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

#### WEEK 11 WORKSHEET

Subject: <u>Applied Technology</u>

Year/Level: 13

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

## LESSON NOTES

Chapter 4: Basic Home improvement.

Electricity Continued from week 10 Lesson notes....

### Submultiple and multiple units

There are times when we need to measure very large or very small amounts of an electrical quantity. This can lead to a number made up of six or more digits, eg 1,000,000 or 0.000001.

In order to simplify these numbers, we use prefixes, eg 5 million ohms can be written as  $5,000,000\Omega$  or simplified to  $5M\Omega$ . M is the symbol for **mega**, which is the prefix meaning 'million'.

### The following table lists the prefixes you are likely to use.

Prefixes				
Prefix	Symbol	Meaning	Value	Factor
nano	n	$1,000,000,000^{\text{th}}$	0.000,000,001	10-9
miero	u	$1,000,000^{\text{th}}$	0.000,001	10 <sup>-6</sup>
milli	m	$1,000^{\text{th}}$	0.001	10 <sup>-3</sup>
centi*	с	$100^{\mathrm{th}}$	0.01	10 <sup>-2</sup>
de ci*	d	10 <sup>th</sup>	0.1	10 <sup>-1</sup>
kilo	k	1,000 x	1,000	$10^{3}$
mega	Μ	1,000,000 x	1,000,000	$10^{\circ}$
giga	G	1,000,000,000 x	1,000,000,000	109

The first five prefixes are submultiples, i.e. they are smaller in value than the basic unit. The remaining prefixes are multiples, and they have larger values than the base unit.

\*centi and deci are only used in relation to metre, the unit of measure.

Examples of submultiple and multiple:

- nano 33nV equals 0.00000033 of a volt
- micro 33uV equals 0.000033 of a volt
- milli 33mV equals 0.033 of a volt
- kilo 33KV equals 33,000 volts
- mega 33MV equals 33,000,000 volts
- giga 33GV equals 33,000,000,000 volts.

#### **Calculations with submultiple and multiple units**

When doing calculations with mixed quantities (any combination of base, multiple or submultiple), all of the quantities should be converted to the base unit.

The conversion is done by moving the decimal point either left or right, based on the factor, as shown in the table above.

To convert 33nV to volts:

• 33 is multiplied by 0.000,000,001to get 0.00000033V (decimal point moved nine places to the left on the number 33.0).

To convert 33mV to volts:

• 33 is multiplied by 0.001 to get 0.033V (decimal point moved three places to the left on the number33.0).

To convert 33GV to volts:

• 33 is multiplied by 1,000,000,000 to get 33,000,000,000V (decimal point moved nine places to theright on the number 33.0).

The conversion rule is:

- submultiple to a base move the decimal point to the left
- multiple to a base move the decimal point to the right.

When reading the value displayed on an electrical meter (particularly a multimeter), the value shown on the meter could be a base, multi

### Ohm's law

Voltage, current and resistance are present in all operational circuits and a relationship exists between these three things. The relationship is named after the person who discovered it, George Ohm. Ohm's law states, 'Current flow in a circuit is directly proportional to the voltage across the circuit and inversely proportional to the resistance contained in the circuit, providing circuit conditions remain the same.

In other words:

- if you increase the voltage (or electrical pressure) in a circuit then the current (flow of electrons) will increase in direct proportion, eg if you double the voltage the current flow will double
- if you increase the resistance (the opposition to current flow) in a circuit then the current flow will decrease in direct proportion, eg if the resistance in a circuit doubles then current flow will halve.

The image below shows that increasing battery voltage from 6 volts to 9 volts will cause the current flow to increase in direct proportion.

The following image shows that If the resistance of the circuit is increased from  $3\Omega$  to  $6\Omega$  (doubled) then the current flow will decrease inversely, ie it will reduce by half.

Ohm's law can be stated as a mathematical formula.

# V = IR

Voltage is equal to current multiplied by the resistance. If the current and resistance of a circuit is known, the voltage can be calculated.

Transposing the formula allows us to calculate current or resistance.

I = V/R

R = V/I

# **STUDENT ACTIVITY**

1. Explain electrical basics with a help of a sketch?



- 2. Convert the following to volts
  - 44nV
  - 55nV
  - 73nV
  - 43nV
- 3. Discuss Ohm's law with the help of a sketch?

4. Describe two electrical properties?

THE END

SANGAM EDUCATION BOARD - ONLINE RESOURCES