9

INDUSTRIAL ARTS: PLUMBING

(PREPARING PIPES, TOOLS AND EQUIPMENT FOR INSTALLATION)

Learner's Material

This instructional material was collaboratively developed and reviewed by educators from public and private schools, colleges, and/or universities. We encourage teachers and other education stakeholders to email their feedback, comments, and recommendations to the Department of Education at action@deped.gov.ph.

We value your feedback and recommendations.

Department of Education
Republic of the Philippines

Technology & Livelihood Education – Grade 9
Industrial Arts: Plumbing - (Preparing pipes, tools and equipment for installation)
Learner's Material
First Edition, 2014

Published by the Department of Education

Secretary: Br. Armin A. Luistro FSC

Undersecretary: Dina S. Ocampo, Ph.D.

Development Team of the Learner's Material

Consultants: Rosendo R. Rafael, Howard Mark N. Plete and Clodualdo V. Paiton

Authors: Jordan G. Domingo Wilmar C. Gamas

Editor: Lando T. Guzman

Validators: Dr. Orlando E. Manuel, Dr. Fely L. Manuel, Dr. Romeo R. Vicmudo, Arnel E. Anonical, Joel G. Castillo, Marvin A. Mendoza, Lino A. Olit

Illustrators:

Subject Specialists: Alber t B. Erni, James Julius M. Liquigan, Owen M. Milambiling

Management Team: Lolita M. Andrada, Jocelyn DR. Andaya, Bella O. Mariñas and Jose D. Tuguinayo Jr.

Department of Education-Instructional Materials Council Secretariat (DepEd-IMCS)

Office Address: 5th Floor Mabini Building, DepEd Complex
Meralco Avenue, Pasig City
Philippines 1600
Telefax: (02) 634-1054 or 634-1072
E-mail Address: imcsetd@yahoo.com

Table of Contents

PREPARING PIPES, TOOLS AND EQUIPMENT FOR INSTALLATION

PREPARING PIPES, TOOLS AND EQUIPMENT FOR INSTALLATION

Content Standard	Performance Standard
The learner demonstrates understanding of basic concepts and underlying theories in plumbing materials tools and equipment.	The learner independently demonstrates competency in the preparation of tools and equipment and pipes needed for installation.

Introduction:

This module contains information and learning activities on Plumbing NC II particularly on the competency "Prepare Pipes for Installation." It includes instructions and procedure on how to layout measurements, cut pipes to the required length of job requirement, and thread pipes in accordance with standard thread engagement.

The learning activities will help you calculate dimensions correctly through proper identification and use of appropriate tools and determine dimension tolerance that is necessary in cutting pipes. Furthermore, improper threading procedures will be corrected. Finally, you will achieve satisfactory work by applying the 5S.

After you have completed this module, report to your facilitator for assessment to check you have achieved the knowledge and skill required in this module. If you pass the assessment, you will be given a certificate of completion. You can easily work and understand better the succeeding module on "Making Piping Joints and Connections."

LAYOUT WORK AREA FOR PIPES INSTALLATION

- Read plans and details in accordance with job requirements
- Interpret plans and details in accordance with job requirements
- Layout and mark dimension
- Use appropriate measuring tools for laying out
- Determine face to face distance according to the allowed engagement length

Pre/Diagnostic Assessment

Multiple Choice

Directions: Choose the best answer. Write only the LETTER of your answers on your test notebooks.

1. It is a type cylindrical metal or plastic conductor which allows the flow of liquid or gas from the source to the terminal.
   A. Wire C. Conductor
   B. Rubber D. Pipe

2. It is a ridge of uniform section in the form of a helix on the external or internal surface of a cylindrical.
   A. Thread C. Brazing
   B. Welding D. Soldering

3. It is a piping or tubing part that can join or connect two or more larger parts.
   A. Knotting C. Holding
   B. Fitting D. Roughing- in

4. It is a printed plan of the plumbing system.
   A. Mock-Up C. Visual Art
   B. Dimension D. Lay-out

5. It is the accepted placement of threads on the external or internal surface of a pipe to allow fittings or exact connections.
   A. Thread Engagement C. Reamer
   B. Brazing D. Cutting

6. It is the representation of any object in a picture, sketch, or letter.
   A. Unit C. Symbols
   B. Dictionary D. Logo

7. It is the nominal Internal Diameter (ID) of any pipe, except brass and copper tube where the term refers to the Outside Diameter (OD) of the pipe.
   A. Diameter C. Radius
   B. Arc D. Circumference

8. It is the measurement across the end of a pipe or refers to wall thickness of the pipe.
   A. Specification C. Lay-out
   B. Dimension D. Schedule

9. It is a kind of Personal Protective Equipment to protect our head from any forms of foreign objects.
   A. Helmet C. Goggles
   B. Safety Shoe D. Ear Muff

10. It refers to a valve in a pipe or channel having a sliding plate that controls the flow of liquid or gas
    A. Gate Valve C. Nipple
    B. Union Fittings D. Coupling

11. It refers to the length of pipe with a sharp bend in it.
A. Union Fittings C. Coupling
B. Nipple D. Elbow

12. It is a kind of fitting that is connected in the pipeline so as not to affect the other side of pipe connection when repair the pipe being damage.
A. Reducer Tee C. Union Fittings
B. Plain Elbow D. Nipple

13. It is used to measure the horizontalness and verticalness position of pipe.
A. Plumb Bob C. Hose Level
B. Spirit Level D. Try Square

14. It has one fixed jaw and another, parallel, jaw which is moved towards or away from the fixed jaw by the screw.
A. Hacksaw C. Grinder
B. Claw Hammer D. Bench Vise

15. It is a kind of equipment driven by electric power through a mechanical transmission used for cutting of metal.
A. Claw Hammer C. Power Hacksaw
B. Grinder D. Cold Chisel

16. It is a kind of fitting used for connecting of three angles of a pipe line.
A. Elbow C. Nipple
B. Tee D. Gate Valve

17. It is a fitting having a larger size at one end than at the other and threaded inside, unless specifically flanged or for some special joint.
A. Tee C. Coupling
B. Nipple D. Elbow Reducer

18. It is a kind of fitting used for connecting of four angles of a pipe line.
A. Elbow C. Cross Tee
B. Tee D. Gate Valve

19. It is a kind of fitting used for reducing the size of the pipe.
A. Elbow C. Union Fitting
B. Tee D. Bushing

20. It is a kind of tool used to measure the parts of an object.
A. Pull Push Rule C. Hose
B. Level Bar D. Plumb Bob

Information Sheet 1.1

PLUMBING SIGNS AND SYMBOLS

Plumbing signs and symbols are used in making a correct layout for the installation of a plumbing system.

The first set of drawings below shows the different plumbing signs and symbols, their names, and how they appear when installed in a particular manner.

The second set of drawings shows some plumbing graphical symbols for piping:

A. Plumbing Signs and Symbols

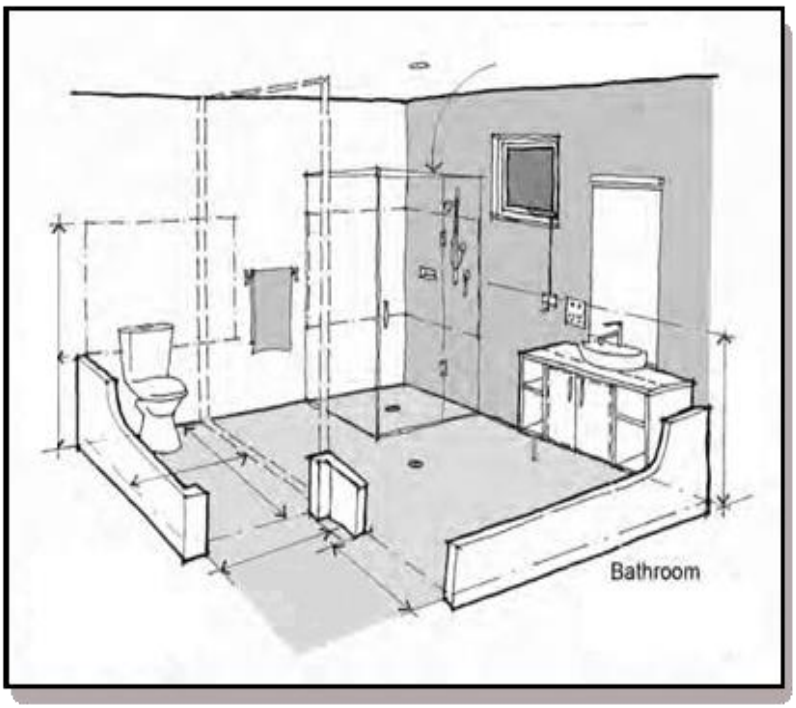
B. Plumbing Piping Signs and Symbols

1. ACID WASTE	ACID
2. COLD WATER	— – — – — – —
3. COMPRESSED AIR	——— A ———
4. DRINKING-WATER FLOW	——— – ——— – ———
5. DRINKING –WATER RETURN	— – – — – – —
6. FIRE LINE	—— F ——— F ——
7. GAS	—— G ——— G ——
8. HOT WATER	— – – — – – — – –
9. HOT-WATER RETURN	— – – – — – – – —
10. SOIL, WASTE OR LEADER (ABOVE GRADE)	———————
11. SOIL, WASTE OR LEADER (BELOW GRADE)	– – – – – – – – – – – – – – –
12. VACUUM CLEANING	—— V ——— V ——
13. VENT	----------
14. HIGH PRESSURE RETURN	— H — H — H —
15. LOW PRESSURE RETURN	— — — — — —

Activity Sheet 1.1

LAYOUT AND MARK DIMENSION

Directions: The students will make their own plan according to their own designs with dimension in simple comfort room with shower valve, shower head, faucet, and lavatory installations.



Directions: Using the tools, materials and equipment, measure the pipe to the required lengths.

TOOLS, MATERIALS AND EQUIPMENT

- Pencil
- Paper
- Pull push rule
- Chalk
- PVC PIPE or Galvanized Iron Pipe ½Ø
- Elbow 90°
- Tee
- Adaptor Male and Female Type
- Union Fittings

Procedure

1. Prepare the tools, material and equipment
2. Using the pull push rule, measure the work area then mark the pipe in

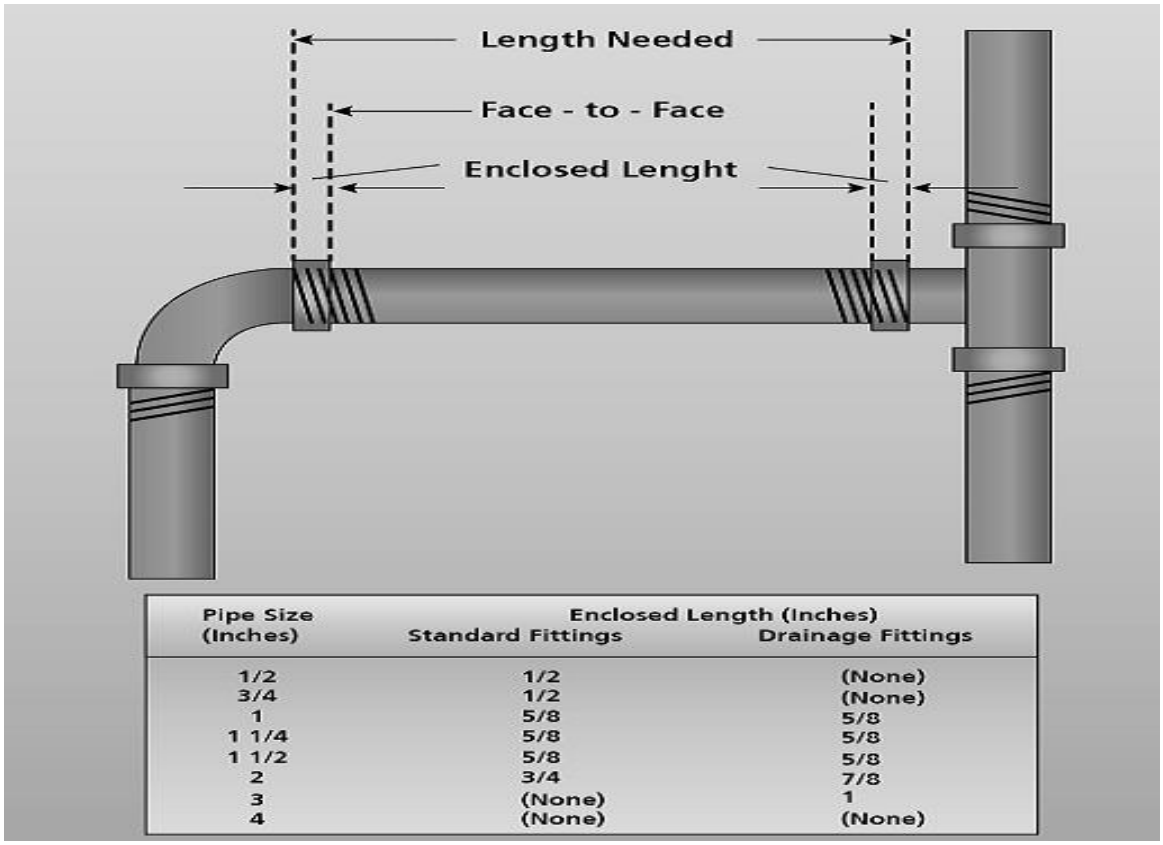
accordance with the requirements

3. Place the pipe and fittings in actual position.

ACTIVITY SHEET 1.2

DETERMINE FACE TO FACE DISTANCE ACCORDING TO THE ALLOWED ENGAGEMENT LENGTH

Directions: The actual length of the galvanized iron wrought iron pipe is 6.0meters, while the Polyvinylchloride is 3.0 meters. Before cutting the pipe, the application face to face distance are required.



Pipe Size (Inches)	Enclosed Length (Inches)	
	Standard Fittings	Drainage Fittings
1/2	1/2	(None)
3/4	1/2	(None)
1	5/8	5/8
1 1/4	5/8	5/8
1 1/2	5/8	5/8
2	3/4	7/8
3	(None)	1
4	(None)	(None)

http://www.techtransfer.com/resources/wiki/entry/2688/
Date Retrieved: Oct 03, 2013 Time : 12:03 pm

Tools, Materials and Equipment

- Pencil
- Paper
- Pull push rule
- Chalk
- Elbow 90°
- Tee
- Adaptor Male and Female Type
- Union Fittings

Procedure

1. Prepare ½ Ø diameters PVC or G.I pipes.
2. The face to face distance is 3.50meters.The additional length inside of the fitting in ½ Ø is 1.2 centimeters therefore,
   1.2 x 2 ends = 2.40 cm
3. Add to the face to face clear distance, as:
   3.50cm + 2.40 cm= 5.90cm Therefore there is 10 cm in excess of pipe.

Self-Check 1.1
PLUMBING SIGNS AND SYMBOLS

I. Illustration

Directions: Draw the symbol for each of the following pipe fittings. Use your test notebook as answer sheet.

1. Gate Valve
2. Elbow 90º
3. Joint (connecting pipe)
4. Reducer (concentric)
5. Union
6. Tee (straight size)
7. Elbow (45º)
8. Bushing
9. Cross Tee (straight size)
10. Elbow Reducer

II. Matching Type: Match the fixture in column A with the plumbing sign and symbol in column B. Write only the letter of the correct answer. Use your test notebook as answer sheet.

A	B
___ 1. Cold Water	A._____ _ _ _____ _ _ _____
___ 2. Hot Water	B. _____ _ _____ _ _____
___ 3. Hot – Water Return	C. ____ _ ____ _ ____ _ ____
___ 4. Drinking – Water Flow	D.____ _ _ _ ____ _ _ _ ____
___ 5. Drinking – Water Return	E. ____ _ _ ____ _ _ ____ _ _

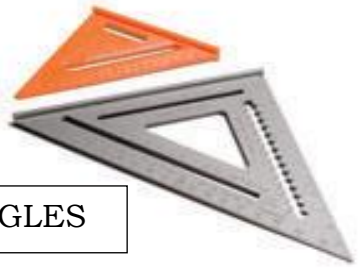
INFORMATION SHEET 1.2
TYPES OF MEASURING TOOLS IN PLUMBING

When doing the plumbing work, one should be acquainted with the types of measuring tools. Such knowledge yields to correct layout.

Some of the measuring tools commonly used in plumbing are listed below. Each of these tools has its specific use. Study the pictures of the tools

MEASURING TOOLS

1. Triangles (30° x 60° , 45° x 45°) are used for drawing the layout of a plumbing system.



TRIANGLES

2. Try Square is also used to measure the outside and inside diameters of a pipe in the absence of a caliper.

TRY SQUARE

3. Spirit Level is used to determine the levelness and plumpness of plumbing system.

SPIRIT LEVEL

4. Pull Push Rule - is used for measuring the exact distances of pipe fittings and fixture in the plumbing system in doing the final lay out.
It is used in measuring the length of pipes before cutting.

PULL PUSH RULE

5. Inside Caliper - is used to measure the inside diameter of a pipe.

INSIDE CALIPER

6. Outside Caliper is used to measure the outside diameter of a pipe.

OUTSIDE CALIPER

SELF-CHECK 1.2

TYPES OF MEASURING TOOLS IN PLUMBING

MULTIPLE CHOICE

Directions: Choose the letter of the term that is described in each item. Write your answer in your test notebook.

1. It is a tool used for making a layout of a plumbing system.
   a. hammer b. vise c. pliers d. triangle

2. It is a tool used for measuring the exact distance between of a pipe fitting and a fixture.
   a. pull push rule b. coping saw c. pliers d. bench vise

3. It is a tool used for measuring the outside diameter of a pipe.
   a. pull push rule b. inside caliper c. outside caliper d. triangle

4. It is a tool used for measuring the inside diameter of a pipe.
   a. pull push rule b. inside caliper c. outside caliper d. triangle

5. It is a tool used for determining the levelness and plumbness of the pipe.
   a. cold chisel b. spirit level c. triangle d. pull push rule

6. It is a tool used to measure the outside and inside diameter of a pipe in the absence of caliper.
   a. spirit level b triangles c. try square d. pull push

SUMMATIVE ASSESSMENT

Multiple Choice

LAYOUT WORK AREA FOR PIPES INSTALLATION.

Directions: Choose the best answer. Write your answer on your test notebook.

1. It is a type of cylindrical metal or plastic conductor which allows the flow of liquid or gas from the source to the terminal.
   A. Wire C. Conductor
   B. Rubber D. Pipe

2. It is a printed plan of the plumbing system.
   A. Mock-Up C. Visual Art
   B. Dimension D. Lay-out

3. It is the representation of any object shown in a picture, sketch, or letter.
   A. Unit C. Symbols
   B. Dictionary D. Logo

4. It is the nominal Internal Diameter (ID) of any pipe, except brass and copper tube where the term refers to the Outside Diameter (OD) of the pipe.
   A. Diameter C. Radius
   B. Arc D. Circumference

5. It is the measurement across the end of a pipe or refers to wall thickness of the pipe.
   A. Specification C. Lay-out
   B. Dimension D. Schedule

Test II (15) points

Directions: Make a sketch of single cold water line installation with shower head, shower valve, faucet and drainage waste ventilations in accordance with the Philippine Plumbing Code requirements.

Test III (10) points

Directions: From the sketch above of single cold water line single installation, identify the correct measurement from one fitting to another. Write your answer on your test notebook.

1. Pipe to gate valve _____
2. Gate Valve to Union fitting _____
3. Union fitting to tee _____
4. Tee to elbow (Lavatory) _____
5. Tee to tee _____ _____
6. Tee to elbow (Water closet) _____
7. Tee to elbow _____
8. Elbow to tee (faucet) _____
9. Tee to shower valve) _____
10. Shower Valve to shower head _____