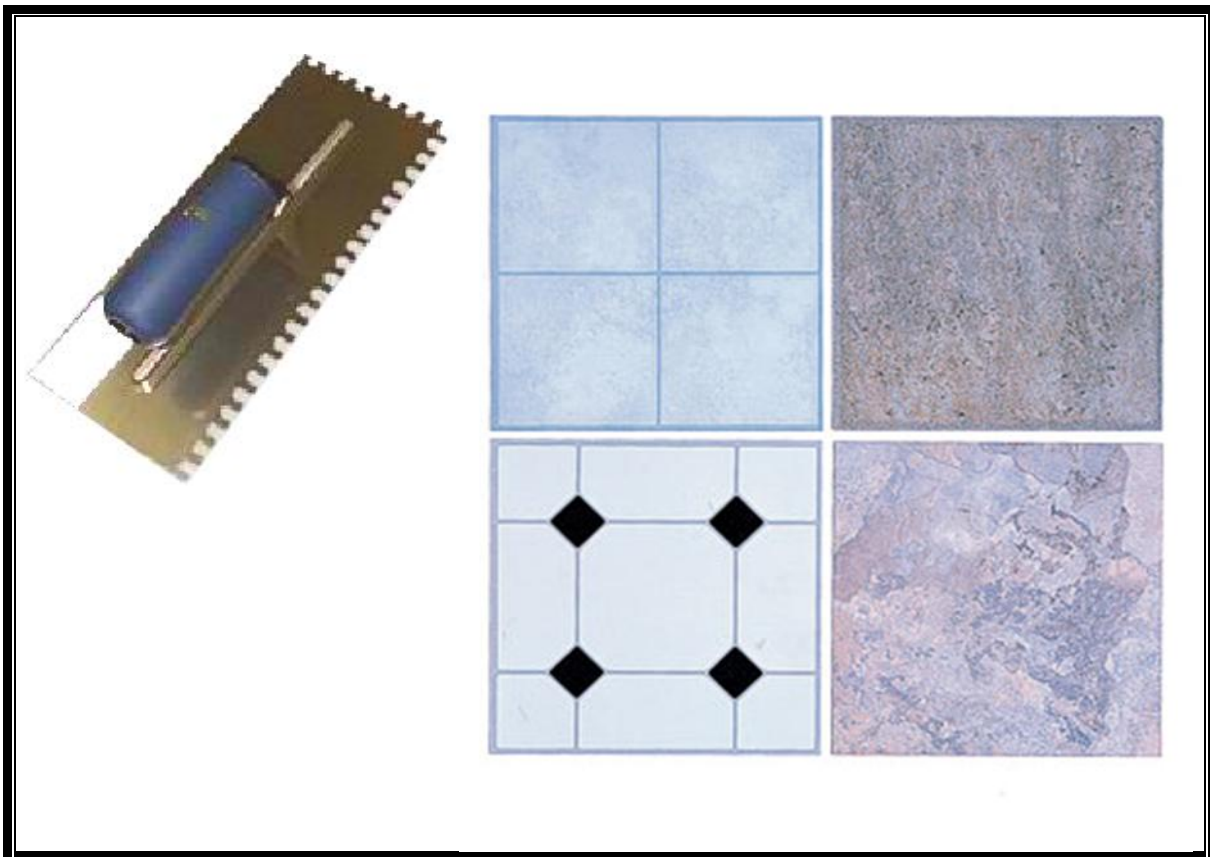




Republic of the Philippines
DEPARTMENT OF EDUCATION



K to 12 Basic Education Curriculum Technology and Livelihood Education Learning Module



TILE SETTING

EXPLORATORY COURSE
Grade 7 and Grade 8

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What Is This Module About?

Welcome to the course of **INDUSTRIAL ARTS - TILE SETTING!**

This Module is an exploratory and introductory course on **Industrial Arts – Tile Setting** which leads you to **Industrial Arts – Tile Setting** National Certificate Level II (NC II)¹. It covers **5** basic competencies in **Industrial Arts – Tile Setting** that a Grade 7/Grade 8 Technology and Livelihood Education (TLE) student like you ought to possess, namely:

- 1) Use of tools/equipment;
- 2) Mensuration and calculation;
- 3) Occupational healthy and safety procedures;
- 4) Maintain tools and equipment; and
- 5) Interpretation of plans and drawings.

These 5 basic competencies are covered separately in 5 Lessons . As shown below, each Lesson is directed to the attainment of one or two learning outcomes:

Lesson 1 – **PREPARE CONSTRUCTION MATERIALS AND TOOLS**

- LO 1 – Identify materials and tools applicable to a specific job
- LO 2 – Receive and Inspect materials

Lesson 2 – **PERFORM MENSURATION AND CALCULATIONS**

- LO 1 - Carry out measurements and calculations
- LO 2 – Select Measuring Instrument

Lesson 3 – **INTERPRET TECHNICAL DRAWINGS AND PLANS**

- LO1 – Read /Interpret blueprints and plans
- LO2 – Perform Freehand Sketching

Lesson 4 – **MAINTAIN TOOLS AND EQUIPMENT**

- LO 1- Check condition of tools and equipment
- LO 2- Perform basic preventive maintenance
- LO 3 – Store tools and equipment

Lesson 5 –**PRACTICE OCCUPATIONAL HEALTH AND SAFETY PROCEDURES**

- LO1 – Evaluate hazards and risks
- LO2 – Control hazards and risks
- LO3 – Maintain occupational health and safety awareness

Your success in this exploratory course on **Horticulture** is shown in your ability to perform the performance standards found in each learning outcome.

¹**NATIONAL CERTIFICATE (NC)** is a certification issued to individuals who achieved all the required units of competency for a national qualification as defined under the Training Regulations. NCs are aligned to specific levels within the PTQF. (**TESDA Board Resolution No. 2004-13, Training Regulations Framework**)

NATIONAL CERTIFICATE LEVEL refers to the four (4) qualification levels defined in the Philippine TVET Qualifications Framework (PTQF) Where the worker in:

- a. **NC I** performs a routine and predictable tasks; has little judgment; and, works under supervision;
- b. **NC II** performs prescribe range of functions involving known routines and procedures; has limited choice and complexity of functions, and has little accountability;



How Do You Use This Module?

This Module has 4 Lessons. Each Lesson has the following:

- Learning Outcomes
- Performance Standards
- Materials
- References
- Definition of Terms
- What Do You Already Know?
- What Do You Need to Know?
- How Much Have You Learned?
- How Do You Apply What You Learned?
- How Well Did You Perform?
- What is your Score?
- How Do You Extend Your Learning?

To get the most from this Module, you need to do the following:

1. Begin by reading and understanding the Learning Outcome/s and Performance Standards. These would tell you what you should know and be able to do at the end of this Module.
2. Find out what you already know by taking the Pretest then check your answers against the Answer Key. If you get 99 to 100% of the items correctly, you may proceed to the next Lesson. This means that you need not go through the Lesson because you already know what it is about. If you failed to get 99 to 100% correctly, go through the Lesson again and review especially those items which you failed to get.
3. Do the required Learning Activities. They begin with one or more Information Sheets. An Information Sheet contains important notes or basic information that you need to know.

After reading the Information Sheet, test yourself on how much you learned by means of the Self-check. Refer to the Answer Key for correction. Do not hesitate to go back to the Information Sheet when you do not get all test items correctly. This will ensure your mastery of basic information.

4. It is not enough that you acquire content or information. You must be able to demonstrate what you learned by doing what the Activity / Operation /Job Sheet directs you to do. In other words, you must be able to apply what you have learned in real life.

5. How well did you perform? Accomplish the Scoring Rubrics.

Each Lesson also provides you with references and definition of key terms for your guide. They can be of great help. Use them fully.



If you have questions, ask your teacher for assistance.

LESSON 1

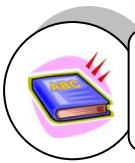
Prepare Construction Materials and Tools



LEARNING OUTCOMES:

At the end of this Lesson you are expected to do the following:

- LO 1.** identify materials and tools applicable to a specific job ; and
- LO 2.** receive and inspect materials.



Definition of Terms

Adhered. When used in reference to stone, the term describes the stone being secured and supported onto an approved backing by an approved bonding agent.

Adhesive. A substance that bonds two materials to one another, also called glue.

Alabaster. A type of gypsum that has a fine grain and is usually white. The term is often inaccurately applied to marble with a fine grain. Alabaster is easily cut and carved with a knife or saw.

Back-buttering. Applying a layer of adhesive, such as glue, to the back of a stone tile before installation in order to ensure the proper coverage of mortar. This process helps prevent future cracking of the tiles.

Backsplash. A section of wall typically located above a counter and below a cabinet, usually 16-18 inches in height, protected by stone or tile.

Brick Trowel. Used primarily on brick but is also popular in the 5" x 11" size by tile setters using it for terra cotta and quarry tile work

Buttering. The process of spreading a coating of bonding material, followed by a mortar or adhesive coat, to the back of a tile immediately before the tile is placed.

Caulking. Sealing a joint with an adhesive.

Caulk. A flexible substance which is spread into joints to create a barrier against air and water.

Cement. An adhesive that sets by the process of a chemical reaction

Cement Mortar. A mixture of cement, sand, and water which is used to bond tile to a base such as a floor or wall.

Crack. A split in the surface of a floor.

Dry Set Mortar. A mortar made of cement and applied in a thickness not greater than 3/16".

Epoxy Adhesive. An adhesive containing a hardener and epoxy resin that is used to adhere tiles to a surface beneath the tile.

Epoxy Grout. A type of grout containing a hardener and epoxy resin that is used to fill grout lines and to fill joints.

Epoxy Resin. A flexible resin, often used as an adhesive, that is usually made by the polymerization of an epoxide.

Floor Tile. A tile which is durable enough to be installed in flooring that is used daily.

Grout. Mortar used to fill grout lines and joints which is available in a number of colors.

Grouting. The process of filling grout lines or joints with grout.

Grouting Float. A trowel which is used to firmly push grout into joints.

Impervious Tile. Tile that is water resistant with an absorption rate of no more than 0.5%.

Latex-Portland Cement Grout. Portland cement grout which has a latex additive that results in a less permeable and less rigid grout when compared to regular Portland cement grout.

Mortar. A cement mixture that contains water, lime, and sand that is used to join masonry to another surface.

Mosaic. A pattern created with small pieces of a material, typically made of stone, tile, or glass.

Mosaic Tile. Small pieces of tiles which are laid together to form designs.

Mounted Tile. Tile that has been pre-mounted by paper, mesh, resin, or another material.

Natural Stone. Stone found in nature such as marble, granite, slate, limestone, sandstone, or travertine.

Notched Trowels. Trowels used to apply bonding materials to tile. The trowel may have square teeth or be serrated and comes in various sizes. The tooth size determines the depth of the mortar.

Pointing Trowel. The most extensively used trowel in the tile setting industry. It is used in every phase and comes in sizes ranging from 4" to 7". It is mainly used in placing mortar in small spaces, and marking floated surfaces. The end of the handle may be used to tap tiles into place that have shifted.

Quarry. It is where stone is extracted from the earth.

Quarry Block. A piece of stone, usually rectangular in shape, that comes from the quarry.

Sealer. A coat that is applied to the surface of a floor prior to the application of other coats in order to prevent subsequent coats from seeping into the flooring. It may also be applied at the end of the process as a protective measure.

Sealant. An elastic adhesive compound used to seal the joints of stone veneer.

Spacer. A small device used to evenly space tiles during installation. It may be shaped as a cross, T, or Y.

Substrate. The surface upon which stone tile is placed.

Texture. The quality of the stone surface independent of color.

Tile. A thin stone unit of uniform size usually less than 3/4" thick. A tile is a manufactured piece of hard-wearing material such as ceramic, stone, metal, or even glass.

LEARNING OUTCOME 1

Identify materials and tools applicable to a specific job

PERFORMANCE STANDARDS

- Tools and materials are identified as per job requirements.
- Tools are classified according to its function per job requirements.
- Materials are classified according to their uses to a specific construction project.
- Tools and materials are selected as per job requirement.



Materials

- Ceramic tile
- Glass tiles
- Clay tiles
- Vinyl tiles
- Granite stone
- Quarry tiles
- Protective membranes
- Common float/grout float
- Finishing trowel
- Pointed trowel
- Plumb bob
- Plumb and level
- Tile cutters
- Utility knife
- Beating block
- Pail or bucket and sponge
- Knee pads
- Plumb and level



What Do You Already Know?

Let us determine how much you already know about identifying tile setting materials and tools. Take this test.

Pretest LO 1

Multiple Choice:

Directions: Select the correct answer. Write the letter of your answers in your activity notebook.

- 1.) A thin stone unit of uniform size usually less than 3/4" thick. It is a manufactured piece of hard-wearing material such as ceramic , stone , metal, or even glass.
- A) Backsplash
 - B) Epoxy resin
 - C) Quarry
 - D) Tile
- 2.) The tool which is most extensively used in the tile setting industry. It is used in every phase and comes in sizes ranging from 4" to 7".
- A) Bull float
 - B) Common float
 - C) Margin float
 - D) Pointing trowel
- 3.) A flexible substance which is spread into joints to create a barrier against air and water.
- A) Caulk
 - B) Cement
 - C) Grout
 - D) Mortar
- 4.) It is a split on the surface of a floor.
- A) Cement mortar
 - B) Crack
 - C) Floor sign
 - D) Mosaic
- 5.) Mortar used to fill grout lines and joints which is available in a number of colors.
- A) Cement Plaster
 - B) Dry Set mortar
 - C) Epoxy grout
 - D) Grout
- 6.) Small pieces of tile which are laid together to form designs.
- A) Clay tiles
 - B) Mosaic tile
 - C) Natural stone
 - D) Quarry block
- 7.) Ceramic tile with smooth, shiny surface.
- A) Unglazed tile
 - B) Glazed tile
 - C) Natural stone
 - D) Quarry block
- 8.) Glass tiles that are usually pre-mounted on mesh backing. These tiles are about 3/4" squares but other sizes are also available.
- A) Granite tile
 - B) Mounted glass tile
 - C) Unmounted glass tile
 - D) Mosaic
- 9.) Looks like a common float but made of flat steel.
- A) Buttering trowel
 - B) Finishing trowel
 - C) Margin trowel
 - D) Pointing trowel
- 10.) Waterproofs, insulates, and seals cracks, crevices and body seams.
- A) Cement mortar
 - B) Grout
 - C) Mosaic
 - D) Seam sealer



What Do You Need To Know?

Read the Information Sheet 1.1 very well then find out how much you can remember and how much you learned by doing Self-check 1.1.

Information Sheet 1.1

Introduction

It is a good idea to learn the different materials and tools in tile setting before going further on the topic. This information would lead you to a more interesting and challenging activities which will enhance your interest and nurture your capabilities.

Materials in Tile Setting

1. Ceramic Tile

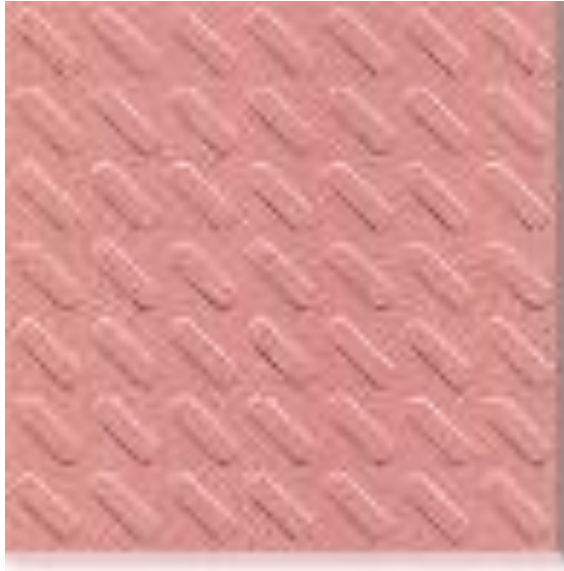
Ceramic tile is a less expensive material used in tile setting. While not all ceramic tiles are cheap, it is possible to find bargain ceramic tiles which can be used to add beauty to your home.

Kinds of ceramic tile:

1.1. Glazed Tiles- with smooth shiny surface



1.2. Unglazed Tiles-usually not shiny and with porous surface



2. Vinyl Tile

Vinyl tile is a flooring material that is generally inexpensive, easy to install, and easy to maintain. It is made from polyvinyl chloride resins and plasticizers. These flooring tiles are waterproof and very durable.



3. Quarry Tile

The tile that comes from quarries. Quarry tile has a rough surface, so that it is perfect for flooring because it provides a good grip. But the quarry tile is not good for kitchen countertops because it is very porous.



4. Granite Stone

Granite tile is popular in the kitchen design tiling. It is attractive but unlike quarry tile it is porous, so it must be sealed and polished on a regular basis



5. Thin-Set Tile Mortar

Thin-set tile mortar is suitable for floors and outdoor tiles. A thin layer of adhesive is spread onto a surface where tile is laid.



6. Organic Mastic: It is a form of adhesive used for wall tiles that enables it to stick immediately in place.



7. Brick Mortar

Brick mortar is coarser than thin-set. It has larger gauge sand and even small pebbles, ideal for mortaring brick walls and walkways.



8. Epoxy Thin Set Mortar

A resin-based mortar that comes in three separate components: resin, hardener, and powder. It sets quickly and very strongly. Various brands are available in the market.



9. Caulk

It includes silicone, polyurethane, polysulfide and acrylic sealant. It is mostly done with ready-mixed construction chemicals and is called caulk.



10. Protective Membranes

Ceramic tile membranes are used to provide protection for ceramic tile installations from external stresses.

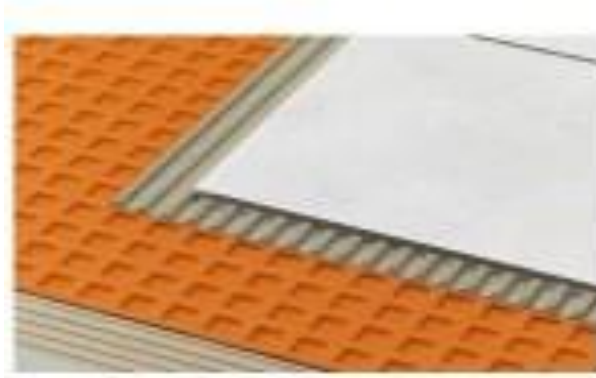
10.1. Crack Isolation Membrane



Used wherever hairline cracking in underneath structure occurs. It isolates ceramic tile and stone installations from damages of horizontal movements.

10.2. Anti-Fracture Membrane

Used to minimize the transfer of minor crack caused by the movement of infrastructure. It can be used to cover an entire floor or over individual cracks that is 1/8" in width or less.



10.3. Waterproofing Membrane

This is used to waterproof ceramic tile substrates in wet areas while providing a suitable surface to adhere tile to.



10.4. Uncoupling Membrane

It separates a ceramic tile or stone floor from the inner structure and minimizes the transfer of thermal movement, shrinkage of cement , subfloor deflection, minor crack transfer caused by underneath movement to the tile flooring .

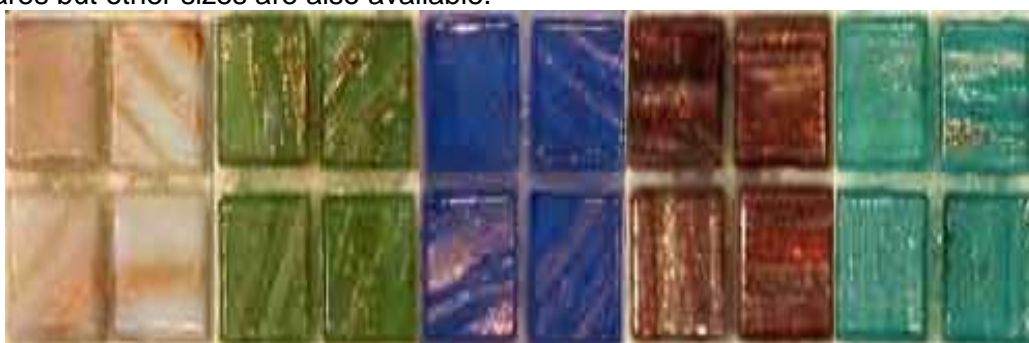


11. Glass Tile

There are two varieties of glass tile, both of which differ when it comes to time to install: mounted and unmounted glass tiles.

11.1. Mounted Glass Tile

Glass tiles that are usually pre-mounted on mesh backing . These tiles are about 3/4" squares but other sizes are also available.



11.2. Unmounted Glass Tile

Tiles that are stained glass, usually without mesh backing. This type of tile takes a long time to install.



Tools Used in Tile Setting

1. Common Float

A wooden float used in spreading and leveling fresh concrete.



2. Grout float.

This is a rubber-backed, rectangular trowel for spreading the grout. It resembles the common float.



3. Finishing Trowel

It looks like a common float but made of flat steel.



4. Pointed Trowel

The most extensively used trowel in the tile setting industry. Mainly used in straightening tiles, filling, ,placing mortar in small spaces. The end of the handle may be used to tap tiles into place that have shifted.



5. Notched and Margin Trowels

Notched tools are used in spreading concrete and at the same time create wavy surface to enable the underneath part of tile to easily stick on the concrete.



6. Tile Spacer

Spacers are used to keep each tile an equal distance apart during tile installation. Spacers make it possible to keep straight grout lines and square tiles together as the adhesive dries.



7. Plumb and level

Used to check the vertical as well as horizontal alignment of structures to be tiled.



8. Plumb bob

It is very accurate in testing the vertical alignment of walls and posts.



9. Spacer Puller

Remove spacers after tiles have been placed but before they fully adhere.



10. Mallet

A mallet is a kind of hammer, usually of rubber, or sometimes wood with a large head used to drive beating block.



11. Caulking gun

Purposely intended for applying caulk.



12. Tile Cutters and Nippers

Tools which are very useful in cutting ceramic tiles.



13. Wet tile saw.

Used to cut tiles quickly. It has a glass cutting blade and equipped with a water dispensing mechanism that serves as a cooler.



Equipment in Tile Setting

1. Utility knife

Utility knives are multi-purpose cutting tools used in various trades and crafts. These tools are needed to mark cut lines, trim plastic or wood materials, or to cut tape, cord, cardboard, or other materials



2. Beating block

Used to set the tile in place which is driven by a rubber mallet. The idea here is not to hammer the tile but just to firmly seat the tile into the setting bed.



3.. Tile Edge Smoothing Stone

Used specifically to smoothen the rough edges of tiles especially after it is cut.



4. Seam sealer

Seam Sealer seals cracks, crevices and body seams, plus waterproofs and insulates.



5. Water bucket with sponge.

Used to clean left out dirt or excesses during tiling process.



6. Haze Remover

This haze paste removes stains left on tiles after tiles were installed.



7. Knee pads

Used to protect knees in the tiling process.



How Much Have You Learned?

Self-Check 1.1

Multiple Choice:

Directions: Choose the letter that corresponds to the correct answer. Write the letters of your answers in your activity notebook.

- It is a less expensive material used in tile setting.
A) Ceramic tile
B) Clay tile
C) Glass tile
D) Quarry tile
- A wooden float mainly used for spreading and leveling fresh concrete.
A) Pointed trowel
B) Margin trowel
C) Common trowel
D) Finishing trowel
- Glass tile that is pre-mounted on mesh backing.
A) Unmounted glass tile
B) Mounted glass tile
C) Quarry tile
D) Ceramic tile

4. Used to minimize the transfer of minor crack caused by the movement of inner structure.

- A) Waterproof membrane
- B) Anti-fracture membrane
- C) Uncoupling membrane
- D) Crack isolation membrane

5. This is a rubber-backed, rectangular trowel for spreading the grout.

- A) Pointed trowel
- B) Grout trowel
- C) Finishing trowel
- D) Margin trowel



How Do You Apply What You Have Learned?

Show that you learned something by doing this activity

Activity Sheet 1.1

Group the items listed below whether they are Tools, Materials or Equipment. Write your answers in your activity notebook.

Water bucket with sponge

Haze Remover

Finishing Trowel

Glass Tile

Glazed Tiles

Notched and Margin Trowels

Seam sealer

Anti-Fracture Membrane

Grout float.

Granite Stone

Refer to the Answer Key. What is your score?

LEARNING OUTCOME 2

Receive and inspect materials

PERFORMANCE STANDARDS

- Needed materials and tools are listed per job requirement.
- Materials and tools are requested according to the prepared list.
- Requests are done per company's standard operating procedures (SOP).
- Materials and tools are provided and unavailable ones substituted without sacrificing cost and quality of work



What Do You Already Know?

Let us determine how much you already know about receiving and inspecting materials. Take this test.

Pretest LO 2

I. Choose the letter of the best answer. Write the answer on your answer sheet.

1. Which contains information about certain services required for performance?
A. borrower's slip
B. job order
C. requisition slip
D. borrower and job slips
2. Which specifies a demand for materials, supplies, or tools?
A. borrower's slip
B. job order
C. requisition slip
D. borrower and job slips
3. It contains an accepted form of request for tools, materials, and equipment on due time?
A. borrower's slip
B. job order
C. requisition slip
D. borrower and job slips
4. Normally, how many signatories are there in the Requisition Slip?
A. 1
B. 2
C. 3
D. 4
5. What happens when any of the slips lack the necessary data?
A. There is delay in processing.
B. Promptness of approval is at stake
C. Misunderstanding occurs
D. all of the above

II. Explain the purpose and importance of the following documents.

1. Requisition Slip
2. Borrower's Slip




What Do You Need To Know?

Read the Information Sheet 2.1 very well then find out how much you can remember and how much you learned by doing Self-check 2.1.

Information Sheet 2.1

JOB ORDER AND REQUISITION SLIPS

Requisition is made through a required form known as requisition slip or in the form of a letter, if the previous is not available. Most government offices use uniform requisition slip, while others have their own. In school shops, teachers are creative enough to devise their own form to suit their local need. Such practice of using requisition slip promotes proper monitoring of supplies, materials, tools, and performance and accomplishment of required service or services among others. Here are some examples of requisition forms according to their purpose.



Textbook Requisition Form

Institution: _____ Date Requested: _____ Year: _____ Requested By: _____ (Name, Title, Department, Address)
 Continuation? Yes No
 Department: _____ Course: _____ Section: _____
 Instructor Name: _____ Instructor Phone: _____
 Instructor Email: _____ Department Phone: _____

Author	Title	ISBN	Quantity	Unit Price	Total Price	Required?
						Yes Title or No
						Yes Title or No
						Yes Title or No
						Yes Title or No
						Yes Title or No

Comments?

This Request Form is issued by SRJC Bookstore. You may contact your instructor, name it, and attach this form back to the bottom of www.srjc.edu/bookstore or call 707-524-1527. For Performance classes, call 707-524-1527. You may order your requisition, name it, and attach this form back to the bottom of www.srjc.edu/bookstore or call 707-524-1527. Thank you for submitting your requisition on behalf of SRJC. Your requisition will allow us to accept, issue, and track for our incoming shipment.

Hotel-XYZ				
Serial No:			Date:	
S/no	Items/ particulars	Quantity Ordered	Quantity Received	Remarks
1	Soaps	50 no's	50 no's	
2	Shampoos	100 no's	80 no's	20 no's are balance
Requested By: _____ Signature of Head of the Department: _____ Signature of Stores Manager: _____ Received By: _____ Date: _____, Time: _____				

Borrower's Slip

This form is used for borrowing materials, tools, equipment. Its use promotes proper monitoring of inventories. It has numerous purposes and outweighs disadvantages. This

form is devised according to the need of the office or accountable officer. Adopting this system necessitates observing certain rules and penalties for violators.

PAMECO			
Contractor * Manufacturer * Design * International Trading			
OR Address: Highway 4000, 9001 100th, Costa Rica, P.O. Box 24-1320 245 1320 Telefax: 245-1321 Email: info@pameco.com			

BORROWER'S SLIP

Name of Borrower: _____ Date: _____

Description	Qty	Remarks

Signature of Borrower

Date returned: _____

Noted by:

Warehouse In-Charge

Requisition Procedure

In as much as some offices or school shops do not use the electronic method, requisition is made on a prepared slip available for use. Properly completed Requisition Form is an important step in efficiently securing your order; otherwise expect delays in the processing and approval of your requisition. The requisitioning process is done by an authorized person.

1. Accomplish the slip with the required data.
2. Have it approved or signed by your supply officer or immediate supervisor.
3. Forward the slip to the section unit officer in charge of purchases, procurement, or preparation and release of requisitioned items.



How Much Have You Learned?

Self-Check 2.1

Direction: This part checks whether you have learned the required competencies for this particular module. Encircle the best answer from the choices given.

1. Which contains information about certain services required for performance?
A. borrower's slip
B. job order slip
C. requisition slip
D. borrower and job slips
2. Which specifies a demand for materials, supplies, or tools?
A. borrower's slip
B. job order
C. requisition slip
D. borrower and job slips
3. It contains an accepted form of request for tools, materials, and equipment on due time carries a provision for default.
A. borrower's slip
B. job order
C. requisition slip
D. borrower and job slips
4. Normally, how many signatories at a very least are there in the Requisition Slip?
A. 1
B. 2
C. 3
D. 4
5. Which happens when any of the slips lack necessary data?
A. There is delay in processing.
B. Promptness of approval is at stake
C. Misunderstanding occurs
D. all of the above

Refer to the Answer Key. What is your score?



How Do You Apply What You Have Learned?

Show that you learned something by doing this activity.

Activity Sheet 2.1

Directions: With your understanding and skills on job order, requisition, and borrower's slips, Be able to accomplish different forms:

- A. Requisition form

- B. Job order
- C. Receiving form
- D. Borrowers slip
- E. Inspection form



How Do You Extend Your Learning?

Assignment Sheet 2.1

Directions: With the information and form samples on hand from the different offices and factories you visited, make your own job order, requisition, and borrower's slips based on your need. Be sure that your slip conforms with certain standards such as:

1. Contains needed data.
2. Easy to understand.
3. Easy to use.
4. Complete in itself and in form.

Submit the three different outputs with brief justification each to your teacher.

REFERENCES

TILE Setting, Construction Sector. CBC, TR. TESDA

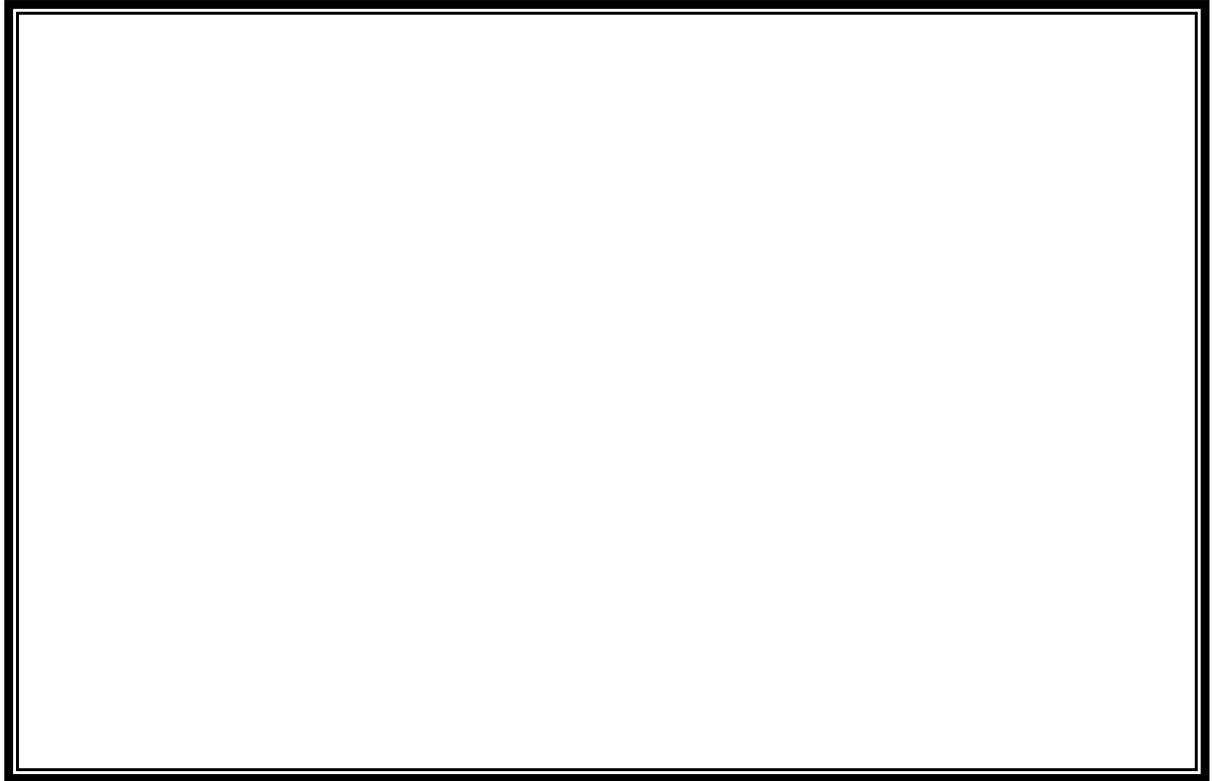
Groneman, Chris. General Woodworking. Copyright 1977



Congratulations! You did a great job! Rest and relax a while then move on to the next lesson. Good luck!

LESSON 2

Perform Mensuration and Calculations



LEARNING OUTCOMES:

At the end of this Lesson you are expected to do the following:

- LO 1. carry out measurements and calculations; and**
- LO 2. select measuring instrument.**



Definition of Terms

Basic unit. It is the smallest or simplest item or unit.

Calculation. Measurement or estimation

English measures. Measures which originated from England; customary measures of England and the United States of America

Linear. Pertains to line distances

Measurement. Size, dimension

Metric system. It is also called metrication; refers to the introduction and use of the SI metric system, the international standard for physical measurements.

Weight. The amount or quantity of heaviness or mass.

Volume. The amount of space, measured in cubic units, that an [object](#) or substance occupies.

LEARNING OUTCOME 1

Carry out measurements and calculations

PERFORMANCE STANDARDS

- Calculation needed to complete work tasks are performed using the four basic processes of addition (+), subtraction(-), multiplication (x) and division (/) including but not limited to:
Trigonometric functions and Algebraic computations.
- Calculations involving fractions, percentages, and mixed numbers are used to complete workplace tasks.
- Numerical computations are self-checked and corrected for accuracy.
- Accurate measurements are obtained according to job requirements.
- Systems of measurements are identified and converted according to job requirements
- Work pieces are measured according to job requirements.



Materials

- Foot rule/ruler
- Pull-push rule
- Different sizes of tiles
- Try square
- Steel square
- Triangles 30°x60° and 45°x45°
- T-square
- Meter stick
- Cloth tape
- Foot rule/ruler



What Do You Already Know?

Let us determine how much you already know about carrying out measurements and calculations. Take this test.

Pretest LO 1

- 1) It is the basic unit used in the English system of linear measures.
A) Inch
B) Foot
C) Yard
D) Mile
- 2) The units below are in English system except _____.
A) Foot
B) Inch
C) Meter
D) Mile
- 3) The basic unit in the Metric system of linear measures.
A) Centimeter
B) Decimeter
C) Hectometer
D) Meter
- 4) One thousand (1000) grams is equivalent to _____.
A) One (1) milligram
B) One (1) kilogram
C) One (1) hectogram
D) One (1) metric ton
- 5) The estimated value of one (1) inch in metric system.
A) 2.5 cm
B) 5.0 cm
C) 10.0 cm
D) 5.0 cm
- 6) Which measuring tool is commonly used because it is very handy?
A) Foot rule
B) Pull-push rule
C) Try square
D) Steel square
- 7) Used mainly for overhead measuring
A) Tape rule
B) Steel square
C) Zigzag rule
D) Foot rule
- 8) Which is the measurement of line distance?
A) Meter stick
B) Linear measure
C) Volume measure
D) Weight measure
- 9) Three feet is the same in length with _____.
A) One (1) yard
B) One (1) meter
C) One (1) kilometer
D) One (1) Mile
- 10) Which is equivalent to one (1) meter?
A) 100 centimeters
B) 100 millimeters
C) 100 decameters
D) 100 hectometers



What Do You Need To Know?

Read the Information Sheet 1.1 very well then find out how much you can remember and how much you learned by doing Self-check 1.1.

Information Sheet 1.1

Introduction

In the school, there are many learning experiences that happen everyday. Of these, it is in TLE subject where you acquire information which are applicable in actual life situations. Surely, the next topics have been part of your knowledge for sometime. It involves using measuring tools and doing some actual measuring of objects at grasp. This would lead you to a more interesting experience about measurements.

Linear measure is the measurement of line distance. It is important to know how to convert linear measures from English to Metric system and vice-versa in order to familiarize yourself with the two systems of measurements.

Kinds of measurements

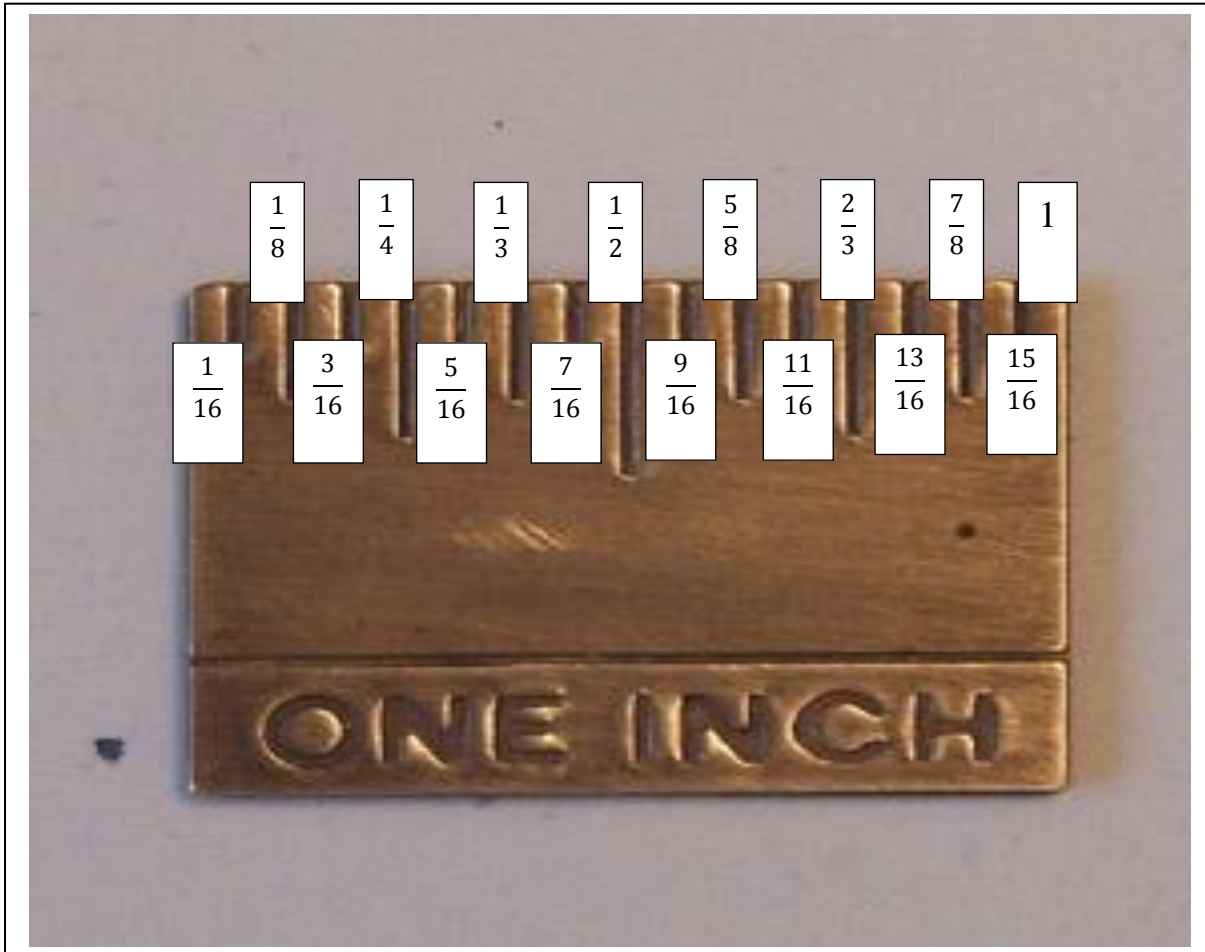
- A. English System
- B. Metric System

A. Units used in the English system of linear measurements:

The foot is the basic unit of measure. The inch is a subdivision of the foot, while the yard and the mile are multiples of the foot.



1. Inch – is the smallest unit of measure in the English system of linear measures. It is divided into 16 16ths, 8 8ths, 4 4ths, and 2 halves.



2. Foot – is the basic unit in the linear measures of the English system. It is equivalent to 12 inches long.

ENGLISH SYSTEM LINEAR MEASUREMENTS

12 inches = 1 foot

3 feet = 1 yard

5280 feet = 1 mile

1760 = 1 mile

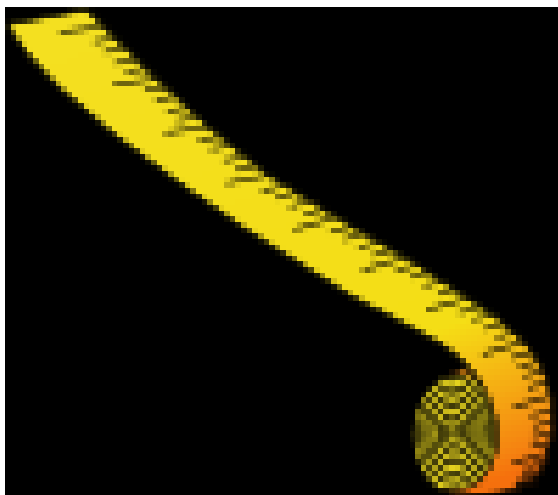
B. Metric system

Metric system is based on the decimal system. The meter is the basic unit of measurement. Units used in the metric system includes; millimeter (mm), centimeter (cm), decimeter (dc), meter (m), decameter (dm), hectometer (hm), kilometer (km).

Shown below are some tools than can be used using metric system.



Tape rule



Cloth tape



Promotionalpromo.com

Calibrated ruler



Meter stick

METRIC SYSTEM LINEAR MEASUREMENTS

10 millimeters (mm) = 1 centimeter (cm)

10 centimeters (cm) = 1 decimeter (dm)

10 decimeters (dc) = 1 meter (m)

10 meters (m) = 1 decameter (dec)

10 decameters = 1 hectometer (hm)

10 hectometers = 1 kilometer (km)

1000 meters (m) = 1 kilometer (km)

100 centimeters = 1 meter (m)

1000 millimeters = 1 meter (m)

Sizes of Ceramic Tiles

Mosaic tile may either be glass or ceramic. Tile sizes are from 5/8 inch (15mm), 7/8 inch, 1 inch square, 1 x 2 in., 2 x 2 in., 2 x 4 in., 2.25 to 5 in., 2 x 8, 3 x 6, 4 x 8, and 4 x 12 inches in a variety of glass, glazed ceramic and glazed porcelain. Other sizes are; 4 1/4 x 4 1/4 inches, 6" x 6", 6" x 8", 8" x 8", 6" x 12", 8" x 12", 12" x 12", 13" x 13", 16" x 16", 17" x 17", 18" x 18", 16" x 24". Other sizes not included here are also in the market.

Weight

10 milligrams (mg) =	1 centigram (cg)	
10 centigrams =	1 decigram (dg)	= 100 milligrams
10 decigrams =	1 gram (g)	= 1,000 milligrams
10 grams =	1 dekagram (dag)	
10 dekagrams =	1 hectogram (hg)	= 100 grams
10 hectograms =	1 kilogram (kg)	= 1,000 grams
1,000 kilograms =	1 metric ton (t)	

Volume/Cubic Measure

1,000 cubic millimeters (mm ³) =	1 cu centimeter (cm ³)
1,000 cubic centimeters =	1 cu decimeter (dm ³)
	= 1,000,000 cu millimeters
1,000 cubic decimeters =	1 cu meter (m ³)
	= 1 stere
	= 1,000,000 cu centimeters
	= 1,000,000,000 cu millimeters

Conversion from English to Metric System

Approximate values

1 in = 2.54 cm = .025 m

2 in = 5.0 cm = .050 m

3 in = 7.5 cm = .075 m

4 in = 10.0 cm = .100 m

5 in = 12.5 cm = .125 m

6 in = 15.0 cm = .150 m

7 in = 17.5 cm = .175 m

8 in = 20.0 cm = .200 m

9 in = 22.5 cm = .225 m

10 in = 25.0 cm = .250 m

15 in = 37.5 cm = .375 m

20 in = 50.0 cm = .500 m

25 in = 62.5 cm = .625 m

30 in = 75.0 cm = .750 m

35 in = 87.5 cm = .875 m

40 in = 100.0 cm = 1.000 m



How Much Have You Learned?

Self-Check 1.1

At this point, perform the self-check below in order to know how much you learned.

Matching Type:

Directions: Match column A with column B. Write your answers in your activity notebook.

- | | |
|---------------------------------|---------------|
| 1. Equivalent to 1000 grams | a. Foot |
| 2. Basic unit in English system | b. Meter |
| 3. Same as 2.5 cm | c. 1 yard |
| 4. Equals 3 feet | d. 1 kilogram |
| 5. Basic unit in Metric system | e. 1 inch |

Refer to the Answer Key. What is your score?

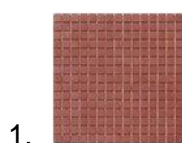


How Do You Apply What You Have Learned?

Show that you learned something by doing this activity

Activity Sheet 1.1

You are now going to measure different pieces of ceramic tiles of different sizes. There are different measuring tools available. Please be reminded that you are going to measure the width and length only and give the measurements in both English and Metric systems.



4.



5.



Activity Sheet 1.2

Class Activity

Display all sizes of tiles in front of the class. One of the students play the role of tile dealer. The rest act as customers. Allow students to order their tiles identifying size specifications. The tile dealer should respond to orders by presenting the correct tile. Students take turn to act as tile dealer until everyone has mastered the size of tiles.

LEARNING OUTCOME 2

Select measuring instrument/ tools

PERFORMANCE STANDARDS

- Objects or components to be measured are identified, classified, and interpreted according to the appropriate regular geometric shapes.
- Measuring tools are selected/identified per object to be measured or according to job requirements
- Correct specifications are obtained from relevant sources.
- Measuring instruments are selected according to job requirements.
- Alternative measuring tools are used without sacrificing cost and quality of work.
- Measurements are obtained according to job requirements.



Materials

- Foot Rule
- Pull-push rule
- Zigzag rule
- Try square
- Steel square
- Triangles
- T-square



What Do You Already Know?

Let us determine how much you already know about selecting measuring instruments/ tools. Take this test.

Pretest LO 2

WHAT DO YOU ALREADY KNOW?

The pre-test below is intended to measure how much you know about the following topics.

Matching Type: Directions: Match the items of column A with column B. Write your answers in your activity notebook.

- | A | B |
|--|-------------------|
| 1.) Mainly used for overhead measuring. | a. Pull-push rule |
| 2.) It is 12 inches long | b. Steel square |
| 3.) Commonly used measuring tool because it is very handy | c. Try square |
| 4.) Used to check the squareness of layouts for tiling | d. Zigzag rule |
| 5.) For measuring short dimensions and testing squareness of tiles | e. Foot rule |



What Do You Need To Know?

Read the Information Sheet 2.1 very well then find out how much you can remember and how much you learned by doing Self-check 2.1.

Information Sheet 2.1

Introduction

It's very interesting to learn many things that are meaningful. This information sheet will give you more knowledge that will build your self-confidence. This upcoming information will also help you develop desirable habits.

Information Sheet 2.2.1

Measuring Tools

1. Foot rule – is equivalent to 12 inches. It is known as the basic unit of measure in linear measures. Steel rule can also be used, only that it is made of steel.



2. Pull-push rule – is the most commonly used measuring tool in many construction work. It very handy and convenient to use. It is also called tape rule and steel tape. Different lengths of this tool are available in the market. A 3- foot(1 m), 6 foot(2 m), 15 foot(5 m) and many sizes can be obtained at hand. Some of these contain both English and Metric units of linear measurement. Workers involved in measuring longer dimensions prefer the longer ones.



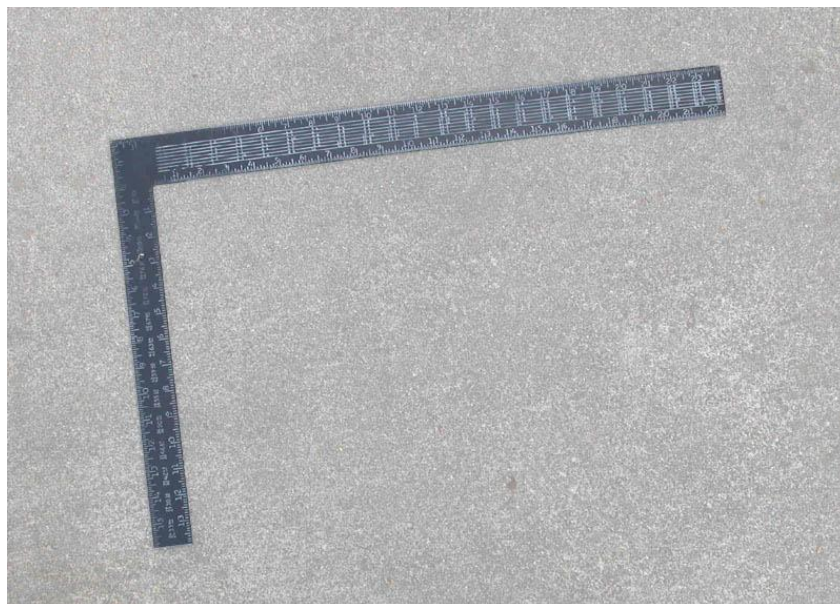
3. Zigzag rule. This is an old form of measuring tool but still functional, especially in measuring overhead dimensions. It is made of parts riveted together so that opening it in zigzag motion, hence the name zigzag rule.



4. Try square. The tool can be used to check squareness of small objects like small tiles. Measurements are scribed in the blade for measuring short dimensions.

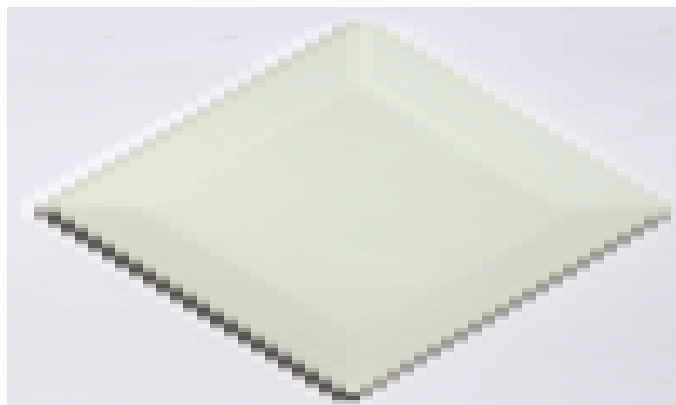


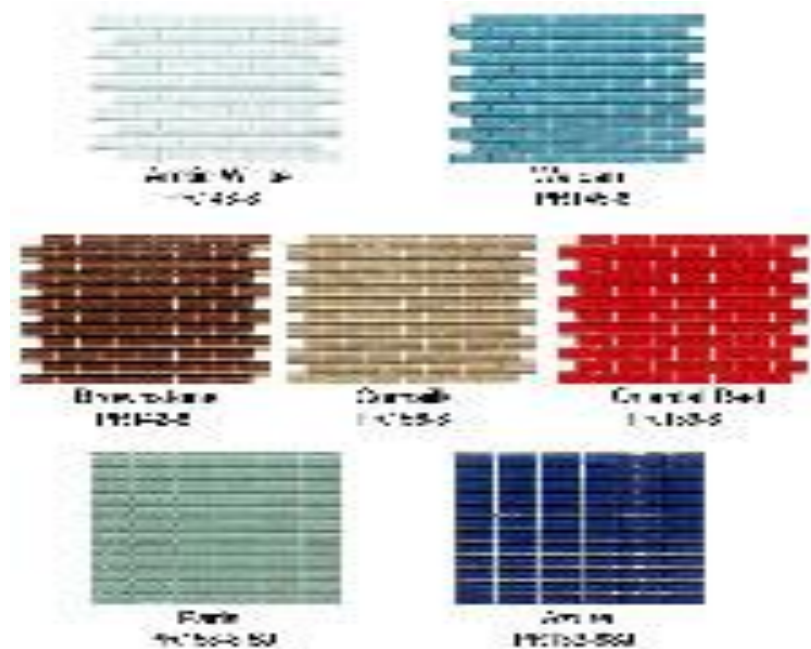
5. Steel square. It is used to test the squareness of layouts for tiling. This tool is equipped with measurements which can be used for measuring.



Shapes of Objects in Tile Setting Tiles







How Much Have You Learned?

Self-Check 2.1

Matching Type: Directions: Match the items of column A with column B. Write your answers in your activity notebook.

- | A | B |
|--|-------------------|
| 1.) Mainly used for overhead measuring. | a. Pull-push rule |
| 2.) It is 12 inches long | b. Steel square |
| 3.) Commonly used measuring tool because it is very handy | c. Try square |
| 4.) Used to check the squareness of layouts for tiling | d. Zigzag rule |
| 5.) For measuring short dimensions and testing squareness of tiles | e. Foot rule |

Refer to the Answer Key. What is your score?



How Do You Apply What You Have Learned?

Show that you learned something by doing this activity

Activity Sheet 2.1

Directions: Identify the shapes of the tiles below. Use the most appropriate tool in measuring the tiles. Write your answers in Metric and English systems in your activity notebook. For your answers, copy the Table below.

1.



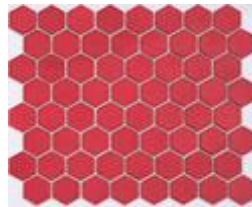
2.



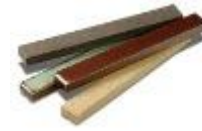
3.



4.



5.



Tile Number	Measurement	
	English System (inches)	Metric System (cm)
Shape		
1.		
2.		
3.		
4.		
5.		



Congratulations! You did a great job! Rest and relax a while then move on to the next lesson. Good luck!

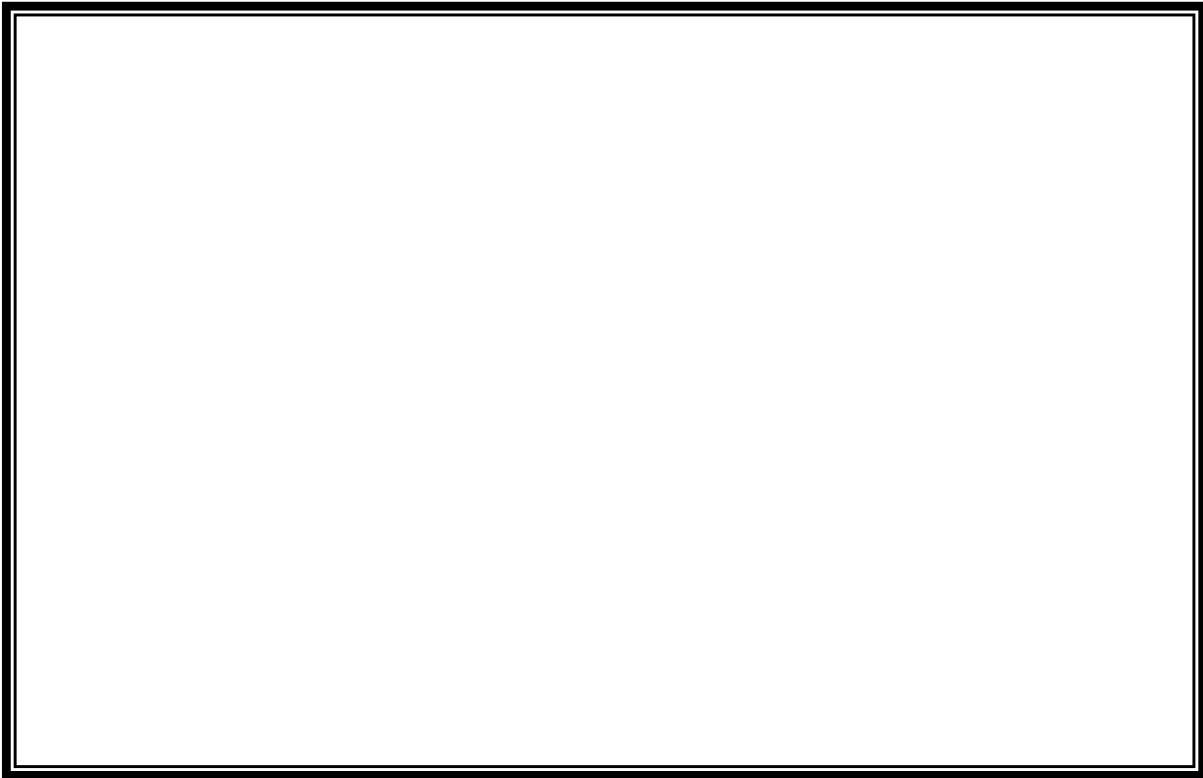
REFERENCES

TILE Setting, Construction Sector. CBC, TR. TESDA

Groneman, Chris. General Woodworking. Copyright 1977

LESSON 3

Interpret technical drawings and plans



LEARNING OUTCOMES:

At the end of this Lesson you are expected to do the following:

- LO 1. read/ interpret blueprints an plans; and
- LO 2. perform freehand sketching.



Definition of Terms

Basic unit. It is the smallest or simplest item or unit.

Calculation. Measurement or estimation

English measures. Measures which originated from England; customary measures of England and the United States of America

Linear. Pertains to line distances

Measurement. Size, dimension

Metric system. It is also called metrication; refers to the introduction and use of the SI metric system, the international standard for physical measurements.

Weight. The amount or quantity of heaviness or mass.

Volume. The amount of space, measured in cubic units, that an [object](#) or substance occupies.

\

LEARNING OUTCOME 1

Read/ interpret blueprints and plans

PERFORMANCE STANDARDS

- Signs, symbols, and data are identified according to job specifications.
- Signs, symbols and data are determined according to classification or as appropriateness in drawing.



Materials

- Triangles
- Rulers
- T-square
- Pencils
- Compass
- Dividers
- Drawing papers



What Do You Already Know?

Let us determine how much you already know about reading/ interpreting blueprints and plans. Take this test.

Pretest LO 1

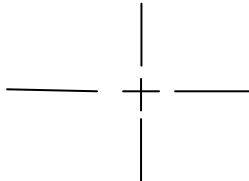

DIRECTIONS: Select the letter of the correct answer. Write the letters of your answers in your activity notebook.

- 1) Which line is used to enclose a drawing?
- | | |
|----------------|-------------------|
| A) Border line | C) Dimension line |
| B) Center line | D) Extension line |

- 2) It is a light line that includes measurement.
 A) Center line C) Hidden line
 B) Dimension line D) Object line
- 3) These are short dashes to show hidden parts of an object in the drawing.
 A) Border line C) Dimension line
 B) Extension line D) Invisible line
- 4) Which line is used to locate the centers of circles, holes or and symmetrical objects?
 A) Border line C) Dimension line
 B) Center line D) Extension line

B. IDENTIFICATION:

DIRECTIONS: Name the following line symbols below. Write your answers on your activity notebook.

- 1) _____
- 2) - - - - -
- 3) 
- 4) 



What Do You Need To Know?

Read the Information Sheet 1.1 very well then find out how much you can remember and how much you learned by doing Self-check 1.1.

Information Sheet 1.1

Introduction

The next learning material will deal more on blueprints/plans and their contents. You will learn the most of it by exerting enough effort in studying and concentrate in developing your learning skills.

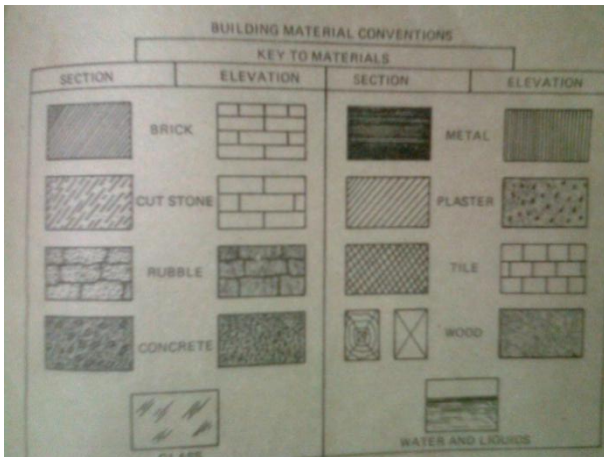
Drawing Symbols and Signs

Most materials, and equipment are represented by drawings. Symbols have

been developed in drawing practices and some of which became basis of standards.

The metal symbol is the one used in machine drawings. Building material symbols are used in architectural and structural drawing. There are some symbols that look so common that they can be recognized easily.

The use of symbols makes drawing easier to do and to read.



Alphabet of Lines

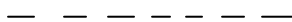
The Alphabet of lines is a list of line symbols that are used in technical drawings to represent the shape and describe the size of an object.

Certain lines have been developed and standardized by long usage in industry and they are known as the Alphabet of Lines.

1. Visible or object line. This is a solid line that represent the outline of an object.



2. Hidden line. It shows the surfaces or edges hidden from view by other parts of the object. It is also called an invisible line.

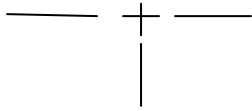


3. Dimension line. A light line that indicates the measurement in the direction of the line

and the point of arrow at each end.



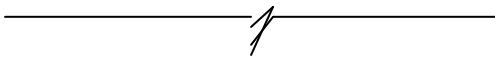
4. Center line. This line is used to indicate the center of holes, circles and symmetrical objects.



5. Section line. The line used to indicate sectioned part of an object on a drawing.



6. Long break line. Used to show the part of the object which is not shown or cut off from the drawing.



7. Short break line. It is a heavy freehand line that indicates that a part is broken out.



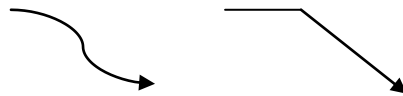
8. Extension line. A line that shows the limit of measurement.



9. Border line. An extra heavy line used to enclosed a drawing.

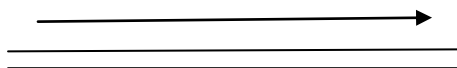


10. Leader line. It shows notes or labels for sizes or special information about a feature. It is written in medium thickness.

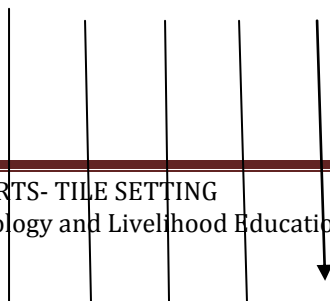


Drawing Lines

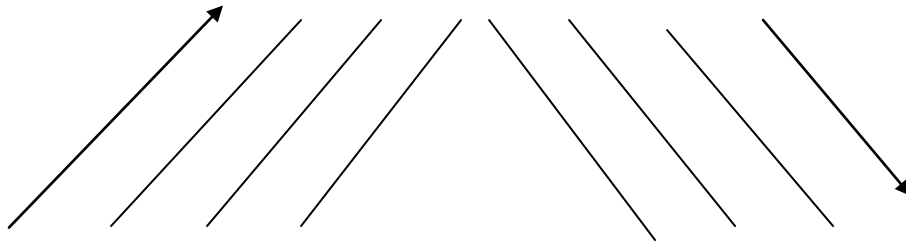
1. Horizontal lines. These are lines that are drawn from left to right.



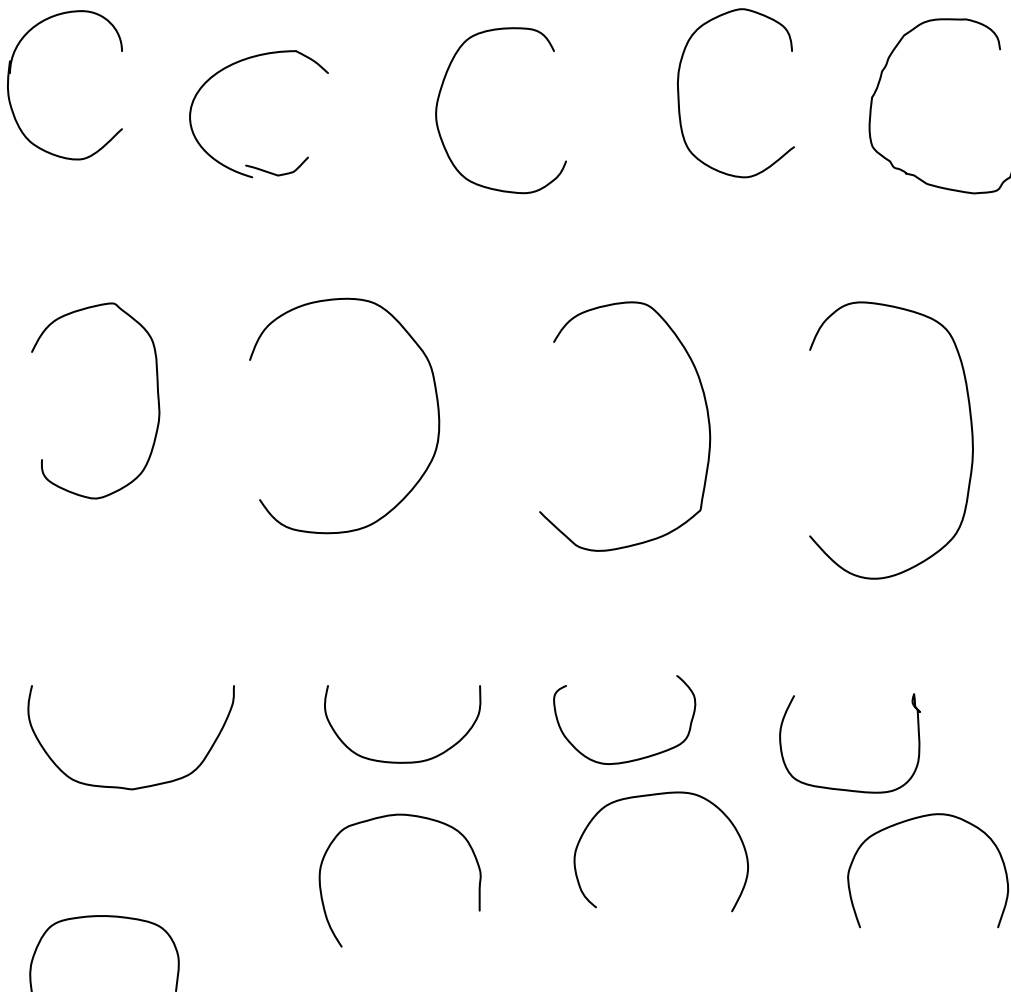
2. Vertical lines. Lines drawn from top to bottom.



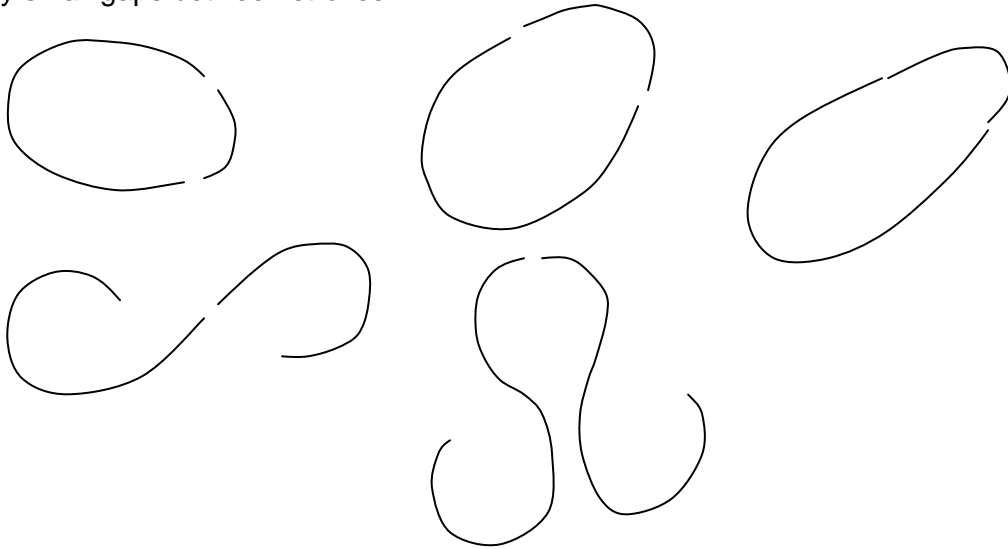
3. Inclined lines. These are lines drawn from left to right at an angle of more or less 45°.



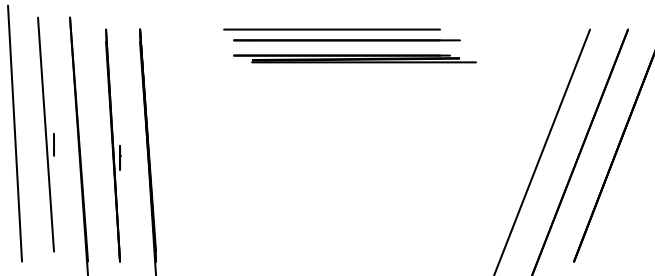
4. Curved lines. The arcs and circles are drawn with one or two strokes similar to the strokes in letter c.



5. Ellipses and irregular curves. These are drawn with one or more strokes preferably with very small gaps between strokes.



6. Light and heavy lines, Are drawn with light and heavy strokes,



How Much Have You Learned?

Self-Check 1.1

MULTIPLE CHOICE:

Directions: Select the letter of the best answer. Write the letters of your answers in your activity notebook.

1) This is a solid line that represents the outline of an object.

- | | |
|-------------------|-----------------|
| A) Border line | C) Hidden line |
| B) Extension line | D) Visible line |

2) A light line that indicates the measurement in the direction of the line and the point of arrow at each end.

- | | |
|-------------------|-------------------|
| A) Border line | C) Extension line |
| B) Dimension line | D) Hidden line |

LEARNING OUTCOME 2

Perform freehand sketching

PERFORMANCE STANDARDS

- Necessary tools, materials and equipment are identified according to the plan.
- Components, assemblies or objects are recognized per job requirement.
- Dimensions and specifications are identified according to job requirements.
- Freehand sketch is produced in accordance with job requirements



Materials

- Triangles
- Pencils
- Rulers
- T-square
- Drawing papers



What Do You Already Know?

Let us determine how much you already know about performing freehand sketching. Take this test.

Pretest LO 2

I. MULTIPLE CHOICE:

DIRECTIONS: Select the answer from the choices that fits to the statement. Write your answers in your activity notebook.

1) When two dots are connected it forms a _____.

- A) Circle
- B) Ellipse
- C) Line
- D) Volt

2) The lines that should be drawn from top to bottom or downward.

- A) Circles
- B) Curves
- C) Inclined lines
- D) Vertical lines

3) These are drawn by first drawing several radial lines and locating points equally distant from the center.

- A) Inclined lines
- B) Circles
- C) Curves
- D) Ellipses

II. Brainstorming

What comes to your mind when you learn the words “freehand sketching”?
Each one goes to the board and write.



What Do You Need To Know?

Read the Information Sheet 2.1 very well then find out how much you can remember and how much you learned by doing Self-check 2.1.

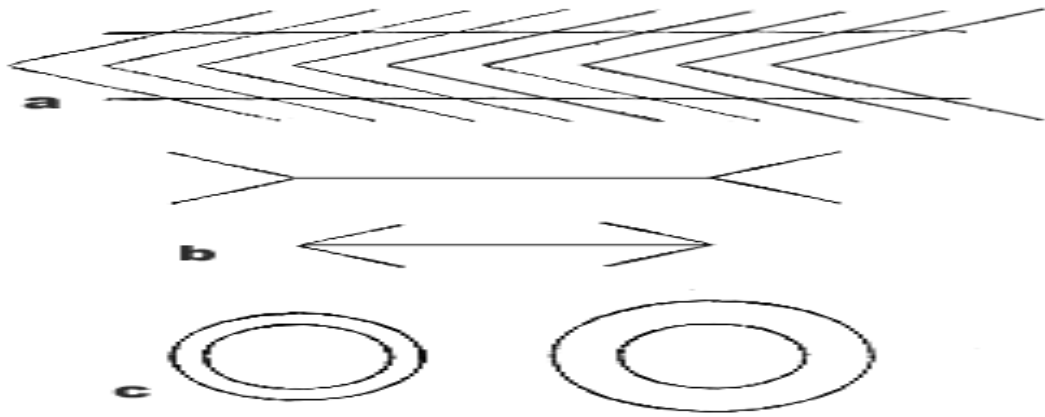
Information Sheet 2.1

Introduction

As you move on with the lessons, more improvement takes place in your mental ability. With the unfolding activities you will learn more relevant information which will sustain your technical knowhow.

Basic Technical Drawing

In this topic, you will experience some practical lessons that will help you to learn drawing straight lines and curves on the plane, sketching simple geometric figures and stroking. All the lessons must be done without a ruler or any measuring instrument. If you use a ruler or dividers it will just bring you harm. Here are some simple examples of visual illusion.



- A. Lines on picture are parallel but seems they don't look parallel because of illusion effects.
- B. The lines are of the same size
- C. The inner circles are of the same size

Freehand Sketching

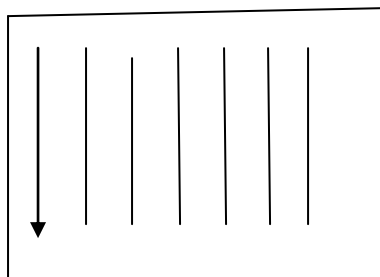
Freehand drawing has some advantages. They are quicker and cheaper to make and in some cases more convenient. A sketch or freehand drawing can be made with paper and pencil only.

Methods:

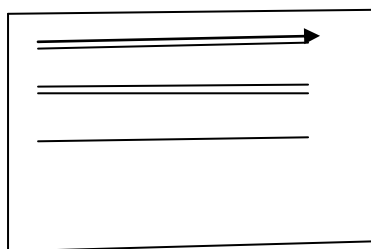
Straight Lines

Usually two dots are connected in drawing straight lines like vertical line with a pencil. This shall be done with light hand pressure. Constant practice in doing this will achieve really straight lines- wide, narrow, light, dark lines, it should be done with the same pressure on the entire line length. After doing this, practice drawing horizontal and inclined or diagonal lines.

1. Vertical lines should be drawn downward.



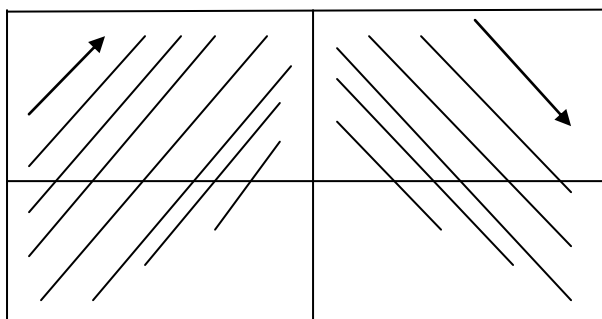
2. Horizontal lines should be drawn from left to right with an arm movement.



3. The pencil should be gripped about 1^{1/2} to 2 in. from the point, and held at an angle of about 45° with the surface of the paper and at right angles with the line.

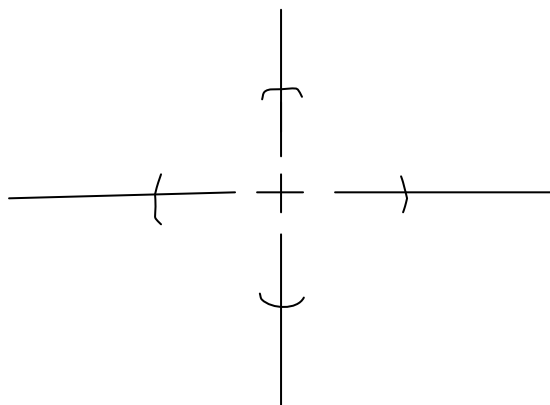


4. Sketching inclined lines. Inclined lines are also drawn from left to right at an angle.

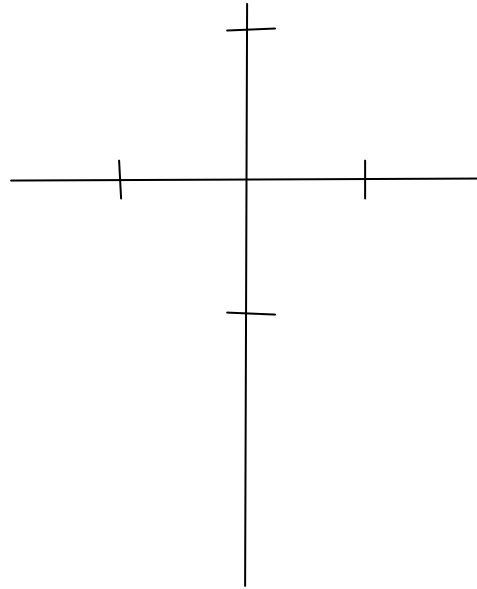
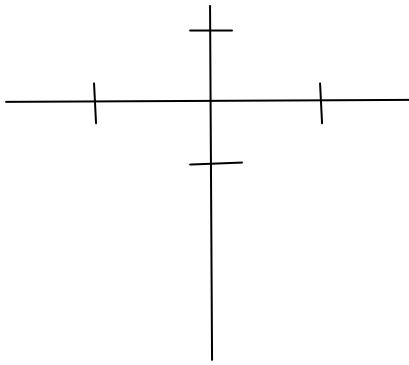


5. Tenseness of the muscles should be avoided.

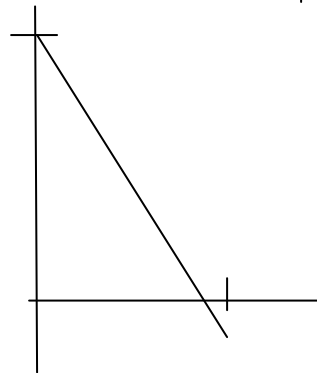
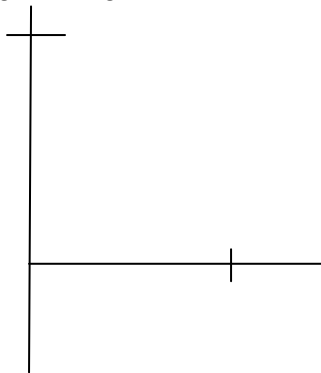
6. Circles may be drawn by first drawing several radial lines and locating points equally distant from the center.



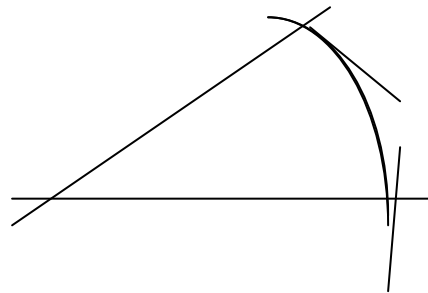
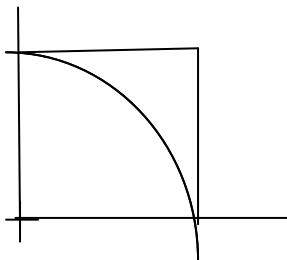
7. Sketching a square or rectangle.



8. Sketching a triangle



9. Sketching curves and arcs



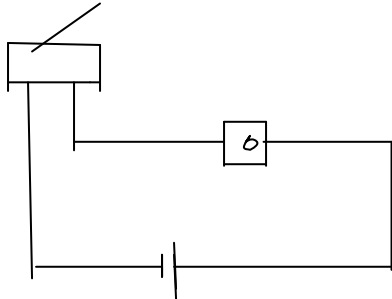
Five General Uses of Freehand sketching

1. It serves as aid in working out mechanical designs.
2. It is frequently the preliminary step in laying out a mechanical drawing on a sheet.
3. It is used by the designer in transmitting his ideas to a draftsman who make the finished drawings.
4. It is used as a means of recording mechanical ideas obtained outside the drafting room.
5. It serves as an aid in conveying mechanical information to others.

Skill in freehand sketching can be acquired if one will practice consistently. The beginner will be surprised at the proficiency that he can acquire after a few practice.

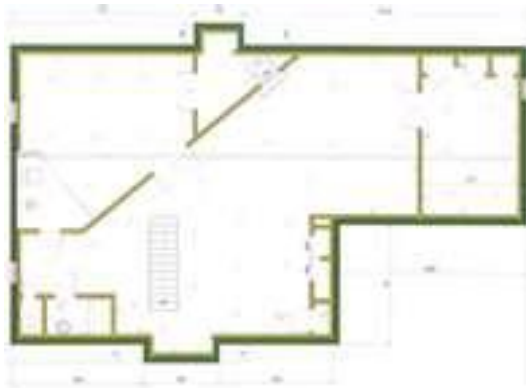
Schematic diagram

It is a drawing that shows all significant components, parts, or tasks (and their interconnections) of a circuit, device, flow, process, or project by means of standard symbols. Schematic diagrams for a project may also be used for preparing cost estimates.



A sample schematic sketch in electricity

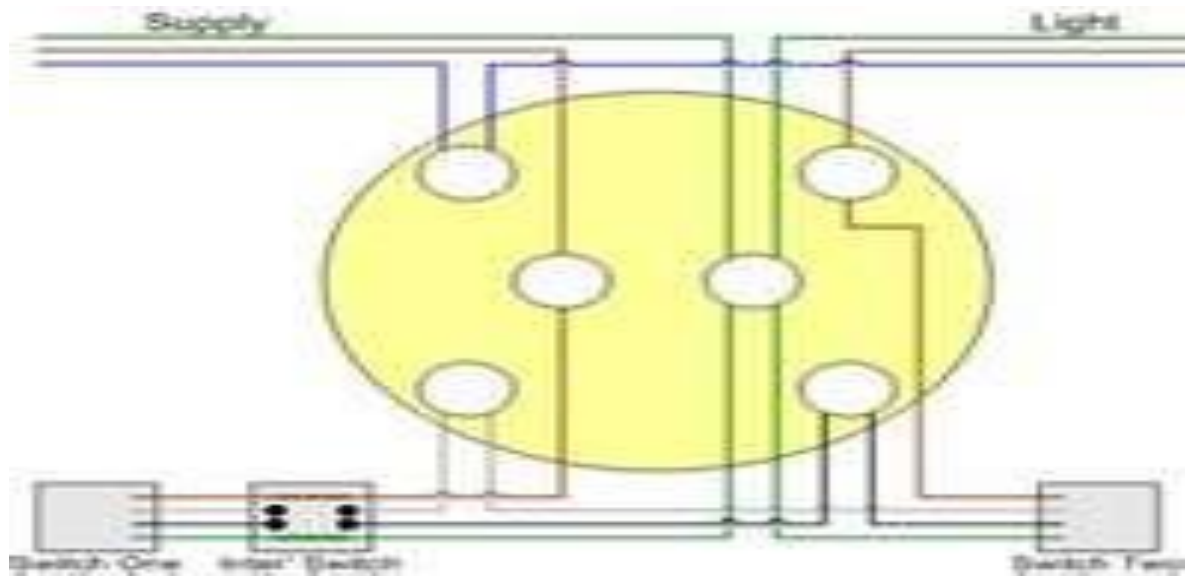
Schematic diagram of a floor plan



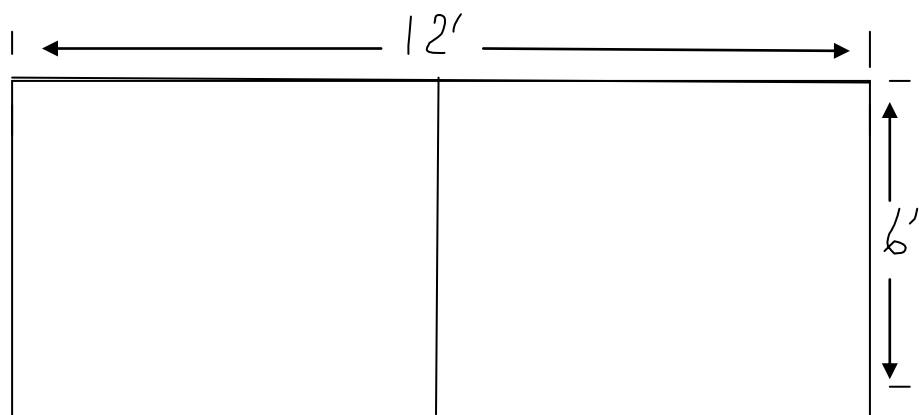
Schematic diagram of bathroom floor



Double switch lighting circuit-Electrical



Schematic diagram of bathroom wall design





How Much Have You Learned?

Self-Check 2.1

MULTIPLE CHOICE:

Directions: Select the letters of the correct answer. Write the letters of your answers in your activity notebook.

- 1) It is a drawing that shows all significant components, parts of a project by means of standard symbols.

A) Freehand drawing	C) Orthographic drawing
B) Schematic diagram	D) Isometric drawing

- 2) This kind of drawing may also be used for preparing cost estimates.

A) Mechanical drawing	C) Schematic diagram
B) Technical sketching	D) Scanner

- 3) Schematic diagram shows all of the following except,

A) Line symbols	C) Specification
B) Dimensions	D) Costs

Refer to the Answer Key. What is your score?



How Do You Apply What You Have Learned?

Show that you learned something by doing this activity

Activity Sheet 2.1

Do freehand sketching of different sizes and shapes of tiles with simple designs.

HOW WELL DID YOU PERFORM?

Rate yourself in freehand sketching by using the Rubrics given below.

Rubrics

Items	1	2	3	4
1. Accuracy				
2. Quality				

(workmanship) 3. Neatness				
4. Speed				

- Legend: 1- Poor
 2- Fair
 3- Good
 4- Excellent

Refer to the Answer Key. What is your score?

REFERENCES

Tile Setting, Construction Sector, CBC, TR, TESDA

Groneman, Chris. General Woodworking, 5th Edition, 1976

Fuglsby, McGee, Sturtevant. General Mechanical Drawing, Revised Edition 1963

Esguerra, Molino. Exploratory Drafting, 1980

Miller, Maddox, Zook, Smith. Woodworking, Basic Industrial Arts, 1978

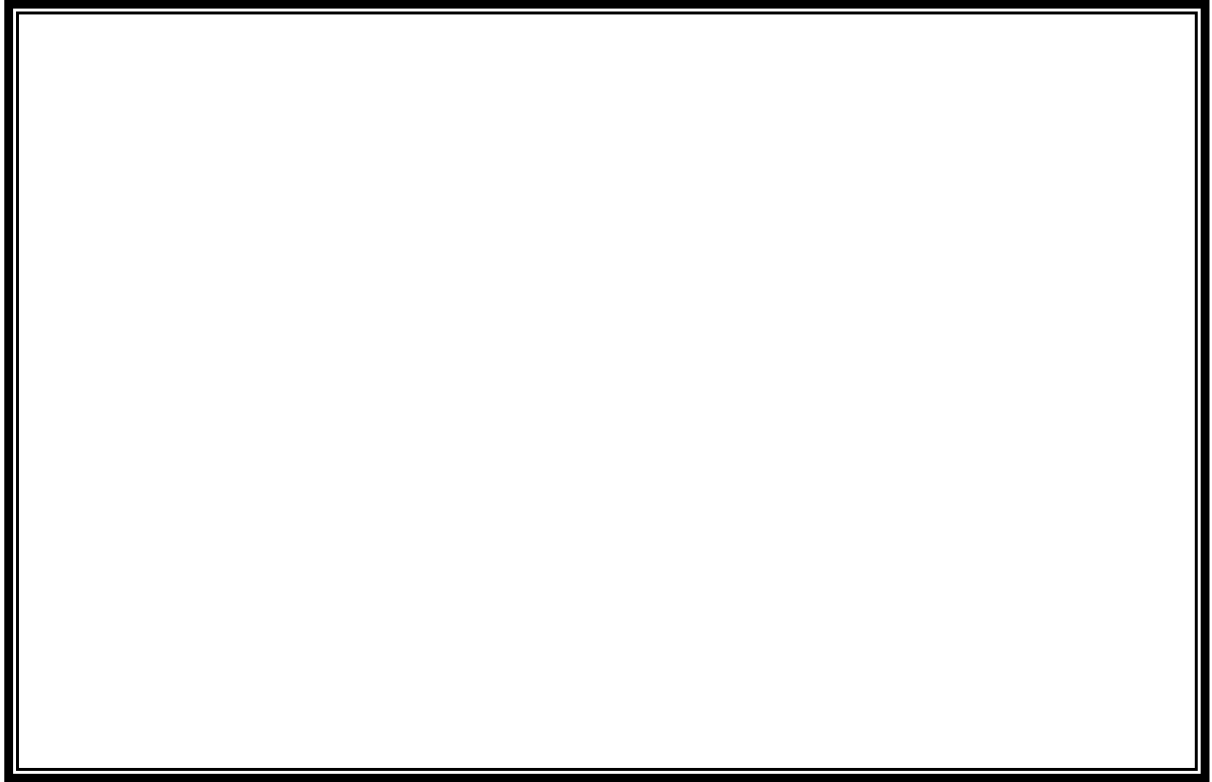
Quilang, T..Handicrafts Handbook, 1975



Congratulations! You did a great job! Rest and relax a while then move on to the next lesson. Good luck!

LESSON 4

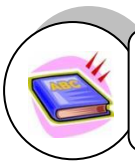
Maintaining tools and equipment



LEARNING OUTCOMES:

At the end of this Lesson you are expected to do the following:

- LO 1. check condition of tools and equipment;
- LO 2. perform basic preventive maintenance; and
- LO 3. store tools and equipment.



Definition of Terms

Functional. Capable of performing; operative

Inventory. A detailed list of things in one's possession; a periodic survey of all goods and materials.

Non-functional. Not capable of performing

Lubricant. Any of the liquid that reduce friction, heat and wear

Maintain. To continue, to preserve or retain

Protective. Intended to afford protection

Solvent. A liquid capable of dissolving another substance.

Storage. Space for storing goods for safekeeping

LEARNING OUTCOME 1

Check condition of tools and equipment

PERFORMANCE STANDARDS

- Tools and equipment are identified according to classification/specification and job requirements.
- Functional and non-functional tools and equipment are segregated and labeled according to classification.
- Safety of tools and equipment are observed in accordance with manufacturer's instructions.
- Conditions of PPE are checked in accordance with manufacturer's instructions.



What Do You Already Know?

Let us determine how much you already know about checking the conditions of tools and equipment. Take this test.

Pretest LO 1

MULTIPLE CHOICE:

DIRECTIONS: Choose the correct answer from the choices that fits to the statement. Write your answers in your activity notebook.

- 1) The PPE that is sealed tightly to the eyes and provide superior protection from dust, dirt, and fumes.
A) Face shield
B) Goggles
C) Gloves
D) Respirator
- 2) A clothing designed to protect the body from excessive dirt, grease, oil, and others.
A) Cover all
B) Life jacket
C) Polo shirt
D) T shirt
- 3) These are used to protect the knees in tile setting.
A) Knee jerk
B) Knee pads
C) Knee socks
D) Pants
- 4) Tools that are used to protect the head from falling objects and forceful bumps.
A) Cover all
B) Helmets
C) Knee pads
D) Leather gloves
- 5.) It is a substance introduced to reduce friction between moving surfaces.
A) Liquid
B) Lubricant
C) Paste
D) Solids



What Do You Need To Know?

Read the Information Sheet 1.1 very well then find out how much you can remember and how much you learned by doing Self-check 1.1.

Information Sheet 1.1

Introduction

INDUSTRIAL ARTS- TILE SETTING
K to 12 -Technology and Livelihood Education

Tools and equipment are very important in earning a living. This topic will give you knowledge on how to take care of the tools and the necessary materials in maintaining them.

Functional

As stated in the definition of terms it means “Capable of performing; operative”. Functional tools therefore are tools that are operable, that can be operated or manipulated to be of use.

Non-functional

Not capable of performing, un-operable. Once non-functional tools and equipment were identified they will be segregated for proper action in order to continue whatever plan that needs to be done.

Classification of Functional and Non-Functional tools

Types of Tools and Equipment	Number of pieces	Condition	Functional/Non-functional	Action Taken
1. Pointing Trowel	10	Rusty	Functional	Clean w/sandpaper, apply oil
2. Finishing Trowel	10	Good	Functional	Clean w/ sandpaper, apply oil
3. Notched trowel	2	Good	Functional	Cleaning w/oil
4. Wooden float	10	Worn out	5- Non-functional	Replacement
5. Grout float	5	Good	Functional	Cleaning
6. Pull-push rule	10	5-Defective	Non-Functional	Replacement
7. Foot rule	10	Good	Functional	Retain
8. Plumb and level	5	Good	Functional	Retain
9. Plumb bob	5	Good	Functional	Retain
10. Mallet	5	Good	Functional	Retain
11. Claw Hammer	5	Good	Functional	Cleaning w/oil
12. Try square	5	Rusty	Functional	Cleaning w/oil
13. Steel square	5	Rusty	Functional	Cleaning w/oil
14. Hack saw	5	Good	Functional	Cleaning w/oil
15. Crosscut saw	5	Rusty	Functional	Cleaning w/oil

16. Beating block	10	Worn out	Non-functional	Replacement
17. Pail and sponge	10	Worn out	Non-functional	Replacement
18. Tile cutters	8	Good	Functional	Retain
19. Tile spacers	1 box	Good	Functional	Retain

PERSONAL PROTECTIVE EQUIPMENT

Personal protective equipment (PPE) refers to protective clothing, gloves, helmets, goggles, or other garment or equipment designed **to protect the wearer's body from injury** by dangerous impacts, electrical hazards, chemicals, and infection, job related purposes, and even in sports .

"Protective clothing" is applied to traditional categories of clothing, and "gear" is a more general term and which means protective categories, such as pads, guards, gloves, shields, masks, etc

The use of personal protective equipment is to reduce worker exposure to hazards and risks.

USES OF PERSONAL PROTECTIVE EQUIPMENT

A. Flying debris or splashing liquids

1. **Face shield** protects from flying debris such as produced by cutting tiles, fine aggregates, welding, chipping, or sanding, and protects against splashes or spray of liquids.
2. **Safety glasses** provide protection for the eyes from sand and may additionally be tinted to block ultra violet or laser light.
3. **Goggles** seal tightly to the eyes and provide superior protection from dust, dirt, and cement powder..

B. Sharp injuries and Rough objects

1. Those who are exposed to sharp injuries can utilize **cut and puncture resistant protective gloves**, and hand held safety tools that offer stand-off distance between themselves and whatever they may come into contact.
2. **Leather gloves** are mainly for rough or porous objects like tiles, and dirt.

C. Air-purifying respirator

1. Respirators such as "**gas masks**" and **particulate respirators** filter chemicals and gases or airborne particles. A second type of respirator protects users by providing clean, inhalable air from another source.

In some work places, **respirators** are used when adequate ventilation is not available or other engineering control systems are not feasible.

D. Other equipment

Cover-all- a clothing designed to protect the body from excessive dirt, grease, oil, and others.

Knee pads- are used to protect the knees in tile setting.

Helmets- are used to protect the head from falling objects and forceful bumps.

First aid kit contains supplies intended for first aid measures.

Conditions of Personal Protective Equipment

Personal Protective Equipment	Quantity/Number of pieces	Condition	Action Taken
1. Gloves	10 pairs	Non-functional	Replacement
2. Dust mask/gas mask	10	Non-functional	Replacement
3. Goggles	10	Functional	Cleaning
4. Clothing/cover all	5	Non-functional	Replacement
5. Knee pads	5 pairs	Functional	Cleaning
6. Helmets	5	Functional	Cleaning
7. Face shield	2	Functional	Cleaning
8. Safety glasses	5	Functional	Cleaning
9. Cut and puncture resistant protective gloves	0		For requisition
10. Cover all	0		For requisition
11. First kit	1	Non-functional	Request supplies



How Much Have You Learned?

Self-Check 1.1

MULTIPLE CHOICE:

DIRECTIONS: Choose the correct answer from the choices that fits to the statement. Write your answers in your activity notebook.

- 1) A tool that can not be operated or defective is classified as,
- | | |
|---------------|-------------------|
| A) Dangerous | C) Non-functional |
| B) Functional | D) Obsolete |

- 2) The PPE that is sealed tightly to the eyes and provide superior protection from dust, dirt, and fumes.

- A) Face shield C) Goggles
B) Gloves D) Respirator
- 3) Tools that are used to protect the head from falling objects and forceful bumps.
A) Coveralls C) Knee pads
B) Helmets D) Leather gloves
- 4) A clothing designed to protect the body from excessive dirt, grease, oil, and others.
A) Coveralls C) Knee pads
B) Helmets D) Leather gloves
- 5) These are used to protect the knees in tile setting.
A) Knee jerks C) Knee socks
B) Knee pads D) Pants
- 6) It protects the face from flying debris such as produced by cutting tiles, welding, chipping, or sanding, and protects against splashes or spray of liquids.
A) Face shield C) Goggles
B) Gloves D) Safety glasses

Refer to the Answer Key. What is your score?

HOW WELL DID YOU PERFORM?
Rate your performance base on the Rating Scale below.

Rating Scale

6 points	90	Outstanding
5 points	85	Very good
4 points	80	Good
3-4 points	75	Satisfactory
1-2 points	70	Needs improvement

LEARNING OUTCOME 2

Perform basic preventive maintenance

PERFORMANCE STANDARDS

- Lubricants are identified according to types of equipment.
- Tools and equipment are lubricated according to preventive maintenance schedule or manufacturer's specifications.
- Tools are cleaned and lubricated according to standard procedures.
- Defective equipment and tools are inspected and replaced according to manufacturer's specification.
- Work place is cleaned and kept in safe state in line with OSHC regulations.



What Do You Already Know?

Let us determine how much you already know about performing basic maintenance. Take this test.

Pretest LO 2

Group Activity.

Group yourselves by six. As a group what you do preventive maintenance of tools for tile setting. Share your list with the class.



What Do You Need To Know?

Read the Information Sheet 2.1 very well then find out how much you can remember and how much you learned by doing Self-check 2.1.

Information Sheet 2.1

Introduction

Very often, workers use different tools and equipment in earning a living. In some cases negligence is a cause of the unexpected deterioration of the effectiveness of their tools.

In your daily observations, you may have noticed the situation above. In this topic you will learn the materials needed for the maintenance of tools and equipment in order to preserve their effectiveness.

LUBRICANTS

A **lubricant** is a substance applied to reduce friction between moving surfaces. It may also have the function of transporting foreign particles

Typically lubricants contain 90% base oil and less than 10% additives.

A good lubricant possesses the following characteristics:

1. High boiling point.
2. Low freezing point.
3. High viscosity index.
4. Thermal stability.
5. Corrosion prevention.
6. High resistance to oxidation.

Lubricants perform the following key functions.

1. Keep moving parts apart

Lubricants are typically used to separate moving parts in a system. This has the benefit of reducing friction and surface fatigue, together with reduced heat generation, operating noise and vibrations

2. Reduce friction

Typically the lubricant-to-surface friction is much less than surface-to-surface friction in a system without any lubrication. Thus use of a lubricant reduces the overall system friction. Reduced friction has the benefit of reducing heat generation and reduced formation of wear particles as well as improved efficiency.

3. Transfer heat

Both gas and liquid lubricants can transfer heat. Liquid lubricants are much more effective on account of their high specific heat capacity.

4. Carry away contaminants and debris

Lubricant circulation systems have the benefit of carrying away internally generated debris and external contaminants that gets into the system to a filter where they can be removed.

5. Transmit power

Lubricants known as hydraulic fluid are used as the working fluid in hydrostatic power transmission.

6. Protect against wear

Lubricants prevent wear by keeping the moving parts apart.

7. Prevent corrosion

Good quality lubricants are formulated with additives that form chemical bonds with surfaces, or exclude moisture, to prevent corrosion and rust.

8. Seal for gases

Lubricants will occupy the clearance between moving parts through the capillary force to seal the clearance.

TYPES OF LUBRICANTS

A. Base oil groups

1. Mineral oil- a term used to encompass lubricating base oil derived from crude oil.

Lubricants for internal combustion engines contain additives to reduce oxidation and improve lubrication. While it is advantageous to have a high-grade base oil in a lubricant, proper selection of the lubricant additives is equally important.

B. Biolubricants made from vegetable oils and other renewable sources

These are primarily triglyceride esters derived from plants and animals.

1. Common ones include high oleic canola oil, castor oil, palm oil, sunflower seed oil and rapeseed oil.

2. Tall oil from tree sources.

3. Whale oil was a historically important lubricant, with some uses as a friction modifier additive for automatic transmission fluid (It is no longer used due to some legal prohibitions).

4. Lanolin is a natural water repellent, derived from sheep wool grease, and is an alternative to the more common petro-chemical based lubricants.

5. Water can also be used on its own, or as a major component in combination with one of the other base oils. Commonly used in processes, such as milling and lathe turning.

C. Synthetic oils

1. Polyalpha-olefin (PAO)
2. Synthetic esters
3. Polyalkylene glycols (PAG)
4. Phosphate esters
5. Alkylated naphthalenes (AN)
6. Silicate esters
7. Ionic fluids

D. Solid lubricants

1. PTFE

Polytetrafluoroethylene (PTFE) is typically used as a coating layer, for example, cooking utensils to provide a non-stick surface. Its usable temperature range up to 350 °C.

PTFE tape (Teflon) is used in plumbing, air cushion and others.

2. Inorganic solids

Graphite, hexagonal boron nitride, molybdenum disulfide and tungsten disulfide are examples of materials that can be used as **solid lubricants**, often to very high temperature.

3. Metal/alloy

Metal alloys, composites and pure metals can be used as grease additives or the sole constituents of sliding surfaces and bearings.

E. Aqueous lubrication

Aqueous lubrication includes strongly hydrated **brush polymers** such as PEG that act as lubricants at liquid solid interfaces.



How Much Have You Learned?

Self-Check 2.1

MULTIPLE CHOICE:

DIRECTIONS: Select the correct answer from the choices that fits to the statement. Write your answers in your activity notebook.

1) It is a substance introduced to reduce friction between moving surfaces

- | | |
|--------------|-----------|
| A) Liquid | C) Paste |
| B) Lubricant | D) Solids |

2) It is a term used to encompass lubricating base oil derived from crude oil.

- | | |
|----------------|----------------|
| A) Alcohol | C) Mineral oil |
| B) Cooking oil | D) Water |

3) It is a solid lubricant used in plumbing, air cushion and others.

- | | |
|-------------|--------------------|
| A) Aromatic | C) Hydraulic fluid |
| B) Graphite | D) PTFE tape |

4) It is a natural water repellent, derived from sheep wool grease, and is an alternative to the more common petro-chemical based lubricants.

- | | |
|----------------|---------------------|
| A) Lanolin | C) PTFE tape |
| B) Metal alloy | D) Synthetic esters |

5) It is a kind of lubricant made from vegetable oils and other renewable sources.

- | | |
|------------------|-------------------|
| A) Biolubricants | C) Lanolin |
| B) Ionic | D) Synthetic oils |

Read the Information Sheet 2.2 very well then find out how much you can remember and how much you learned by doing Self-check 2.2.

Information Sheet 2.2

TYPES AND USES OF CLEANING MATERIALS/SOLVENTS

Solvents

A **solvent** (from the Latin *solvō*, “I loosen, untie, I solve”) is a liquid, solid, or gas that dissolves another solid, liquid, or gaseous solute, resulting in a solution that is soluble in a certain volume of solvent at a specified temperature.

Common uses for organic solvents are:

1. In dry cleaning (e.g., tetrachloroethylene),
2. As a paint thinner (e.g., toluene, turpentine),
3. As nail polish removers and glue solvents (acetone, methyl acetate, ethyl acetate),
4. In spot removers (e.g., hexane, petrol ether),
5. In detergents (citrus terpenes)
6. In perfumes (ethanol), nail polish and in chemical synthesis.

The use of inorganic solvents (other than water) is typically limited to research chemistry and some technological processes.

Solutions and solvation

When one substance is dissolved into another, a **solution** is formed. When all of the ingredients are uniformly distributed at a molecular level and no residue remains it is termed as **miscibility**. The ability to dissolve one compound into another is known as **solubility**.

Solvents are classified into two categories:

1. Polar

As a rule of thumb, polar solvents dissolve polar compounds best and non-polar solvents dissolve non-polar compounds best: ‘like dissolves like’.

Polar compounds like sugars (sucrose) or ionic compounds, like inorganic salts (table salt) dissolve only in very polar solvents like water, while strongly non-polar compounds like oils or waxes dissolve only in very non-polar organic solvents like hexane.

Water and hexane (or vinegar and vegetable oil) are not miscible with each other and will quickly separate into two layers even after being shaken well.

2. Non-polar.

Solvents with a dielectric constant of less than 15 are generally considered to be **non-polar**

The dielectric constant measures the solvent's ability to reduce the field strength of the electric field surrounding a charged particle immersed in it.

Health and safety

Fire

Most organic solvents are flammable or highly flammable, depending on their volatility. Exceptions are some chlorinated solvents like dichloromethane and chloroform.

Mixtures of solvent vapors and air can explode. Vapors can also be found in empty drums and cans, posing a **flash fire hazard**

Explosive peroxide formation

Ethers like diethyl ether and tetrahydrofuran (THF) can form **highly explosive** organic peroxides upon exposure to oxygen and light.

Health effects

Health hazards associated with solvent exposure include **toxicity** to the nervous system, reproductive damage, liver and kidney damage, respiratory impairment, cancer, and dermatitis.

Some solvents can lead to a **sudden loss of consciousness** if inhaled in large amounts like diethyl ether and chloroform. **Ethanol** (grain alcohol) is a widely used and abused psychoactive drug.

Diethyl ether, chloroform, and many other solvents are used recreationally in glue sniffing, often with harmful long term health effects like neurotoxicity or cancer.

Methanol can cause permanent blindness and death. It is also dangerous because it burns with an invisible flame.

Some solvents including **chloroform** and **benzene** are carcinogenic. These can damage internal organs like the liver, the kidneys, or the brain.

Chronic exposure to organic solvents in the work environment can produce a range of adverse neuropsychiatric effects. Occupational exposure to organic solvents has been associated with higher numbers of painters suffering from alcoholism.

General precautions

- Avoid being exposed to solvent vapors by working in a fume hood, or with local exhaust ventilation (LEV), or in a well-ventilated area

- Keep the storage containers tightly closed
- Never use open flames near flammable solvents; use electrical heating instead
- Never flush flammable solvents down the drain; read safety data sheets for proper disposal information
- Avoid the inhalation of solvent vapors
- Avoid contact of the solvent with the skin — many solvents are easily absorbed through the skin. They also tend to dry the skin and may cause sores and wounds.

Environmental contamination

Health effects arises from **spills or leaks of solvents** that reach the underlying soil. Since solvents readily migrate substantial distances **soil contamination** is common.



How Much Have You Learned?

Self-Check 2.2

MULTIPLE:

DIRECTIONS: Select the letter of the correct answer. Write the letters of your answers in your activity notebook.

- 1) It is a liquid, solid, or gas that dissolves another solid, liquid, or gaseous solute.

A) Lubricant	C) Polar
B) Non-polar	D) Solvent
- 2) These are solvents with a dielectric constant of less than 15.

A) Kosower's Z	C) Non-polar
B) Miscibility	D) Polar
- 3) The ability to dissolve one compound into another is known as _____.

A) Miscibility	C) Polarity
B) Non-polarity	D) Solubility
- 4) It can cause permanent blindness and death. It is also dangerous because it burns with an invisible flame.

A) Chloroform	C) Glycerin
B) Diethyl ether	D) Methanol
- 5) It is defined as the density of the solvent divided by the density of water at the same temperature.

A) Boiling point	C) Specific gravity
B) Soil contamination	D) Toxicity

Refer to the Answer Key. What is your score?

LEARNING OUTCOME 3

Store tools and equipment

PERFORMANCE STANDARDS

- Inventory of tools, instruments, and equipment are conducted and recorded per company practices.
- Tools are inspected and stored after use.
- Tools and equipment are stored safely in accordance with manufacturer's specifications or company procedures.



What Do You Already Know?

Let us determine how much you already know about storing tools and equipment. Take this test.

Pretest LO 3

I. TRUE or FALSE

DIRECTIONS: Write True if the statement is correct and False if the statement is not. Write your answers in your activity notebook.

1. It is of utmost importance that tools are handled with care to avoid injuries to workers and damages to the tool itself.
2. When working with tools it must be cleaned frequently to eliminate the risk of wear.
3. Tools need not be maintained in a proper way to keep it functional at all times.
4. The handle of tools should be made of plastic material with non-slip surface and designed to allow a firm and safe grip.
5. Tools and equipment must be subject to simple routine servicing and maintenance to be carried out by the worker on a regular basis.

Group Activity.

Group yourselves by six. As a group what you do preventive maintenance of tools for tile setting. Share your list with the class.



What Do You Need To Know?

Read the Information Sheet 3.1 very well then find out how much you can remember and how much you learned by doing Self-check 3.1.

Information Sheet 3.1

Introduction

If you need a tool for a certain job its easy to locate it if the storage is near the workplace. Aside from easy access it is also taken care of because of a secured location.

Inventory of Tools and Equipment

1. Tools and equipment are set aside in proper places and arranged according to types and classification.

2. Easy access of tools and equipment needs to be thought out because it contributes to the proper use of quality time in performing various activities in the workplace.

3. The list of all tools and equipment should be checked every now and then, in order to determine its future needs and plans.

4. Every year one must come out with some sort of list of tools they suggest for equipping a work shop.

5. The tools selection usually leaves some major gap in the basic consist and most likely includes a few items most workers consider second priority options.

6. The "setting up shop" question is frequently examined.

7. Due to space and time constraints, most deserved to make with what is available and functional.

HANDLING OF TOOLS

1. Workplaces should supply personnel with the correct types of hand tools and basic equipment.

2. Tools and equipment must be subject to simple routine servicing and maintenance to be carried out by the worker on a regular basis.

Tools

1. Tools used in job operations should have basic safety features.
2. The handle should be made of plastic material with non-slip surface and designed to allow a firm and safe grip.
3. The end of the handle is often slightly enlarged (handle knob) to prevent the tool from slipping out of the hand.

Care of Tools

1. It is of utmost importance that tools are handled with care to avoid injuries to workers and damages to the tool itself.
2. When working with tools it must be cleaned frequently to eliminate the risk of wear.
3. Tools must also be maintained in a proper way to keep it functional at all times. Unmaintained tools leads to early worker fatigue and slower work speed.
4. The correct shape and size is very important to facilitate work and allow for easy operations.
5. The recommended shape and size ensures a firm grip and facilitates smooth flow of work.



How Much Have You Learned?

Self-Check 3.1

TRUE or FALSE

DIRECTIONS: Write True if the statement is correct and False if the statement is not. Write your answers in your activity notebook.

1. It is of utmost importance that tools are handled with care to avoid injuries to workers and damages to the tool itself.
2. When working with tools it must be cleaned frequently to eliminate the risk of wear.
3. Tools need not be maintained in a proper way to keep it functional at all times.
4. The handle of tools should be made of plastic material with non-slip surface and designed to allow a firm and safe grip.

5. Tools and equipment must be subject to simple routine servicing and maintenance to be carried out by the worker on a regular basis.

Refer to the Answer Key. What is your score?

REFERENCES

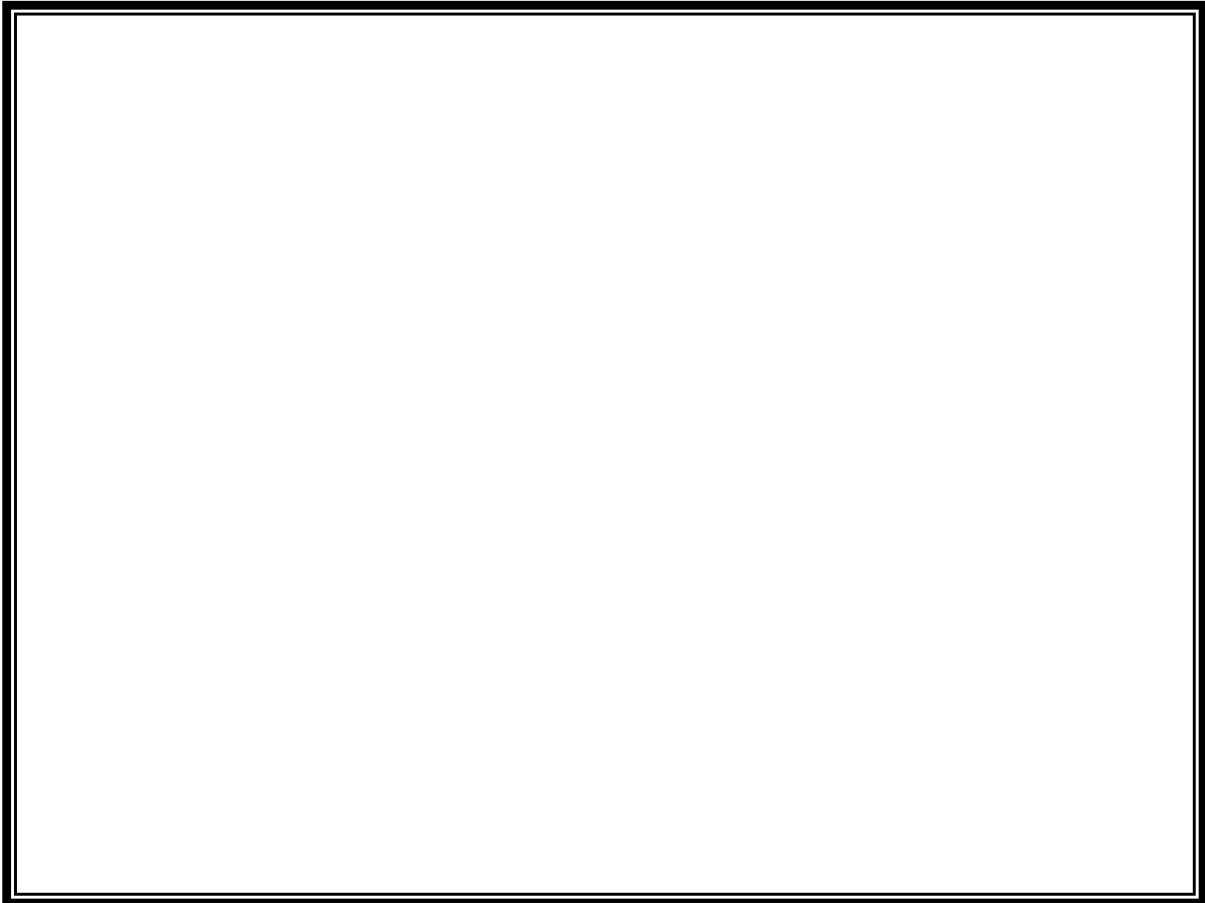
- Tile Setting, Construction Sector, CBC, TR. TESDA
- Groneman, Chris. General Woodworking, 5th Edition, 1976
- The Grolier International Dictionary, Vol. One, Vol. Two
1981 Eddition
- Quilang, T. Handicrafts Handbook. 1975



Congratulations! You did a great job! Rest and relax a while then move on to the next lesson. Good luck!

LESSON 5

Practice occupational health and safety procedures



LEARNING OUTCOMES:

At the end of this Lesson you are expected to do the following:

- LO 1. evaluate hazards and risks;**
- LO 2. control hazards and risks; and**
- LO 3. maintain occupational health and safety awareness.**



Definition of Terms

Contingency

A possibility that must be prepared against; future emergency

Disaster

An occurrence inflicting widespread destruction and distress

Emergency

A situation or occurrence of a serious nature, developing suddenly and unexpectedly, and demanding immediate action

Ergonomics

Include not well designed tools or work areas, improper lifting or reaching, poor visual conditions, or repeated motions in an awkward positions which can result in accidents or illnesses in the workplace.

Hazards

A chance or accident; a danger; peril, risk

Management

The act, manner, or practice of managing, handling, or controlling something

Measures

An action taken as a means to an end.

Occupational

Pertaining to, or caused by engagement in a particular occupation

Operational

Pertaining to an operation or a series of operations

Risks

The possibility of suffering harm or loss; danger

LEARNING OUTCOME 1

Evaluate hazards and risks

PERFORMANCE STANDARDS

- Terms of maximum tolerable limits are identified based on threshold limit value (TLV).
- Effects of hazards are determined.
- OHS issues and concerns are identified in accordance with workplace requirements.
- Requirements and relevant workplace OHS legislation.



What Do You Already Know?

Let us determine how much you already know about evaluating hazards and risks. Take this test.

Pretest LO 1

I. MULTIPLE CHOICE:

DIRECTIONS: Select the correct answer from the choices that fits to the statement.

Write your answers in your activity notebook.

- 1) It is an area concerned with protecting the safety, health and welfare of people engaged in work or employment.
 - A) Bureau of Corrections
 - B) Department of Health
 - C) Department of Social Welfare
 - D) Occupational Safety and Health
- 2.) It is the study of designing equipment and devices that fit the human body, its movements, and its cognitive abilities
 - A) Employee's Compensation commission
 - B) Ergonomics
 - C) Safety Code
 - D) Waste management
- 3) This means any alteration of the physical, chemical and biological properties of the atmosphere.
 - A) Air Drying
 - B) Air Pollution
 - C) Liquidation
 - D) Oxidation

4) These are extremely important to ensure that alarm systems are working properly, that emergency reporting systems are efficient.

- A) Electrical Code
- B) Emergency Drills
- C) Fire Safety Code
- D) Waste Management

5) It is defined as a concentration in air, typically for inhalation or skin exposure.

- A) Atmosphere
- B) Carbon Dioxide
- C) Oxygen
- D) TLV for Chemical Substance

II. Please explain the Threshold Limit Value of the following elements:

Acetone, Ammonia, Carbon Dioxide, Carbon Monoxide, and Chlorine.



What Do You Need To Know?

Read the Information Sheet 1.1 very well then find out how much you can remember and how much you learned by doing Self-check 1.1.

Information Sheet 1.1

Introduction

More than ever, safety must be the concern of everybody. Nothing is of greater value than the welfare of a worker in a given situation or place.

You will learn that this safety is the guiding factor towards a successful work or career. In the future, you can use this knowledge fruitfully and meaningfully.

Threshold Limit Values(TLV)

Definitions

The **threshold limit value (TLV)** of a chemical substance is a level to which it is believed a worker can be exposed day after day for a working lifetime without adverse health effects

The TLV is an estimate based on the known toxicity in humans or animals of a given chemical substance, and the reliability and accuracy of the latest sampling and analytical methods

The TLV for chemical substances is defined as a concentration in air, typically for inhalation or skin exposure. Its units are in parts per million (ppm) for gases and in milligrams per cubic meter (mg/m^3) for particulates such as dust, smoke and mist.

TABLE I—THRESHOLD LIMIT VALUES (T.L.V.)
(In Alphabetical Order)

<i>Substance</i>	<i>ppm (a)</i>	<i>mg/M³ (b)</i>
* Abate	—	15
Acetaldehyde	200	360
Acetic acid	10	25
Acetic anhydride	5	20
Acetone	1,000	2,400
Acetonitrile	40	70
Acetylene dichloride, see 1,2 Dichloroethylene		
Acetylene tetrabromide	1	14
Acrolein	0.1	0.25
Acrylamide-skin	—	0.3
Acrylonitrile-skin	20	45
Aldrin-skin	—	0.25
Allyl alcohol-skin	2	5
Allyl chloride	1	3
C Allyl glycidyl ether (AGE)	10	45
Allyl propyl disulfide	2	12
2-Aminoethanol, see Ethanolamine		
2-Aminopyridine	0.5	2
Ammonia	50	35
Ammonium sulfamate (Ammate)	—	15
n-Amyl acetate	100	525
sec-Amyl acetate	125	650
Aniline-skin	5	19
Anisidine (o, p-isomers)-skin	—	0.5
Antimony & compounds (as Sb)	—	0.5
ANTU (alpha naphthyl thiourea)	—	0.3
Arsenic & compounds (as AS)	—	0.5
Arsine	0.05	0.2
Azinphos-methyl-skin	—	0.2
Barium (soluble compounds)	—	0.5
C Benzene (benzol)-skin	25	80
Benzidine-skin	—	A
p-Benzoquinone, see Quinone		
Benzoyl peroxide	—	5
Benzyl chloride	1	5
Beryllium	—	0.002
Biphenyl, see Diphenyl		
Boron oxide	—	15
* Boron tribromide	1	—
C Boron trifluoride	1	3
Bromine	0.1	3
* Bromine pentafluoride	0.1	—

(a) Parts of vapor or gas per million parts of contaminated air by volume at 25 degrees Centigrade and 760 mm. Hg pressure.

(b) Approximate milligrams of particulate per cubic meter of air.

* 1969 Addition.

C Ceiling limit which shall not be exceeded even momentarily or infrequently.

A No exposure or contact permitted by any route (respiratory, oral or skin).

TABLE I—THRESHOLD LIMIT VALUES (T.L.V.)
(In Alphabetical Order)

Substance	ppm (a)	mg/M ³ (b)
* Abate	—	15
Acetaldehyde	200	360
Acetic acid	10	25
Acetic anhydride	5	20
Acetone	1,000	2,400
Acetonitrile	40	70
Acetylene dichloride, see 1,2 Dichloroethylene		
Acetylene tetrabromide	1	14
Acrolein	0.1	0.25
Acrylamide-skin	—	0.3
Acrylonitrile-skin	20	45
Aldrin-skin	—	0.25
Allyl alcohol-skin	2	5
Allyl chloride	1	3
C Allyl glycidyl ether (AGE)	10	45
Allyl propyl disulfide	2	12
2-Aminoethanol, see Ethanolamine		
2-Aminopyridine	0.5	2
Ammonia	50	35
Ammonium sulfamate (Ammate)	—	15
n-Amyl acetate	100	525
sec-Amyl acetate	125	650
Aniline-skin	5	19
Anisidine (o, p-isomers)-skin	—	0.5
Antimony & compounds (as Sb)	—	0.5
ANTU (alpha naphthyl thiourea)	—	0.3
Arsenic & compounds (as AS)	—	0.5
Arsine	0.05	0.2
Azinphos-methyl-skin	—	0.2
Barium (soluble compounds)	—	0.5
C Benzene (benzol)-skin	25	80
Benzidine-skin	—	A
p-Benzoquinone, see Quinone		
Benzoyl peroxide	—	5
Benzyl chloride	1	5
Beryllium	—	0.002
Biphenyl, see Diphenyl		
Boron oxide	—	15
* Boron tribromide	1	—
C Boron trifluoride	1	3
Bromine	0.1	3
* Bromine pentafluoride	0.1	—

(a) Parts of vapor or gas per million parts of contaminated air by volume at 25 degrees Centigrade and 760 mm. Hg pressure.

(b) Approximate milligrams of particulate per cubic meter of air.

* 1969 Addition.

C Ceiling limit which shall not be exceeded even momentarily or infrequently.

A No exposure or contact permitted by any route (respiratory, oral or skin).

TABLE I—THRESHOLD LIMIT VALUES (T.L.V.)

Substance	ppm (a)	mg/M ³ (b)
Bromoform-skin	0.5	5
Butadiene (1, 3-butadiene)	1,000	2,200
Butanethiol, see Butyl mercaptan		
2-Butanone	200	590
2-Butoxy ethanol (Butyl Cellosolve)-skin	50	240
Butyl acetate (n-butyl acetate)	150	710
sec-Butyl acetate	200	950
tert-Butyl acetate	200	950
Butyl alcohol	100	300
sec-Butyl alcohol	150	450
tert-Butyl alcohol	100	300
C Butylamine-skin	5	15
C tert-Butyl chromate (as CrO ₃ -skin	—	0.1
n-Butyl glycidyl ether (BGE)	50	270
Butyl mercaptan	10	35
p-tert-Butyltoluene	10	60
Cadmium (Metal dust and soluble salts)	—	0.2
Cadmium oxide fume	—	0.1
Calcium arsenate	—	1
Calcium oxide	—	5
*Camphor	2	—
Carbaryl (Sevin**)	—	5
Carbon black	—	3.5
Carbon dioxide	5,000	9,000
Carbon disulfide-skin	20	60
Carbon monoxide	50	55
Carbon tetrachloride-skin	10	65
Chlordane-skin	—	0.5
Chlorinated camphene-skin	—	0.5
Chlorinated diphenyl oxide	—	0.5
*Chlorine	1	—
Chlorine dioxide	0.1	0.3
C Chlorine trifluoride	0.1	0.4
C Chloroacetaldehyde	1	3
alpha-Chloroacetophenone (phenacylchloride)	0.05	0.3
Chlorobenzene (monochlorobenzene)	75	350
o-Chlorobenzylidene malononitrile (OCBM)	0.05	0.4
Chlorobromomethane	200	1,050
2-Chloro-1, 3 butadiene, see Chloroprene		
Chlorodiphenyl (42% Chlorine)-skin	—	1
Chlorodiphenyl (54% Chlorine)-skin	—	0.5
1, Chloro, 2, 3, epoxypropane, see Epichlorhydrin		
2, Chloroethanol, see Ethylene chlorohydrin		

(a) Parts of vapor or gas per million parts of contaminated air by volume at 25 degrees Centigrade and 760 mm. Hg pressure.

(b) Approximate milligrams of particulate per cubic meter of air.

C Ceiling limit which shall not be exceeded even momentarily or infrequently.

* 1969 Addition.

** Registered trade name.

TABLE I—THRESHOLD LIMIT VALUES (T.L.V.)

Substance	ppm (a)	mg/M ³ (b)
Chloroethylene, see Vinyl chloride		
C Chloroform (trichloromethane)	50	240
1-Chloro-1-nitropropane	20	100
Chloropicrin	0.1	0.7
Chloroprene (2-chloro-1, 3-butadiene) -skin	25	90
Chromic acid and chromates (as CrO ₃)	—	0.1
Chromium, sol. chromic, chromous salts (as Cr)	—	0.5
Metal and insoluble salts	—	1
Coal tar pitch volatiles (benzene soluble fraction, anthracene, BaP, phenanthrene, acridine, chrysene, pyrene)	—	0.2
Cobalt, metal fume and dust	—	0.1
Copper fume	—	0.1
Dusts and mists	—	1
Cotton dust (raw)	—	1
Crag** herbicide	—	15
Cresol (all isomers) -skin	5	22
Crotonaldehyde	2	6
Cumene-skin	50	245
Cyanide (as CN) -skin	—	5
*Cyanogen	10	—
Cyclohexane	300	1,050
Cyclohexanol	50	200
Cyclohexanone	50	200
Cyclohexene	300	1,015
Cyclopentadiene	75	200
2, 4-D	—	10
DDT-skin	—	1
DDVP-skin	—	1
Decaborane-skin	0.05	0.3
Demeton** -skin	—	0.1
Diacetone alcohol (4-methyl-2-pentanone)	50	240
1, 2 Diaminoethane, see Ethylenediamine		
Diazomethane	0.2	0.4
Diborane	0.1	0.1
C 1, 2-Dibromoethane (ethylene dibromide) -skin	25	190
Dibutyl phosphate	1	5
Dibutylphthalate	—	5
C o-Dichlorobenzene	50	300
p-Dichlorobenzene	75	450
Dichlorodifluoromethane	1,000	4,950
1, 3-Dichloro-5, dimethyl hydantoin	—	0.2
1, 1-Dichloroethane	100	400
1, 2-Dichloroethane	50	200

(a) Parts of vapor or gas per million parts of contaminated air by volume at 25 degrees Centigrade and 760 mm. Hg pressure.

(b) Approximate milligrams of particulate per cubic meter of air.

C Ceiling limit which shall not be exceeded even momentarily or infrequently.

* 1969 Addition.

** Registered trade name.

TABLE I—THRESHOLD LIMIT VALUES (T.L.V.)

Substance	ppm (a)	mg/M ³ (b)
1, 2-Dichloroethylene	200	790
C Dichloroethyl ether-skin	15	90
Dichloromethane, see Methylenechloride		
Dichloromonofluoromethane	1,000	4,200
C 1, 1-Dichloro-1-nitroethane	10	60
1, 2-Dichloropropane, see Propylenedichloride		
Dichlorotetrafluoroethane	1,000	7,000
Dieldrin-skin	—	0.25
Diethylamine	25	75
Diethylamino ethanol-skin	10	50
C Diethylene triamine-skin	10	—
Diethylether, see Ethyl ether		
Diffuorodibromomethane	100	860
C Diglycidyl ether (DGE)	0.5	2.8
Dihydroxybenzene, see Hydroquinone		
Diisobutyl ketone	50	290
Diisopropylamine-skin	5	20
*Diphenyl amine	—	10
Dimethoxymethane, see Methylal		
Dimethyl acetamide-skin	10	35
Dimethylamine	10	18
Dimethylaminobenzene, see Xylidene		
Dimethylaniline (N-dimethylaniline) -skin	5	25
Dimethylbenzene, see Xylene		
Dimethyl 1, 2-dibromo-2, 2-dichloroethyl, (Dibrom) ..	—	3
Dimethylformamide-skin	10	30
2, 6 Dimethylheptanone, see Diisobutyl ketone		
1, 1-Dimethylhydrazine-skin	0.5	1
Dimethylphthalate	—	5
Dimethylsulfate-skin	1	5
Dinitrobenzene (all isomers) -skin	—	1
Dinitro-o-cresol-skin	—	0.2
Dinitrotoluene-skin	—	1.5
Dioxane (Diethylene dioxide) -skin	100	360
Diphenyl	0.2	1
*Diphenyl Amine	—	10
Diphenylmethane diisocyanate (see Methylene bisphenyl isocyanate) (MDI)		
Dipropylene glycol methyl ether-skin	100	600
Di-sec, octyl phthalate (Di-2-ethylhexylphthalate)	—	5
Endrin-skin	—	0.1
Epichlorhydrin-skin	5	19
EPN-skin	—	0.5
1, 2-Epoxypropane, see Propyleneoxide		
2, 3-Epoxy-1-propanol, see Glycidol		

(a) Parts of vapor or gas per million parts of contaminated air by volume at 25 degrees Centigrade and 760 mm. Hg pressure.

(b) Approximate milligrams of particulate per cubic meter of air.

C Ceiling limit which shall not be exceeded even momentarily or infrequently.

* 1969 Addition.

TABLE I—THRESHOLD LIMIT VALUES (T.L.V.)

Substance	ppm (a)	mg/M ³ (b)
Ethanethiol, see Ethylmercaptan		
Ethanolamine	3	6
2 Ethoxyethanol-skin	200	740
2 Ethoxyethylacetate (Cellosolve acetate)-skin	100	540
Ethyl acetate	400	1,400
Ethyl acrylate-skin	25	100
Ethyl alcohol (ethanol)	1,000	1,900
Ethylamine	10	18
Ethyl sec-amyl ketone (5-methyl-3-heptanone)	25	130
Ethyl benzene	100	435
Ethyl bromide	200	890
Ethyl butyl ketone (3-Heptanone)	50	230
Ethyl chloride	1,000	2,600
Ethyl ether	400	1,200
Ethyl formate	100	300
Ethyl mercaptan	10	25
Ethyl silicate	100	850
Ethylene chlorohydrin-skin	5	16
Ethylenediamine	10	25
Ethylene dibromide, see 1, 2-Dibromoethane		
Ethylene dichloride, see 1, 2-Dichloroethane		
C Ethylene glycol dinitrate and/or Nitroglycerin-skin	0.2 (d)	1
Ethylene glycol monomethyl ether acetate, see Methyl cellosolve acetate		
Ethylene imine-skin	0.5	1
Ethylene oxide	50	90
Ethylidene chloride, see 1, 1-Dichloroethane		
N-Ethylmorpholine-skin	20	94
Ferbam	—	15
Ferrovandium dust	—	1
Fluoride (as F)	—	2.5
Fluorine	0.1	0.2
Fluorotrichloromethane	1,000	5,600
C Formaldehyde	5	6
Formic acid	5	9
Furfural-skin	5	20
Furfuryl alcohol	50	200
Gasoline	—	A
Glycidol (2, 3-Epoxy-1-propanol)	50	150
Glycol monoethyl ether, see 2-Ethoxyethanol		
Guthion**, see Azinphosmethyl		

- (a) Parts of vapor or gas per million parts of contaminated air by volume at 25 degrees Centigrade and 760 mm. Hg pressure.
- (b) Approximate milligrams of particulate per cubic meter of air.
- C Ceiling limit which shall not be exceeded even momentarily or infrequently.
- (d) An atmospheric concentration of not more than 0.02 ppm, or personal protection may be necessary to avoid headache.
- A Requires development of TLV based on benzene, other aromatics and additives content.
- ** Registered trade name.

TABLE I—THRESHOLD LIMIT VALUES (T.L.V.)

Substance	ppm (a)	mg/M ³ (b)
Strychnine	—	0.15
C Styrene monomer (phenylethylene)	100	420
Sulfur dioxide	5	13
Sulfur hexafluoride	1,000	6,000
Sulfuric acid	—	1
Sulfur monochloride	1	6
Sulfur pentafluoride	0.025	0.25
Sulfuryl fluoride	5	20
Systox, see Demeton**		
2, 4, 5, T	—	10
Tantalum	—	5
TEDP-skin	—	0.2
Teflon** decomposition products	—	A ²
Tellurium	—	0.1
Tellurium hexafluoride	0.02	0.2
TEPP-skin	—	0.05
C Terphenyls	1	9
1, 1, 1, 2-Tetrachloro-2, 2-difluoroethane	500	4,170
1, 1, 2, 2-Tetrachloro-1, 2-difluoroethane	500	4,170
1, 1, 2, 2-Tetrachloroethane-skin	5	35
Tetrachloroethylene, see Perchloroethylene		
Tetrachloromethane, see Carbon tetrachloride		
Tetrachloronaphthalene-skin	—	2
Tetraethyl lead (as Pb)-skin	—	0.075
Tetrahydrofuran	200	590
Tetramethyl lead (TML) (as Pb)-skin	—	0.075
Tetramethyl succinonitrile-skin	0.5	3
Tetranitromethane	1	8
Tetryl (2, 4, 6-trinitrophenylmethylnitramine)-skin	—	1.5
Thallium (soluble compounds)-skin	—	0.1
Thiram	—	5
Tin (inorganic compounds, except SnH ₄ and SnO ₂)	—	2
Tin (organic compounds)	—	0.1
Titanium dioxide	—	15
Toluene (toluol)	200	750
C Toluene-2, 4-diisocyanate	0.02	0.14
o-Toluidine-skin	5	22
Toxaphene, see Chlorinated camphene		
Tributyl phosphate	—	5
1, 1, 1-Trichloroethane, see Methyl chloroform		
1, 1, 2-Trichloroethane-skin	10	45
Trichloroethylene	100	535
Trichloromethane, see Chloroform		
Trichloronaphthalene-skin	—	5

(a) Parts of vapor or gas per million parts of contaminated air by volume at 25 degrees Centigrade and 760 mm. Hg pressure.

(b) Approximate milligrams of particulate per cubic meter of air.

C Ceiling limit which shall not be exceeded even momentarily or infrequently.

A² No TLV recommended pending determination of toxicity of products, but air concentrations should be minimal.

** Registered trade name.

PHILIPPINE OCCUPATIONAL HEALTH AND SAFETY (OHS) Standards

Occupational safety and health is an area concerned with protecting the safety, health and welfare of people engaged in work or employment.

Occupational health should aim at:

The promotion and maintenance of the highest degree of physical, mental and social well-being of workers in all occupations.

Tile Setting Workplace

The workplace of Tilers depends on the requirement of the owner. Usually most tiling jobs are done indoors.

Common Hazards and Risks

1. Exposure to dust and flying debris
2. Thin- edged or sharp- edged tools
3. Falling objects inside buildings
4. Electrical connections when using power tools
5. Lack of ventilation and light especially in bathroom tiling
6. Falls on scaffoldings or ladders
7. Smoking
8. Noise
9. Violence and Aggression

(NOTE) The following text will be used for further reading, not for class discussion.

**REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF LABOR
Manila**

DEPARTMENT ORDER NO. 4

Pursuant to Section 2 of Republic Act No. 679, as further amended by Presidential Decree No. 148, commonly known as the Woman and Child Labor Law, the following occupations are hereby declared hazardous to young workers, without prejudice to other occupations that may subsequently be declared as such:

HAZARDOUS OCCUPATIONS TO YOUNG WORKERS

A. Farming, Fishing, Hunting, Logging, and Related Occupations

- fishermen (deep sea and offshore)
- divers of (sponge, pearl and shell)
- logging (as cutter, sawyer, stripper, cable installer, feller)
- charcoal burner (big scale)

B. Mining, Quarrying and Related Occupations

- operators of (drilling and blasting machines, stone crushing equipment, conveyor, compressor, steam boiler, air receiver, gas cylinder, acetylene generator)
- firing (with fuse, electricity)
- stone splitter
- underground workers

C. Transport, Communication and Navigational Occupations

- firemen
- drivers or operators of bulldozer, crane, pile driving equipment, trailer, road roller, tractor lifting appliances, scaffold winch, hoist, excavator, loading machine, trucks, buses, jeeps and taxis
- tilers and greasers of heavy machineries
- traffic controller and dispatchers

D. Craftsman, Production, Process and Related Occupations

- spinners and winders (textile)
- fiber and plastic preparers
- bleacher, dyer and finisher of textiles using chemicals
- tool maker, machinist, plumber, welder, flame cutter and plater
- installer and repairer of telephone and telegraph
- electrical and electronic fitter
- linemen and cable jointer
- sawyer and woodworking machine setter and operator
- furnace and oven workers in brick making
- furnace man and kilnman in the manufacture of glass and ceramics
- brewer and wine maker
- distiller of alcoholic beverages
- tanner
- blacksmith, hammersmiths, forgeman
- slaughtering and killing large cattle (carabao, cow, horses)
- extraction of lard and oil

E. Service, Sports and Related Work

- fire-fighters and guards
- ship stewards
- airline hostesses

- bartenders
- bus conductors and conductresses
- masseurs and masseuses
- taxi-dancers
- entertainers (stripteasers, burlesque, dancers, bomba)
- female bath house attendants
- female escorts for men
- janitors in bawdy houses
- lifeguards in swimming pools and resorts
- jockeys and horse trainers
- judo-karate instructor
- embalmers and undertakers
- dealers, croupiers, bookies and bet takers
- lifting, carrying, handling and moving heavy loads

F. Professional, Technical and Related Works

- personal service of female in bars, cocktail lounges, motels, hotels, massage clinics, and other drinking places

G. All occupational in the Processing and Preparation of Drugs and Chemical Products Involving Exposure to Dangerous Chemicals

H. All Occupations in the Manufacturing, Handling, and Transporting of Explosives, Toxic, Corrosives, Poisonous and Noxious Components and Flammable Liquids in Bulk

I. All Activities in any Work-room, Building, Premises, or any place where Radium is Stored, Kept or Processed or Used in the Manufacture of Self-Luminous Compounds or other Radioactive Substances.

This Department Order shall take effect immediately.

Approved: June 8, 1973

(SGD) AMADO G. INCIONG
Acting Secretary



How Much Have You Learned?

Self-Check 1.1

I. MULTIPLE CHOICE:

DIRECTIONS: Select the letter of the best answer. Write the letters of your answers in your activity notebook.

- 1) This is an area concerned with protecting the safety, health and welfare of people engaged in work or employment.
 - A) Contingency plan
 - B) Disaster Preparedness
 - C) Occupational Safety and Health
 - D) Threshold Limit Value

- 2) It is the equivalent amount of a chemical substance which is a level to which it is believed a worker can be exposed day after day for a working lifetime without adverse health effects.
 - A) Equipment Specification
 - B) Hazard Pay
 - C) Related Occupations
 - D) Threshold Limit Value

- 3) It is defined as a concentration in air, typically for inhalation or skin exposure.
 - A) Atmosphere
 - B) Carbon Dioxide
 - C) Oxygen
 - D) TLV for chemical substances

- 4) Occupational health should aim at:
 - A) The highest physical and mental achievements in social studies.
 - B) The promotion and maintenance of the highest degree of physical, mental and social well-being of workers in all occupations.
 - C) The promotion of the highest level of achievement in the practiced occupation.
 - D) The maintenance of the highest degree of educational attainment.

II. Refer to Table on Threshold Limit Values. Look at Acetone, Ammonia, Carbon Dioxide, Carbon Monoxide, Chlorine and other familiar elements. Read the corresponding TLV. Explain what it means.

Refer to the Answer Key. What is your score?

Read the Information Sheet 1.2 very well then find out how much you can remember and how much you learned by doing Self-check 1.2.

Information Sheet 1.2

Effects of Hazards in the Workplace

1. Exposure to dust and flying debris

Effects on the respiratory system can be the runny, itching eyes and nose typical of hay fever. These may be followed by more severe symptoms typical of asthma such as:

- wheezing
- tightness of the chest
- breathlessness
- coughing.

2. Thin- edged or sharp- edged tools

It may cause cuts or wounds especially without the use of gloves.

3. Falling objects inside buildings

If the worker do not use PPE like helmet, these can cause heavy damaged.

4. Electrical connections when using power tools

These may cause electric shocks or maybe electrocution to workers, if not immediately addressed. Voltages over 50 volts AC or 120 volts DC are considered hazardous.

5. Lack of ventilation and light on confined places especially in bathroom tiling.

This may cause suffocation and hard of breathing to workers.

6. Falls on scaffoldings or ladders

These can cause shocks or severe and permanent injury.

7. Smoking

Smoking is a major cause for concern within a workplace. It can have a direct impact on both smokers and non-smokers, and ultimately employers. Most employers now have a legal responsibility to ensure that people do not smoke in the workplace.

8. Noise

The use of power tools in cutting tiles cause noise. The louder the noise, the more damage it can cause. Excessive noise causes permanent damage to hearing. Loud noises can cause hearing loss, or by exposures over a long period of time.

9. Violence and Aggression

The risks to the workers from violence and aggression of others who are under the influence of alcohol or prohibited drugs.



How Much Have You Learned?

Self-Check 1.2

DIRECTIONS: Select the letter of the correct answer. Write the letters of your answers in your activity notebook.

- 1) It is simply the breathing in of environmental tobacco smoke, whether it is smoke from burning tobacco, or smoke which is exhaled by smokers.
A) Abusive smoker
B) Chance smoker
C) Direct smoking
D) Passive smoking
- 2) The effects on which the respiratory system can be runny, itching eyes and nose typical of hay fever.
A) Exposure to dust and flying debris
B) Exposure to sun
C) Exposure to wind
D) Influenza
- 3) These can cause shocks or severe and permanent injury.
A) Confined places
B) Falls on scaffoldings or ladders
C) Mild noise
D) Smoking

Read the Information Sheet 1.3 very well then find out how much you can remember and how much you learned by doing Self-check 1.3.

Information Sheet 1.3

ERGONOMICS


Ergonomics is the study of designing equipment and devices that fit the human body, its movements, and its cognitive abilities.

Ergonomics (or human factors) is the **scientific discipline** concerned with the understanding of interactions among humans and other elements of a system, and the profession that applies theory, principles, data and methods to design in order to optimize human well-being and overall system performance.

1. Ergonomics is employed to fulfill the two goals of health and productivity.
2. Proper ergonomic design is necessary to prevent repetitive strain injuries, which can develop over time and can lead to long-term disability
3. Ergonomics is concerned with the fit between the user, equipment and their environments.
4. It takes into account of the user's capabilities and limitations in seeking to ensure that tasks, functions, information and the environment suit each user.

Physical ergonomics: is concerned with human anatomy (body parts), and some of the anthropometric, physiological (body size) and bio mechanical (health) characteristics as they relate to physical activity.

Ergonomics in the workplace

 The term 'ergonomics' is generally used to refer to physical ergonomics as it relates to the workplace (for example ergonomic tools and equipment). **Ergonomics in the workplace** has to do largely with the safety of employees, both long and short-term.

Ergonomics in Tile Setting

1. Tiling Tools – The sizes of tools fit with the workers handling like; handles can be gripped with ease. The handles are made of materials which is comfortable to grip and not slippery.
2. Personal Protective Equipment (PPE) – These are designed in accordance with the workers physique.
 - 2.1. Coveralls are sized either small, medium, large, and other sizes.
 - 2.2. Dust masks must fit the nose and the cheek area.
 - 2.3. Gloves should fit the worker's hands, not too loose and not too tight.
 - 2.4. Knee pads must fit the user's knees.
 - 2.5. Helmets should fit the head and complete with the necessary locks.
 - 2.6. Safety shoes must fit the size of the worker's feet.

Ergonomics practices.

1. **Reactive ergonomics** is when something needs to be fixed, and corrective action is taken.
2. **Proactive ergonomics** is the process of seeking areas that could be improved and fixing the issues before they become a large problem. Problems may be fixed through equipment design, task design, or environmental design.

Equipment design changes the actual, physical devices used by people.

Task design changes what people do with the equipment.

Environmental design changes the environment in which people work, but not the physical equipment they use.



How Much Have You Learned?

Self-Check 1.3

DIRECTIONS: Select the correct answer from the choices that fits to the statement. Write your answers in your activity notebook.

1) It is the study of designing equipment and devices that fit the human body, its movements, and its cognitive abilities.

- | | |
|---------------|--------------|
| A) Economics | C) Etymology |
| B) Ergonomics | D) History |

2) When something needs to be fixed, and corrective action is taken.

- | | |
|------------------------|-------------------------|
| A) Ergonomic equipment | C) Proactive ergonomics |
| B) Ergonomics society | D) Reactive ergonomics |

3) It is concerned with human anatomy, and some of the anthropometric, physiological and bio mechanical characteristics as they relate to physical activity.

- | | |
|-------------------------|------------------------------|
| A) Active ergonomic | C) Organizational ergonomics |
| B) Cognitive ergonomics | D) Physical ergonomics |

4) It is about changing the actual, physical devices used by people.

- | | |
|-------------------------|---------------------|
| A) Environmental design | C) Remodeled design |
| B) Equipment design | D) Task design |

LEARNING OUTCOME 2

Control hazards and risks

PERFORMANCE STANDARDS

- OHS procedures for controlling hazards and risks are strictly followed.
- Procedures in dealing with workplace accidents, fire and emergencies are followed in accordance with the organization's OHS policies.
- Personal protective equipment (PPE) is correctly used in accordance with organization's OHS procedures and practices.
- Procedures in providing appropriate assistance in the event of workplace emergencies are identified in line with the established organizational protocol.



What Do You Already Know?

Let us determine how much you already know about controlling hazards and risks. Take this test.

Pretest LO 2

DIRECTIONS: Select the correct answer from the choices that fits to the statement. Write your answers in your activity notebook.

1) These are defined as mandatory requirements that aim to prevent or reduce injury

- | | |
|--------------------|--------------------------|
| A) Clean air | C) Safety regulations |
| B) ECC regulations | D) Transportation sector |

2) The role of regulation is to _____.

- | | |
|---------------------------------------|--------------------------------------|
| A) Encourage colorful clothing | C) Encourage fines |
| B) Encourage expensive motor vehicles | D) Encourage good safety performance |

3) Regulation is more common in _____, where the potential for fatal injury is perceived to be more.

- A) home
- B) office

- C) recreational places
- D) transportation and workplace



What Do You Need To Know?

Read the Information Sheet 2.1 very well then find out how much you can remember and how much you learned by doing Self-check 2.1.

Information Sheet 2.1

Introduction

Maybe you heard some programs on how to preserve the clean air that we breath. Surely, this time you will learn much about clean air.

CLEAN AIR ACT

What is clean air?

It is an air free of dirt, stain, or impurities. Hazards derive from air can be minimized or reduced by maintaining the air clean.

In so doing, the government enacted a law that governs clean air. It is known as Philippine Clean Air Act of 1999.

Tile Setting Job and Clean Air

Preparation of materials:

1. The use of sieve in preparing fine aggregates may cause fine dust carried on air.

Control: Prepare fine aggregates at open space and maintain the sieve as low as possible. Pour some amount of water on fine aggregates to minimize dust. Wear dust mask in cases of too much dust.

2. Pouring cement powder in fine aggregates may be carried on by air.

Control: Do not drop bags of cement on aggregates forcefully. Wear dust mask to avoid inhaling cement powder.

3. Cutting tiles with a power tool produces dust and loud noise.

Control: Do proper maintenance of power tool to minimize excessive noise. Wear ear plugs to avoid too much noise, dust mask to avoid inhaling tile dust, and safety glasses or goggles for eye protection. Use gloves for hand protection.

Some excerpts from the Clean Air Act

"Air pollutant" means any matter found in the atmosphere other than oxygen, nitrogen, water vapor, carbon dioxide, and the inert gases all in their natural or normal concentrations, that is detrimental to health or the environment, which includes but not limited to smoke, dust, soot, cinder, fly ash, solid particles of any kind, gases, fumes, chemical mists, contaminated steam and radioactive substances;

"Air pollution" means any alteration of the physical, chemical and biological properties of the atmosphere, or any discharge thereto of any liquid, gaseous or solid substances that will or is likely to create or to render the air resources of the country harmful, detrimental, or injurious to public health, safety or welfare or which will adversely affect their utilization for domestic, commercial, industrial, agricultural, recreational, or other legitimate purposes;

"Emission" means any measurable air contaminant, pollutant, gas stream or unwanted sound from a known source which is passed into the atmosphere.

"Hazardous substances" refers to those substances which present either: (1) short-term acute hazards such as acute toxicity by ingestion, inhalation, or skin absorption, corrosivity or other skin or eye contact hazard or the risk of fire explosion; or (2) long-term toxicity upon repeated exposure, including carcinogenicity (which in some cases may result in acute exposure but with a long latent period), resistance to the detoxification process, or the potential to pollute underground or surface waters;

"Infectious waste" refers to soiled surgical dressings, swabs and other contaminated waste from treatment areas; materials which have been in contact with persons or animals suffering from infectious diseases; cultures and stocks of infectious agents from laboratory work; dialysis equipment; apparatus and disposable gowns, aprons, gloves, towels, etc; waste from dialysis treatment area; waste from patients in isolation wards; all materials which may contain pathogens in sufficient concentration or quality that exposure to it could result in disease;

"Pollution control device" refers to any device or apparatus that is used to prevent, control, or abate the pollution of air caused by emissions from identified sources at levels within the air pollution standards established by the Department;

"Pollution control technology" refers to pollution control devices, production processes, fuel combustion processes or other means that effectively prevent or reduce emissions or effluents;

"Sigá" means the traditional small scale method of burning of wastes resulting from cleaning the backyard such as fallen leaves, twigs, stems, and other similar matter from plants and trees in the backyard where the burning is done.

Open Burning

No person shall be allowed to burn any materials in any quantities which shall cause the emission of toxic and poisonous fumes. Such materials include but not limited to plastic, polyvinyl chloride, polypropylene, paints, ink, wastes containing heavy metals, organic chemicals, petroleum related compound, industrial wastes, ozone depleting substances and other similar toxic and hazardous substances.

(NOTE: The following excerpts are for further reading, NOT for class discussion).

PHILIPPINE CLEAN AIR ACT OF 1999

Pursuant to the provisions of Section 51 of Republic Act No. 8749, otherwise known as the "Philippine Clean Air Act of 1999," and by virtue of Executive Order No. 192, Series of 1987, the Department of Environment and Natural Resources hereby adopts and promulgates the following rules and regulations:

PART I GENERAL PROVISIONS

RULE I PRELIMINARY PROVISIONS

Section 1. Title. - These Rules shall be known and cited as the "Implementing Rules and Regulations of the Philippine Clean Air Act of 1999."

Section 2. Purpose. - The purpose of these Rules is to provide guidelines on the operationalization of the Philippine Clean Air Act of 1999.

RULE III AIR QUALITY PRINCIPLES

(Continuation, some parts cut)

Section 1. Air Quality Principles.

- a. The State shall promote and protect the global environment to attain sustainable development while recognizing the primary responsibility of local government units to deal with environmental problems.
- b. The State recognizes that the responsibility of cleaning the habitat and environment is primarily area-based and that air quality management and control is most effective at the level of airsheds.
- c. The State recognizes the principle that "polluters must pay" and the important role of economic instruments in air quality management and control.
- d. The State recognizes that a clean and healthy environment is for the good of all and should therefore be a concern of all.

DEFINITION OF TERMS

Section 1. Definitions. - The following terms as used in these Implementing Rules and Regulations shall be defined as follows:

"Act" refers to Republic Act No. 8749, otherwise known as the "Philippine Clean Air Act of 1999";

"Air pollutant" means any matter found in the atmosphere other than oxygen, nitrogen, water vapor, carbon dioxide, and the inert gases all in their natural or normal concentrations, that is detrimental to health or the environment, which includes but not limited to smoke, dust, soot, cinder, fly ash, solid particles of any kind, gases, fumes, chemical mists, contaminated steam and radioactive substances;

"Air pollution" means any alteration of the physical, chemical and biological properties of the atmosphere, or any discharge thereto of any liquid, gaseous or solid substances that will or is likely to create or to render the air resources of the country harmful, detrimental, or injurious to public health, safety or welfare or which will adversely affect their utilization for domestic, commercial, industrial, agricultural, recreational, or other legitimate purposes;

"Best Available Control Technology" refers to approaches, techniques or equipment which when used, result in lower air emissions but in a cost-effective manner. BACT results in lower emission rates than those specified in the National Emission Standards for Source Specific Air Pollutants

"Bio-medical waste" refers to pathological wastes, pharmaceutical wastes, chemical wastes and sharps.

"Pathological wastes" include all human tissue (whether infected or not) such as limbs, organs, fetuses and body fluid; animal carcasses and tissue from laboratories, together with all related swabs and dressings.

"Pharmaceutical wastes" include pharmaceutical products; drugs and chemicals that have been returned from wards; have been spilled or soiled; are expired or contaminated; or are to be discarded.

"Chemical wastes" include discarded solid, liquid or gaseous chemicals from housekeeping and disinfecting procedures.

"Bureau" or "EMB" refers to the Central Office of the Environmental Management Bureau and its Regional Offices under the Department;

"Cease and Desist Order" refers to the ex parte Order directing the discontinuance of the operation resulting in the emission or discharge of pollutants exceeding the emission standards or whenever such emission or discharge constitutes imminent threat to human, animal or plant life, public health or public safety.

"Certificate of Conformity" refers to the certificate issued by the Department to a vehicle manufacturer/assembler or importer certifying that a particular new vehicle or vehicle type meets the requirements provided under this Act and its Implementing Rules and Regulations;

"Completely Built-up Unit (CBU)" refers to vehicles imported into the country either brand new or used and ready for operation;

"Compliance Plan" refers to a plan submitted to the Bureau for approval which details how an existing stationary air emissions source will be brought into compliance.

"Criteria Pollutants" are air pollutants for which National Ambient Air Quality Guideline Values have been established;

"Department" refers to the Department of Environment and Natural Resources;

"Detoxification process" refers to the process of diminishing or removing the poisonous quality of any substance using chelating agents to prevent or reverse toxicity particularly for those substances (e.g., heavy metals) that are cumulative or persistent in the body;

"Emission" means any measurable air contaminant, pollutant, gas stream or unwanted sound from a known source which is passed into the atmosphere.

"Hazardous substances" refers to those substances which present either: (1) short-term acute hazards such as acute toxicity by ingestion, inhalation, or skin absorption, corrosivity or other skin or eye contact hazard or the risk of fire explosion; or (2) long-term toxicity upon repeated exposure, including carcinogenicity (which in some cases may result in acute exposure but with a long latent period), resistance to the detoxification process, or the potential to pollute underground or surface waters;

"Imported Used/Second-Hand Vehicle" means any used or second-hand motor vehicle imported and registered in the country of origin;

"Incinerator" refers to a facility, equipment, furnace or other similar structure which burns municipal, bio-medical or hazardous wastes, which process emits toxic and poisonous fumes;

"Infectious waste" refers to soiled surgical dressings, swabs and other contaminated waste from treatment areas; materials which have been in contact with persons or animals suffering from infectious diseases; cultures and stocks of infectious agents from laboratory work; dialysis equipment; apparatus and disposable gowns, aprons, gloves, towels, etc; waste from dialysis treatment area; waste from patients in isolation wards; all materials which may contain pathogens in sufficient concentration or quality that exposure to it could result in disease;

"In-Use Vehicle" means a motor vehicle duly registered with the LTO;

"Light Duty Vehicles" are motor vehicles whose gross vehicle weight is equal to or less than 3,500 kgs. This also refers to "Light Commercial Vehicles;"

"Motorcycle" refers to any two-wheeled motor vehicle with at least one headlight, taillight and stoplight, and one or more saddle seats. For purposes of these rules, motorcycles shall include motorcycles with attached cars also known as **"tricycles"**.

"Motor Vehicle" means any vehicle propelled by a gasoline or diesel engine or by any means other than human or animal power constructed and operated principally for the conveyance of persons or the transportation of goods.

"Motor Vehicle Registration" refers to the official recording of a motor vehicle by the Land Transportation Office (LTO) subject to the conformance of the vehicle to the safety and emission standards provided under Section 21 of the Act, including the pre-evaluation of the documents/requirements pursuant to Section 5 of Republic Act 4136, as amended, otherwise known as the Land Transportation Code;

"Municipal waste" refers to the waste materials generated from communities within a specific locality;

"National Ambient Air Quality Guideline Values" are limits on criteria air pollutant concentrations published by the Department, intended to be protective of public health, safety, and general welfare.

"New Motor Vehicle" means a vehicle constructed entirely from new parts that has never been sold or registered with the DOTC or with the appropriate agency or authority, and operated on the highways of the Philippines, any foreign state or country;

"Ozone Depleting Substances" (ODS) refers to those substances that significantly deplete or otherwise modify the ozone layer in a manner that is likely to result in adverse effects on

human health and the environment such as, but not limited to, **chlorofluorocarbons, halons,** and the like.

"Particulate Matter" or "Suspended Particulates" means any material, other than uncombined water, which exists in a finely divided form as a liquid or solid;

"Poisonous and toxic fumes" means any emission and fumes which do not conform to internationally accepted standards, including but not limited to World Health Organization (WHO) guideline values;

"Pollution control device" refers to any device or apparatus that is used to prevent, control, or abate the pollution of air caused by emissions from identified sources at levels within the air pollution standards established by the Department;

"Pollution control technology" refers to pollution control devices, production processes, fuel combustion processes or other means that effectively prevent or reduce emissions or effluents;

"Siga" means the traditional small scale method of burning of wastes resulting from cleaning the backyard such as fallen leaves, twigs, stems, and other similar matter from plants and trees in the backyard where the burning is done.

Section 4. Modification of Sources. - Any existing source in an attainment area making a change or modification to its process or production which results in an increase of POTENTIAL emissions equal to or greater than the following shall be considered significant and subject to Rule X for the affected pollutant(s).

Carbon Monoxide	100 tons per year
Nitrogen Oxides	40 tons per year
Sulfur Dioxide	40 tons per year
TSP	25 tons per year
PM10	15 tons per year
Volatile Organic Compounds	40 tons per year
Hydrogen Sulfide	10 tons per year

Section 5. Emission Fee Surcharge. - Sources subject to the non-attainment provisions will be assessed a 50% surcharge (i.e., 150% of base) on the annual emission fees for the pollutant(s) for which the area is designated non-attainment.

Section 6. Penalty and Fine Surcharge. - Sources subject to the non-attainment provisions will be subject to a 100% surcharge (i.e., 200% of base) for any penalties or fines relating to a violation of the non-attainment provisions.

Miscellaneous Equipment.

Re-heating furnaces, smoke ovens, bake ovens, coffee heaters, varnish kettles, paint booths and similar equivalent shall be so designed that when operating, there is no free flow of

objectionable gases into the atmosphere. To minimize the escape of smoke, odors, fly ash or fumes, appropriate air pollution control facilities shall be installed.



How Much Have You Learned?

Self-Check 2.1

MULTIPLE CHOICE:

DIRECTIONS: Select the correct answer from the choices that fits to the statement. Write your answers in your activity notebook.

1) It means any measurable air contaminant, pollutant, gas stream or unwanted sound from a known source which is passed into the atmosphere.

- A) Chemical component
- B) Emission
- C) Pollute
- D) Smokescreen

2) This means any matter found in the atmosphere other than oxygen, nitrogen, water vapor, carbon dioxide, and the inert gases all in their natural or normal concentrations, that is dangerous to health or the environment.

- A) Air craft
- B) Air drying
- C) Air pollutant
- D) Air space

3) It include discarded solid, liquid or gaseous chemicals from housekeeping and disinfecting procedures.

- A) Animal waste
- B) Chemical waste
- C) Pharmaceutical waste
- D) Waste management

4) The traditional small scale method of burning of wastes resulting from cleaning the backyard such as fallen leaves, twigs, stems, and other similar matter from plants and trees in the backyard where the burning is done.

- A) Kaingin
- B) Saing
- C) Salot
- D) Siga

5) It is an air free of dirt, stain, or impurities.

- A) Air Philippines
- B) Clean air
- C) Cold air
- D) Hot air

Refer to the Answer Key. What is your score?

LEARNING OUTCOME 3

Maintain occupational health and safety awareness

PERFORMANCE STANDARDS

- Procedures in emergency related drill are strictly followed in line with the established organizational guidelines and procedures.
- OHS personal records are filled up in accordance with workplace requirements.
- PPE are maintained in line with organization guidelines and procedures.



What Do You Already Know?

Let us determine how much you already know about maintaining occupational health and safety awareness. Take this test.

Pretest LO 3

DIRECTIONS: Select the correct answer from the choices that fits to the statement. Write your answers in your activity notebook.

1) It is the first step in 5S, it refers to the sorting of the clutter from the other items within the work area that are actually needed

- A) Set in order(seiton)
- B) Sort(seiri)

- C) Sustain (shitsuke)
- D) Sweep (seiso)

2) The final stage, ensuring that the company continue to continually improve using the previous stages of 5S, maintain housekeeping, and conduct audits and so forth.

- A) Sort (seiri)
- B) Standardize (seiketsu)

- C) Sustain (shitsuke)
- D) Sweep (seiso)

3) It is the thorough cleaning of the area, tools, machines and other equipment to ensure that everything is returned to a nearly new status.

A) Set in order (seiton)
B) Sort (seiri)

C) Sustain (shitsuke)
D) Sweep (seiso)



What Do You Need To Know?

Read the Information Sheet 3.1 very well then find out how much you can remember and how much you learned by doing Self-check 3.1.

Information Sheet 3.1

WHAT DO YOU NEED TO KNOW?

Read the Information Sheet very well then find out how much you can remember of the important points.

Introduction

Healthy body makes a healthy mind. Health concerns is everybody's concern. In the workplace, the safety practices contribute largely in the maintenance of healthy body. All you need to do is perform the necessary procedures and regulations.

OCCUPATIONAL HEALTH AND SAFETY PROCEDURE, PRACTICES AND REGULATIONS

Safety regulations are defined as mandatory requirements that aim to prevent or reduce injury.

Environments for Safety Regulations

1. A common factor in regulation is used is the seriousness of addressing human health.

2. Regulation is more common in transportation and the workplace, where the potential for fatal injury is perceived to be relatively high.

3. Less common in the home and in sports environments, where the potential for fatal injury is perceived to be less.

4. The overall effectiveness of safety regulations depends on the requirement being mandated is capable of preventing or reducing the target injury and on whether the process of regulation is effective.

Tile Setting Workplace

Inside of a Building

Safety regulations

1. Enforce the wearing of necessary protective equipment.
2. Install the necessary scaffoldings properly.
3. Prepare all materials near the workplace to avoid unnecessary movements.
4. Abide with the laws/statutes that pertain to workplace safety.
5. Participate in various activities in maintaining safety of the workplace and in the community.
6. Get involve in the society's efforts to sustain safety in the workplace and nearby vicinity.

Some of the factors that influence the effectiveness of the process of regulation include:

- (1) whether the regulation requires active or passive compliance;
- (2) the effectiveness of enforcement;
- (3) public awareness of the regulation; and
- (4) public support for the regulation.

Five (5) Workplace Fire Safety Issues

Using Cords

. When using lights or other electronic decorations that have to be plugged in, it is very important to place cords out of the way. Cords can cause serious accidents or injuries if someone trips over a cord on the floor.

Never plug too many devices into one plug, because that could cause a fire.

Burning Candles

Lots of people like to burn scented candles around the workplace. Someone in the office should be in charge in going around at closing time to make certain all candles have been put out.

Warming Food

Someone in the office should be responsible for checking the warming device periodically to ensure it doesn't get too hot and cause a fire

Fire Extinguishers

It's very important that every workplace has fire extinguishers on hand in case of a fire.

Heaters

Workers must be careful and must not allow anything flammable to get close to the heaters.

HEALTHY HABITS IN THE WORKPLACE

All workplaces including Tile Setting workplace need to be well organized to achieve maximum results. The well known Five S were proven to be very effective.

WHAT ARE THE FIVE S'S?

5S Definition

Below are definitions and explanations of each step of the 5S process

1. 5S Seiri or Sort

5S Seiri or Sort is the first step in 5S, it refers to the sorting of the clutter from the other items within the work area that are actually needed.

2. 5S Seiton or Straighten / Set in order

5S Seiton or Straighten is the process of taking the required items that are remaining after the removal of clutter and arranging them in an efficient manner through the use of ergonomic principles and ensuring that **every item has a place and that everything is in its place.**

3. 5S Seiso or Sweep / shine

5S Seiso or Sweep is the thorough cleaning of the area, tools, machines and other equipment to ensure that everything is returned to a nearly new status.

4. 5S Seiketsu or Standardize

5S Seiketsu or standardize is the process of ensuring that what we have done within the first three stages of 5S become standardized; that is we ensure that we have common standards and ways of working.

5. 5S Shitsuke or Sustain

The final stage is 5S Shitsuke or sustain, ensuring that the company continue to continually improve using the previous stages of 5S, maintain housekeeping, and conduct audits and so forth.



How Much Have You Learned?

Self-Check 3.1

DIRECTIONS: Select the correct answer from the choices that fits to the statement. Write your answers in your activity notebook.

1) It is the first step in 5S, it refers to the sorting of the clutter from the other items within the work area that are actually needed

- A) Set in order(seiton) C) Sustain (shitsuke)
B) Sort(seiri) D) Sweep (seiso)

2) The final stage, ensuring that the company continue to continually improve using the previous stages of 5S, maintain housekeeping, and conduct audits and so forth.

- A) Sort (seiri) C) Sustain (shitsuke)
B) Standardize (seiketsu) D) Sweep (seiso)

3) It is the thorough cleaning of the area, tools, machines and other equipment to ensure that everything is returned to a nearly new status.

- A) Set in order (seiton) C) Sustain (shitsuke)
B) Sort (seiri) D) Sweep (seiso)

Refer to the Answer Key. What is your score?

Read the Information Sheet 3.2 very well then find out how much you can remember and how much you learned by doing Self-check 3.2.

Information Sheet 3.2

EMERGENCY-RELATED DRILLS

Emergency drills are extremely important:

1. to ensure that alarm systems are working properly,
2. that emergency reporting systems are efficient and
3. to encourage the communication between school or workplace.

By making these drills a priority, we can prevent injury and catastrophe if an actual disaster strikes.

FIRE , EARTQUAKE and other EMERGENCY DRILLS

1. These drills are usually initiated by the government through the Fire department. School children are required to participate in these activities which is done in schools.
2. All government and private agencies shall participate in these drills so that awareness will be instilled in their mind.
3. Local government units conduct information dissemination campaigns about these emergencies through community assemblies.

EMERGENCY DRILL PROCEDURE

Emergency Coordinators

- An **emergency coordinator** begin orchestrating the emergency procedure. For example, if you are coordinating a school emergency drill, there should be at least one teacher or employee in each hallway who will lead the other teachers and students to their designated emergency exits.
- **Coordinators** should be led in a **training walk-through session once every year** before the annual drill.
- These coordinators will call the fire department, lead their peers and relay all information to the fire department upon their arrival.

Room by Room

- In each room, **teachers, students or employees** must follow safety protocol before exiting. All laboratory operations or electrical devices should be turned off.
- **Windows and doors** should be opened or closed in accordance with the particular fire safety rules of your building.
- **Chairs** should be pushed into desks and large bags and other items should be placed under desks.
- **Ensure that all members** of the room or area are accounted for before exiting the room in a calm fashion.

Proceeding to Meeting Place

- One of the most important parts of the emergency drill procedure is **to establish the meeting places** for each class or department.
- Have each leader or emergency coordinator lead their group in a quick walk toward the designated area.
- All people participating in the drill should be kept calm while exiting and upon reaching the location.
- **All participants** should stay in the meeting place until the alarm has ceased and each emergency coordinator has been given permission to let everybody go back to their normal working areas.

Upkeep

- **Emergency coordinators** or other personnel should be assigned to check all closets, restrooms, and storerooms to ensure that all people have evacuated the building.

- **Personnel** should also be assigned to aid all handicapped students in leaving the building.
- If streets must be crossed to reach the designated meeting area, emergency coordinators should act as crossing guards to promote student safety.

Evaluation

- It is important to include members of senior management in the drill who are actively participating to show that all members of the staff are in support of the drill.
- By inviting the head of the school, superintendent and senior board members, you can have these senior members evaluate the success of the drill first hand.
- To make sure these staff members are available, make sure to invite them and organize the event ahead of time by at least a few weeks.
- After the drill, conduct a meeting with the staff and the emergency coordinators to report on its successes and failures



How Much Have You Learned?

Self-Check 3.2

MULTIPLE CHOICE:

DIRECTIONS: Select the correct answer from the choices that fits to the statement. Write your answers in your activity notebook.

1) They should stay in the meeting place until the alarm has ceased and each emergency coordinator has been given permission to let everybody go back to their normal working areas.

- | | |
|----------------------|-----------------|
| A) All Board members | C) All Seniors |
| B) All participants | D) All watchers |

2. These _____ should be led in a training walk-through session once every year before the annual drill.

- | | |
|-----------------|---------------|
| A) Coordinators | C) Parents |
| B) Graduates | D) Principals |

3. These should be pushed into desks and large bags and other items should be placed under desks.

- | | |
|---------------|---------------------|
| A) Appliances | C) Kitchen utensils |
| B) Chairs | D) Shoes |

Refer to the Answer Key. What is your score?



Congratulations! You did a great job! You are now ready for your assessment.

REFERENCES

- Clean Air Act of 1999, RA 8749
- The Grolier International Dictionary, Vol. One, Vol. Two 1981 Edition
- Tile Setting, Construction, CBVC, TR. TESDA
- Occupational Health and Safety ,DOLE



Answer Keys

LESSON 1

Pretest LO 1

- | | |
|------|-------|
| 1. D | 6. B |
| 2. D | 7. A |
| 3. A | 8. B |
| 4. B | 9. B |
| 5. D | 10. D |

Self-Check 1.1

- 1) A
- 2) A
- 3) B
- 4) A
- 5) A

Activity 1.1

Group of Materials

1. Glazed tiles
2. Granite stone
3. Glass tile
4. Anti-fracture membrane

Tools

1. Finishing trowel
2. Grout float
3. Notched and margin trowel

Equipment

1. Water bucket and sponge
2. Seam sealer
3. Haze remover

Pretest LO 2

Role Playing

Self-Check 2.1

Defects or damages of tiles

1. Scratches
2. Cracks
3. Inaccurate size

There are also tools delivered with damages;

1. Handles not well-fitted,
2. Warped blades of trowels,
3. Corroded parts,
4. Missing or detached parts of tools and equipment,
5. Low quality of materials used.

Activity Sheet 2.1

(ANSWER)

Assignment Sheet 2.1

(ANSWER)

LESSON 2

Pretest LO 1

- 1) B
- 2) C
- 3) D
- 4) B
- 5) A
- 6) B
- 7) C
- 8) B
- 9) A
- 10) A

Self-Check 1.1

1. B
2. E
3. D
4. A
5. C

Activity Sheet 1.1

1. 4" x 4"
2. 4" x 8"
3. $\frac{3}{4}$ " x $\frac{3}{4}$ "
4. 2" x 10"

Activity Sheet 1.2

Role Playing

Pretest LO 2

1. D
2. E
3. A
4. B
5. C

Self-Check 2.1

1. D
2. E
3. A
4. B
5. C

Activity Sheet 2.1

Tile Number and shape	Measurement	
	English System (inches)	Metric System (cm)
1. 2. 3. 4. 5.		

(ANSWER)

LESSON 3

Pretest LO 1

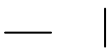
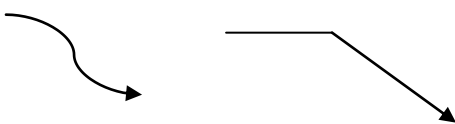
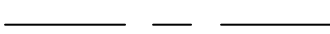

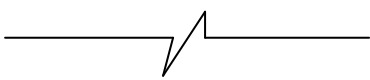


- | | |
|--|--|
| <p>A.</p> <ul style="list-style-type: none"> 1) A 2) B 3) D 4.) B | <p>B.</p> <ul style="list-style-type: none"> 1) Visible line 2) Hidden line 3) Dimension line 4) Dimension line |
|--|--|

Self-Check 1.1

- 1) D
- 2) B
- 3) C
- 4) D
- 5) B

Activity Sheet 1.1

- 1) Visible line _____
- 2) Hidden line - - - - -
- 3) Dimension line ←—————→

- 4) Extension line 
- 5) Leader line 
- 6) Center line 
- 7) Short break line 
- 8) Long break line 
- 9) Section line 
- 10) Border line 

Pretest LO 2

I.

1. C
2. D
3. B

II. Brainstorming

Self-Check 2.1

- 1) B
- 2) B
- 3) D

Activity Sheet 2.1

Freehand sketching

LESSON 4

Pretest LO 1

- 1) B

- 2) A
- 3) B
- 4) B
- 5) B

Self-Check 1.1

- 1) C
- 2) C
- 3) B
- 4) A
- 5) B
- 6) A

Pretest LO 2

Group Activity

Self-Check 2.1

- 1) B
- 2) C
- 3) D
- 4) A
- 5) A

Self-Check 2.2

1. D
2. C
3. D
4. D
- 5.(ANSWER)

Pretest LO 3

- 2) True
- 3) False
- 4) True
- 5) True

Self-Check 3.1

- 1) True
- 2) True
- 3) False
- 4) True
- 5) True

LESSON 4

Pretest LO 1

I.

- 1) D
- 2) B
- 3) B
- 4) B
- 5) D

II. TLV of some elements

Self-Check 1.1

I.

- 1) D
- 2) B
- 3) B
- 4) B
- 5) D

II. TLV of some elements

Self-Check 1.2

- 1) D
- 2) B
- 3) B

Self-Check 1.3

- 1) B
- 2) A
- 3) D
- 4) B

Pretest LO 2

- 1) C
- 2) D
- 3) D

Self-Check 2.1

- 1) C
- 2) D
- 3) D

Self-Check 2.2

- 1) B
- 2) C
- 3) C
- 4) D
- 5) B

Pretest LO 3

- 1) B
- 2) C
- 3) D

Self-Check 3.1

- 1) B
- 2) C
- 3) D

Self-Check 3.

- 1) B
- 2) A
- 3) B

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