PENANG SANGAM HIGH SCHOOL
P.O.BOX 44, RAKIRAKI

WEEK 13 WORKSHEET

Subject: Applied Technology **Year/Level:** 13

Strand: 4	**Basic Home Improvement**
Sub Strand	General Trade Skills
Content Learning Outcome	Demonstrate Knowledge of general trade skills.

LESSON NOTES

Chapter 4: Basic Home improvement.

Electricity

Continued from week 12 Lesson notes....

Electrical Properties

Conductors - Materials that are made up of atoms with these 'free electrons' are known as conductors. Conductance is defined as the ability to conduct current, which is the opposite of resistance.

Most metals are good conductors. Examples of good conductors include gold, silver and copper because each of these metals has only one electron in its valence shell.

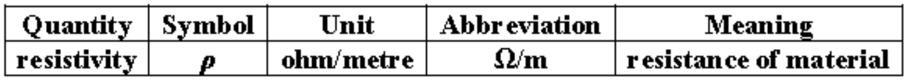
Insulators - Insulator material can be a solid, liquid or gas. Insulators are generally organic materials, but a number of inorganic materials are also good insulators. Examples of insulator materials used with electrical circuits include mica, glass, rubber and plastic.

Resistance - Resistance is the opposition to current flow. In an electrical circuit everything has some resistance, including conductors.

Some factors that determine the amount of resistance in a conductor are explained below.

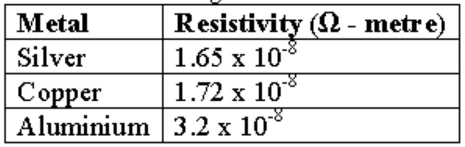
Conductor material - The amount of resistance of a conductor will depend on the atomic structure of the conductor material. The amount of resistance offered by a material is termed its 'resistivity'.

The symbol for the resistivity of a material is ***ρ*** (rho).

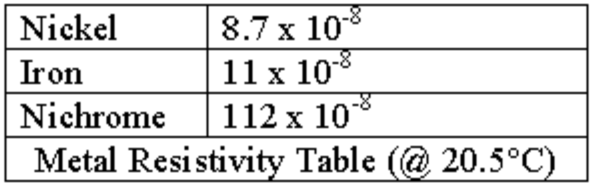


Quantity	Symbol	Unit	Abbreviation	Meaning
resistivity	*ρ*	ohm/metre	Ω/m	resistance of material

The following table shows the resistivity of a number of conductors.



Metal	Resistivity (Ω - metre)
Silver	1.65×10^{-8}
Copper	1.72×10^{-8}
Aluminium	3.2×10^{-8}



Nickel	8.7×10^{-8}
Iron	11×10^{-8}
Nichrome	112×10^{-8}

Metal Resistivity Table (@ 20.5°C)

As temperature increases or decreases, its resistance value changes.

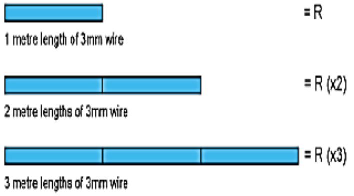
A material that has a Positive Temperature Coefficient (PTC) will increase in resistance with an increase in temperature.

A material with a Negative Temperature Coefficient (NTC) will decrease in resistance with an increase in temperature.

Conductor length

This is how the resistance of a conductor changes, depending on the conductor's length.

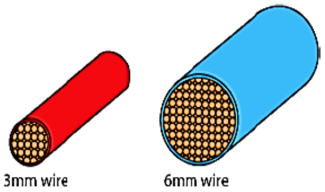
Increased conductor length equals increased resistance in direct proportion.



Conductor cross sectional area

The thinner or smaller the diameter (cross sectional area), the greater the resistance.

A wire with a 3mm diameter would have four times the resistance of a 6mm diameter wire.



Calculating resistance of a conductor

The following formula can be used to calculate the resistance of a length of conductor (at 20 degrees Celsius).

$R = \rho l / A$

where

R = resistance in ohms

ρ = resistivity in ohmmetres

l = length in metres

A = cross-sectional area in square metres (m2)

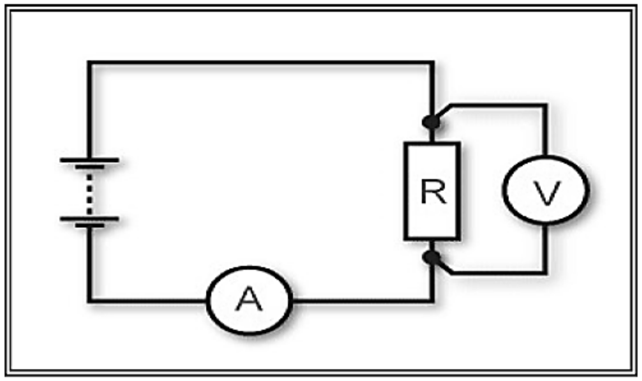
STUDENT ACTIVITY

1. List and explain three electrical properties?

2. The ability of a device to store an electrical charge is known as

   A. Resistance.
   B. Inductance.
   C. Capacitance.
   D. Potential difference.

3. Use the circuit diagram shown below to answer the given question.



Source: *Year 13 Applied Technology*, Ministry of Education, 2017.

Calculate the power dissipated by resistor (R) if the circuit has a current flow (A) of 2A with an applied voltage (V) of 24V.