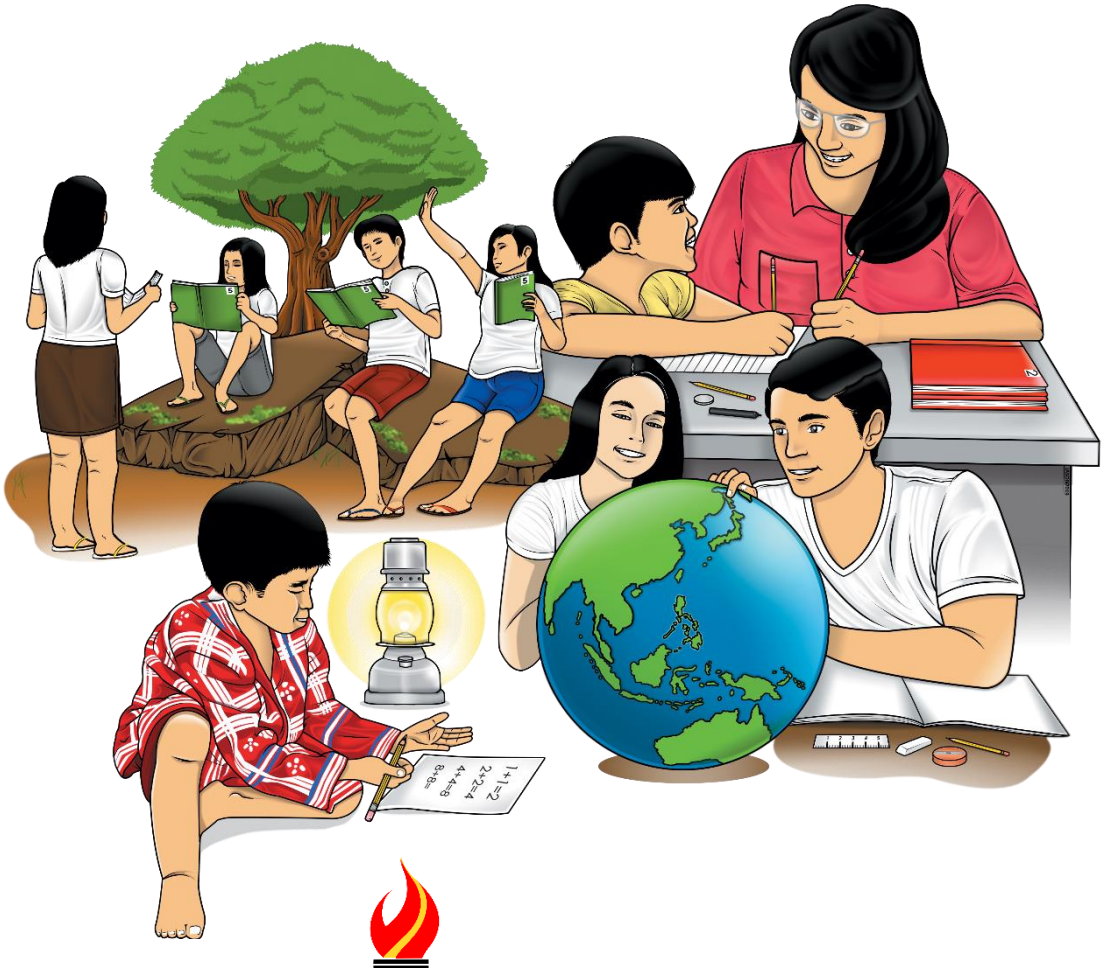
7/8

DepED
DEPARTMENT OF EDUCATION

TLE- EPAS

Quarter 1 – Module 3: Performing Mensuration and Calculation (PMC)



ALTERNATIVE DELIVERY MODE
ADM

TLE-EPAS – Grade 7/8
Alternative Delivery Mode
Quarter 1 – Module 3: Performing Mensuration and Calculation (PMC)
First Edition, 2020

Published by the Department of Education
Secretary: Leonor Magtolis Briones
Undersecretary: Diosdado M. San Antonio

Development Team of the Module

Author:	Renee Bel B. Ignacio, Margie B. Matias, Sharon C. Ruña
	Herminigildo M. Peñera, Arvin R. Calimlim
Content Editors:	Roel J. Dorado, Romulus N. Tangpos
Language Editors:	Jaymark L. Tugade, Ellen Claudette P. Arguez, Lovelyn S. Tangpos
Reviewer:	Martin I. Diaz
Layout Artist:	Mac Andrew M. Solano II, Lawrence C. Aduca, Erwin J. Etoc
Cover Art Designer:	Reggie D. Galindez
Management Team:	Allan G. Farnazo
	Gilbert B. Barrera
	Arturo D. Tingson Jr.
	Peter Van C. Ang-Ug
	Arlene Rosa G. Arquiza
	Ma. Dianne Joy R. dela Fuente
	Jesus V. de Gracia
	Virgie T. Metal

Printed in the Philippines by Department of Education – SOCCSKSARGEN Region

Office Address: Regional Center, Brgy. Carpenter Hill, City of Koronadal
Telefax: (083) 2288825/ (083) 2281893
E-mail Address: region12@deped.gov.ph

7/8

TLE- EPAS

Quarter 1 – Module 3: Performing Mensuration and Calculation (PMC)

DepED
DEPARTMENT OF EDUCATION

Introductory Message

This Self-Learning Module (SLM) is prepared so that you, our dear learners, can continue your studies and learn while at home. Activities, questions, directions, exercises, and discussions are carefully stated for you to understand each lesson.

Each SLM is composed of different parts. Each part shall guide you step-by-step as you discover and understand the lesson prepared for you.

Pre-tests are provided to measure your prior knowledge on lessons in each SLM. This will tell you if you need to proceed on completing this module or if you need to ask your facilitator or your teacher's assistance for better understanding of the lesson. At the end of each module, you need to answer the post-test to self-check your learning. Answer keys are provided for each activity and test. We trust that you will be honest in using these.

In addition to the material in the main text, Notes to the Teacher are also provided to our facilitators and parents for strategies and reminders on how they can best help you on your home-based learning.

Please use this module with care. Do not put unnecessary marks on any part of this SLM. Use a separate sheet of paper in answering the exercises and tests. And read the instructions carefully before performing each task.

If you have any questions in using this SLM or any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator.

Thank you.

Lesson 5 Select Measuring Instrument

What I Need to Know

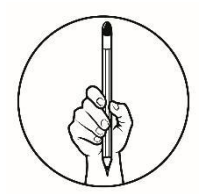
This module was designed and written with you in mind. It is here to help you master the (Exploratory of Electronic Products Assembly and Servicing). The scope of this module permits it to be used in many different learning situations. The language used recognizes the diverse vocabulary level of students. The lessons are arranged to follow the standard sequence of the course. But the order in which you read them can be changed to correspond with the textbook you are now using.

The module is divided three lessons:

- LO1 – Select measuring instrument (TLE_IAEPAS9- 12PMC-Ig-h-9)
- LO2 - Carry out measurement and calculation (TLE_IAEPAS9- 12PMC-Ih-j-10)
- LO3 - Maintain measuring instruments (TLE_IAEPAS9- 12PMC-Ij-11)

After going through this module, you are expected to:

1. identify object or component to be measured;
2. obtain correct specifications from relevant source;
3. select measuring tools in line with job requirement;
4. select appropriate measuring instrument;
5. obtain accurate measurements for job. Perform calculation needed to complete work tasks;
6. handle measuring instruments without damage;
7. clean measuring instruments before and after using; and
8. undertake proper storage of instruments



What I Know

Multiple Choice: Directions: Read and choose the letter of your answer. Use the activity sheet for your answer.

1. What is the color code for a 560 kΩ resistor with 10% tolerance?
   a. green-blue-yellow-silver
   b. blue-violet-yellow-silver
   c. blue-green-orange-silver
   d. green-blue-orange-silver

2. What is the resistance of four (4) resistors connected in series having the resistance of R1=35Ω, R2=23Ω, R3=47Ω, R4=18Ω?
   a. 103 b. 115 c. 132 d. 123

3. What measuring instrument that produces simple wave form?
   a. signal generator
   b. multi-tester
   c. oscilloscope
   d. calliper

4. Which digit is represented by a blue band on a resistor?
   a. 2 b. 6 c. 8 d. 7

5. What is 10% of 4,670?
   a. 674 b. 587 c. 337 d. 467

6. A resistor's first three color bands are brown, black, and red. What is its value?
   a. 2000 ohms
   b. 1000 ohms
   c. 10 ohms
   d. 10 K ohms

7. What is the value of resistor having a color of Green – Blue – Red – Gold?
   a. 860 Ω ±5%
   b. 4,500 Ω ±5%
   c. 5,600 Ω ±5%
   d. 3,500 Ω ±5%

8. What do we call with the non-linear scale where reading of resistance is based?
   a. ohmmeter scale
   b. ammeter scale
   c. voltmeter scale
   d. millimeter scale

9. What is 5% of 2,500?
   a. 225 b. 340 c. 125 d. 194

10. What is the value of a resistor having a color of Brown-Green-Black-Silver?
    a. 160 Ω b. 25 Ω c. 150 Ω d. 15 Ω

11. Which digit is represented by a white band on a resistor?
    a. 2 b. 4 c. 7 d. 9

12. What is 5% of 4,600?

a. 210 b. 235 c. 220 d. 230

13. What is the color of the tolerance representing ± 5%?

a. gold b. black c. orange d. silver

14. What is the numerical of 5 in the second band of the resistor color code chart?

a. brown b. green c. red d. yellow

15. What do we call with the three-dimensional square with six equal sides?

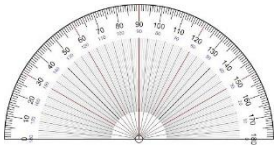
a. triangle b. rectangle c. cube d. circle

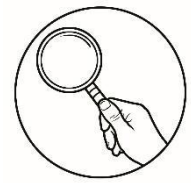
What's In

Activity 1. Directions: Identify and name the computer hardware shown below. Write your answer in your activity sheet.

What's New

Activity 2. Matching type. Directions: Match the measuring instrument to be used in column A from the image in column B. Write the letter only in your activity sheet.

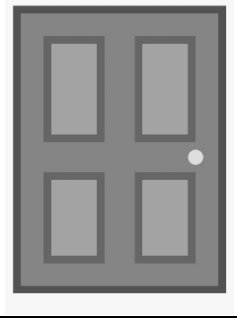
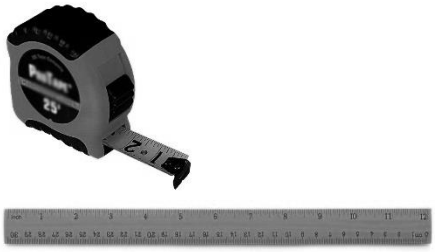
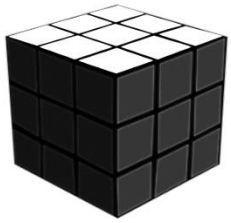
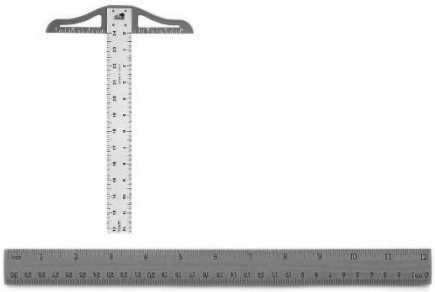
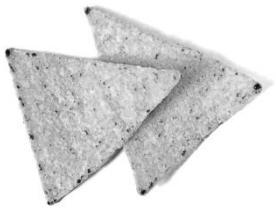
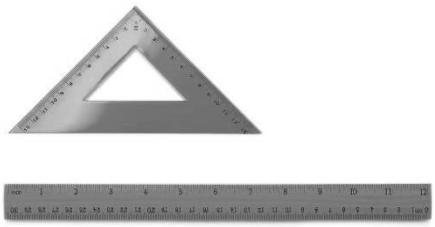
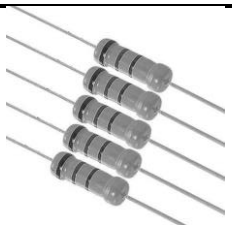
A	B
_____1. Liquid	A 
_____2. Length	B 
_____3. Temperature	C 
_____4. Weight	D 
_____5. Angles	E 

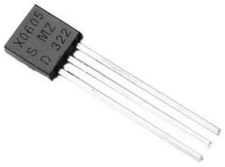
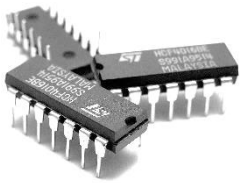


What is It

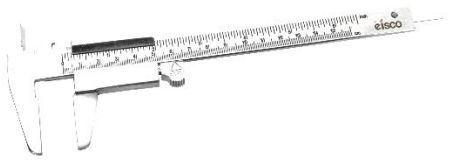
Measuring Instrument

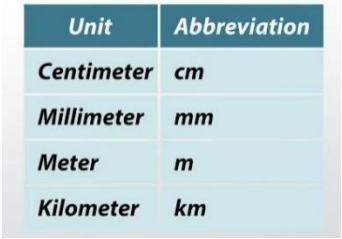
The device that is used for measurement of certain physical quantity is called as measuring instrument. The measuring instruments are used frequently in our day-to-day life for the measurement of various quantities like length, weight, temperature, pressure, current, voltage etc.

Object/ Component	Picture	Measuring tools
Cylindrical object- solid geometric figure with three-dimensional object with two round bases and straight sides.		
Rectangular Object- is a 2D shape in geometry, having 4 sides and 4 corners. Its two sides meet at right angles. Thus, a rectangle has 4 angles, each measuring 90˚.		
Cube- is a three-dimensional square with six equal sides		
Triangular- A triangle is a three-sided and two-dimensional closed structure. It is a polygon with three corners, vertices and three angles joined together forming a closed structure.		
Resistor- is a device with a known value of resistance. Its main function is to reduce voltage and to limit the flow of current in a circuit.		

Capacitor- is a device that consists essentially of two conducting surfaces separated by a dielectric material like air, paper, mica, ceramic, glass, or Mylar. It makes it possible to store electric energy.		
Coil- a wire around a central core that can consist of a variety of materials. Hence, inductors are also known as a coil or a reactor.		
Transistor- semiconductor device used to amplify or switch electronic signals and electrical power.		
Integrated Circuit (I.C) - device made of interconnected **electronic** co mponents, such as transistors and resistors, that are etched or imprinted onto a tiny slice of a semiconducting material, such as silicon or germanium.		

Measuring Instrument

Instrument	Photo/Image
1. **Vernier calliper -** is a measuring instrument very useful tool to use when measuring the diameter of a round objects like cylinders because the measuring jaws can be secured on either side of the circumference.	

2. English/Metric rule- it is a system of weights and measures length, area, volume and weight. Metric System - is a decimalized system of measurement.	
3. Torque gauge- a wrench that measures and indicates the amount of turning and twisting force applied in tightening a nut or bolt	 
4. Tri-square- is a woodworking tool used for marking and measuring a square piece of wood. The square refers to the tool's primary use of measuring the accuracy of a right angle (90 degree angle).	
5. Protractors- are used to mark or measure angles between 0 and 180°.	
6. Combination gauge The reason this is called a 'combination gauge' is because it combines the functionality of two very similar tools, the marking gauge and mortise gauge.	

Electronics is a branch of technology that deals with many applications. Audio electronics, video electronics, digital, medical up to weapons and banking are covered by the influence of electronics. To name a few of these electronic components are resistors, capacitors, inductors and semi-conductors.

TYPES OF RESISTORS

Variable resistor (slide type)

Variable resistor (rotary type)

Carbon composition resistor

The most commonly used electronic components in the field are known as resistors. Resistor is a discrete component that offers opposition to the flow of current. Resistors have different types in accordance with the material used like carbon-composition and the wirewound resistor. One distinct feature of this resistance - giving component is the way its value is determined. It uses a set of colors which follows a code for its assumed resistance expressed in OHMS or by this symbol Ω.

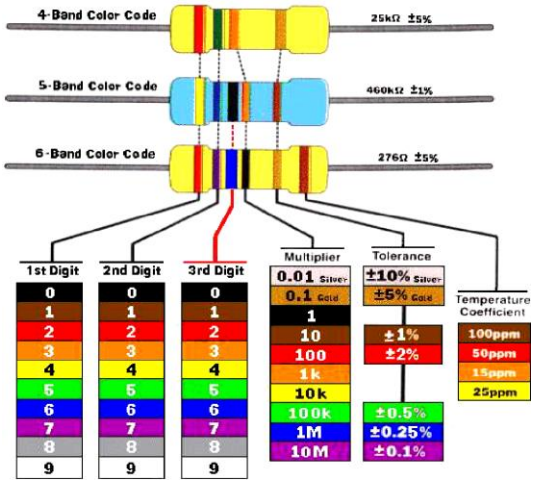
The common symbol for resistor:

Prefixes used in reading value of resistor:

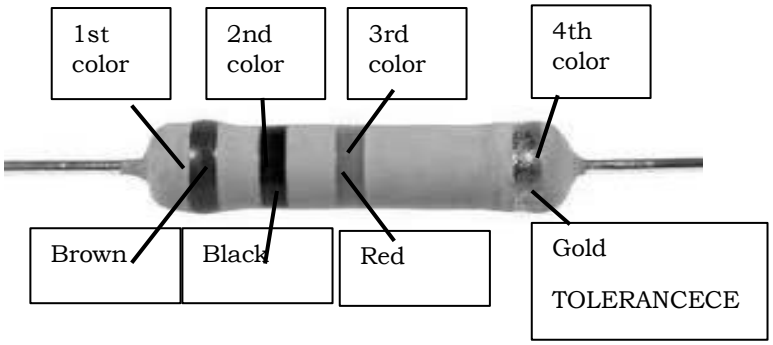
1,000 = kilo = 1KΩ
1,000,000 = Mega = 1KΩ
1,000,000,000 = Giga = 1GΩ

RESISTOR COLOR CODING CHART

COLORS	1ST BAND	2ND BAND	MULTIPLIER	TOLE RANCE
BLACK	__	0	x1	
BROWN	1	1	x10	
RED	2	2	X100	
ORANGE	3	3	X1,000	
YELLOW	4	4	X10,000	
GREEN	5	5	X100,000	
BLUE	6	6	X1,000,000	
VIOLET	7	7	____	
GRAY	8	8	____	
WHITE	9	9	____	
GOLD	____	____	0.1	±5%
SILVER	____	____	0.01	±10%
NO COLOR	____	____		±20%



STEPS IN DETERMINING THE COLOR-CODED VALUE OF RESISTOR



1. Look at the 1st color band and determine its color. Now look at the chart and match the 1st color to the digit it represents.

From our image above, the 1st color is BROWN. The color brown represents number **1** from our color code chart. You write the number down.

1

2. Now look at the 2nd color and match that color it represents from our color code chart.
From our image above, the 2nd color is BLACK. The color black represents zero(0) from our color code chart. You will write and combine the 1st and 2nd color and write it down.

1 0

3. Match the 3rd color under multiplier. This is the number you will multiply the first two numbers. Write it next to the other two numbers with a multiplication sign before it.

From our image above, the 3rd color is RED. The color red represents x100 under multiplier from our color code chart. Meaning, our first two colors will be multiplied by 100.

1 0 x 100

First color is Brown which is 1
Second color is Black which is 0
Third color is Red which is x100
Tolerance is Gold which is ± 5%. Just copy the tolerance value

The equation is:

1 0 x 100 = 1,000 ohms ± 5% or 1KΩ ± 5%

Therefore, the coded value of a resistor having a color band of Brown, Black, Red, Gold is:

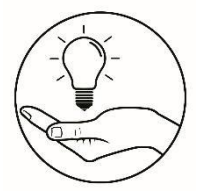
1,000 ohms ± 5% or 1KΩ ± 5%

What's More

Activity 3. Directions: Fill in the box with the right value based on resistor color code chart. Use your activity sheet for your answer.

COLORS	1ST BAND	2ND BAND	MULTIPLIER	TOLERANCE
BLUE				
GRAY				
VIOLET				
GOLD				
WHITE				
GREEN				

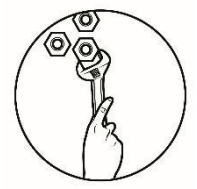
BLACK				
RED				
BROWN				
SILVER				
ORANGE				
YELLOW				
NO COLOR				



What I Have Learned

Activity 4. Directions: Determine the color value of the following resistor:

1. 330Ω ±10% -
2. 7,000Ω ±10% -
3. 1,500Ω ±5% -
4. 820Ω ±5% -
5. 5,600Ω ±5% -
6. 400 Ω ±5% -
7. 250 Ω ±5% -
8. 660 Ω ±10% -
9. 350 Ω ±10% -
10. 130 Ω ±10%



What I Can Do

Activity 5. Directions: Compute for Over-all value of carbon resistors. Use the activity sheet for the answer.

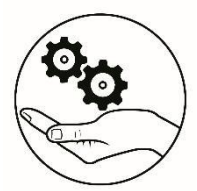
Procedure:

1. Identify the value of 1st color, 2nd color, 3rd color and record them in the resistor tabulation sheet.
2. Compute for the coded value
3. Compute for the over-all value.

1. Blue-Green – Orange – Gold
2. Grey – Red – Red – Silver
3. Orange – White – Brown - Gold
4. Yellow – Gray – Orange – Silver
5. White – Brown – Black - Go

1st band Color/value	2nd band Color/value	3rd band multiplier	Coded value	Tolerance	Over-all Value
1.					
2.					

3.					
4.					
5.					

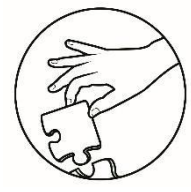


Additional Activities

Activity 6. Directions: True or False. Write **TRUE** in the space provided if the resistor value is correct and **FALSE** if the resistor value is incorrect.

_____1. RED – BLUE – BROWN –SILVER = 2,600Ω ±10%
_____2. YELLOW – GRAY – ORANGE – SILVER = 480Ω ±10%
_____3. GREEN – BROWN – RED – GOLD = 5,100Ω ±5%
_____4. BLUE – BLACK – BROWN – GOLD = 600Ω ±5%
_____5. BROWN – WHITE – RED – SILVER = 190Ω ±10%
_____6. VIOLET – YELLOW – BROWN – SILVER = 740Ω ±10%
_____7. RED – RED – BROWN – GOLD = 221Ω ±5%
_____8. WHITE – BLUE – RED – GOLD = 9,600Ω ±5%
_____9. GRAY – BROWN – BROWN – SILVER = 811Ω ±10%
_____10. BLUE – BLUE – RED – GOLD = 6,600Ω ±5%

Lesson 6 Carry-out Measurement and Calculation



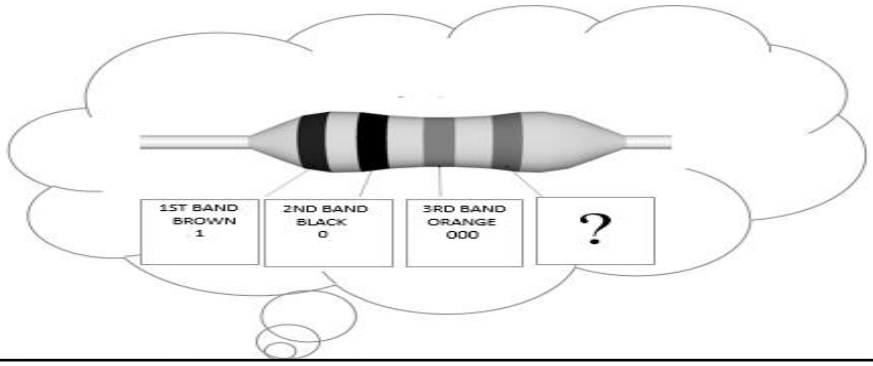
What's In

Activity 7. Directions: Arrange the following jumbled words below and write a brief description. Write your answer in your activity sheet.

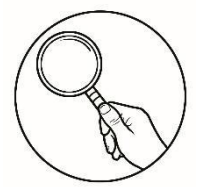
1. orretsis –
2. rotrotcarp –
3. nsisortrat –
4. pacitorca –
5. moh –

What's New

Activity 8. Write your answer in your activity sheet.



What do you think is the purpose of the purpose of the fourth bond?



What is It

Resistor color coded value is not absolute. The real resistance of the resistor is sometimes lower or higher than its color- coded value but not to exceed its tolerance level. Tolerance is the limit on how far the real value of the resistor can deviate from its color- coded value. It can be more or less but subjected to a tolerable limit. In the color-coding chart, there is a column for tolerance. Color *gold* is + or – 5%, *silver* is + or – 10 %, and the *no color* means + or – 20%.

Procedure in interpreting the tolerance of resistor

1. Identify the tolerance color of the resistor being analyzed. Assuming the color is gold which has a value of + or – 5%.
2. Convert the percentage into its decimal equivalent. 5% is equivalent to .05

Percent means "per 100", so 5% means 5 per 100, or simply 5 divided by 100 answer is .05

When we divide 5 by 100 we get .05 (a decimal number) and remove the % sign.

3. Compute for the percentage of the color-coded value. Assuming that the color-coded value is 100 ohms ± 5%.
So 100 x .05 = 5
4. For the + side, add 5 to the color-coded value of 100.

100 + 5= 105 ohms

That is the maximum deviation or maximum resistance for that resistor. Beyond that, the resistor will not be fitted for the circuit which requires such tolerance.
5. For the – side, deduct 5 from the color-coded value of 100.
100 – 5 = 95 ohms
That will be the minimum deviation or minimum resistance for that particular resistor. Far beyond that the resistor will be considered to be defective.
6. Finally the value of the resistor with colors brown- black- brown – gold is 100 ohms with a deviation of +5 or -5. (95 ohms -105 ohms).
Example:

1. A 220 ohms resistor has a silver tolerance band ±10%.

- Tolerance = value of resistor x value of tolerance band = 220 ohms x 10% = 22 ohms
  First, convert 10% to decimal by dividing 10 to 100
  10 ÷ 100 = .10

  Now, we can multiply 220 ohms to .10
  220 x .10 = 22 ohms
  Since we have ±10% of 220 or +10% of 220 and -10% of 220
  The +10% of 220 ohms is 242 ohms
  220 ohms + 22 = 242 ohms (Maximum resistance of resistor)
  The -10% of 220 ohms is 198 ohms
  220 ohms - 22 = 198 ohms (Minimum resistance of resistor)

- 220 Ω stated resistance +/- 22 Ω tolerance means that the resistor could range in actual value from as much as 242 Ω to as little as 198 Ω.

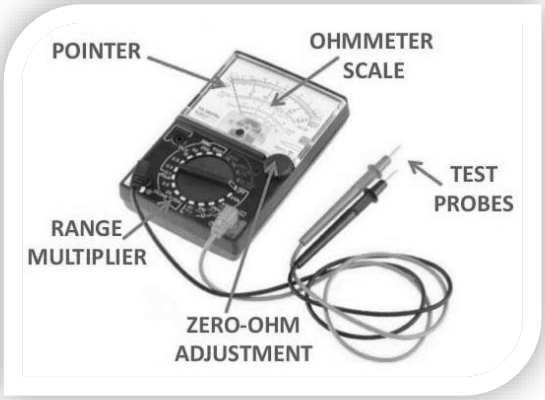
2. A 460 ohms resistor has a gold tolerance band ±5%.
   Convert 5% to decimal. 5 ÷ 100 = .05
   460 0hms x .05 = 23 ohms
   The +5% of 460 ohms is 242 ohms
   460 ohms + 23 = 483 ohms (Maximum resistance of resistor)

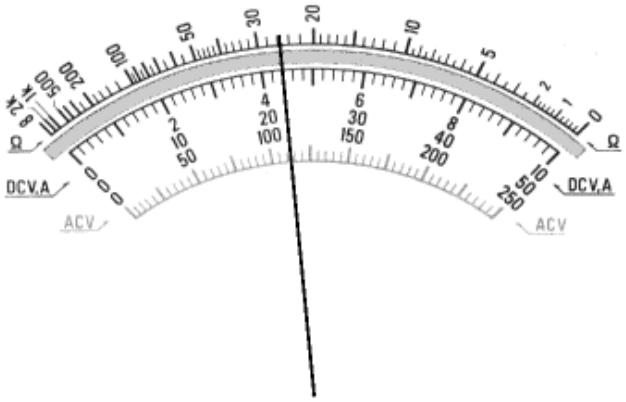
   The -5% of 460 ohms is 198 ohms
   460 ohms - 23 = 437 ohms (Minimum resistance of resistor)

Resistor color coding gives us the color-coded value of a given resistor as well as the maximum and minimum value as dictated by the tolerance but the actual resistance

is still unknown to us. The actual value of the resistor and the recorded data will confirm the status of the resistor whether good or defective.

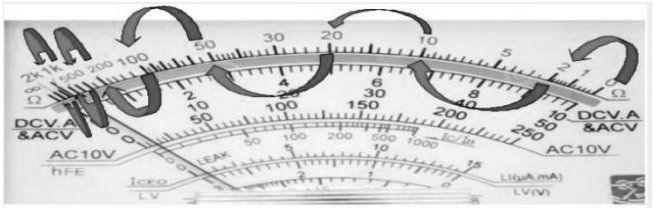
OHMMETER- is a measuring instrument used to determine the resistance of a component or equipment. This instrument is a great help in knowing the actual resistance of the resistors we use in the two operation sheets. The commonly used ohmmeter in electro-electrical laboratories now nowadays is embedded in a multi-function testing instrument called the (Volt-Ohm-Milliammeter) VOM. For this discussion the VOM will be used but confined only to the ohmmeter section.





PROCEDURE ON HOW TO INTERPRET RESISTANCE READING IN AN OHMMETER

1. Know the value of individual calibration in the ohmmeter scale. An ohmmeter scale is nonlinear which means the value of one line or calibration may not be true to other lines. It is therefore proper to assign values to every line for proper and accurate interpretation



As shown in the illustration, the scale can be divided into eight areas where individual treatment has to be made. Several mathematical computations will be involved to show the manner how values of individual lines are resolved.

The areas involved are 0- 2, 2-10, 10 -20, 20-50, 50 – 100, 100- 200,
Value of 1calibration = line distance / total calibrations involved

For 0- 2:	For 100 – 200:
Line distance = 2	Line Distance = 100

Value of 1 line = 2/10 Total no. of cal = 10 Line Distance = 8 Total no. of cal = 16 Value of 1line = 8/16 = 0.5 For 10-20: Line Distance = 10 Total no. of cal = 10 Value of 1line= 10 /10 = 1 For 20 -50: Line Distance = 30 Total no. of cal = 15 Value of 1 line = 30/15 = 2.0 For 50-100: Line Distance = 50 Total no. of cal = 10 Value of 1 line = 50/10 = 5.0	Total no. of cal = 5 Value of 1 line = 100/5 = 20 For 200-300: Line Distance= 100 Total no. of lines = 2 Value of 1 line = 100/2 = 50 For 300–500: Line Distance = 200 Total no. of cal= 2 Value of 1 line = 200/2 = 100

2. Identify the appropriate range multiplier to be used Range multiplier is from R X 1, R X

10, R X 100, R X 1K, and R X 10K.

In range x1, the actual reading is multiplied by 1.

In range x10, the actual reading is multiplied by 10

In range x1K, the actual reading is multiplied by 1,000

In range x10K, the actual reading is multiplied by 10,000

3. Connect the metallic part of the test probes and take note if the pointer points at zero. If not, adjust the zero-ohm adjustment to zero.

4. Make the necessary resistance measurements.

Example:

Ohmmeter reading as indicated by the arrow.

1. 250 Ω 2. 160 3. 75Ω 4. 36 Ω 5. 17 Ω 6. 3.5 Ω 7. 0.6 Ω

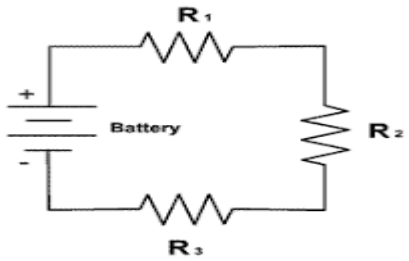
Ohms Law Computation

Basic Connection of Resistor

A Resistor when connected in a circuit, that connection can be either **series or parallel**.

Series Connection

A series connection in which the current is the same through each component in the circuit regardless of what components are used or their values



Series connection of Resistor

FORMULA:

$$R_T = R_1 + R_2 + R_3 + \ldots + R_N$$

Where;
R_T = Total Resistance
R_1, R_2, R_3, R_N = Resistor

Note: R_1, R_2, R_3 and so on is in series connection

Computation in Series Connection

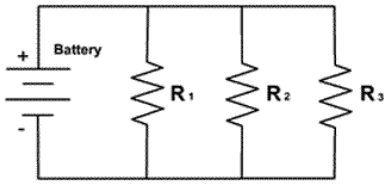
Given;

$R_1 = 25\ \Omega$
$R_2 = 50\ \Omega$
$R_3 = 22\ \Omega$
Compute the Total Resistance

$R_T = R_1 + R_2 + R_3$
$R_T = 25\Omega + 50\Omega + 22\Omega$
$R_T = 97\ \Omega$

Parallel Connection

A Parallel connection in which the current in each branch is dependent upon the values of the components used but the voltage is the same across all components



Computation in parallel Connection
Formula:

$$R_{TOTAL} = \frac{1}{1/R1 + 1R2 + R3 \ldots\ldots}$$

Where;
R_{Total}/R_T = Total Resistance
R_1, R_2, R_3, R_N = Resistor

Note: R_1, R_2, R_3, R_N is connected in parallel

Given;

$R_1 = 25\ \Omega$
$R_2 = 50\ \Omega$
$R_3 = 80\ \Omega$

Compute the Total Resistance R_T

$$R_T = \frac{1}{1/R_1 + 1/R_2 + 1/R_3} \qquad R_T = \frac{1}{0.04+0.02+0.0125}$$

$$R_T = \frac{1}{1/25 + 1/50 + 1/80} \qquad R_T = \frac{1}{0.0725}$$

$R_T = 13.793$

The total Resistance is 12.5 Ω

What's More

Activity 9. Directions: Solve the following

Write your answer in your activity sheet. Show your solution.

- Computation in series connection

1. Calculate the resistance of two (2) resistors connected in series having the resistance of $R_1 = 15\ \Omega$, $R_2 = 20\ \Omega$

- Computation in parallel connection

2. Compute the total resistance of three (3) resistors connected in parallel having $R_1 = 40\ \Omega$, $R_2 = 40\ \Omega$, $R_3 = 40\ \Omega$.

What I Have Learned

Activity 10. Directions: Choose the right answer. Write the letter only in your activity sheet.

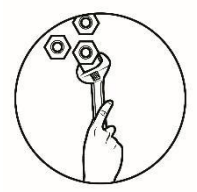
1. Resistance is measured by what instrument?
   a. ammeter b. ohmmeter c. voltmeter d. wattmeter

2. Resistance reading is derived from what part of the ohmmeter?
   a. range multiplier c. test probes
   b. reading scale d. pointer

3. What is the lowest range multiplier in an ohmmeter?
   a. RX 1 b. R X 10 c. R X 100 d. R X 1K

4. The reading scale of the ohmmeter is of what type?
   a. horizontal b. linear c. nonlinear d. vertical

5. In what instrument can you find the ohmmeter?
   a. ammeter b. tube tester c. dmm d. vom



What I Can Do

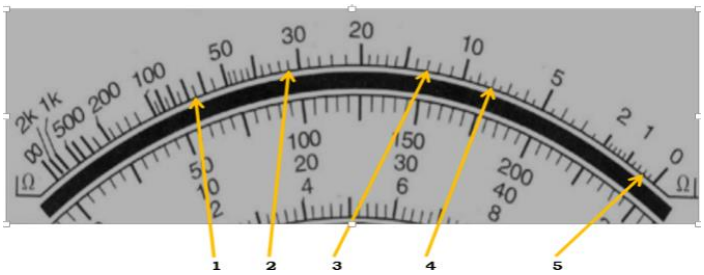
Activity 11. Directions: Complete the resistor tabulation sheet. Use the activity sheet for the answer.

1. Identify the color-coded value.
2. Compute for the tolerance
4. Compute for the maximum and minimum value.

Colors	Color - coded Value	Tolerance	Maximum Value	Minimum Value
1. Green – Blue – Red - Gold				
2. Yellow – Brown – Brown – Silver				
3. White – Grey -Black – Gold				
4. Red – Green – Brown – Silver				
5. Blue – Grey – Black – Silver-				

Additional Activities

Activity 12. Directions: Interpret the reading using the Range of (x1) of the following based on the direction indicated by the arrow. Use your activity sheet for the answer



Lesson 7 Maintain Measuring Instrument

What's In

Activity 13. Directions: Draw the ohmmeter scale. Use your activity sheet for the answer.

What's New

Activity 14. Directions**:** Answer the questions given, use activity sheet for your answer.

1. What can you say about the picture?
2. What will be the significance of putting tools in place?

What is It

Measuring tools, by their very nature, are meant to be perfectly precise and to keep them that way they will have to be cared for and maintained properly. There are a lot of different tools for measuring a lot of different things.

Know How to Properly Handle Instruments

Once you have a precise measuring instrument in your hand, it becomes that much more important to protect that tool from harm or providing false readings. There are a few things you should do that will help prevent damage or miscalibration during use, including avoiding sudden shocks or rough treatment. Do not drop, throw, or bang measuring instruments against hard surfaces.

Store Instruments in an Appropriate Environment

Whenever you place an instrument in its storage location, be sure the location is well-protected from destructive elements. Do not store precision instruments where they can jostle against one another in a drawer; instead, separate instruments from one another using dividers or place them in padded cases. Avoid stacking instruments on top of each other, unless they are well-protected in cases.

Electronic Measuring Instruments

Aside from hand tools, measuring instruments are also needed for more accurate and quality output. In this connection, three of the most used instruments are presented here for you to be familiar with their uses and the proper way of maintaining them.

Volt-Ohm-Milliammeter

It is equipment that combines three functions: as a voltmeter that measures both ac and dc voltages; an ohmmeter that measures resistance; and milliammeter that measures small amount of dc current. As safety precautions in the maintenance of this instrument, the following should be observed:

Oscilloscope

Oscilloscope (commonly abbreviated CRO, for cathode-ray oscilloscope, or scope) is a piece of electronic test equipment that allows signal voltages to be viewed, usually as a two-dimensional graph of one or more electrical potential differences (vertical axis) plotted as a function of time or of some other voltage (horizontal axis).

Signal Generator

A signal generator is a device which produces simple waveforms. Such devices contain an electronic oscillator, a circuit that is capable of creating a repetitive waveform. These are typically used in simple electronics repair and design; where they are used to stimulate a circuit under test.

What's More

Activity 15. Directions: Choose the right answer and write the letter only in your activity sheet.

1. What is the instrument that serves as 3 measuring instruments in one?
   a. audio generator b. oscilloscope c. signal generator d. VOM

2. Wave forms is produced by what device?
   a. audio amplifier b. VOM c. signal tracer d. signal generator

3. VOM is rested in what position if an "off" option is not available?
   a. 10VDC b. 50 VAC c. 00 VAC d. 250 VAC

4. Place instruments in a cool dry place and away from any _____ devices.

a. other instruments b. audio amplifiers
c. magnetic devices d. digital sources

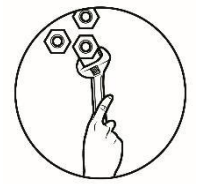
5. What measuring instrument should be given regular check-up by connecting them to power line?
a. capacitor tester b. dmm c. oscilloscope d. vom

What I Have Learned?

Activity 16. Directions: Answer the following question Write your answer in your activity sheet.

1. Why precision is very important in measuring tools?

2. Measuring tools should be kept away or not be put close to magnets. What will happen if the measuring tool will have contact to magnet?

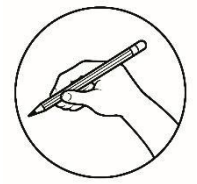


What I Can Do

Activity 17. Directions: Answer the following question. Write your answer in your activity sheet.

1. Why measuring instrument tools are properly care and maintain compared to other tools?

2. Why you need to use the right tools for the job?



Assessment

Multiple Choice: Directions: Choose the correct answer and write only the letter on your answer sheet.

1. A resistor's first three color bands are brown, black, and red. What is its value?
a. 2000 ohms b. 1000 ohms c. 10 ohms d. 10 K ohms

2. What is the value of resistor having a color of Green – Blue – Red – Gold?

a. 860 Ω ±5% b. 4,500 Ω ±5% c. 5,600 Ω ±5% d. 3,500 Ω ±5%

3. What do we call with the non-linear scale where reading of resistance is based?
   a. ohmmeter scale b. ammeter scale
   c. voltmeter scale d. millimeter scale

4. What is 5% of 2,500?
   a. 225 b. 340 c. 125 d. 194

5. What is the value of a resistor having a color of Brown-Green-Black-Silver?
   a. 160 Ω b. 25 Ω c. 150 Ω d. 15 Ω

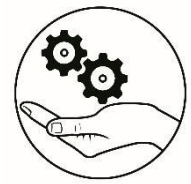
6. Which digit is represented by a white band on a resistor?
   a. 2 b. 4 c. 7 d. 9

7. What is 5% of 4,600?
   a. 210 b. 235 c. 220 d. 230

8. What is the color of the tolerance representing ± 5%?
   a. gold b. black c. orange d. silver

9. What is the numerical of 5 in the second band of the resistor color code chart?
   d. brown b. green c. red d. yellow

10. What do we call with the three-dimensional square with six equal sides?
   a. triangle b. rectangle c. cube d. circle



Additional Activities

Activity 18. Directions: Name and give the function of the following electronic measurement tool. Write your answer in activity sheet.

Measuring Instrument	FUNCTION/USAGE
	
	
	

Answer Key

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

Activity 1
1. Printer
2. Monitor
3. System
4. Microphon e
5. Keyboard
6. Mouse
7. Speaker

Activity 2
1. b
2. c
3. d
4. a
5. e

Activit y 3
1. c
2. a
3. b
4. c
5. b

Activity 4
1. orange-orange-brown-silver
2. violet-black-red-silver
3. brown-green-red-gold
4. grey-red-brown-gold
5. green-blue-red-gold
6. yellow-black-brown-gold
7. red-green-brown-gold
8. black-black-brown-silver
9. orange-green-brown-silver
10. brown-orange-brown-

Activity 5
1. 65k Ω ±5%
2. 8.2 Ω ±10%
3. 390 Ω ±5%
4. 48 Ω ±10%
5. 91Ω Ω ±5%

Activi ty 6.
1. F
2. F
3. T
4. T
5. F
6. T
7. F
8. T
9. F
10. T

Activity 7

COLORS	1ST BAND	2ND BAND	MULTIPLIER	TOLE RANCE
BLACK	__	0	x1	
BROWN	1	1	x10	
RED	2	2	X100	
ORANGE	3	3	X1,000	
YELLOW	4	4	X10,000	
GREEN	5	5	X100,000	
BLUE	6	6	X1,000,000	
VIOLET	7	7	____	
GRAY	8	8	____	
WHITE	9	9	____	
GOLD	____	____	0.1	±5%
SILVER	____	____	0.01	±10%
NO COLOR	____	____		±20%

Activity 9
1. 35Ω
2. 13.33Ω

Activity 10
1. B
2. B
3. A
4. C
5. D

Activity 15
1. d
2. d
3. d
4. c
5. c

ASSESSMENT

1. A 2. C 3. C 4. C 5. D 6. A 7. C 8. C 9. D 10. D

11. D 12. D 13. A 14. B 15. C

Activity 16

1. To get accurate measurement

2. It can damage the instrument / Affect the accurateness

Activity 17

1. Because they are delicate tools

2. Getting the job right without causing damage

Activity 12

1. 65 Ω
2. 32 Ω
3. 13 Ω
4. 8 Ω
5. 0.2 Ω

Activity 11

1. 5,880Ω / 5,320Ω
2. 451 Ω / 369 Ω
3. 102.9 Ω / 93.9 Ω
4. 275 Ω / 225 Ω
5. 74.8 Ω / 61.20 Ω

Activity 13.

Activity 8

To determine the highest and minimum resistance

Activity 14

1. Set of tools

2. Organize and clean

References

K-12 CONSUMER ELECTRONICS SERVICING (EXPLORATORY COURSE GRADE 7 AND 8) Date Accessed July 02, 2020
https://en.wikipedia.org/wiki/Electronic_symbol Date Accessed July 02, 2020
https://en.wikipedia.org/wiki/Electronic_component Date Accessed July 02, 2020
https://www.slideshare.net/NormanPolilin/performing-mensuration-and-calculation Date Accessed July 02, 2020
https://en.wikipedia.org/wiki/Millimetre Date Accessed July 06, 2020
https://en.wikipedia.org/wiki/Centimetre Date Accessed July 06, 2020
https://www.google.com/search?q=ruler+image+with+decimeter&tbm=isch&hl=en&chips=q:ruler+decimeter,g_1:actual+size&hl=en&ved=2ahUKEwiJ3_6asLzqAhX9xIsBHZ0CAiAQ4lYoAXoECAEQFg&biw=1351&bih=667#imgrc=qnjTRpJ_cCWaZM Date Accessed July 06, 2020
https://en.wikipedia.org/wiki/Centimetre Date Accessed July 06, 2020
https://k8schoollessons.com/computer-input-and-output-devices-quiz-1/ Date Accessed July 07, 2020
https://learn.sparkfun.com/tutorials/resistors/all Date Accessed July 07, 2020
https://en.wikipedia.org/wiki/Electronic_symbol Date Accessed July 07, 2020
https://www.tutorialspoint.com/basic_electronics/basic_electronics_polarized_capacitors.htm Date Accessed July 07, 2020
https://www.google.com/search?q=trimmercapacitor+symbol&tbm=isch&ved=2ahUKEwjU2tit1bzqAhXCI6YKHSSUB8oQ2- Date Accessed July 07, 2020
cCegQIABAA&oq=trimmercapacitor+symbol&gs_lcp=CgNpbWcQAzIGCAAQBxAeOggIABAIEAcQHlD- Date Accessed July 07, 2020
0AdYrtoHYOfiB2gAcAB4AIAB1AKIAYIOkgEHMC4xLjQuMpgBAKABAaoBC2d3cy13aXotaW1n&sclient=img&ei=NjcFX9TnCcLHmAWkqJ7QDA&bih=667&biw=1366&hl=en#imgrc=GhnKbx_pQmuM9M Date Accessed July 08, 2020
https://pixabay.com/vectors/coil-circuit-symbol-electronics-146521/ Date Accessed July 08, 2020
http://www.reuk.co.uk/wordpress/electric-circuit/what-is-a-thyristor/ Date Accessed July 08, 2020
http://www.clipartbest.com/voltmeter-symbol Date Accessed July 08, 2020
https://tex.stackexchange.com/questions/418258/remove-arrow-from-ammeter-in-circuitikz
https://enacademic.com/dic.nsf/enwiki/11664307 Date Accessed July 08, 2020
https://www.mbacrystalball.com/blog/2015/10/16/triangles-properties-types-geometry/ Date Accessed July 09, 2020
https://www.splashlearn.com/math-vocabulary/geometry/rectangle Date Accessed July 09, 2020
https://www.yourdictionary.com/cube Date Accessed July 09, 2020
https://study.com/academy/lesson/inductor-definition-function-uses.html Date Accessed July 09, 2020
https://en.wikipedia.org/wiki/Transistor Date Accessed July 09, 2020
https://www.wonkeedonkeetools.co.uk/calipers/what-is-a-vernier-caliper Date Accessed July 09, 2020
https://www.merriam-webster.com/dictionary/torque%20wrench Date Accessed July 09, 2020
https://en.wikipedia.org/wiki/Try_square

For inquiries or feedback, please write or call:

Department of Education - Bureau of Learning Resources (DepEd-BLR)

Ground Floor, Bonifacio Bldg., DepEd Complex
Meralco Avenue, Pasig City, Philippines 1600

Telefax: (632) 8634-1072; 8634-1054; 8631-4985

Email Address: blr.lrqad@deped.gov.ph * blr.lrpd@deped.gov.ph