7/8

CITY SCHOOLS DIVISION OF DASMARIÑAS

TLE

CARPENTRY

SELF-LEARNING MATERIAL

TLE

Carpentry

Development Team of the Module

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Guide in Using Learner's Module

For the Parents/Guardian

This module is designed to assist you as the learning facilitator at home. It provides you with activities and lesson information that the learners need to accomplish in a distance learning modality.

For the Learner

This module is designed to guide you in your independent learning activities at your own pace and time. This also aims to help you acquire the competencies required by the Department of Education at the comfort of your home.

You are expected to answer all activities on separate sheets of paper and submit the outputs to your respective teachers on the time and date agreed upon.

What I need to know?

Lesson 1

Prepare Construction Materials and Tools

Content Standard:
The learner demonstrates an understanding of the underlying principles in the preparation of carpentry tools and construction materials.

Performance Standard:
The learner independently prepares carpentry tools and construction materials based on industry standards.

LEARNING OUTCOMES:
At the end of this lesson, you are expected to do the following:
LO1. Materials and tools applicable to a specific construction job; and
LO2. Request appropriate materials and tools.

WORD BANK
These are few words that you might encounter in this lesson.

Tool – a handheld device that aids in accomplishing a task
Material – substance/s of which a thing is made or composed
Requisition – the process of requesting something usually necessary to perform specific task
Quantity - a determinate or estimated amount
Unit - a determinate quantity adopted as a standard of measurement

What is new?

Lesson 1 – Learning Outcome 1

Identify Materials and Tools for a Task

In this section, you will learn about tools and materials used in carpentry; and prepare tools and Materials for a task.

1. How do you understand the word carpentry and how would you relate it to construction job?

   _____
   _____

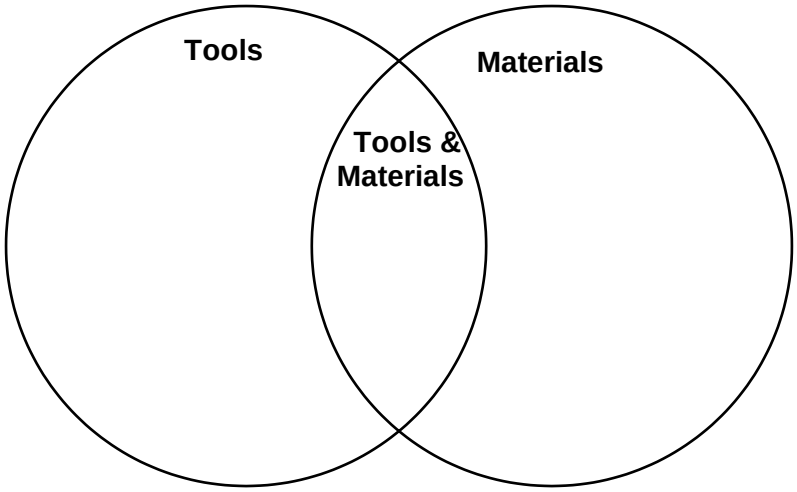
2. What do you think are things needed to perform construction job?

   _____
   _____

D What is in?

Directions: Based on your own understanding what are the similarities and differences of tools and materials?

Tools vs. Materials



D What is it?

INTRODUCTION

Carpentry is a skilled trade in which the primary work performed is the cutting, shaping and installation of building materials during the construction of buildings, ships, timber bridges, concrete formwork, etc. Carpenters traditionally worked with natural wood and did the rougher work such as framing, but today many other materials and tools are also used. Construction work has undergone major changes. Once dependent upon craftsmanship with simple mechanical aids, the industry now relies largely on machines and equipment.

Materials, tools, and equipment that will be mentioned in this lesson are particularly important in construction work since these are primarily used to put things together.

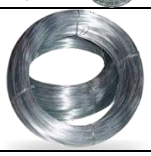
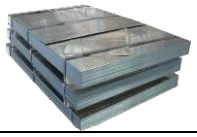
MATERIALS AND TOOLS IN CARPENTRY

In every field of work there is a corresponding set of material, tool and equipment that is in need to be considered and identified. These are anything that we use and help us to do specific job or task. Without such, productivity will be limited and sacrificed. The difference between the two is that tools are used to process materials wherein materials act as an ingredient to create a particular output.

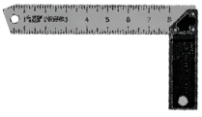
Below are some of the commonly used materials, tools and equipment in carpentry or construction job.

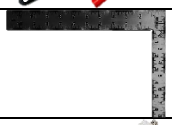
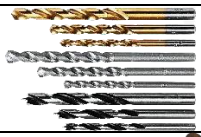
MATERIALS IN CARPENTRY

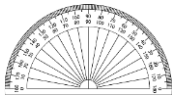
	ILLUSTRATION	DESCRIPTION
1		**LUMBER** It is any wooden material sawed or split into boards timber.

2		**NAIL** It is a metal that has one end pointed and one end flattened for hammering. It comes into different lengths and is usually used to fasten woods in carpentry.
3		**SCREW** It is a metal that has a thread and is made of metal. It comes into different types and lengths.
4		**GI WIRE** Galvanized iron wire is a steel or iron wire coated with zinc commonly used for fencing.
5		**GI SHEET** Galvanized iron sheet is a steel sheet coated with zinc to prevent it from rusting.
6		**STEEL REINFORCEMENT** It is a steel bar used to strengthen concrete under tension. It is also known as reinforcing bar or Rebar.

TOOLS IN CARPENTRY

	ILLUSTRATION	DESCRIPTION
1		**PULL-PUSH RULE** It is a retractable tape measure.
2		**PLUMB-BOB** It is a heavy pointed tip suspended by a string which is used as a vertical reference line. It is also known as a plummet.
3		**CARPENTER PENCIL** A marking tool just like a standard pencil but has a rectangular or elliptical body which prevents it from rolling away.
4		**MARKING GAUGE** It is a tool used for marking lines on wood or metal for cutting. It is also known as scratch gauge.
5		**LEVEL BAR** It is a bubble reading level which indicates the levelness of the surface being tested.
6		**LEVEL HOSE** It is a tool that uses water or liquid to determine the levelness of a surface.
7		**TRY SQUARE** It is a tool primarily used to test the flatness, squareness, or accuracy of a right angle.

8		**CHALK LINE** It is a tool used to mark long, straight, and flat surfaces.
9		**STEEL RULE** A carpenter's square or steel square or framing square used to construct or test right angles.
10		**PLANE** It is a tool used for smoothing or taking out sharpness out of woods, joints, or stocks.
11		**CHISEL** It is a tool used for carving woods and cleaning joints and saw cuts. Below are some of the commonly used chisels in woodworking. a. **Bench chisel** is commonly used chisel for chopping and trimming woods. b. **Paring chisel** is a delicate chisel used for careful trimming of woods. **Mortise chisel** is used for heavy chopping of wood joints.
12		**HAND SAW** It is a tool used for cutting woods manually. It comes into different types. Below are some of the commonly used saws in woodworking. a. **Crosscut saw** is used to cut across the grain of the wood. b. **Rip saw** is used to cut along the grain of the wood.
13		**DRILL BIT** It is a bit inserted to an electric drill or brace to punch hole on wood, wall or other objects.
14		**BRACE** It is a hand tool used with drill bit to bore holes usually in woods.
15		**BENCH VISE** It is a holding device attached to a workbench. It has two jaws that hold something in place.
16		**BAR CLAMP** It is a tool used to hold two pieces of wood for nailing or gluing.
17		**PAINTBRUSH** It is made out of clamp bristles used for applying paint and varnish on woods and other materials.
18		**OIL STONE** It is a stone used to sharpen edges of steel tools.
19		**SAW SET** It is used to sharpen and adjust the distance of saw tooth from its blade.

20		**NAIL SET** It is used to drive nails deeper on the wood's surface that comes into several sizes.
21		**FILE** It is a case-hardened steel bar that has forward-facing teeth used for smoothing, cutting and shaping surface of wood or material.
22		**JIGSAW** It is a power-saw used to cut wood or other materials in straight or curved manner.
23		**SANDER** It is a power tool that moves in circular or back and forth pattern to smoothen surface of a wood.
24		**ELECTRIC DRILL** It is used with drill bit to make round holes and drive bit to use it as driving fasteners.
25		**CIRCULAR SAW** It is a power-saw that has abrasive circular blade that moves in circular motion to cut different types of materials. It has adjustable plate that determines the angle of material to be cut.
26		**ROUTER** It is used to shape edges of woodworks. It has various bits that determine the shape of the edges.
27		**SCREWDRIVER** It is used to tighten or loosen screws. It comes into different types and sizes. **a. Flat Head** is a type of screwdriver that has flattened tip. It is also known as "Slotted screwdriver". **b. Cross Head** is a type of screwdriver that has cross-shaped tip. It Is also known as "Phillips screwdriver".
28		**CLAW HAMMER** It is a tool used for driving and pulling out nails.
29		**MALLET** It is a tool usually made of wood and is used to drive chisels and dowels. Dowels are cylindrical pin made of wood and is cut into different lengths and used to fasten woods.
30		**PROTRACTOR** It is a tool used to measure angles.
31		**ZIGZAG RULE** It is a folding rule that consists of rule strips joined with hinges which allows it to be folded against each other to keep it short and portable. This can also be used to easily create parallel lines.

E What is more?

Learning Task 1.1: Carpentry Tools & Materials

Direction: Draw at least 5 tools and 5 materials used in carpentry and write each tool's name correspondingly using the table below.

Materials needed: *Paper, pencil, eraser, coloring materials (*optional)*

Example:

Paintbrush

5 Carpentry Tools	5 Carpentry Materials
1.	1.
2.	2.
3.	3.
4.	4.
5.	5.

Scoring Rubric

Accuracy

- Label - 10 points
- Drawing - 10 points

(Note: 1 point for each tool)

Creativity

- Illustration presentation - 10 points

(ex. Cleanliness, balance of colors applied, etc.)

Total: 30 points

E What else can I do?

Learning Task 1.2: Look around!

Now, try to look around your house and try to see if there are available tools or materials used in carpentry. If there are, list them inside the box and ask your guardian/parent where and when are they usually used.

Example: Hammer

1.

2.

3.

4.

5.

A What I can do?

Learning Tasks 1.3: Reflective Thinking!
Directions: Answer the following questions

1. Is it important to familiarize yourself with the tools and materials used in specific job? Why?

2. Why are carpenters important?

3. Do you consider engaging in a carpentry or construction job someday?

I What I need to know?

Lesson 1 – Learning Outcome 2

Request Appropriate Materials & Tools

In this lesson, you will learn about filling out forms in requesting for carpentry and tools and materials as required for a task.

Based on the tools and materials in carpentry that you have learned in the previous lesson, what do you think is/are the tool/s and material/s needed to perform the given situation?

- Smoothening surface of a rough table. _____
- Fixing sticking out nails on the chair. _____
- Attaching a lumber to another wood material. _____

D What is it?

INTRODUCTION

One of the most important things in working with a project are the availability of tools and materials. It is inevitable that some or all of the tools and materials needed are not available at hand. If this happens, one should request these tools and materials to support the project. Requesting is not merely done verbally but follows standard operating procedure by accomplishing a requisition slip or form. In this lesson, requisition procedure and definition, sample and accomplishing requisition slip will be discussed

REQUISITION PROCEDURE

Below is a suggested step by step procedure in requesting needed materials and tools.

1. Discuss and Identify tools or materials needed within a group or department.
2. Canvass for the unit cost of identified tools and materials.
3. Accomplish a requisition slip.
4. Submit slip to an authorized person and seek for approval.
5. Submit purchasing order slip to the purchasing officer once approved.
6. Wait for the required date agreed to acquire the needed tools or materials.

REQUISITION FORM

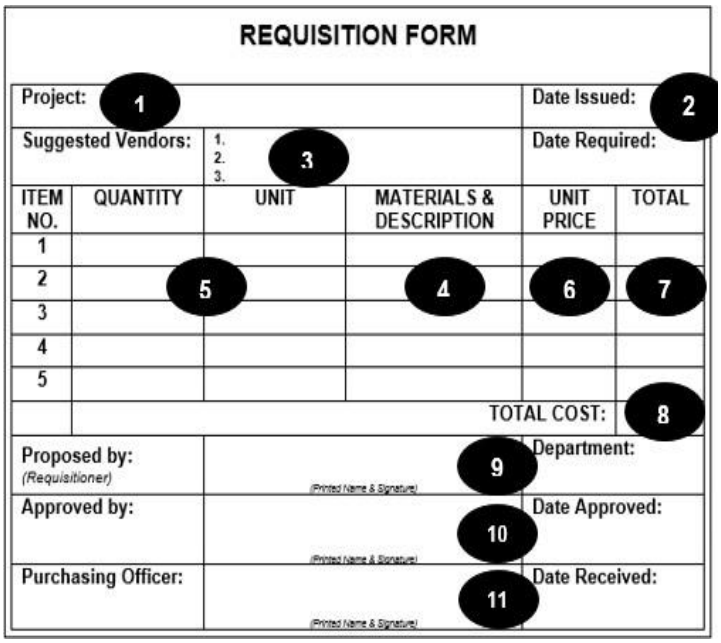
Project:				Date Issued:	
Suggested Vendors:	1. 2. 3.			Date Required:	
ITEM NO.	QUANTITY	UNIT	MATERIALS & DESCRIPTION	UNIT PRICE	TOTAL
1					
2					
3					
4					
5					
			TOTAL COST:		
Proposed by: *(Requisitioner)*		(Printed Name & Signature)		Department:	
Approved by:		(Printed Name & Signature)		Date Approved:	
Purchasing Officer:		(Printed Name & Signature)		Date Received:	

What is a requisition slip?

A requisition slip is a documented form used for procurement of necessary goods for a specific project. It comes into different formats depending on the standard existing in a firm. Below is an example of basic requisition slip.

Filling Out Requisition Form Procedure

1. State the name of the project on the "Project" section.
2. Indicate the date when you request the tools or materials and the date they need to be acquired on the "Date Requested" and "Date Required" section respectively.
3. Suggest stores where requested items can be purchased. Write it on the "Suggested Vendors" section.
4. List items to be requested and specify description of each item on "Materials & Description" Section.
5. Indicate the quantity of each item in the "Quantity" section and specify the appropriate unit of measurement in the "unit" section.
6. Indicate the cost per unit of each item on the "Unit Cost" section. Costshould be based on the canvassed prices on the suggested vendors.
7. Calculate the total cost per item by multiplying unit cost to quantity. Indicate it on the "total" section.
8. Get the total cost of all requested items and write it on the "Total Cost" section.
9. Write the name of the requisitioner and affix signature on the "Proposed by" section. Also, indicate the department where the requisitioner belongs on the "department" section.
10. Write the name of an approving authority and seek for his/her approval on the "Approved by" section and indicate the date of approval on "Date approved" section.
11. Purchasing officer will write his/her name and affix his/her signature on the "Purchasing Officer" section. Indicate the date on "Date received" section upon receiving the slip.



E What is more?

Learning Tasks 1.4: Filling out Requisition Form

Directions: On a sheet of paper, create your own requisition form and accomplish it based on the given scenario below.

Scenario:

Mrs. Rosana V. Santos one of the head teachers in Kapayapaan National High School, a multiple-hectare institution that consists of eight departments namely TLE, MAPEH, AP, Math, English, Filipino, ESP and Science. She wants to propose a bulletin board project for each department of the school. With this, she researched about the materials that she will be needing to create a bulletin board. She found out that each bulletin board requires the following materials: a piece of ¾ plywood, liter of stain maple, kilo of finishing nail 11/2, foot of sandpaper, liter of QDE Boysen (Green), liter of thinner and piece of paintbrush no. 2. Based on her canvass at Dasmarinas Hardware, the materials cost 700, 110, 30, 50, 150, 80, and 20 PHP respectively. With this information, help Mrs. Santos fill out her project's requisition form noted by Mrs. Perlita I. Reyes, school principal and submit it to Mr. Jan L. Santiago, school supply officer as one of the requirements to materialize the project.

REQUISITION FORM

Project:				Date Issued:	
Suggested Vendors:	1. 2. 3.			Date Required:	
ITEM NO.	QUANTITY	UNIT	MATERIALS & DESCRIPTION	UNIT PRICE	TOTAL
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
			TOTAL COST:		
Proposed by: (Requisitioner)		(Printed Name & Signature)		Department:	
Approved by:		(Printed Name & Signature)		Date Approved:	
Purchasing Officer:		(Printed Name & Signature)		Date Received:	

What I need to know?

Lesson 2

Maintain Tools and Equipment

Content Standard:
The learner demonstrates an understanding of the underlying principles in the maintenance of carpentry tools and equipment.

Performance Standard:
The learner independently performs maintenance of carpentry tools and equipment based on industry standards

LEARNING OUTCOMES:
At the end of this lesson, you are expected to do the following:
LO1. Check condition of tools and equipment; and
LO2. Perform basic preventive maintenance.

WORD BANK
These are few words that you might encounter in this lesson.

Finishing materials - chemical or substance applied in finishing carpentry
Hardware - metal supplies used in furniture
Inventory - the accounting of tools and materials
Label - refers to the indicated name of tools and equipment
Lubricants - oil or grease which is used to help the machine to run smoothly
Segregate - set aside things from the others
Stock - refers to a lumber for a certain carpentry job

What is new?

Lesson 2 – Learning Outcome 1

Check Condition of Tools and Equipment

In this section, you will learn about segregating defective tool from functional ones, labeling defective tool, and reporting the list of defective tools.

1. How often do you check condition of tools, devices, materials, or equipment inside your house?
2. How do you check condition of tools, devices, materials, or equipment inside your house? Detail your procedure below.

D What is it?

INTRODUCTION

In this lesson you will learn about procedure in checking of tools and equipment and fill out basic inspection report form.

CHECKING OF TOOLS AND EQUIPMENT PROCEDURE

1. Conduct regular checking and inventory

2. Test functionality of tools and equipment

3. Separate functional from non-functional tools and equipment

4. Label tools and equipment that are no longer serviceable to prevent other people from using it.

5. Record the condition of tools and equipment using an inspection report form.

INSPECTION REPORT FORM

Date:

TOOLS / MATERIALS DESCRIPTION	GOOD	REJECT	REMARKS
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

Prepared by: _____

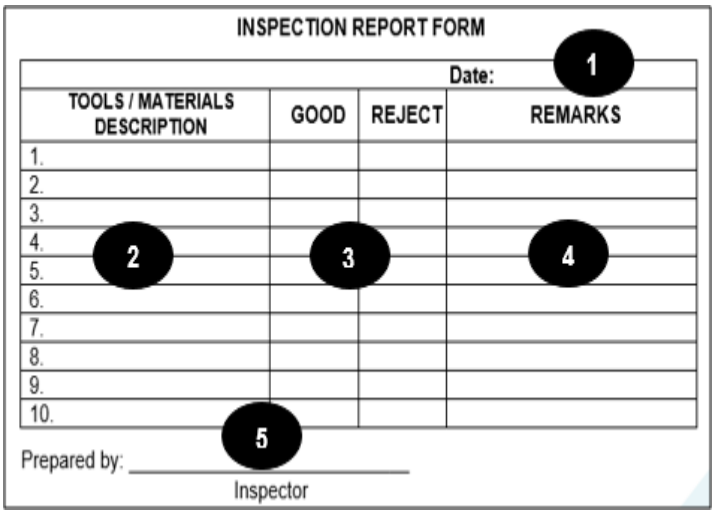
Inspector

What is an inspection report form?

An inspection report form is a written form used to document and indicate the condition of an object being inspected at a specific time. It comes in different formats depending on the standard existing in a firm.

Filling Out Inspection Report Form Procedure

A. Indicate the date of inspection on the “date” section.
B. List all the tools and materials with its description to be inspected on “tools/materials description” section.
C. Note: Indicating description of things to be inspected is a must for the accuracy of inspection.
D. Based on observation, indicate the condition of the tool by putting a check mark on “good” section if it is in good condition and on “reject” if it is not.
E. Write necessary notes for each item on the “remark” section. This could be insufficient or sufficient if it’s in good condition and replace or repair if it is in “reject” condition. Other remarks may be used based on the firm’s preference.
F. Affix inspector’s signature over his or her printed name.



6. Report condition of tools and equipment especially tools that are subject for replacement and repair through submitting the result of inspection to a firm’s supply officer.

7. Return tools and equipment on its storage properly after inspection

E What I can do?

Learning Task 2.1: Plan it out!

Directions: One of the best practices in checking tools and equipment is creating a schedule of inspection that will serve as our reminder. Now, try to create inspection schedule for your tools, devices and equipment inside the house using the calendar template below.

MY MONTHLY INSPECTION SCHEDULE						
SUN	**MON**	**TUE**	**WED**	**THU**	**FRI**	**SAT**

E What else can I do?

Learning Task 2.2: Look around!

Now, try to look around your house and label any defective items that you can see. Take a picture and paste it in the box below. Then, fill out the inspection form below and show the report to your guardian for hazard prevention.

Tool/Equipment/Material	Working (✓)	Defective (✓)	Remarks
0. Knife		✓	Broken Handle
1.			
2.			
3.			
4.			
5.			

A What I have learned?

Learning Task 2.3: Checking of Tools Procedure

Directions: Arrange the following steps in chronological order. Use number 1 to 7 to indicate its number of precedence.

_____1. Segregate functional from non-functional tools or equipment.

_____2. After inspection, return tools or equipment on their storage room properly.

_____3. Label each tool or equipment whether it is still functional or non- functional.

_____4. Fill out inspection report form based on your inspection.

_____5. Check functionality of each tool or equipment.

_____6. Perform checking and inventory of tools and equipment regularly.

_____7. Report condition of tools and equipment especially tools to supply officer.

I What I need to know?

Lesson 2 – Learning Outcome 2

Perform Basic Preventive Maintenance

In this lesson, you will learn about repairing defective tools and conducting preventive maintenance of carpentry tools.

How do you maintain tools, devices, materials, or equipment inside your house? Write below your procedure or illustrate it using diagram, organizer, or any graphical representation.

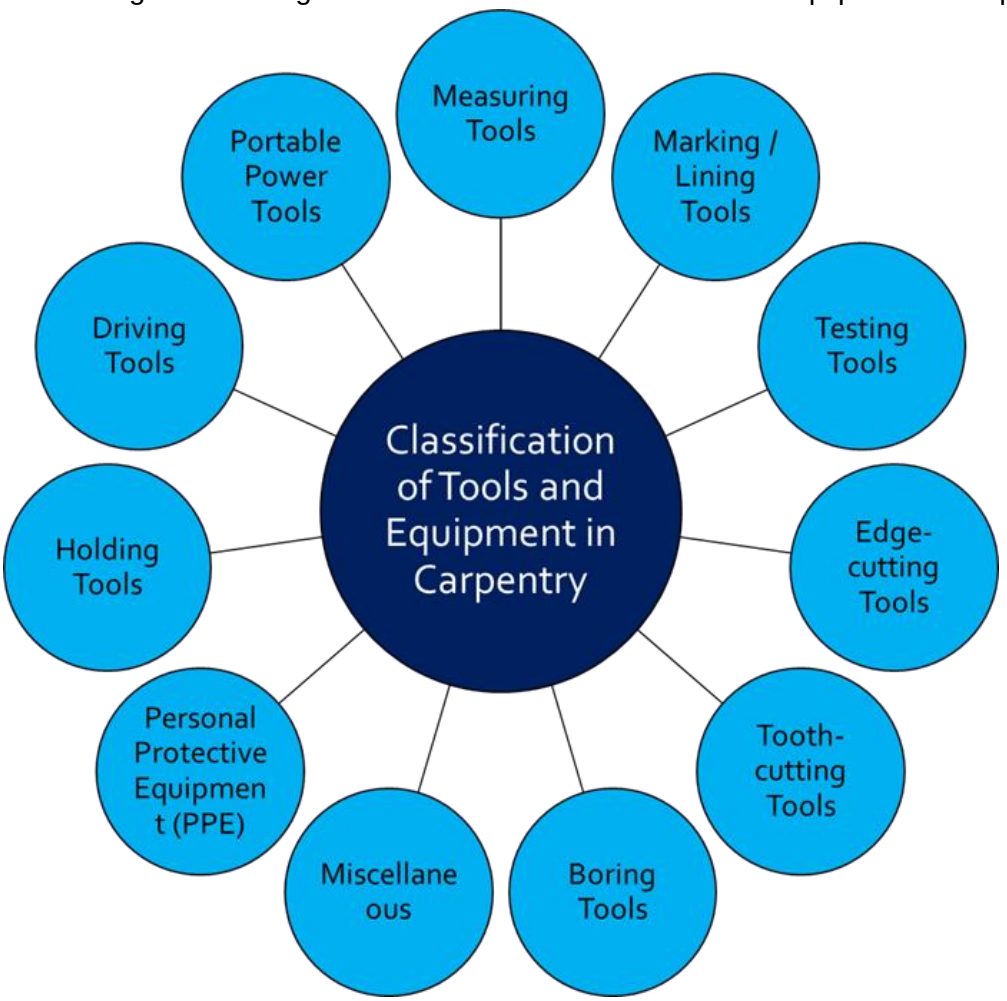
D What is it?

INTRODUCTION

In Lesson 1, tools, materials, and equipment used in carpentry or construction have been identified and defined. In this lesson, identified tools and equipment will be grouped into different classification. Tools and equipment will be segregated according to their similarities in terms of functions or characteristics to organize for preventive measures and maintenance.

CLASSIFICATION OF TOOLS IN CARPENTRY

Below is a diagram showing different classifications of tools and equipment in carpentry.



	CLASSIFICATION	DESCRIPTION
1.	**Measuring**	Tools used to measure physical quantity of an object
2.	**Marking / Lining**	Tools used to put notations on objects that will serve as your reference point, line, or guide to perform specific processes like cutting and placing of an object
3.	**Testing**	Tools used to test levelness and squareness of stocks
4.	**Edge-Cutting**	Tools that have sharp edges and are used to carve and cut woods
5.	**Tooth-Cutting**	Tools that have sharp teeth to cut woods

6.	**Boring**	Tools used for making holes on the wood
7.	**Holding**	Tools used to firmly hold the material in place during cutting, fastening, and gluing.
8.	**Portable Power Tools**	Tools that are handy and require power source or electricity to operate
9.	**Driving**	Tools used to push an object
10.	**Personal Protective Equipment (PPE)**	Equipment worn by a carpenter or worker to avoid potential harm that might hurt him or her
11.	**MISCELLANEOUS**	Other tools in carpentry that are different from each other and are not classified according to their function.

Below are the list of tools and equipment classified according to their function**.**

Measuring Tools	Marking/Lining Tools	Testing Tools	Edge Cutting Tools	Tooth Cutting Tools	Boring Tools
✓ Pull-push Rule ✓ Steel Rule ✓ Zigzag Rule	✓ Chalk line ✓ Carpenter Pencil ✓ Marking Gauge ✓ Chalk Line	✓ Plumb-bob ✓ Level Bar ✓ Level Hose ✓ Try Square	✓ Plane ✓ Chisel	✓ Crosscut Saw ✓ Rip Saw	✓ Brace ✓ Drill Bit
Holding Tools	**Portable Power Tools**	**Driving Tools**	**Personal Protective Equipment (PPE)**	**Miscellaneous Tools**	
✓ Bench Vise ✓ Bar Clamp	✓ Jigsaw ✓ Sander ✓ Electric Drill ✓ Circular Saw ✓ Router	✓ Nail Set ✓ Screwdriver ✓ Claw Hammer ✓ Mallet	✓ Face mask ✓ Coverall Suit ✓ Gloves ✓ Goggles ✓ Ear Protector ✓ Hard Hat	✓ Paintbrush ✓ Oil Stone ✓ Saw set ✓ File	

Performing basic preventive maintenance is one of the most important routine in a workplace. Through this, the lifespan of tools and equipment will increase, and they can be used for longer period of time. One way to do this is to apply appropriate lubricants on tools and equipment used in the workplace.

BASIC TYPES OF LUBRICANTS AND ITS USES

	Lubricant	Description
1		Oil is the commonly used lubricant for tools and equipment. It is a thin liquid used for hinges, tool maintenance and sharpening blades. **Use When:** ✓ You want to lubricate something without the resistance inherent in using grease ✓ You need lubrication to wick into a small space, without having to take anything apart

1	 **OIL**	**Don't Use When:** ✓ The surfaces being lubricated are exposed to dust or dirt, which can eventually gum up and cause more friction. ✓ You need to keep things around the surfaces clean, because oils are low in viscosity and thus tend to drip and run. ✓ The surfaces are exposed to water or anything that can wash the oil away.
2	 **GREASE**	Grease is a combination of oil and thickeners used for equipment with gears, bearings, chains and linkages. **Use When:** ✓ You need lubrication to stay put and stick to surfaces for a long time ✓ You want to seal out contaminants such as water or dust ✓ You use a machine so infrequently that you may forget to oil it **Don't Use When:** ✓ You have fine or fast-moving mechanisms where thick grease would create too much resistance. ✓ You don't want a mess. ✓ When parts move, they can fling grease all around, so it may not be the best option for keeping things clean.
3	 **PENETRATING LUBRICANT**	Penetrating lubricant is a very low- viscosity oil that allows it to infiltrate in narrow spaces between parts of tools or equipment. However, this is not designed for long lasting lubrication.
4	 **DRY LUBRICANT**	Dry lubricant is made up of slippery substance and is used to reduce friction between surfaces in contact with one another. Example of this is graphite powder spray.

A What I have learned?

Learning Task 2.4: Classify the Tools

1. **Direction:** Classify the following tools and materials according to their function.

Brace	Coverall Suit	Chalk Line	Level Bar	Plumb bob
Sander	Pull-push rule	Mallet Goggles	Nail Set	Oil Stone
Chisel	Crosscut saw	Bench Vise	Drill bit	File

Measuring	Marking / Lining	Testing	Edge Cutting	Tooth Cutting	Boring
Holding	**Portable Power Tools**	**Personal Protective Equipment**	**Driving**	**Miscellaneous**	

2. Directions: Identify the different lubricants below and write a short description about it.

What I need to know?

Lesson 3

Maintain Tools and Equipment

Content Standard:
The learner demonstrates an understanding of the concepts and underlying principles in performing measurements and calculations

Performance Standard:
The learner independently performs accurate measurements and calculation based on a given task.

LEARNING OUTCOMES:
At the end of this lesson, you are expected to do the following:
LO1. Select measuring instruments; and
LO2. Carry out measurement and calculations

WORD BANK
These are few words that you might encounter in this lesson.

Area - extent of part of a surface enclosed within a boundary
Calculation - the act or process of or result of calculating
Classification - group or category within an organized system
Decimal - number expressed in a counting system that uses units of 10, especially a decimal fraction
Dimension - measurable extent such as length, thickness, and width
Mensuration - act or art of measuring
Standard - serves as a measure of reference
Linear - straight

What is new?

Lesson 3 – Learning Outcome 1

Select Measuring Instruments

In this section, you will learn about identifying linear measuring instrument appropriate for a given task.

Direction: Write in the diagram on the next page your considerations in selecting measuring instruments for your work.

D What is it?

INTRODUCTION

One of the most important tools ever invented are the measuring tools. Imagine life without measurements and life without the ability to measure things. It could create tremendous chaos and misalignments not only in construction and carpentry, but also around and beyond the world. As the proverb says “measure twice, cut once” shows how important measuring tools among other tool classifications.

Measuring tools used in carpentry are identified in Lessons 1 and 2 of this module. In this section, selection of appropriate measuring instruments and proper handling of measuring tools will be discussed. Specifically, measuring a lumber will be the focus of this section for it is the common material that is being measured in woodworking.

SELECTION OF MEASURING INSTRUMENTS

Selection of measuring instruments is significant to obtain accurate measurements. Below are the factors to consider in selecting appropriate measuring tool.

1. Size and type of parts to be measured. Objects come in different sizes, types and shapes so as the measuring instrument. Just imagine measuring large objects using small measuring tools, measuring linear objects using measuring tools for round objects and vice versa. For more efficient and accurate measurement this must be considered.
2. Environment. This must be considered for temperature, humidity and pressure of an object to be measured. One must consider the capacity and limitation of instrument to handle specific

degree of temperature, humidity and pressure to prevent potential hazards and damages to operator, material that is being measured and to the measuring instrument itself

3. Skilled operator. User of the tool must be identified beforehand to consider his or her knowledge and skill in using measuring tools. This is done for the convenience and efficiency of the operator.
4. Cost of equipment. Choose measuring tool that is affordable but will not sacrifice the quality and accuracy of measurements. Make use of less expensive alternative equipment.

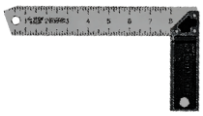
PROPER HANDLING OF MEASURING INSTRUMENTS

Proper handling and maintenance of measuring tool is done for the favor of users. If these are well-maintained, it will not be prone to damages and will be much safer and easier to use. This will also increase the lifespan of a tool.

Below are some guidelines on how to use measuring instruments properly.

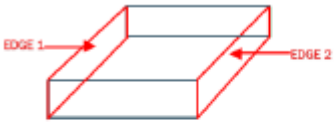
1. Regularly clean and wipe not only the measuring tools but also its storage.
2. Lubricate measuring tools that have movable parts to prevent it from stocking up.
3. Avoid rough particles around measuring tools because they can erase graduations on the measuring tool through friction.
4. Regularly check the functionality of measuring tools and its parts. This must be done in schedule and not just before you use the tool. This will provide enough time to repair and replace needed measuring tool.
5. Avoid wiping measuring tools that are made up of thin steel sheets using bare hands. Its sharp edges may cut and pose harm to your hands.
6. Avoid pulling too much retractable measuring tool like pull-push rule to prevent difficulty in putting it back to its case.

LINEAR MEASURING INSTRUMENTS

	ILLUSTRATION	DESCRIPTION
1		**PULL-PUSH RULE** A retractable tape measures. It is also known as “flexible rule” and “push-pull tape”
2		**TRY SQUARE** Primarily used to test the squareness or accuracy of a right angle and to measure piece of wood.
3		**STEEL RULE** A carpenter’s square or steel square or framing square which is used to construct or test right angles
4		**ZIGZAG RULE** Folding rule that consists of rule strips joined with hinges which allow it to be folded against each other to keep it short and portable and can be used to easily create parallel lines.

FACES OF A LUMBER

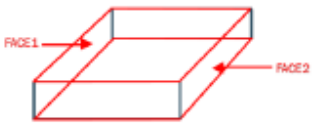
Lumber as defined is a sawn timber. It has six (6) faces.



Measurement that can be obtained from this is:

⟷

Edge 1 to Edge 2 = **Width** (W)



Measurement that can be obtained from this is:

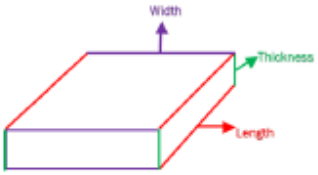
⟷

Face 1 to Face 2 = **Thickness** (T)

Measurement that can be obtained from this is:

⟷

End 1 to End 2 = **Length** (L)



E What is more?

Learning Task 3.1: Measuring Device

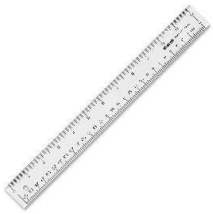
Direction: On a separate paper, label each measuring device using pool of words below.

Weighing Scale	Pull-Push Rule	Multitester	
Try square	Thermometer	Body Weighing Scale	
Tape measure	Zigzag Rule	Steel Rule	Ruler

1. 

2. 

3. 

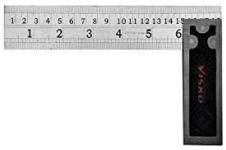
4. 

5. 

6. 

7. 

8. 

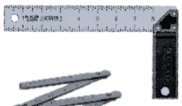
9. 

10. 

A What I have learned?

Learning Task 3.2: Assessment

I. Directions: Match the following measuring tools with their corresponding illustrations.

Column A	Column B
1. Pull-push rule	a. 
2. Zig-zag rule	b. 
3. Protractor	c. 
4. Steel Rule	d. 
5. Try Square	e. 

II. Mark with ✓ if the statement is correct and ✗ if it is incorrect.

____6. Check functionality of measuring tool regularly.

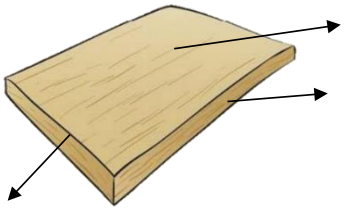
____7. Lubricate movable parts of measuring tools.

____8. Wipe off measuring tools that is made out of thin steel sheets with bare hands.

____9. Exposing measuring tool to rough particles is fine.

____10. Regularly clean measuring tools and its storage.

III. Identify the faces of a lumber.



11._____

12. _____

13. _____

IV. Give at least 2 linear measurements obtained from the faces of a lumber.

14. _____ 15. _____

A What I can do?

Learning Tasks 3.3: Reflective Thinking!

Directions: Write a short essay entitled My Learnings that contains your answer to the following questions.

- What did you learn from this lesson? What did you realize after finishing the lesson?
- What is your plan after this lesson?

Use the following prompts for your opening statement.

I learned that …
I realized …
I plan to …

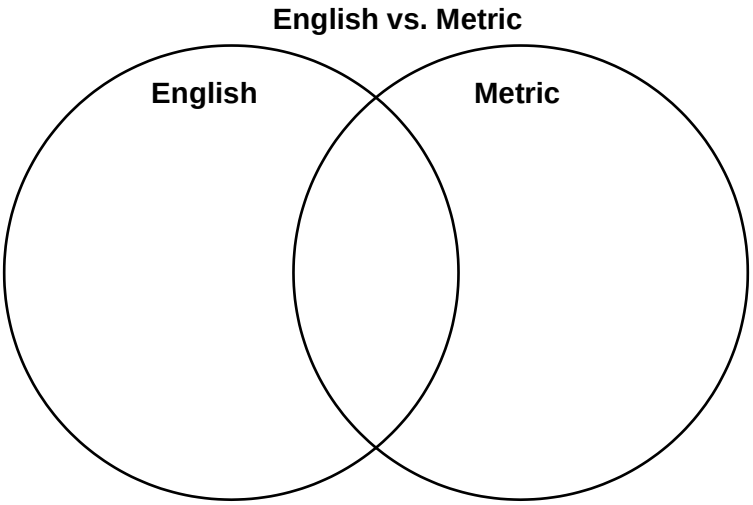
I What I need to know?

Lesson 3 – Learning Outcome 2

Carry Out Measurement and Calculations

In this lesson, you will learn about measuring given materials and calculating amount of materials for a specific task.

Based on your own understanding, what are the similarities and differences of English and Metric systems of measurement?



D What is it?

INTRODUCTION

Numerous systems of measurement had been created by different countries, places and races to measure objects. These systems of measurement are collections of different units of measurement and rules relating to them. English and Metric system are two of the most popular systems of measurement nowadays, but there must be one universal system and that is the International System of Units (SI). SI is the modern form of metric system that is the adapted unit of measurement among different countries. In this section, systems of measurement, basic reading of measurement, fractions, conversion of fraction to decimal and measuring board foot of a lumber will be discussed.

English System *It is also known as the imperial system. originated from England*	**Metric System** *Metric system's unit of measurement usually ends in a word "meter" and varies its value to its prefix. This system originated from France*
Commonly used linear measurement for these systems are: ✓ Yard ✓ Inch ✓ Foot	Commonly used linear measurement for these systems are: ✓ Meter ✓ Kilometer ✓ Centimeter ✓ Millimeter

BASIC READING OF MEASUREMENTS

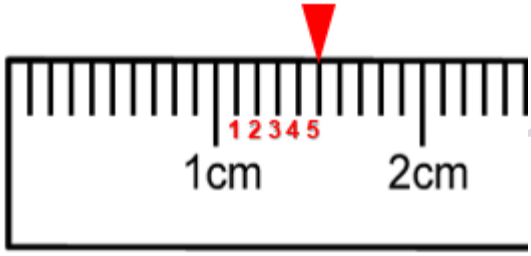
The major requirement in using measuring instrument is someone's knowledge and ability to read measurements accurately. Below are guides on how to read basic units of measurement such as millimeter, centimeter and inch which are commonly found units in measuring tools used in carpentry.

HOW TO READ CENTIMETER?

Centimeter is commonly read in decimal number. Decimal number contains two parts and is separated by a decimal point as illustrated below.

To get the measurement of a centimeter, you must know that a centimeter is equal to ten millimeters (1cm=10mm). Whole centimeters before the measurement falls will serve as the whole number and segments excess to that will serve as the measurement's decimal value.

For example:



Therefore, this can be read as:

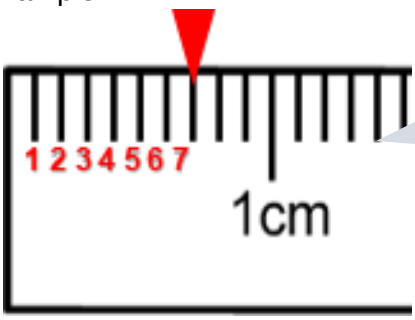
1.5 centimeters

or 1.5 cm

HOW TO READ MILLIMETER?

To read a millimeter, just simply count the number of segments the measurement falls.

For example:



Therefore, this can be read as:

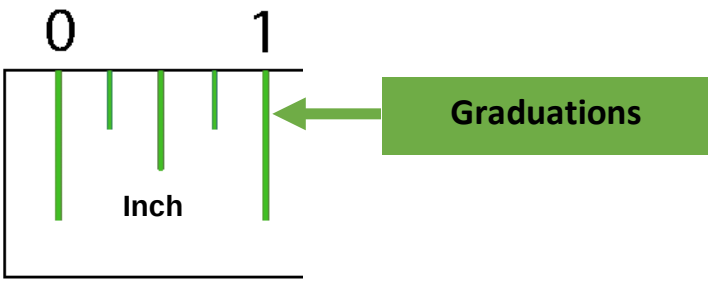
7 millimeters

or 7 mm

TIP: *In case, the measurement falls too far, just keep in mind that in e very centimeter there is 10 millimeter so you just have to count by 10 for every whole centimeter before measurement falls.*

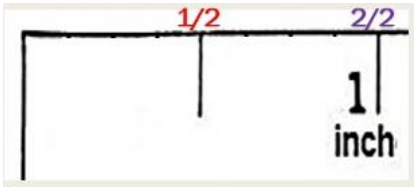
HOW TO READ INCH?

To read an inch, you must know that it is divided into graduations. These are lines found in a measuring device. It can be divided into two (2), four (4), eight (8) and sixteen (16) graduations. Below are sample graduations or segment.

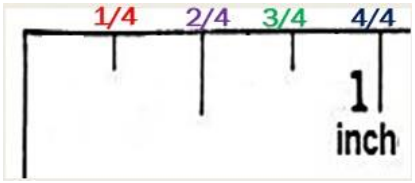


Example of an inch divided into different number of graduations

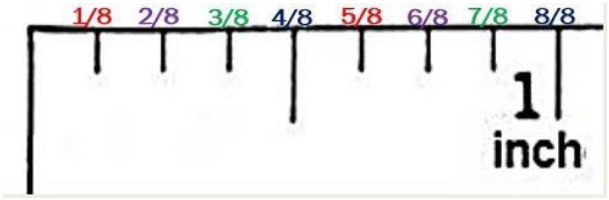
Divided into **2**



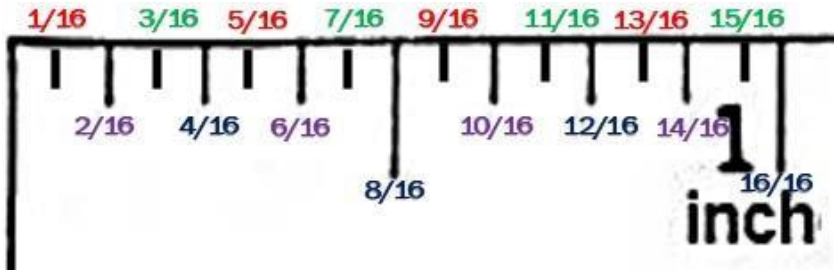
Divided into **4**



Divided into **8**

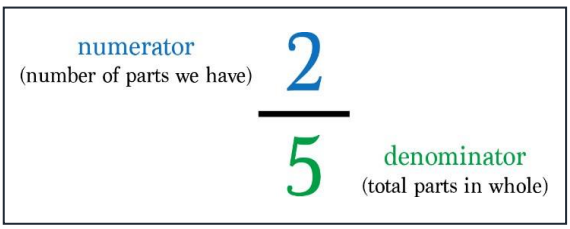


Divided into **16**



READING AN INCH

First you must understand fractions because originally it is read in fraction. There are two parts of fraction as shown in the image on the left side. It has three basic types such as proper, improper and mixed fraction.



a) Proper Fractions are fractions where denominator is greater than the numerator. (denominator > numerator)

Example: $\frac{7}{8}$

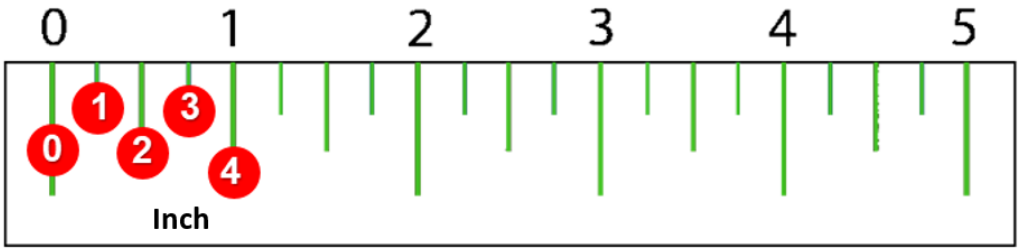
b) Improper Fractions are fractions where denominator is less than the numerator. (denominator < numerator)

Example: $\frac{17}{8}$

c) Mixed Fractions are any fractions combined with a whole number.

Example: $1\frac{7}{8}$

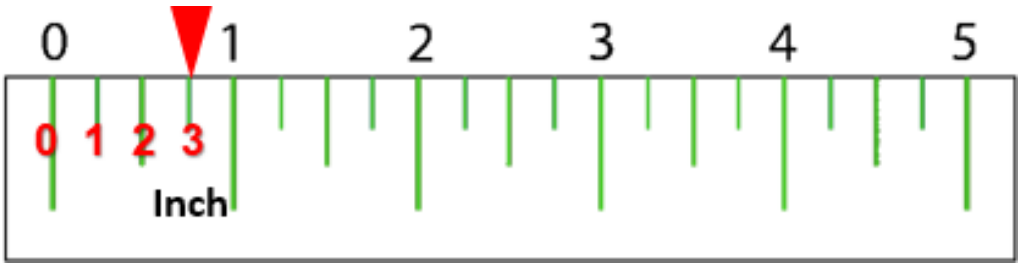
2. To get the measurement's denominator, Count the number of graduations an inch were divided.



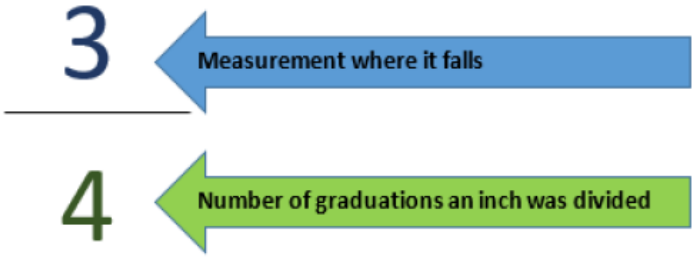
In this case, an inch is divided into four (4) graduations. This will serve as our measurement's denominator.
(Note: Some measuring devices don't start with 0 instead start with 1 segment so please be mindful of the indicated number the device started to get the correct division)

3. To get the measurement's numerator, count the number of graduations where the measurement falls.

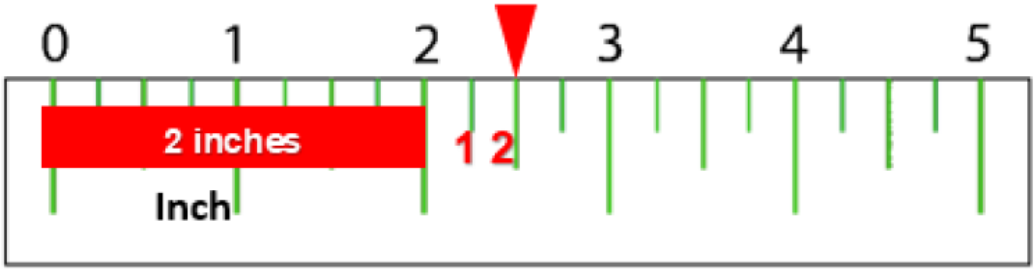
For example:



In this case, measurement falls on the third (3rd) graduations so the numerator will be three. Therefore, measurement above is read as:



If in case the measurement falls beyond an inch, whole inch or inches before the measurement falls will serve as whole number. For the numerator, counting will start on the nearest whole inch before the measurement falls and the denominator will stay as is.



Therefore, measurement above is read as:

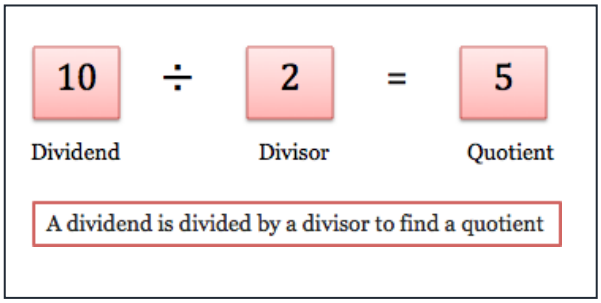
$$2\frac{2}{4}$$

TIP: *If you are familiar in simplifying fractions you can just simplify it into:*

$$2\frac{1}{2}$$

CONVERSION OF FRACTIONS TO DECIMAL

Since some of the measurements are in form of fractions, you might need or wantto convert it into decimal number. To easily convert it, you must review your knowledge in division and skill in dividing numbers.



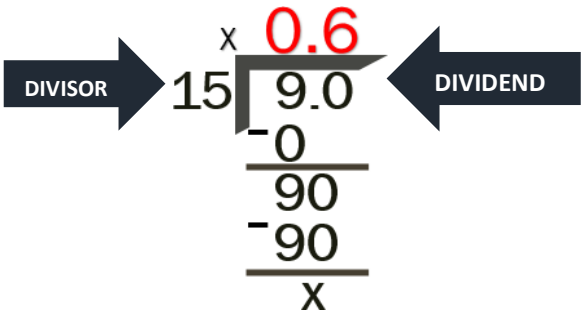
Source: https://www.ipracticemath.com/learn/integer/dividing-integers

Fundamental operation of division has three basic parts as illustrated above. In converting fraction to decimal given fraction's numerator will serve as dividend and the given denominator will serve as the divisor. All you have to do is to perform basic division to get the decimal value of the fraction.

Below are examples of converting different types of fractions to decimal

A. CONVERTING PROPER FRACTION TO DECIMAL

$$\frac{9}{15}$$



B. CONVERTING IMPROPER FRACTION TO DECIMAL

$\frac{25}{12}$

```
      x  2.083..
12 | 25.000
   -24
     10      40
   -  0     -36
     100      ∞
   -  96
```

C. CONVERTING MIXED PROPER FRACTION TO DECIMAL

$7\frac{17}{18}$

```
      x  0.94.. + 7 = 7.94
18 | 17.0
   -0
    170
   -162
     80
   -  72
      ∞
```

CONVERSION OF UNITS OF MEASUREMENTS

Converting units of measurements is an important process that allows the uniformity of measures that translates specific unit of measure in a system to another unit of measurement in a different system. For examples are translating English system of measurement to metric system and vice versa. Moreover, conversion is not limited system to system but could also convert units within the same system.

To easily convert system of measurement to another system, you must secure a guide table for conversion to guide you with their corresponding values. Otherwise, memorize each conversion. Below is an example of conversion table.

English to English	1 foot = 12 inches 1 yard = 3 feet
Metric to Metric	1 meter = 100 centimeters 1 centimeter = 10 millimeters 1 decimeter = 0.1 meter
English to Metric	1 foot = 30.48 centimeter 1 inch = 25.4 millimeter
Metric to English	1 meter = 3.28 feet 1 kilometer = 1093.61 yard

CONVERTING DIFFERENT UNITS OF MEASUREMENTS

1. Converting English To English System of Measurement

A. FOOT TO INCHES

4 ft. = __48__ inches

(/12) 1 ft. = 12 inches (x12)
4 ft. = ? Inches
4 x 12 = 48 inches

B. INCH TO FEET

60 inches = __5__ feet

(/12) 1 ft. = 12 inches (x12)
? ft. = 60 Inches
60 / 12 = 5 ft.

2. Converting Metric to Metric System of Measurement

C. CENTIMETER TO MILLIMETER

77 cm = 770 millimeters

(/10) 1 cm = 10 mm(x10)
77 cm = ? mm
77 x 10 = 770 mm

3. Converting English to Metric System of Measurement

D. INCH TO CENTIMETER

10 inches = 25.4 centimeter

(/2.54) 1 inch = 2.54 cm(x2.54)
10 inch = ? cm
10 x 2.54 = 25.4 mm

CALCULATING BOARD FEET OF A LUMBER

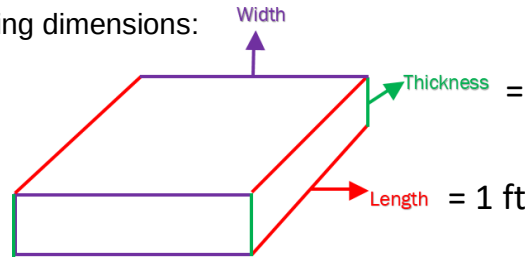
To calculate the board feet of a lumber, one must get first its faces' measurements using a linear measuring device. Once it is done, get the board feet by gathering data needed such as lumber's measurement of length, width and thickness and supply it on the formula provided below.

Formula: $\text{Board foot (Bd. Ft.)} = \frac{T \times W \times L}{12}$

T = Thickness in inches
W = width in inches
L= Length in feet

Here is an example of calculating board feet of a lumber following basic steps in problem solving.

A lumber has the following dimensions:



- **What is asked?**
  Board feet of a lumber
- **What is given?**
  T = 1 inch
  W = 4 inches L = 1 foot
- **Solution:**
  Bd. Ft. = $\frac{1 \times 4 \times 1}{12} = \frac{4}{12}$

  = 0.33 Bd.Ft

E What is more?

Learning Tasks 3.3: Measure and Transfer

Directions: Cut out quadrilateral shapes based on the given measurement for each item using colored papers and scissors. Then, correspondingly paste these shapes on the space provided beside each item.

Materials needed: Pencil, ruler, colored papers, scissors and glue.

Measurement	**Cut Out**
Length: 1 inches Width: 3 inches	Example: 
Length: 2 inches Width: 4 inches	
Length: 3 inches Width: 3 inches	
Length: 50 mm Width: 30 mm	
Length: 1 cm Width: 5 cm	
Length: 2 cm Width: 20 mm	

A What I have learned?

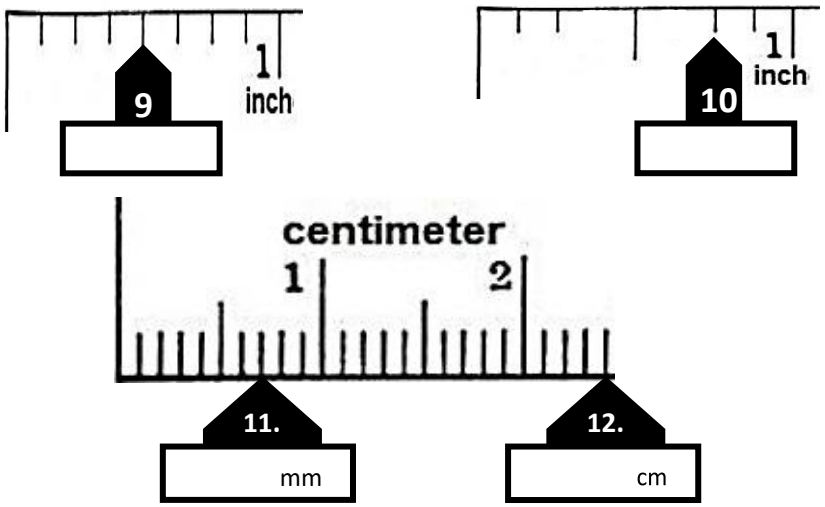
Learning Task 3.4: Measurement

I. Directions: Group the following units of measurement accordingly. (8 points)

Yard
Millimeter
Decimeter
Mile
Centimeter
Inch
Foot
Meter

English System	Metric System

II. Directions: Read the following measurements.



III. Convert the following fractions to decimal.

13. 7/25 _____
14. 60/5 _____
15. 7 ¾ _____
16. ½ _____
17. 7/7 _____
18. 8 ¼ _____

IV. Calculate boardfoot of lumbers having the following dimensions.

19. 2" X 6" X 12" _____
20. 3" X 4" X 10" _____

What I need to know?

Lesson 4
Interpret Drawings and Plans

Content Standard:
The learner demonstrates an understanding of the concepts in interpreting technical drawing signs and symbols in carpentry.

Performance Standard:
The learner independently reads and interprets simple technical drawing signs and symbols based on standard specifications.

LEARNING OUTCOMES:
At the end of this lesson, you are expected to do the following:

LO1. Analyze signs, symbols and data;
LO2. Interpret technical drawings and plans; and
LO3. Apply freehand sketching

WORD BANK
These are few words that you might encounter in this lesson.

Isometric Drawing – a drawing which resembles a perspective drawing
Orthographic Projection – an arrangement in a drawing of the three principal views of an object
Projection – the process of reproducing
Sketch - freehand drawing of an object
Axis - line about which a body turns or rotate
Perspective Drawing- the representation of an object on a plan surface, pertaining to materials, styles and finish presented as to have the same appearances as when seen from a particular viewpoint
Standard - serves as a measure of reference
Linear - straight

What I need to know?

Lesson 4 – Learning Outcome 1
Analyze Signs, Symbols and Data

In this section, you will learn about the importance of signs, symbols and data in interpreting workplan

✓ Based on your knowledge, differentiate Signs, Symbols and Data

_____

_____

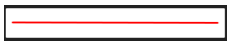
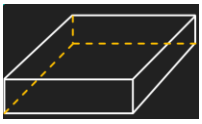
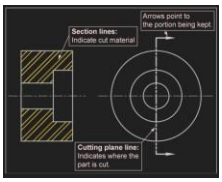
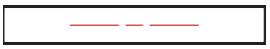
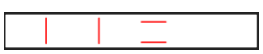
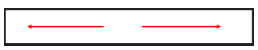
D What is it?

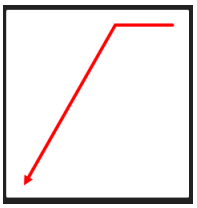
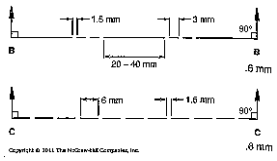
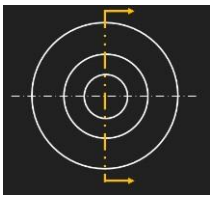
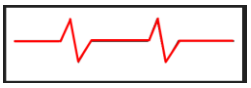
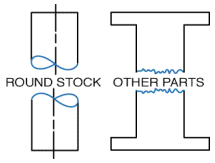
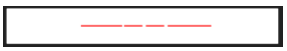
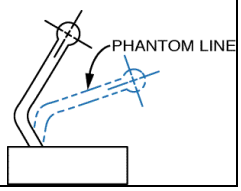
INTRODUCTION

Standardization plays a vital role in the uniformity of understanding things regardless of differences in language and race. In this section, Standard alphabet of lines that is widely used among countries will be discussed.

ALPHABET OF LINES

The alphabet of lines is created to standardize interpretation of technical drawing plans. Below are the different alphabet of lines used in technical drawings and interpretation of each line.

	TYPE	DESCRIPTION	ILLUSTRATION	APPLICATION
1	**VISIBLE LINE**	It is a thick line that represents the visible part of an object. It is also known as “object line”.		
2	**HIDDEN LINE**	It is a broken line of medium thickness composed of short dashes (2-3 mm) and space between dashes (1-2 mm).		
3	**SECTION LINE**	They are thick lines used to indicate the material used in the object.		
4	**CENTER LINE**	It is composed of alternating long and short dashes which shows the center of an object.		
5	**EXTENSION LINE**	It is a Line used to extend a point from an object for dimensioning.		
6	**DIMENSION LINE**	It is composed of two lines with an opposite arrowhead to show the extent of a dimension.		

7	**LEADER LINE**	It is a short inclined thin line with an arrowhead at the end and short horizontal line on the other end use to show dimensions of circular objects.		
8	**CUTTING PLANE LINE**	It has thick lines used to indicate an imaginary cut through an object along the line.		
9	**BREAK LINE**	It is a line which reduced the length and size of an object to conserve space.		
10	**PHANTOM LINE**	It is a thick line that is used to indicate that a part of an object is movable.		

E What is more?

Learning Task 4.1: Alphabet of Lines
Directions: On a long bond paper, copy the template below and draw an alphabet of line for each box. Label it accordingly.
Materials needed: long bondpaper, pencil and eraser.

NAME:			SCORE:	
GRADE & SECTION:			DATE:	

I What I need to know?

Lesson 4 – Learning Outcome 2

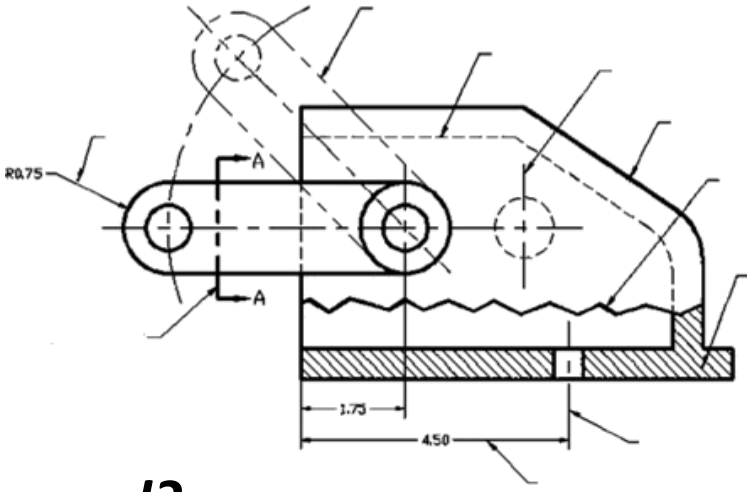
Analyze Signs, Symbols and Data

In this section, you will read and interpret a working plan based on what you have learned in the previous discussion.

Learning Task 4.2: Interpreting Technical Drawing

Directions: Identify different alphabet of lines present on the drawing below.

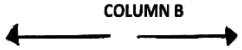
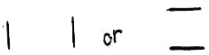
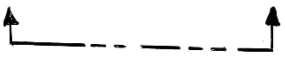
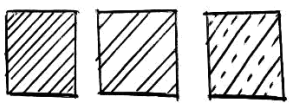
1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____



A What I have learned?

Learning Task 4.3: Matching Type

Directions: Match column A with column B according to its corresponding illustration. Use different colors of pen or crayons for each item.

COLUMN A	COLUMN B
1. VISIBILE LINE	a. 
2. HIDDEN LINE	b.
3. SECTION LINE	c.
4. CENTER LINE	d. 
5. EXTENSION LINE	e. 
6. DIMENSION LINE	f.
7. LEADER LINE	g.
8. CUTTING PLANE LINE	h. 
9. BREAK LINE	i. 
10. PHANTOM LINE	j. 

I What I need to know?

Lesson 4 – Learning Outcome 3
Apply Freehand Sketching

In this lesson, you will perform freehand sketching exercises, draw simple carpentry plans based on given tasks.

Based on your understanding, describe and differentiate freehand sketch and technical drawing.

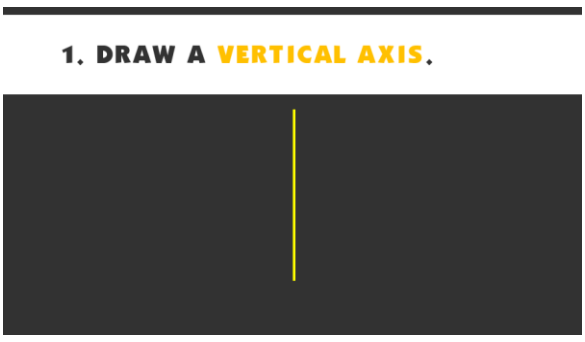
Freehand Sketch	Technical Drawing

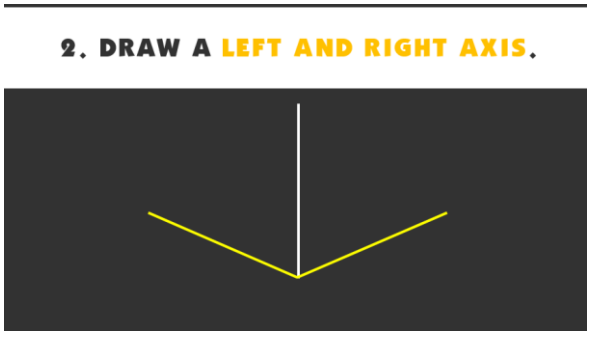
D What is it?

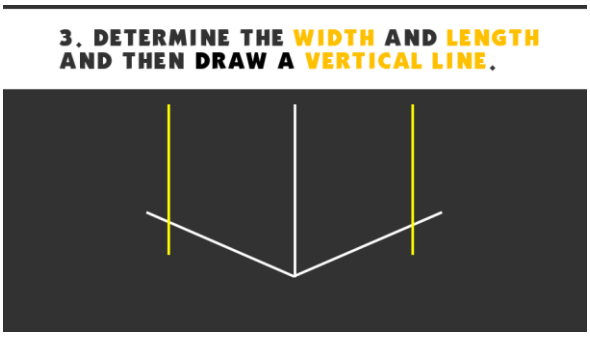
INTRODUCTION

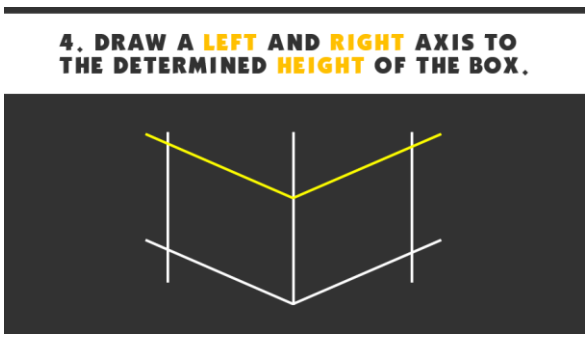
Freehand sketching is drawing an object without the aid of tools except from pencil or any type of material for sketching. To draw a freehand sketch, eye and brain must be coordinated. This could be quite challenging for some who do not have the talent in drawing freehand, but through perseverance, nothing is impossible. So let's get started.

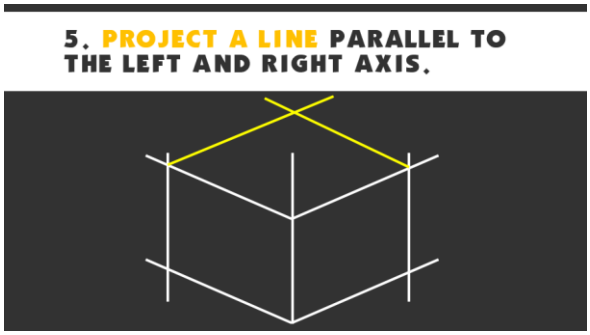
SKETCHING AN ISOMETRIC BOX PROCEDURE

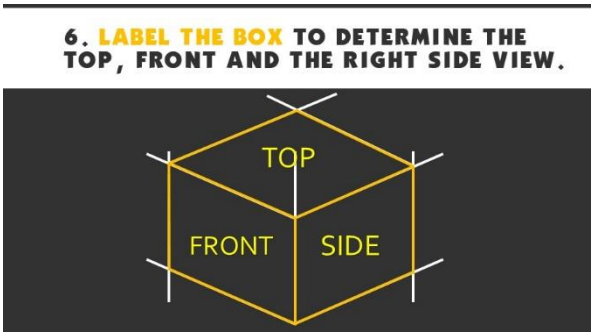




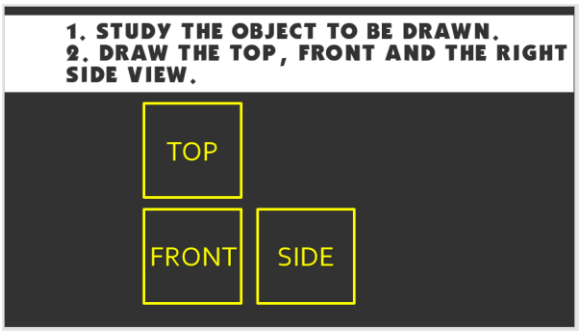


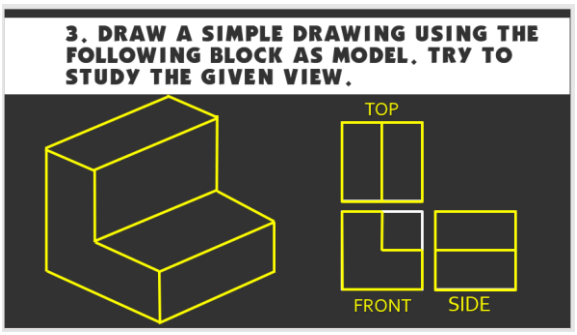






SKETCHING AN ORTHOGRAPHIC DRAWING PROCEDURE





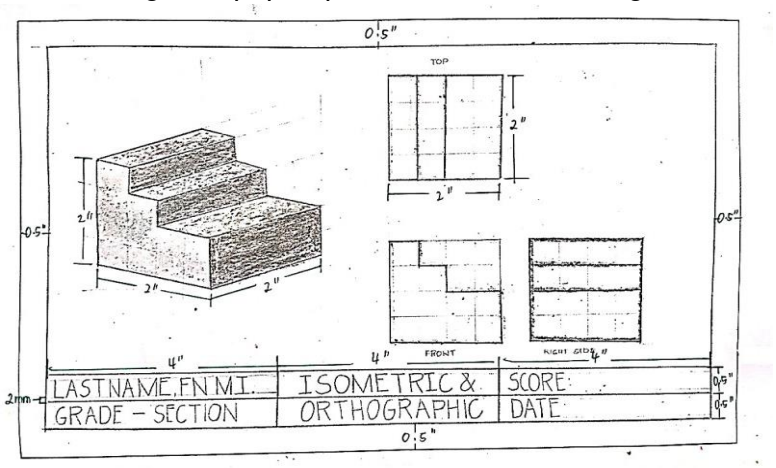
E What is more?

Learning Task 4.4: Freehand Sketching

Directions: On a long bond paper, draw your own isometric figure and its equivalent orthographic projection. Use 3 different colors to emphasize each view. Follow the given format below.

Materials needed: long bondpaper, pencil, ruler and coloring materials

Example:



What I need to know?

Lesson 5

Practice Occupational Health and Safety Procedures

Content Standard:
The learner demonstrates an understanding of the concepts of occupational health and safety procedures.

Performance Standard:
The learner independently prepares an occupational health and safety checklist being applied in carpentry.

LEARNING OUTCOMES:
At the end of this lesson, you are expected to do the following:

LO1. Identify Hazard and Risks

WORD BANK
These are few words that you might encounter in this lesson.

Accident - an event occurring unintentionally or by chance
Control - to direct or to determine
First Aid- all forms of remedies given immediately to humans to minimize or prevent casualties or fatalities caused by accidents or normal course of time
Hazard - involves unforeseen incident that is physically unfavorable to humans or animals
Risk – the chance of a person to be harmed if exposed to hazard.
Occupation – an activity in which one is engaged in
Safety – a state of being out of danger, uninjured, not involving risk
Toxic - deadly, harmful and poisonous

What I need to know?

Lesson 5 – Learning Outcome 1

Identify Hazards and Risks

In this lesson, you will list down the different health hazards and risks found in the workplace

Based on your prior knowledge, tell the difference between hazard and risks.

_____

_____

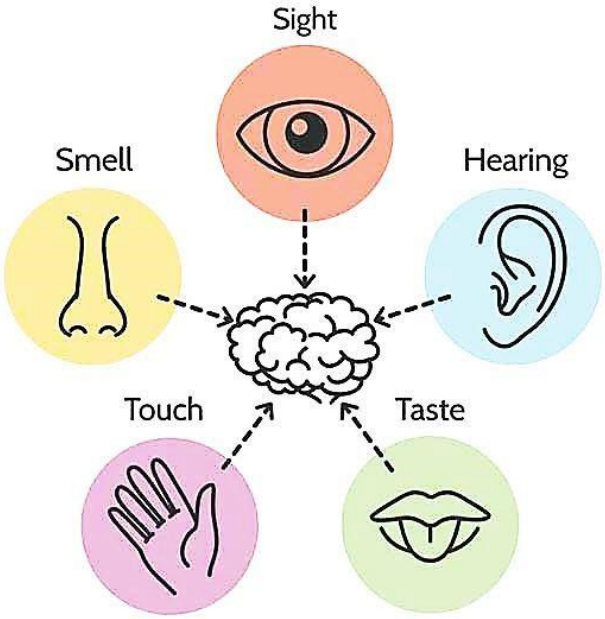
_____

D What is it?

INTRODUCTION

Hazard is the potential harm that might exist in the area. On the other hand, risk is a combination of potential hazard and the degree of its effects.

Identifying properly the potential hazards in the workplace is one of the most important steps in risk management. It is a must to identify potential harm to prevent it from happening in the future. Through hazard identification, risk will be reduced around the area.



IDENTIFYING HAZARDS AND RISKS

Identifying hazards and risks is just simply walking around the workplace using our five senses such as sense of sight, hearing, taste, touch and smell to identify potential cause of accident around the area.

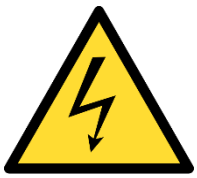
BASIC TYPES OF HAZARDS

Below are the basic types of hazards existing in a workplace

PHYSICAL HAZARD
is any form of danger that affects the physical body of a person.

MECHANICAL HAZARD
is harm brought by using specific equipment or machines.

CHEMICAL HAZARD
are danger caused by toxic and harmful substances that can be inhaled or absorbed by a person.



ELECTRIC SHOCK HAZARD
is any risks brought by electricity.

CONTROL HAZARDS AND RISKS

Identifying hazards and risks is useless if there is no action made after they have been identified. Evaluating such hazard and controlling it must come after to prevent it from occurring. Using accident prevention tags, signs and signals are some of the ways to address these hazards

ACCIDENT PREVENTION TAGS

Are label attached to specific tool, equipment or material that warns the user before using it. It is usually used to indicate defective tools and equipment.

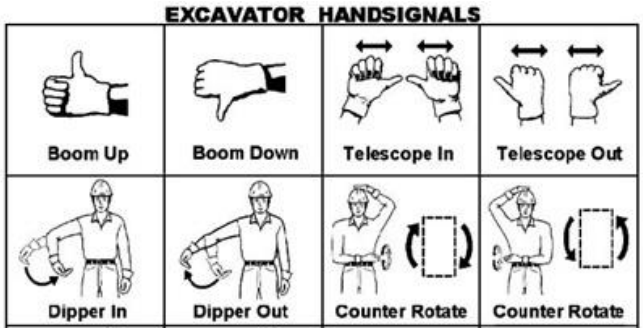
SIGNS

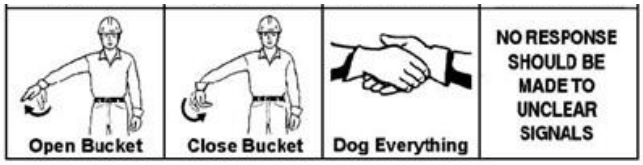
Indicate various hazards existing in the workplace usually in printed form and posted where specific hazard exists. There are several types of signs namely safety, danger, caution, exit, directional and traffic signs.

- **Safety Signs** usually indicate what to do to protect oneself from potential harm like wearing PPE signage.
- **Danger Signs** are posted if there are immediate hazard existing in the area and are removed when not existing already.
- **Caution Signs** are warnings about possible hazards brought by unsafe practices.
- **Exit Signs** are usually posted to indicate way to exit specific place in case of emergency.
- **Directional Signs** served as guide for workers in site for they tell specific direction on where to go.
- **Traffic Signs** are usually found in road. In road construction, they usually warn travelers to take precautionary measures as they approach in the area.

SIGNALS

These are gestures, actions or sounds used to convey safety instructions such as hand gestures and alarms.



	
	**BARRICADES** These are barriers that prevent unauthorized person from entering specific point of a place.

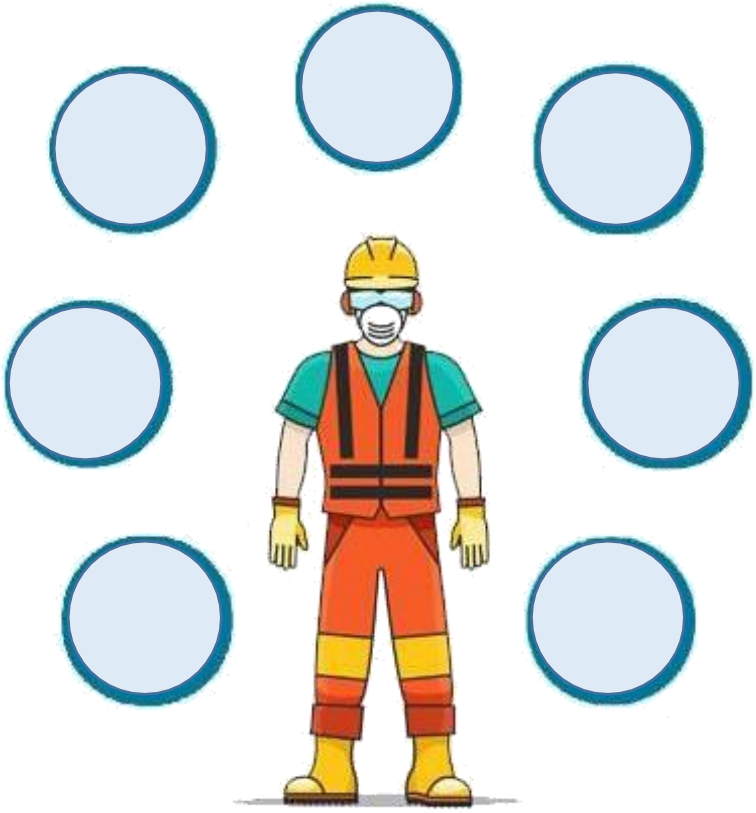
PERSONAL PROTECTIVE EQUIPMENT (PPE)

1		**FACE MASK** It is a flexible pad that protects mouth and nose against dusts or under harmful substances present on air of a working area. It is also known as respirator or dust mask.
2		**COVERALL SUIT** It is worn to protect clothes while working. It has pockets to hold small and frequently used tools.
3		**GLOVES** They can be either metal mesh, leather or canvass worn to protect hands from cuts, punctures, burns and abrasions.
4		**GOGGLES** It is a protective eyewear that is enclosed and protect area surrounding the eyes to prevent them from harmful particles from striking the eyes.
5		**EAR PROTECTOR** It is worn to amplify quiet sounds and protect ears from loud noise around the work area. It is also known as ear plugs.
6		**HARD HAT** It protects the head from falling objects and other hazards around the working area.

E What is more?

Learning Task 5.1: Personal Protective Equipment

Directions: Identify the different protective equipment worn by the construction worker below. Write your answer in the circles around the worker



E What else can I do?

Learning Task 5.2:Look around!

Directions: Now, try to look around your house, see if there was safety signage inside, take a picture and paste it on the box below. If there is none, create your own safety signage, post it on its corresponding place, take a picture and paste it below. Ask permission and guidance in posting your safety signage.

We are Safe at Home!

A What I have learned?

Learning Task 5.4: Identification
Directions: Identify what is being described in each item by using pool of words below

Physical Hazard	Barricades	Hazard
Chemical Hazards	Tags	Signs
Mechanical Hazards	Signals	
Electric Shock Hazards	Risks	

1. It pertains to potential hazard and degree of its effects.
2. It indicates various hazards existing in the workplace usually in printed form.
3. These are any risks brought by electricity.
4. Label attached to specific tool, equipment or material that warns the user before using it
5. These are gestures, actions or sounds used to convey safety instructions.
6. These are dangers caused by toxic and harmful substances that can be inhaled or absorbed by a person.
7. These are barriers that prevent unauthorized person from entering specific point of a place.
8. These are harm is brought by using specific equipment or machines.
9. It is any form of danger that affects the physical body of a person.
10. Pertains to potential harm that might exist in the workplace