___	___	___	___	___	___	___
6	11	7	5	9	4	13	14

Let's practice for mastery 15

THE HIGHEST SCORER

In 1994, the Third International Math and Science study was given to randomly selected students from more than 40 countries. Which country obtained the highest score in mathematics?

To find out, encircle the letter of the correct answer. Then write the letter in the blank that goes with the number.

1. 34.2 km = _____ cm
   R. 342,000 S. 3,420,000 T. 000342

2. What would you use to measure the length of a room?
   I. meter J. kilometer K. centimeter

3. Which is the shortest?
   M. 0.01 m N. 0.1 dm O. 0.001 km

4. Choose the most sensible measurement for the length of a tennis racket.
   E. 68 km F. 68 m G. 68 cm

5. 38,902 m = _____ mm
   A. 38,902,000 B. 38.902 C. 0.038902

6. 4.25 cm = _____ hm
   N. 42500 O. 0.0425 P. 0.000425

7. Which is the longest?
   M. 10 cm N. 0.01 m O. 1000 mm

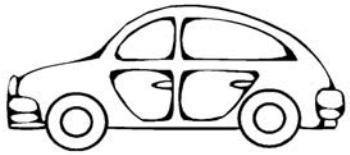
8. Add 3.4 m + 689 cm + 12 mm
   R. 10,302 mm S. 10.41 m T. 1,140 cm

9. The length of an average book is
   D. 2 mm E. 24 cm F. 24 m

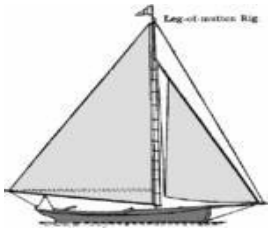
____	____	____	____	____	____	____	____	____
1	2	3	4	5	6	7	8	9

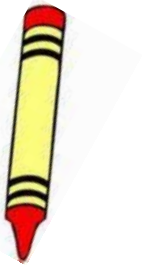
Let'practice for mastery 16

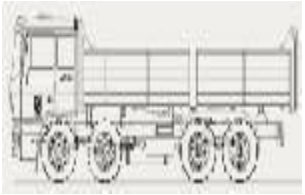
A. Estimate the length of each object in centimeters:



B. Estimate the height of each object in centimeters:







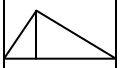
Perimeter, Area, and Volume

Perimeter is the distance around a polygon.

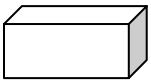
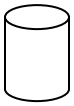
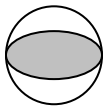
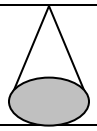
Area is the measure of the surface of a plane.

Volume is the amount of space that a solid contains.

Perimeter and Area

Plane	Picture	Perimeter	Area	Example
Triangle		P = a+b+c = 2+3+4 = 9 cm	$A=\frac{bxh}{2}$	$A=\frac{3x3}{2}$ =4.5 cm²
Rectangle	l=3.4 w=1.4 	P=2 (l+w) =2(3.4+1.4) = 9.6 cm	A= lxw	A=3.4(1.4) = 1.76 cm²
Square	s=7 	P= 4s = 4(7) = 28 cm	A = s²	A = 7² = 49 cm²
Trapezoid		$P=b_1+b_2+b_3+b_4$	$A=\frac{(b1+b2)h}{2}$	$A=\frac{(2+3)1.4}{2}$ =3.5 cm²
Circle		C = 2πr	A = πr²	

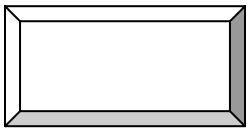
Volume

Solid	Figure	Volume
Cube		V = e³ = (1.5)³ = 3.375 cm³
Prism		V = lxwxh = 3 x 1 x 1.5 = 4.5 cm³
Right Cylinder		V = πr²h =3.14 (1^2)(3) = 9.32 cm²
Sphere		V = 4/3πr³ =4/3(3.14)(3^3) =4(3.14)(9) = 111.04 cm³
Right Circular Cone		V =1/3 πr²h =1/3(3.14)(4^2)(10) =167.40 mm³

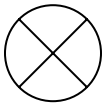
Let's practice for mastery 17

Solve the following problems.

1. Find the area of a rectangular frame whose length is 8 cm and width is 5 cm.

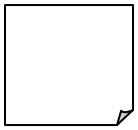


2. The diameter of a bicycle tire is 70 cm. What is its circumference? (Use 3.14 for π)



bicycle tire

3. The perimeter of a handkerchief is 100 cm. How long is each side?



4. A cubed-ice has an edge of 2.5 cm. Find its volume.

5. A bedroom is 8 m long, 6 m wide, and 3.5 m high. Find the volume of the air space inside the bedroom.

Let's check your understanding 16

Solve the following problems.

1. A rectangular dining table has a length of 2 m and its width is 1.5 m. Find its area.
2. A circular pizza pie has a radius of 75 cm. How big is the pizza pie
3. A throw pillow has a side of 25 cm. How big is the throw pillow?
4. A cubic box has an edge of 15 cm. find its volume.
5. A classroom in Angeles Elementary School is 9m long, 6 m wide, and 4 m high. Find the volume of the air space inside the classroom.

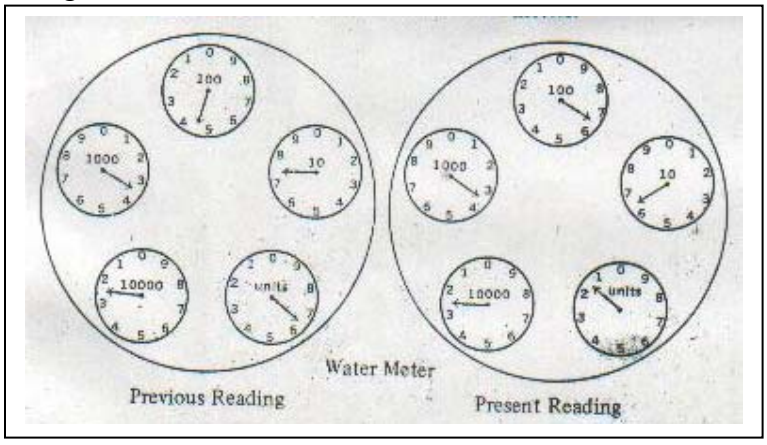
- *After answering the Test, check your answers with those on the answer key page.*
- *If your score is 3 or higher, you may proceed to the next lesson; otherwise, read the lesson once more for the missed items.*

Water Meter Reading

In some provinces, water is abundant, available for free from springs, wells, and rivers. It is then considered a free commodity. However, in the cities, water is quite scarce and expensive. When the different dams in the country dry up, they cannot supply the needs of the consumers. Water then becomes an economic commodity. In any case, to ensure the abundance of water supply in the future, measures must be taken to conserve water.

We must be aware that if we do not try to conserve water now, someday we might not have anything to drink. There will be no more beaches to swim in, no more lakes for fishing, and no more dams to irrigate the rice fields.

The water meter is simple to read. The face dial of a typical water meter illustrated below will guide us on how to read water meters.



Note that the dials are read in alternate counter-clockwise and clockwise directions from left to right. The last figure passed by each pointer is the figure that is read. Consider the water meter

under the Previous Reading. Under the Previous Meter Reading, the last numbers passed are listed as follows:

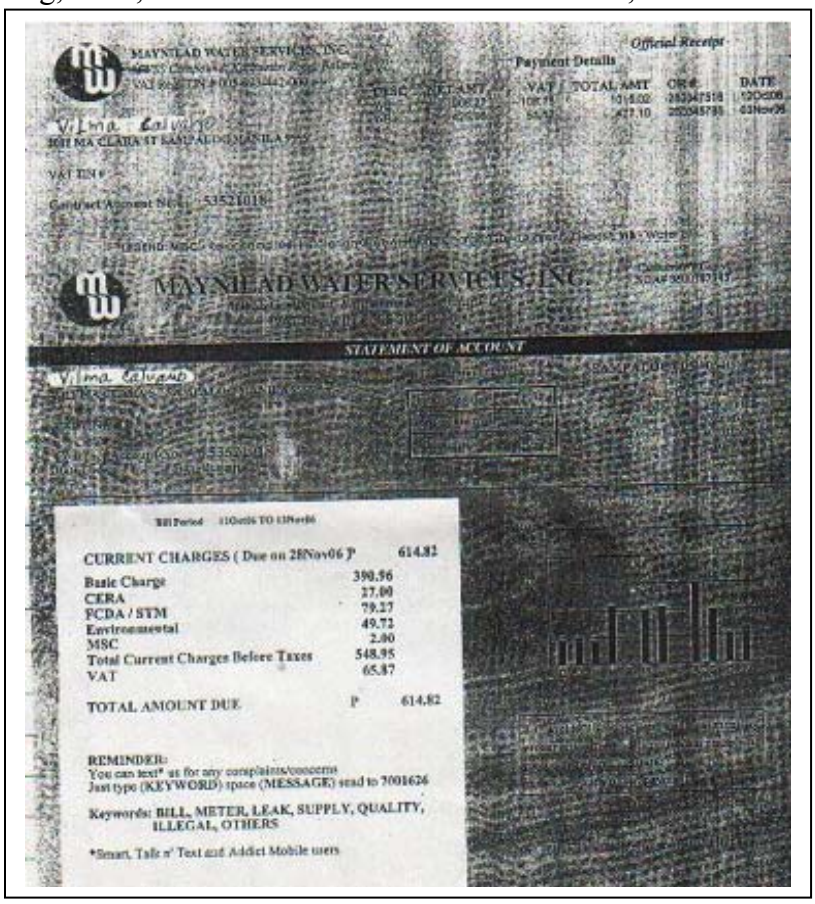
Dial	10,000 cu. m.	1,000 cu. m.	100 cu. m.	10 cu. m.	Units
Last Number Passed	2	3	4	7	6

Thus, the figures we get from the Previous Reading are 23476 and the Present reading is 23661. The number of cubic meters of water used is 185 cu. m., which is the difference between the present reading and the previous reading.

How to Compute Water Consumption

Consider this example:

If the meter readings of Mrs. Vilma Calvario show: Present Reading, 6252; and Previous Reading, 6225, what is her water bill from October 2, 2006 to November 3, 2006.



The solution to the above problem is presented below.

Step 1 – Present Reading = 6252
Previous Reading = 6225
27 cu. m.

Therefore, the number of cubic meters consumed is 27 cu. m.

To compute for the monthly water bills of a family, MAYNILAD had added some surcharges needed for the computation of monthly water bill of a certain family.

Let's practice for mastery 18

Solve the following problems.

1. The water meter readings of four families during the month of May 2 to June 2 are listed. Compute for the monthly water consumption of each family.

Family	Previous Reading	Present Reading
A	46789	46828
B	27610	27723
C	00482	00498
D	02674	02698

Electric Meter Reading

Our present electrification program tries to reach as far as the remotest areas of the country. As the population grows, there is a need for more electric power.

Electric power is measured in Watts, which is dependent upon the number of Amperes (current) and the Voltage. In measuring the amount of power, we also have to consider the time. This is expressed in hours.

The relationship between Power, Current, and time may be described by the rule,

$$\text{Power} = \text{Current} \times \text{Time}$$
$$\text{or } P = CT$$

where current = amperes x force per volt.

Power is expressed in watt hours.

1 kilowatt hour = 1,000 watt hours
Hence, 1 kilowatt hour = power of one ampere of 1,000 volts per hour.

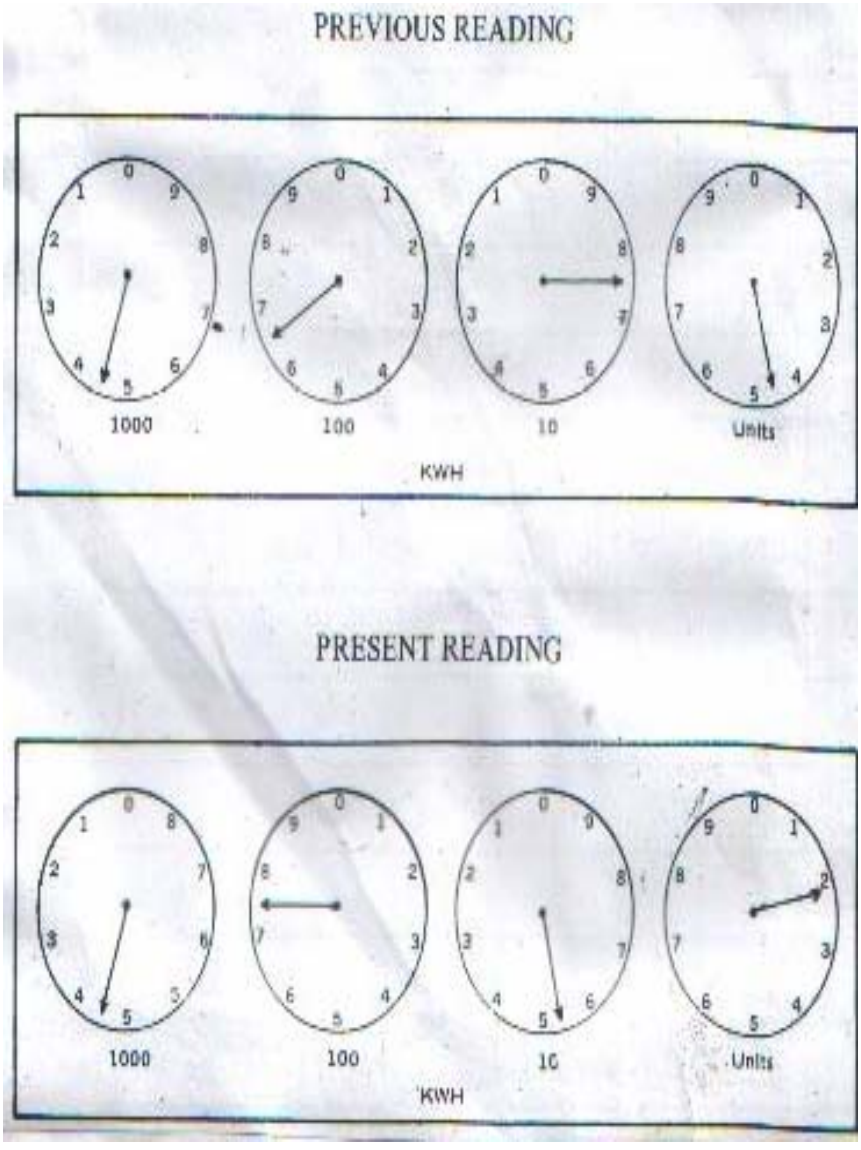
Example: Compute for the number of kilowatt hours consumed by 30 bulbs that had been used for 8 hours at 25 watts each.

Solution: We wish to find the Power or the number of kilowatt hour used. So that,

$$P = 30 \times 25 \times 8$$
$$P = 6{,}000 \text{ watt hours or } 6 \text{ kilowatt hours.}$$

Thus, in computing the power or the number of watt hours or the number of kilowatt hours used, we multiply the number of bulbs by the number of watts by the number of hours used.

The electric meter shown below consists of four dials. The dials are read from left to right in the same manner as a water meter. The last figure passed by each is the figure that is read.



In the meter showing the Previous Reading. the last numbers passed are listed as follows:

Dials	1000 kwh	100 kwh	10 kwh	Units
Last number Passed	4	6	7	4

Thus the number we get from the Previous Reading is 4674 and in the Present Reading is 4752. The number of kwh used is 78 kwh, which is the difference between the Present Reading and the Previous Reading.

How to Compute Electric Consumption

Electric Rates are categorized and described as Residential and Commercial.

Let us consider this example of a residential consumption of electric bills.

Example:

Mrs. Vilma Calvario's electric meter reading for the month of October 6, 2006 shows: Present Reading, 6983; Previous Reading, 6742. What is her bill from September 5, 2006 to October 6, 2006?

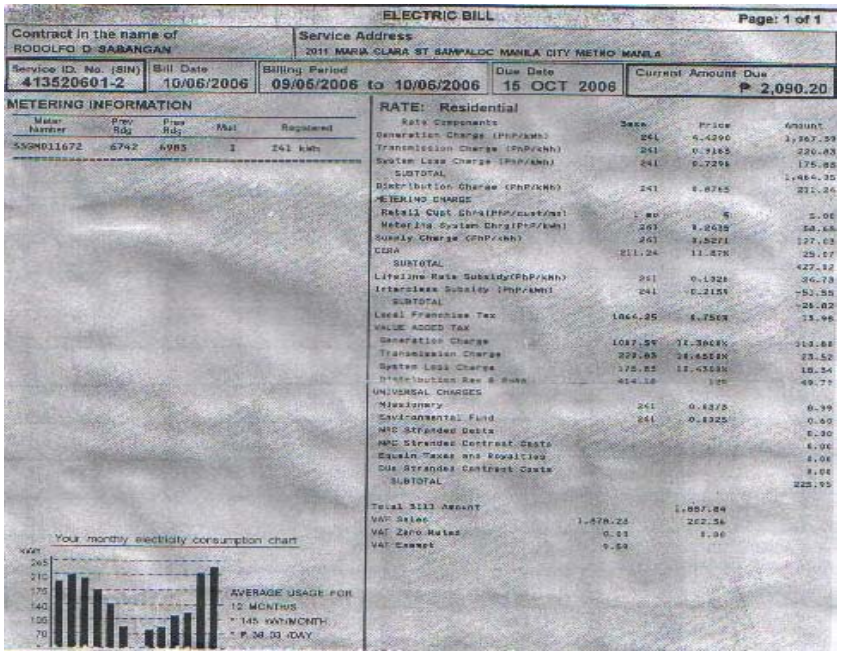
Solution:

Step 1 – Present Reading – 6983
Previous Reading – 6742
241 kwh

Account Name & Billing Address

Vilma Calvario
2011 Maria Clara St.
Sampaloc, Manila

MERALCO ELECTRIC BILL



Therefore, the number of kwh consumed is 241 kwh. To compute for the monthly electric bills of a family there are some additional surcharges and the value added tax which are being charged by MERALCO.

Let's practice for mastery 19

The electric meter readings of the following families were as follows:

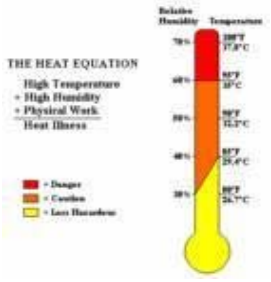
Family	Meter Readings January 5 to February 4	
A	2674 kwh	2798 kwh
B	1082 kwh	1172 kwh
C	4523 kwh	5926 kwh
D	3124 kwh	4032 kwh

Compute the electric consumption of each family.

Temperature

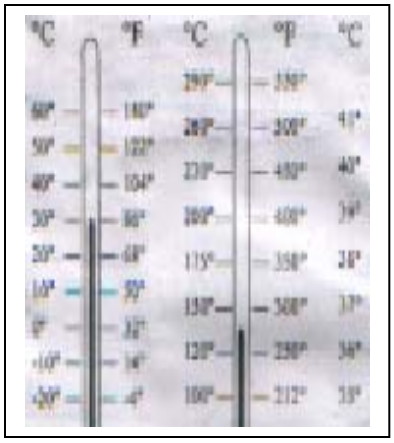
Temperature refers to the degree of hotness or coldness. ***Thermometer*** is the instrument used to measure temperature. In the metric system, the common unit of temperature is given in ***degrees Celsius*** (°C) while in the English system the common unit of temperature is given in ***degrees Fahrenheit*** (°F).

In order to work with different temperatures it is necessary to have some reference points.



In the English system,
Water freezes at 32°F
Water boils at 212°F
while in the Metric system
Water freezes at 0°C
Water boils at 100°C

Some temperatures that are often measured are: *atmospheric temperature* (usually given in weather reports), *body temperature* (used to determine illness) and *oven temperature* (used in cooking). You use the same scales in measuring all these temperatures; however they have different ranges of temperatures.



A moderate oven temperature is 175°C and the normal body temperature is 37°C. In degrees Fahrenheit, the normal body temperature is 98.6°F. Thus, if you get the temperature of a person and it is 39°C, you will know that the person has a fever.

Conversion of Celsius to Fahrenheit and Vice-Versa

Formulas:

a. $\mathbf{°C = (\frac{5}{9})(°F - 32°)}$

b. $\mathbf{°F = (\frac{9}{5}\ x\ °C) + 32°}$

Example 1:

Express 40°C in °F.

Solution:

$°F = (\frac{9}{5}\ x\ °C) + 32°$

$= (\frac{9}{5}\ x\ 40°) + 32°$

$= 72° + 32°$

$°F = 104°$

Therefore, 40°C = 104°F

Example 2:

Express 132°F in °C.

Solution:

$°C = (\frac{5}{9})\ x\ (132° - 32°)$

$= (\frac{5}{9})\ x\ 100$

$°C = 55.56°$

Therefore, 132°F = 55.56°C

Let's practice for mastery 20

Give each temperature in degrees Celsius.

1. Normal body temperature
2. Boiling point of water
3. Freezing point of water

Give each temperature in degrees Fahrenheit.

4. Freezing point of water
5. Normal body temperature
6. Boiling point of water

Convert each of the following.

7. 25°C = ___ °F 8. 40°C = ___ °F 9. 142°F = ___ °C 10. 100°F = ___ °C

Let's check your understanding 20

Convert each of the following.

1. 38°C = ___ °F 2. 57°C = ___ °F 3. 65°F = ___ °C

Solve the following.

4. If Joan's temperature is 99°F, does she have a fever? Why? Convert her temperature to degrees Celsius.

5. A weather report stated that the high temperature for the day is 90°. What scale was used?

- *After answering the Test, check your answers with those on the answer key page.*
- *If your score is 3 or higher, you may proceed to the next lesson; otherwise, read the lesson once more for the missed items.*

Rounding Numbers

Mount Apo has an elevation of 2953 meters. It is usually easier to remember an estimate of the height such as 3000 meters. An estimate for a number can be found by rounding.

For convenience and for us to remember the figure, rounding off numbers is needed.

Illustrative Examples

1. **Rounding off to the nearest tens**

392 Round down 390

if the unit digit is < 5 drop it and replace it by 0

5458 Round up 5460

if the unit digit is > 5 add 1 to the tens digit and add 0 for the unit digit

635 Round up 640

if the unit digit is = 5 add 1 to the tens digit and add 0 for the unit digit

2. **Rounding off to the nearest hundreds**

Consider the tens digit.

724 Round down 700

2< 5, drop 24 and replace them by two zeros

8,687 Round up 8,700

8>5, drop 87 and add 1 to 6

553 Round up 600

5 = 5

3. **Rounding off to the nearest thousands**

6,145 Round down 6000

4 < 5

21,836 Round up 22,000

8 > 5

4. **Rounding off to the nearest tenths**

3.4113 Round down 3.4

1 < 5

5. **Rounding off to the nearest hundredths**

0.7064 Round up 0.71

6 > 5

6. **Rounding off to the nearest thousandths**

2.9815 Round up 2.982

5 = 5

Let's practice for mastery 21

Refer to the chart below. Is the estimate reasonable?

1. Mt. Halcon is about 2600 m high.
2. Mt Pinatubo is about 1700 m high.
3. Mt. Santo Tomas and Mt. Isarog are about 2000 n high.
4. Mt. Arayat is about 1400 m high.
5. Mt. Irid is about 1400 m high.
6. Both Mt. Baco and Mt. Mayon are about 2400 m high.
7. Mt. Pulog is about 3000 high.
8. Mt. Malinao is about 200 m lower than Mt. Pinatubo.

	Altitude in Meters
Mt. Pulog	2930
Mt. Halcon	2587
Mt. Baco	2488
Mt. Mayon	2432
Mt. Santo Tomas	2259
Mt. Isarog	1966
Mt. Pinatubo	1740
Mt. Malinao	1533
Mt. Irid	1448
Mt. Arayat	1125

(Source: Math Time Journal Vol. VIII-no.1, 2002.)

Let's check your understanding 21

Solve the following problems.

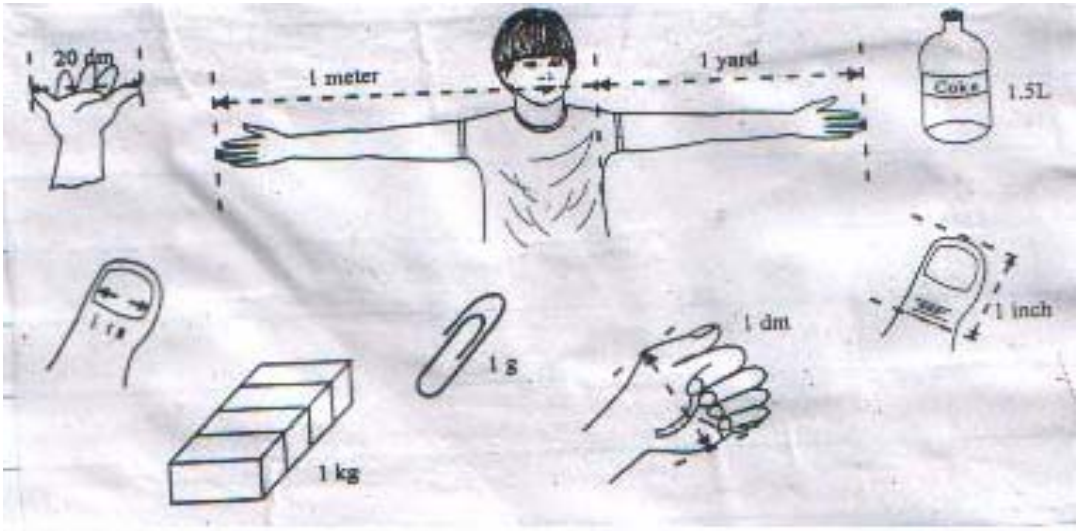
1. A quiz book and a spelling book together cost P92.75. To the nearest P10, what is the cost of two books?
2. The science book and the spelling book together cost P276.50. What is the cost of these two books to the nearest peso?
3. On a chessboard one can group squares to make larger squares. There are 204 squares of varying sizes on any chessboard. What is this number to the nearest ten?
4. The highest score made by a person in a popular word game (Scrabble) is 2313 points. What is this number rounded to the nearest thousand?
5. Katherine scored 150.4758 points in playing computer game. What was her total score to the nearest thousandths?

- *After answering the Test, check your answers with those on the answer key page.*
- *If your score is 4 or higher, you may proceed to the next lesson; otherwise, read the lesson once more for the missed items.*

Approximation of Measurements

There are common objects and parts of the body that help in the approximation. The illustrations below give you an idea on how to approximate certain objects.

Approximation in measurements is important especially when devices or instruments in measuring are not available or accessible. You need to have an alternative by estimating or making an approximate measure.



Let's Do It

Make an approximation or estimate the measure.

1. Estimate the distance from your house to the nearest:
    a. church
    b. school
    c. grocery store
2. Estimate the length of your bed.
3. Estimate the height of a coconut tree nearest to your house.
4. Estimate the age of your best friend.
5. Estimate the floor area of your house.
6. Estimate your height.

Scientific Notation

Do you know that scientists who studied lunar samples from the Apollo space missions estimate that the moon is 4,600,000,000 years old. And do you also know that the unit of length known as the

There is much easier and shorter way to write big numbers like 4,600,000,000 and small numbers like 0.00000001. This is by expressing the number in scientific notation.

Angstrom is 0.00000001 of a centimeter?

To express a number in scientific notation, you write it as a product of a number between 1 to 10, and a power of 10.

Recall:

Remember that:

$10 = 10^1$	$0.1 = 10^{-1}$
$100 = 10^2$	$0.01 = 10^{-2}$
$1000 = 10^3$	$0.001 = 10^{-3}$
$10000 = 10^4$	$0.0001 = 10^{-4}$
$100000 = 10^5$	$0.00001 = 10^{-5}$

Writing numbers in scientific notation is useful and a convenient way for scientists and mathematicians to work with very large as well as very small numbers.

Example 1:

Express 150,000,000 in scientific notation.

Solution:

$150{,}000{,}000 = 1.5 \times 10^8$

You get an exponent of 8 by moving the decimal point eight times to the left from 150,000,000 to get 1.5.

Example 2:

Express 0.00000001 in scientific notation.

Solution:

$0.00000001 = 1 \times 10^{-8}$

You get an exponent of -8 by moving the decimal point eight times to the right from 0.00000001 to get 1.

Example 3:

Express 7×10^5 in standard form.

Solution:

$7 \times 10^5 = 700000$

Move the decimal point 5 places to the right since the exponent is positive.

Example 4:

Express 6×10^{-5} in standard form.

Solution:

$6 \times 10^{-5} = 0.00006$

Move the decimal point 5 places to the left since the exponent is negative.

Calculators and Scientific Notation

Most calculators shift to scientific notation when the results are greater than their allowable display of digits. For example, to find 25^{10}, the display will show 9.536743163 13. This means $9.536743163 \times 10^{13}$.

If the calculator has the EXP or EE key, enter numbers in scientific notation this way.

To enter 2.75×10^4 press

2.75 EXP 4 → 27500

2.75 EXP 4 → 2.75×10^4

Let's practice for mastery 22

Write the numbers in scientific notation.

1. The first manned space flight was made by Vostok I from the USSR. Its average speed was 27,353 kph.
2. The star Merak is approximately 740,000,000,000,000 m from the Earth.
3. The measure of one calorie is equal to 0.000000278 kilowatt-hours.
4. One light year is approximately equivalent to 9,461,000,000,000 km.
5. The thickness of a particular surface is 0.0000415 cm.
6. Write 4×10^{7} in standard form.
7. The standard form of 7×10^{-2} is _____.
8. What is the standard form of 4.3×10^{8}.

Let's check your understanding 22

Write the numbers in scientific notation.

1. Earth travels approximately 986 600 000 km in its orbit around the sun every year.
2. The most remote heavenly body visible to the naked eye is the Great Galaxy in Andromeda, known as Messier 31. It is 37 000 000 000 000 000 000 m from Earth.
3. The height of a certain microorganism is 0.00000007 mm.
4. Proxima Centauri is the closest star (other than the sun) to Earth. It is about 38 290 000 000 000 km away.
5. Earth is approximately 149 600 000 km from the sun.
6. Write 6.83×10^{7} in standard form.
7. The standard form of 8×10^{-5} is _____.
8. What is the standard form of 9.2×10^{8}.

- *After answering the Test, check your answers with those on the next page.*
- *If your score is 6 or higher, you may proceed to the next lesson; otherwise, read the lesson once more for the missed items.*

Unit Test II

Answer the following. Solve if necessary.

1. What is the base unit of measure of length?
   What unit of measurement will you use to find the following?
   (mm, cm, m, km)
2. average length of toothpick
3. distance between Manila and Quezon City
4. the height of a tree

5. What is the basic unit of liquid measure in the metric system?
6. What is the basic unit of mass measure in the metric system?

Give the missing units.

7. The capacity of a gasoline tank is about 75 _____.
8. The weight of a loaf bread is 475 _____.
9. A newborn baby would weigh about 5.8 _____.
10. An average cup of coffee is about 250 _____.

11. What is the area of rectangular pigpen whose length is 6.5 m and its width is 2.8 m?

12. What is the perimeter of a squared paper whose side is 18 cm?

13. It refers to the hotness or coldness.

14. The temperature on the surface of the sun is approximately $(7.5 \times 10^2)°C$. What is the reading in degrees Fahrenheit?

15. The cost of a 10% discounted T-shirt is P299.92. What is the cost to the nearest peso?

16. Earth is approximately 149,600,000 km from the sun. Express in scientific notation.

Round off each of the following peso amounts to the values indicated.

17. P304.85 (nearest peso)
18. P52.945 (nearest centavo)
19. P28.72 (nearest centavot)

20. A melon has a weight of 0.72 kg. How many grams is this?

21. Sarah drinks 5 glasses of water everyday. Each glass holds 375 mL. How many liters does Sarah drink each day?

22. What is the normal body temperature in degrees Centigrade?

23. If Joan's temperature is 100°F. Does she have a fever? Why? Convert her temperature to degrees Celsius.

24. A 100-m wire is cut into 75-cm pieces. How many pieces can be cut?

25. Jomar bought 6 can of pineapple juice, each with 350 mL of juice. How many liters of juice are in the six cans?

Answer Key

Let's practice for mastery 1

I – 1) $\frac{42}{1} = 42$ rational

2) $-6\frac{1}{7} = -\frac{43}{7}$ rational

3) $-2.6 = -2\frac{6}{10} = -\frac{26}{10}$ rational

4) $23\% = \frac{23}{100}$ rational

5) $0.3 = \frac{3}{10}$ rational

II – 6) $\frac{5}{12}$ one dozen = 12

7) $\frac{50}{100} = \frac{1}{2}$ one peso = 100 centavos

8) $\frac{3}{7}$ one week = 7 days

9) $\frac{45}{60} = \frac{3}{4}$ one hour = 45 minutes

10) $\frac{3}{12} = \frac{1}{4}$ one year = 12 months

Let's check for understanding 1

1. $\frac{8}{1}$ rational
2. $-\frac{35}{4}$ rational
3. $\frac{67}{10}$ rational
4. $\frac{67}{100}$ rational
5. $\frac{18}{100}$ rational
6. $\frac{12}{12}$
7. $\frac{90}{200} = \frac{9}{20}$
8. $\frac{12}{7}$
9. $\frac{35}{120} = \frac{7}{24}$
10. $\frac{12}{36} = \frac{1}{3}$

Let's practice for mastery 2

1) $\sqrt{48} = \sqrt{16(3)} = \sqrt{16} \cdot \sqrt{3} = 4\sqrt{3}$ irrational
2) $\sqrt{20} = \sqrt{4(5)} = \sqrt{4} \cdot \sqrt{5} = 2\sqrt{5}$ irrational
3) $\sqrt{64} = 8$ rational
4) $\sqrt{72}\ \sqrt{72} = \sqrt{36(2)} = \sqrt{36} \cdot \sqrt{2} = 6\sqrt{2}$ irrational
5) $\sqrt{121} = 11$ rational

Let's check for understanding 2

1. irrational
2. rational
3. irrational
4. irrational
5. rational

Let's practice for mastery 3

1) $\frac{1}{4}$ → 0.25 terminating

```
      0.25
   4 | 1.00
       8
      ---
       20
       20
      ---
        0
```

2) $\frac{2}{3}$ → 0.66... repeating

```
      0.66...
   3 | 2.00
       18
      ---
        20
        18
      ---
         20
```

3) $\frac{3}{11}$ → 0.2727…

```
      0.2727…
  11 | 3.000
       22
      ---
        80
        77
      ---
         30
         22
      ---
          80
          77
      ---
           30
```

4) $\frac{7}{10}$ terminating → 0.7

```
      0.7
  10 | 7.0
       7 0
      ---
         0
```

5) $\frac{5}{12}$ repeatimg → 0.4166…

```
      0.4166…
  12 | 5.0000
       4 8
      ---
        20
        12
      ---
         80
         72
      ---
          80
          72
      ---
```

TEST 3

1. .089 terminating decimal
2. 0.3636… terminating decimal
3. 4.5 repeating decimal

Let's practice for mastery 4

1) 0.4 → $\frac{4}{10} or \frac{2}{5}$
2) 0.45 → $\frac{45}{100} or \frac{9}{20}$
3) 0.225 → $\frac{225}{1000} or \frac{9}{40}$
4) 0.63 → $\frac{63}{100}$
5) 0. 984 → $\frac{984}{1000} = \frac{123}{125}$

TEST 4

1. $\frac{15}{100} or \frac{3}{20}$ 2. $\frac{6}{10} or \frac{3}{5}$ 3. $\frac{473}{1000}$ 4. $\frac{2}{10}$ or $\frac{1}{5}$ 5. $\frac{8}{100}$ or $\frac{2}{25}$

Try these:

1. $\frac{5}{9}$ 2. $\frac{52}{99}$ 3. $\frac{7825}{9999}$ 4. $\frac{138}{999}$

Let's practice for mastery 5

1) + 700 or 700
2) – 150
3) +15 or 15
4) -50
5) 1,000
6) withdrawal of P32
7) 280 below sea level
8) 25 miles north
9) 20 sec after departure
10) an asset of P5,000

TEST 5

1. 5
2. -2
3. 1125
4. -40
5. 33750
6. 30 min earlier
7. a decrease of 20 cm in height
8. 12 is located to the right of zero
9. 5 km going downstream
10. spending P250

Let's practice for mastery 6

Which fraction in each pair is greater?

1) $\frac{3}{5} > \frac{2}{5}$ If fractions have the same denominators, the greater the numerator, the greater the value.

2) $\frac{5}{7} > \frac{5}{9}$ If fractions have the same numerators, the greater the denominator, the smaller the value.

3) $\frac{3}{4} > \frac{2}{3}$ $\frac{2}{3} = 0.666\ldots$ $\frac{3}{4} = 0.75$

4) $\frac{1}{2} > \frac{2}{5}$ $\frac{1}{2} = 0.5$ $\frac{2}{5} = 0.4$

5) $\frac{2}{3} > \frac{4}{7}$ $\frac{2}{3} = 0.666\ldots$ $\frac{4}{7} = 0.571\ldots$

Write <, = or > on the blank to make a true statement.

1) $\frac{3}{7} \_\_ \frac{2}{7}$ 3) $\frac{7}{9} \_\_ \frac{6}{9}$ 5) $\frac{8}{3} \_\_ \frac{9}{4}$

2) $\frac{6}{11} \_\_ \frac{6}{12}$ 4) $\frac{8}{8} \_\_ \frac{12}{12}$

Problem Solving:

1) Araullo HS $\frac{9}{11} > \frac{10}{3}$ $\frac{9}{11} = 0.8181$

$\frac{10}{3} = 0.7692$

TEST 6

1. $\frac{5}{12} = 0.41666\ldots$ $\frac{3}{5} = 0.6$ $\frac{5}{12} < \frac{3}{5}$

2. $\frac{7}{9} = 0.777\ldots$ $\frac{8}{9} = 0.888\ldots$ $\frac{7}{9} < \frac{8}{9}$

3. $\frac{8}{12} = \frac{2}{3} = 0.666\ldots$ 4. $\frac{5}{6} = 0.833\ldots$ 5. Magsaysay HS

$\frac{3}{15} = \frac{1}{5} = 0.2$ $\frac{7}{8} = 0.875$ $\frac{3}{4} > \frac{5}{8}$

$\frac{8}{12} > \frac{3}{15}$ $\frac{5}{6} < \frac{7}{8}$

Let's practice for mastery 7

1. -12 > -18
2. 10 > -4
3. 5 > 0
4. >
5. <
6. <
7. -19, -15, -13, -12, -1
8. -17, -8, -5, 0, 18
9. 10, 6, 3, -6, -7, -8, -9
10. a man who is on a hill 207 meters above the sea level

TEST 7

1. 8
2. -9
3. 5
4. <
5. >
7. -14, -32, -10, 15, 25
8. -9, -5, -4, -2, 4, 6, 9
9. 17, 16, 15, -15, -16, -17
10. A student whose score was 20 above the passing score. Difference = 55

Let's practice for mastery 8

1) $\frac{5}{12} + \frac{1}{12} = \frac{6}{12}$ or $\frac{1}{2}$

2) $\frac{5}{6} - \frac{1}{6} = \frac{4}{6}$ or $\frac{2}{3}$

3) $\frac{1}{9} + \frac{2}{3} = \frac{1}{9} + \frac{6}{9} = \frac{7}{9}$

4) $\frac{3}{5} + \frac{1}{7} = \frac{21}{35} + \frac{5}{35} = \frac{26}{35}$

5) $\frac{7}{8} - \frac{3}{16} = \frac{14}{16} - \frac{3}{16} = \frac{11}{16}$

6) $\frac{1}{2} \times \frac{1}{4} = \frac{1}{8}$

7) $\frac{3}{8} \times \frac{4}{7} = \frac{12}{56}$ or $\frac{3}{14}$

8) $\frac{3}{4} \times 8 = 6$

9) $\frac{2}{3} \div \frac{5}{6} = \frac{2}{3} \times \frac{6}{5} = \frac{12}{15}$ or $\frac{4}{5}$

10) $\frac{1}{2} \div \frac{7}{16} = \frac{1}{2} \times \frac{16}{7} = \frac{8}{7}$ or $1\frac{1}{7}$

11) $3\frac{3}{5} + 1\frac{4}{5} = 4\frac{7}{5}$ *or* $5\frac{2}{5}$

12) $5\frac{7}{8}$

$-\ 1\frac{3}{8}$

$4\frac{4}{8}$ or $4\frac{1}{2}$

13.) $7\frac{3}{9}$ *or* $7\frac{1}{3}$

14) 2

15) $\frac{3}{10}$

B. 1. answer was done for you
2. 64

3. 5
4. 16
5. 14

TEST 8

1. $\frac{6}{18} + \frac{1}{18} = \frac{7}{18}$
2. $\frac{12}{15} - \frac{5}{15} = \frac{7}{15}$
3. $\frac{2}{3} + \frac{3}{4} = \frac{(8+9)}{12} = \frac{17}{12}$ or $1\ \frac{5}{12}$
4. $\frac{5}{12} + \frac{2}{3} = \frac{(5+8)}{12} = \frac{13}{12}$ or $1\frac{1}{12}$
5. $\frac{4}{9} - \frac{1}{6} = \frac{(8-3)}{18} = \frac{5}{18}$
6. $\frac{5}{8}$ x $\frac{4}{8} = \frac{20}{64}$ or $\frac{5}{16}$
7. $\frac{6}{8}$ x $\frac{12}{24} = \frac{3}{8}$
8. $\frac{4}{7}$ x $7 = 4$
9. $\frac{3}{7} \div \frac{3}{7} = \frac{3}{7}$ x $\frac{7}{3} = 1$
10. $\frac{5}{6} \div \frac{3}{5} = \frac{5}{6} x \frac{5}{3} = \frac{25}{18}$
11. $3\frac{1}{5}$
    $+\_ 2\frac{4}{5}$
    $5\frac{5}{6} or\ 6$
12. $5\frac{3}{4}$
    - $2\frac{1}{4}$
    $3\frac{2}{4} or 3\frac{1}{2}$
13. $7\frac{3}{5}$
14. $\frac{98}{3} or 32\frac{2}{3}$
15. $\frac{30}{3} = 10$

Let's practice for mastery 9

1) $\frac{3}{8} + \frac{1}{10} = \frac{30}{80} + \frac{8}{80} = \frac{38}{80}$ or $\frac{19}{40}$ of his cornfields was ruined by the typhoon
2) $9\frac{3}{4} - 6\ \frac{1}{2} = 3\frac{3}{4} - \frac{2}{4} = 3\frac{1}{4}$ hours
3) $\frac{1}{2}$ x $\frac{2}{3} = \frac{1}{3}$ part of the cake she ate
4) $3 \div \frac{1}{4} = 12$ boxes

5) $\frac{7}{16} + \frac{5}{8} = \frac{7}{16} + \frac{10}{16} = \frac{17}{16}$ or 1 $\frac{1}{16}$ inches total length

TEST 9

1. $\frac{5}{6} - \frac{1}{5} = \frac{25-6}{30} = \frac{19}{30}$ m
2. $9 \div \frac{3}{4} = 9 \times \frac{4}{3} = \frac{36}{3}$ or 12 curtains

Let's practice for mastery 10

1) 8 + (-12) = -4
2) -20 + (-13) = -33
3) -28 – (-10) = -18
4) 49 – (-18) = 67
5) (-3) + 11 = 8
6) (-6) (-4) = 24
7) (32) ÷ (-8) = -4
8) (-54) ÷ 9 = -6
9) 8 + (-5) + (4) = 7 It's on the 7th floor
10) 65 + (-4) + (-2) + (3) + (1) = 63 kg.
11) -25 + (-23) + 15 = -33 m
The diver is 33 m under water.
12) 10
13) 6 is greater than -19

TEST 10

1. -3
2. -25
3. 14 – (-6) = 20
4. 24 – (-6) = 30
5. 32
6. -15
7. -45
8. (4,260 + 1,059) – 2,115+780 = 3,984 m
9. P2000 – P1050 – P450 + P1380 = P1,880
10. a) It rises by 9°C
    b) It drops by 9°C

Unit Test I

Answers

1) Rational
2) $\frac{8}{12}$ or $\frac{2}{3}$
10) $\frac{7}{8} = 0.875$
$\frac{9}{10} = 0.9$
$\frac{7}{8} < \frac{9}{10}$

3) 0.777…

4) $0.012 = \frac{12}{1000} = \frac{3}{250}$

5) –5°

6) +6

7) –9

8) +P500

9) $\frac{5}{6} = 0.833\ldots$

$\frac{3}{4} = 0.75$

$\frac{5}{6} > \frac{3}{4}$

11) -15 > -18

12) -30 < 25

13) $\frac{3}{7} + \frac{2}{7} = \frac{5}{7}$

14) $\frac{5}{6} - \frac{3}{4} = \frac{10}{12} - \frac{9}{12} = \frac{1}{12}$

15) $\frac{5}{12} \times \frac{3}{5} = \frac{1}{4}$

16) $\frac{8}{12} \div \frac{2}{3} = \frac{4}{4} = 1$

17) (-5) + (8) = 3

18) Yes

19) 15

20) -9
21) 4
22) -90
23) 37.5 ÷ 2.5 = 15 weeks
24) 5 x (–P20,000) = – P100,000; P150,000 – P100,000 = P50,000
25) 20° above zero

Let's practice for mastery 11

1) 31 mm
2) 2 km
3) 68 cm
4) 8 kg
5) 453 g
6) 54 g
7) 1.8 kg
8) 165 mL
9) 200 mL
10) 400 L

TEST 11

1. 1 mm
2. 26 cm
3. 10,000 m
4. 305 g
5. 380 mg
6. 5 g
7. 515 mg
8. 250 mL
9. 500 mL
10. 2 L

Let's practice for mastery 12

1) 1,000 km [>] 1,000 mm

2) 100 cm [=] 1 m

3) 924 cm = 9.24 m
coins

4) 3 m = 3,000 mm

5) 8,643 dm = 864.3 m

6) 1 m = 1,000 mm
1,000 ÷ 23 = 43.4
Therefore, there are around 43

TEST 12

1. >
2. =
3. 0.00421
4. 0.758
5. 40
6. 100 m = 10,000 cm
   10,000 = 133 pieces can be cut
   75

Let's practice for mastery 13

1) Liters
2) Milliliters
3) Milligrams
4) Kilograms
5) 3,840 L = 3.840 kL
water
6) 0.5 L = 50 cL
7) 85 cg = 850 mg
8) 6.5 kg = 6,500 g

9) 5 x 375 ml = 1875
There are 1,000 ml in 1 liter
1,875 ÷ 1,000 = 1.875 liters
Therefore:
Sarah drinks 1.875 liters of

everyday.

10) 2,000 g = 2 kg
2,000 ÷ 10 = 200 keys

TEST 13

1. mL
2. L
3. g
4. kg
5. 29,000
6. 2
7. 0.028
8. 0.015
9. There are 1,000 L in 1 kL
   4500 ÷ 1000 = 4.5 kL.
   There are 4.5 kL.
10. 15 kg = 15,000 g

Let's practice for mastery 14

Boy Do I Have Problems

Let's practice for mastery 15

SINGAPORE

Let's practice for mastery 16

Answers may vary depending on the unit of measurement.

TEST 16

1. $A = l \times w$
   $= 2 \times 1.5$
   $= 3$ cm

2. $A = \pi r^2$
   $= (3.14)(75\text{ cm})^2$
   $= 17{,}662.5\text{ cm}^2$

3. $A = s^2$
   $= 25^2$
   $= 625\text{ cm}^2$

4. $V = e^3$
   $= 15^3$
   $= 3375\text{ cm}^3$

5. $V = l \times w \times h$
   $= 9 \times 6 \times 4$
   $= 216\text{ cm}^3$

LET'S PRACTICE FOR MASTERY 17

1) $l = 8$; $w = 5$
   $A = l \times w$
   $= 8 \times 5$
   $= 40$ sq. cm.

2) $C = 2\pi r$; $r = d/2$; $r = 70/2 = 35$cm
   $= 2(3.14)(35)$
   $= 219.80$ cm

3) $P = 4s$
   $100 = 4s$
   $S = \frac{100}{4}$
   $S = 25$ cm

4) $V = e^3$
   $= (2.5)^3$
   $= 15.625\text{ cm}^3$

5) $V = l \times w \times h$
   $= 8 \times 6 \times 35$
   $= 168\text{ m}^3$

LET'S PRACTICE FOR MASTERY 18

A – 39
B – 113
C – 16
D – 24

LET'S PRACTICE FOR MASTERY 19

1) 2,798	2) 1,172	3) 5,926	4) 4,032
- 2,674	- 1,082	- 4,523	- 3,124
124 kwh	90 kwh	403 kwh	908 kwh
Family A	Family B	Family C	Family D

ACTIVITY 20

1) 37°C
2) 100°C
3) 0°C
4) 32°F
5) 98.6°F
6) 212°F
7) $(\frac{9}{5}$ x 25) + 32

45° + 32° = 77°F

8) $(\frac{9}{5}$ x 40) + 32

72 + 32 = 104°F

9) $(\frac{5}{9})$ x (142 – 32)

$\frac{5}{9}$ x 110 = 61.1°C

10) $(\frac{5}{9})$ x (100 -32)

$\frac{5}{9}$ x 68 = 37.7°C

TEST 20

1. 38°C = _____ °F

= $(\frac{9}{5}$ x 38°) + 32°

= 68.4°F + 32

= 100.4°F

2. 57°C = _____ °F

= $(\frac{9}{5}$ x 57°) + 32°

= 102.6°F + 32°

= 134.6°F

3. 65°F = _____ °C

4. Yes, she has a slight fever.

99°F = _____ °C

= $\frac{5}{9}$ x (99° - 32°)

= $\frac{5}{9}$ x 67

= 37.2°C

The normal body temperature is 37°C or 98.6°F.

5. Fahrenheit

$= \frac{5}{9}$ x (65° - 32°)

$= \frac{5}{9}$ x 33° = 18.3°C

LET'S PRACTICE FOR MASTERY 21

1) Yes 2,587 → 2,600
2) Yes 1,740 → 1,700

3) Yes 2,259 → 2,000
   1,966 → 2,000
4) Yes 1,125 → 1,100
5) Yes 1,448 → 1,400
6) No 2,488 → 2,500 Mt. Baco
   Yes 2,432 → 2,400 Mt. Mayon
7) Yes 2,930 → 3,000
8) Yes 1,533 → 1,500 Mt. Malinao
   1,740 → 1,700 Mt. Pinatubo

TEST 21

1. P92.80
2. P277.00
3. 200
4. 2000
5. 150.005

ACTIVITY 22

1) 27,353 = 2.7353×10^{4}

2) 740,000,000,000,000 = 7.4×10^{14}

3) 0.000000278 = 2.78×10^{-7}

4) 9,461,000,000,000 = 9.461×10^{12}

5) 0.0000145 = 4.15×10^{-5}

6) 40,000,000

7) 0.07

8) 430,000,000

TEST 22

1. 9.866×10^{8}
2. 3.7×10^{19}
3. 7×10^{-8}
4. 3.829×10^{13}
5. 1.496×10^{8}
6. 68,300,000
7. 0.00008
8. 920,000,000

UNIT TEST II

ANSWERS

1. meter
2. cm
3. km
4. m
5. liter
6. gram
7. liter
8. g
9. kg
10. mL
11. 18.2 sq m
12. 72 cm
13. temperature
14. 1382°F
15. P300
16. 1.496×10^{8}
17. P305
18. P52.95
19. P28.70
20. 720 g
21. 0.375 L
22. 37°C
23. 37.78°
24. 133 pieces
25. 2.1 L

Common Errors / Misconceptions in Units I and II

1. Addition and Subtraction of Fractions

Examples

1. $\frac{2}{3}+\frac{3}{4}$ 2. $\frac{10}{12}-\frac{3}{6}$

The common answers of the students for this kind of problem is

$\frac{2}{3}+\frac{3}{4}=\frac{5}{7}$ $\frac{10}{12}-\frac{3}{6}=\frac{7}{6}$

Students usually add/ or subtract the numerator then write the common denominator. It is the most common error since to get the sum / difference of fractions with different denominators we have to look for the LCD

Examples:

$\frac{2}{3}+\frac{3}{4}=\frac{8+9}{12}=\frac{17}{12} or 1\frac{5}{12}$ $\frac{10}{12}-\frac{3}{6}=\frac{10-6}{12}=\frac{4}{12}=\frac{1}{3}$

2. Order of Operations (MDAS)

Example:

Simplify: $6 + 12 \div 3 \otimes 5$

The common answer of the students is 30, but actually is the 26. we have to do all multiplication and division first and add then subtract.

$6 + 12 \div 3 \otimes 5 = 6 + 4 \times 5$

$= 6 + 20$

$= 26$

3. Multiplication / Division of Integers

Examples: 1. (-3)(-4) = -12 2. (-12)/ (-6) = -2

This is a common mistake of the students, since to multiply/ divide integers with like sign the product / quotient is always positive.