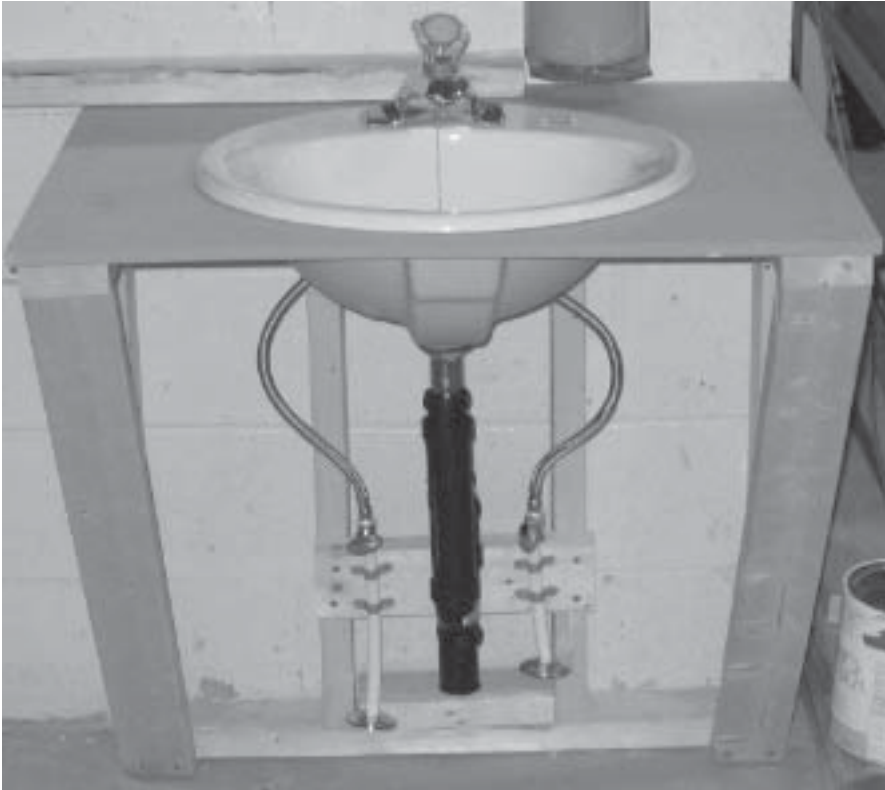


Module 7

Plumber: Sink Installation

The picture below shows a sample sink installation station.



Module 7

Plumber: Sink Installation

Module Overview

This module will involve the proper setup and installation of a sink (can be either a kitchen or bathroom sink). The students will be expected to measure and layout the vanity top and then prepare the top for cutting. After the top is cut and the sink is in place students will install the faucets, install the drain kit using plumbers putty, install supply lines using Pex tubing, and install shut-offs and the water supply lines to the faucets. Students will follow accepted practice using the proper tools at each stage of the installation. Once the water supply is complete students will then complete the drain/waste/vent system for the sink. This will involve the use of ABS pipe using all appropriate parts. These include a p-trap, sanitary t, and the cutting of ABS pipe to connect each part. Students will dry fit most of these parts in order to reduce cost but it would be prudent to have student do a glue-up so they can experience the set times related with ABS cement. They will employ the safe shop and construction practices covered in the earlier safety section and will emulate safe building and workplace guidelines. Students will learn the value of teamwork and the importance of planning ahead to achieve proper results. The work plan and pricing will give them real life experience with building projects.

Specific Curriculum Outcomes and Suggested Timelines

Module 7 will cover all the specific curriculum outcomes (SCOs) from the Plumber: Sink Installation section in the Skilled Trades 1211 curriculum guide. The time allocated in each module is recommended but can be adjusted if the teachers sees fit. However, it should be noted that the entire module is only allocated 7 hours and this needs to be adhered to.

Topic 1: Theory of Residential Plumbing (2 hours)

- 3.8.2 Identify, describe, and give the function of the components of a residential water supply system for a sink [1.401][1.402] [2.401][3.401]
- 3.8.3 Identify, describe, and give the function of the components of a waste water drainage system for a sink [1.401][1.402] [2.401][3.401]
- 3.8.4 Identify the different types of fixtures, tubing, pipes, connectors, and fittings used in a sink installation [1.401][1.402] [2.401][3.401]

Topic 2: Plumbing Fabrication (4 hours)

- 3.8.1 Demonstrate safe practices for use of hand and power tools common in sink installation procedures. [2.401][2.402][2.405][3.401][5.402]
- 3.8.5 Install a sink and faucets, including supply and waste lines, using manufacturers instructions [1.401][1.402][1.403][1.404][1.405] [2.401][2.402][5.402]

Topic 3: Reflection and Disassembly (1 hour)

- 2.3.2 Develop strategies for managing individual and team activities [4.401][5.401][5.402][5.403]
- 2.3.3 Maintain a work log (portfolio) for personal and professional assessment [1.405]

Topic 1: Theory of Residential Plumbing

Suggested Duration: 2 hours
Suggested Format: Computer Lab

Following the completion of this activity, students will be able to:

- 3.8.2 Identify, describe, and give the function of the components of a residential water supply system for a sink [1.401][1.402] [2.401][3.401]
 - 3.8.3 Identify, describe, and give the function of the components of a waste water drainage system for a sink [1.401][1.402] [2.401][3.401]
 - 3.8.4 Identify the different types of fixtures, tubing, pipes, connectors, and fittings used in a sink installation [1.401][1.402] [2.401][3.401]
-

Teacher Required Resources

Skilled Trades 1211 Teacher's Resource Guide

Student Required Resources

Skilled Trades 1211 Student Reference Textbooks
Student Materials Pack

Teacher Preparation

1. Review the theory of residential plumbing (specifically as it relates to sink installation) and the new tools, materials, and building techniques used in today's plumbing industry. This review can be done by referring to the resources listed below.

Blankenbaker, Keith E. 2005. *Modern Plumbing*. Tinley Park, Illinois. The Goodheart-Willcox Company, Inc.

Smith, Lee. 2000. *Plumbing Technology: Design & Installation*. Albany, New York. Delmar Thompson Learning.

2. Prepare copies of assignment sheets located in resource guide at the end of this unit. Appropriate assignments are #ASG-M7-T1-1, #ASG-M7-T1-2, and #ASG-M7-T1-3. These can either be copied and passed out in paper format or placed in a folder electronically on a shared resource for students to access.

Introduction

- State the purpose of this activity and the expected learning outcomes.
- State how this activity relates to the other activities in this module.
- Summarize what will be covered in this lesson and the related student activity.

Presentation

Discuss with students the importance of the theoretical aspect of training for any trade. Students have to understand that in order to become a plumber there is a requirement that the theoretical portion of the course be completed before the practical can be started. The requirement at the post-secondary level will be emulated in this course as well. Students need to be informed of the value (grade) placed on the completion of the theoretical portion of the module. Students will be given 2 hours to complete these activities and if they feel that they are at risk of not finishing then they should supplement class time with homework or after school work arranged with the teacher. Of utmost importance is the necessity that students be aware of the absolute limit of 7 hours as it impacts every other group and every other module. There can be **no extension** to the time allocated for the module. Attendance and completion of this section allows for ease of movement to the practical portion and enables the group to finish the practical portion in the time allotted.

Assessment and Evaluation

The teacher will formally evaluate the completed assignments as completed by each individual in each group. Teachers can choose whether to make the group responsible for one copy of all assigned work **or** a separate copy of all assignments from each individual in the group. These theoretical assignments will be valued at 30% of the module.

Learning Resources

Blankenbaker, Keith E. 2005. Modern Plumbing. Tinley Park, Illinois. The Goodheart-Willcox Company, Inc.

Smith, Lee. 2000. Plumbing Technology: Design & Installation. Albany, New York. Delmar Thompson Learning.

Student Materials Pack

The Student Material Pack for Topic 1 includes the following attached documents:

1. Assignment #ASG-M7-T1-1, “Theory of Residential Plumbing”.
2. Assignment #ASG-M7-T1-2, “Labeling and Defining Sink and Faucet Components”
3. Assignment #ASG-M7-T1-3, “Materials Pricing Activity”

Theory of Residential Plumbing

Assignment #ASG-M7-T1-1

Using the resource materials below answer the following questions.

Blankenbaker, Keith E. 2005. **Modern Plumbing**. Tinley Park, Illinois. The Goodheart-Willcox Company, Inc.

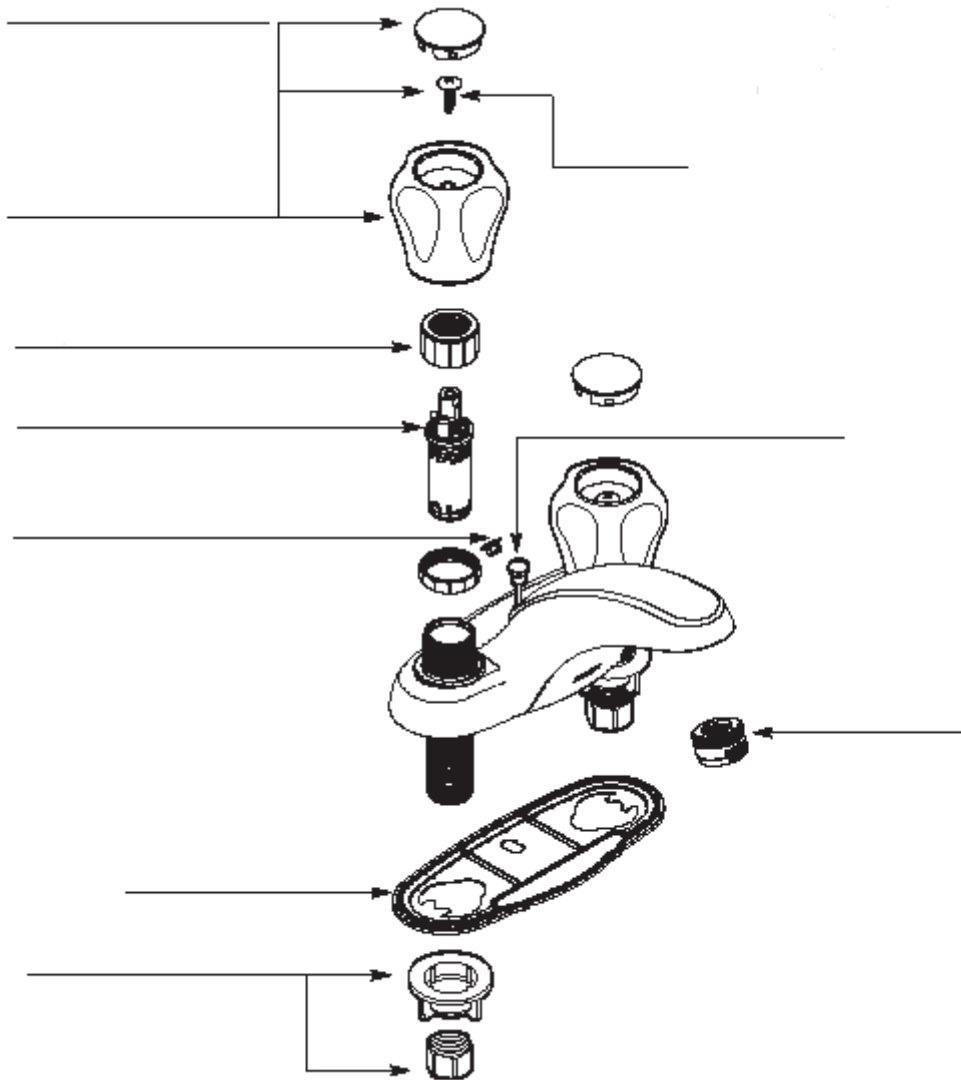
Smith, Lee. 2000. **Plumbing Technology: Design & Installation**. Albany, New York. Delmar Thompson Learning.

1. What are the two types of pipes involved in a plumbing system? Explain.
2. Briefly describe the six types of plastic material used to make 90% of all plastic pipe.
3. What does the term *outside diameter* refer to in relation to plastic pipe? Why is it important?
4. Discuss the differences between copper pipe and Pex pipe. Include the advantages and disadvantages of each.
5. Give a brief description of each of the following fittings and their uses:
 - Reducer
 - Elbow
 - Sanitary Tee
 - Vent Tee
 - P-Trap with Cleanout
 - P-Trap with Slip Joint

Labeling and Defining Faucet Components

Assignment #ASG-M7-T1-2

Label the parts of the faucet below. Give a brief description of how these parts work together to make a faucet work.



Materials Pricing Activity

Assignment #ASG-M7-T1-3

Using your components kit provided with this module, calculate the cost of doing a typical sink installation for a bathroom. Be sure to include the cost of the components, materials, and labor cost for a licensed plumber. You can get these cost estimates using an online quote or by calling the local hardware store and getting the prices. Put your information in the table below and then calculate a total cost.

Cost of Sink Installation	
Materials Cost	
Material	Cost
Total	
Components Cost	
Components	Cost
Total	
Plumbers Cost	
Rate per hour	# of hours
Total	
Total cost	

Topic 2: Plumber Fabrication

Suggested Duration: 4 hours
Suggested Format: Fabrication Lab

Following the completion of this activity, students will be able to:

- 3.8.1 Demonstrate safe practices for use of hand and power tools common in sink installation procedures. [2.401][2.402][2.405][3.401][5.402]
 - 3.8.5 Install a sink and faucets, including supply and waste lines, using manufacturers instructions [1.401][1.402][1.403][1.404][1.405][2.401][2.402][5.402]
-

Teacher Required Resources

Skilled Trades 1211 Teacher's Resource Guide

Student Required Resources

Skilled Trades 1211 Student Reference Textbooks
Student Materials Pack

Teacher Preparation

1. Purchase material needed to complete the assembly of sink work stations.. This would include wood of appropriate sizes, nails, and screws. This material should be stored safely in an area easily accessible to students. Complete the construction of the sink installation stations using the technical drawing provided in the Teacher Resource Kit, Learning Resource Sheet #LRS-M7-T2-Drawing 1. The sink stations can be assembled and attached to the wall using existing free wall space. Alternatively, they can be made with rectangular sides and placed on castors so they can be moved around when needed. The tops are attached with screws so they can be easily removed after they have been used.
2. Compile a tool kit and a resource kit necessary for students to use for this activity. The tools kit would preferably be a Rubbermaid container large enough to hold the tools necessary for a sink installation. The components kit would preferably be a Rubbermaid container that could hold all the components necessary for a sink installation. The instructions from the sink manufacturer can be laminated and included in the kit for the students to follow.
3. Ensure all tools are in proper and safe working order. Checking all tools prior to assigning them to students also reinforces the idea of safety to students.

Introduction

- State the purpose of this activity and the expected learning outcomes.
- State how this activity relates to the other activities in this module.
- Summarize what will be covered in this lesson and the related student activity.

Presentation

Students are provided with a brief description of their activity for this module. It is explained that they will go through the complete process of installing a sink. Students will need to work together as a group and be on task if they are to complete this module in the time allocated. Students are reminded of the fragile nature of porcelain and are reminded to be careful when handling the sink. They are reminded of all safe shop and tool operation practices and are given a quick overview of the tools and operations they will be completing during this activity. Potential hazards are also pointed out as a point of emphasis.

Suggested Student Activity

The sink installation module involves students doing a sink installation complete with water supply lines and a drain/waste/vent system. Students will measure and layouts the vanity top, drill a pilot hole, and then cut the hole to accept the sink. Once the sink has been installed the drain kit is installed using ensuring that plumbers putty is used to avoid leakage. Students then install the faucets using proper techniques and tools. Students will then measure and install the drain/waste/vent system including the installation of a sanitary-T, a p-trap with cleanout, and the proper vent system. These components will all be dry fit to save on cost. Students will then install their water supply system. This will involve the installation of Pex pipe, shut-offs, and water supply lines. They will use Pex crimpers and Pex connectors to simulate current practice in the plumbing industry.

Required Tools

Safety

Safety Glasses
Hearing Protection
Safety Footwear
Coveralls

Hand Tools

Steel Tape
Try Square
Miter Square
Framing Square
2 Foot Level
Plumb Bob
Drill bits
Screw Diver Bits
Hack Saw
Reaming and deburring tools
Bench vise
Pliers (groove joint, slip joint, locking)
Adjustable wrenches, 6 and 10 inch sizes
Basin, pipe, strap, monkey, and spud wrenches
Pex crimper

Power Tools

Compound Miter Saw
Drill
Circular Saw
Jig Saw

Required Materials

Bathroom Sink
Faucets
3/8" x 20" Water Supply Lines
1/2" x 40' White Teflon Tape
1-1/2" ABS pipe
Plumbers Putty
1/2" Chrome Flange
ABS P-Trap with Cleanout 1-1/2"
1/2" Pex to 3/8" Straight Valve
ABS Trap Adapter 1-1/2" x 1-1/4"
1-1/2" ABS Sanitary-T
1-1/2" 90 Degree Elbow
13mm (1/2") Pex Pipe
Drain Kit
50mm x 100mm (2" x 4") for Sink Stations
16mm (5/8") MDF for Countertops
25mm (1") Screws for attaching tops
75mm (3") Screws for building Sink Stations

Assessment and Evaluation

The teacher will formally evaluate the completed sink installation. Students will be assessed based on how well their sink installation meets the technical drawing specifications. Students will be graded on the quality of the sink installation including the installation of the water supply and drain/waste/vent systems, the effort they put into the project, their attendance throughout the module, and their ability to work as a team to complete the project on time without sacrificing quality. Teachers should be aware that both members of the group would probably get different grades even though it is a group project. Students will also be graded on their use of acceptable shop practices and their proper use of shop etiquette and shop clean up. This practical portion will be worth 60% of the grade for this module.

Learning Resources

Blankenbaker, Keith E. 2005. Modern Plumbing. Tinley Park, Illinois. The Goodheart-Willcox Company, Inc.

Smith, Lee. 2000. Plumbing Technology: Design & Installation. Albany, New York. Delmar Thompson Learning.

<http://www.hometime.com/Howto/projects/plumbing.htm>

Visit from a certified plumber

Teacher Resource Kit

The Teacher Resource Kit for Topic 2 includes the following technical drawings:

1. Learning Resource Sheet #LRS-M7-T2-Drawing 1
2. Learning Resource Sheet #LRS-M7-T2-Drawing 1

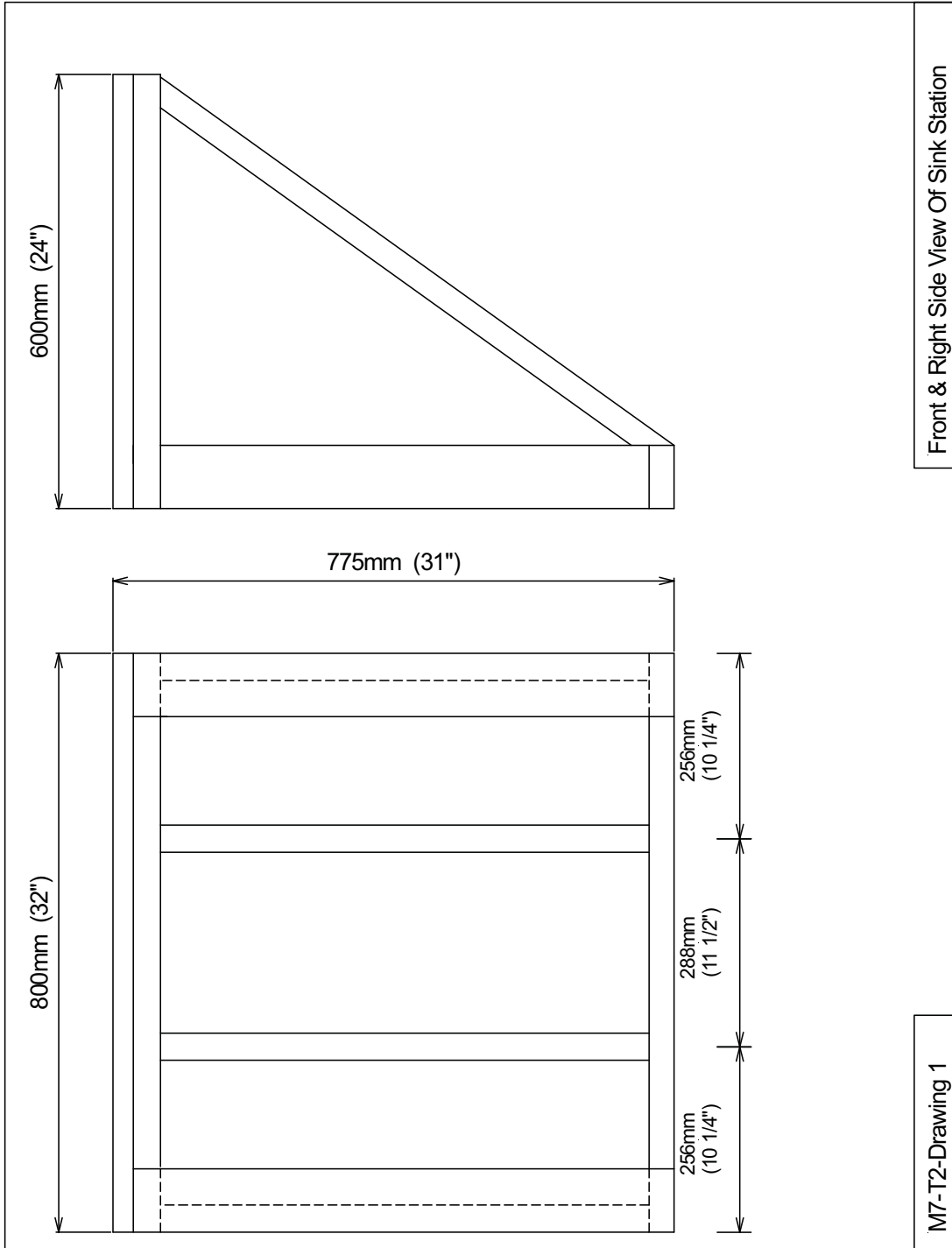
Student Material Pack

The Student Material Pack for Topic 2 should include:

1. Sink Installation Tool Kit
2. Sink Installation Resource Kit

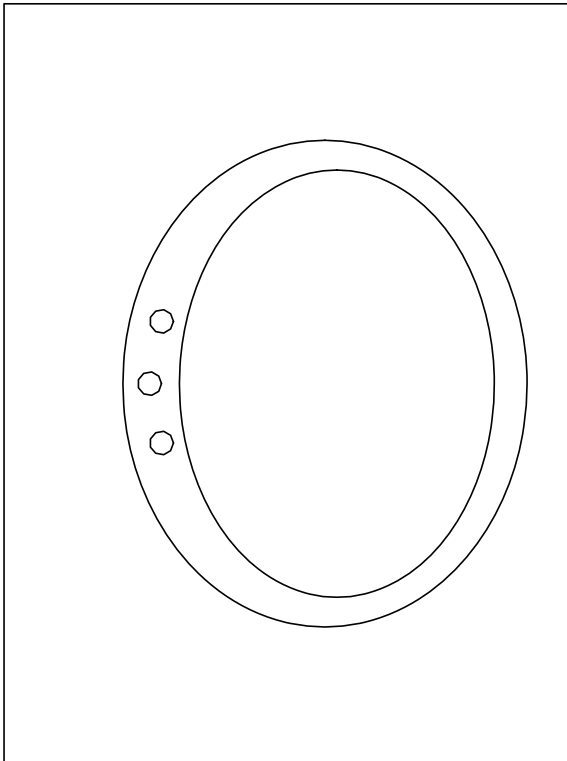
Sink Technical Drawing

Learning Resource Sheet #LRS-M7-T2-Drawing 1



Sink Technical Drawing

Learning Resource Sheet #LRS-M7-T2-Drawing 2



Sink frame is attached to an existing wall space. The frame is made of 50mm x 100mm (2" x 4") with a short studded wall supporting the vanity top. The top is made of 16mm (5/8") MDF attached to the frame using 38mm (1 1/2") screws. The angled braces are 50mm x 100mm (2" x 4") which are attached to the wall and the top. The MDF is replaced after each group installs their sink and the frame remains intact.

M7-T2-Drawing 2

Top View of Sink Station

Topic 3: Reflection

Suggested Duration: 1 hour
Suggested Format: Fabrication Lab/Computer Lab

Following the completion of this activity, students will be able to:

- 2.3.2 Develop strategies for managing individual and team activities
[4.401][5.401][5.402][5.403]
 - 2.3.3 Maintain a work log (portfolio) for personal and professional assessment
[1.405]
-

Teacher Required Resources

Skilled Trades 1211 Teacher's Resource Guide

Student Required Resources

Skilled Trades 1211 Student Reference Textbooks
Student Materials Pack

Teacher Preparation

1. Check materials stock to ensure that all necessary materials are available for next group of students.
 2. Check all tools to ensure they are in working order and have been properly maintained.
-

Introduction

- State the purpose of this activity and the expected learning outcomes.
- Emphasize how the completion of the sink installation allows for the other trades to move in and start the next phase of the project. (flooring, painting, etc)
- Point out to the students how the accuracy of the project just completed will affect the finished project.

Presentation

Teacher explains to students the importance of evaluating the completed activity. Students should examine all phases of their installation and determine how they could have improved if there was indeed room for improvement. Students need to realize that the skills used here get better with practice and patience. Students need to understand the importance of reassessing their completed work and learning from the activity. Teacher explains the importance of the work log and the role it plays in real life situations.

Suggested Student Activity

Students will be responsible for the disassembly of their sink and all water supply and drain/waste/vent components. This involves the proper disassembly and storage of all reusable components involved. It also involves replacing the removable top for the sink station. Students are given a “Reflection Activity” (Assignment #ASG-M7-T3-1 Reflection Activity) to complete. Each group member must complete his or her own reflection sheet to be submitted and evaluated. Students must also complete their work log (Assignment #ASG-M7-T3-2 Work Log) and get it initialed (in this case, graded) by their teacher.

Assessment and Evaluation

Students must submit their “Reflection Activity” and their “Work Log” to be evaluated. This will account for 10% of their overall grade in this module.

Student Materials Pack

The Student Material Pack for Topic 3 should include:

- a. Assignment #ASG-M7-T3-1 Reflection Activity.
- b. Assignment #ASG-M7-T3-2 Work Log.

Reflection

Assignment #ASG-M7-T3-1

Read each of the following questions and provide a written response to each.

1. If doing the sink installation project again what would you do differently?

2. What are the advantages of using Pex pipe instead of the traditional copper tubing?

3. How could you have divided your duties differently to make the project go more smoothly?

4. Discuss the advantages of working inside in a shop as opposed to outside on a typical jobsite. Give at least three advantages and disadvantages of each.

5. Finalize your work plan (completed in Topic 2) to be submitted for grading.

Work Log

Assignment #ASG-M7-T3-2

Record of Workplace Skills (LOG)		
Name: _____ Module: _____		
Workplace Skills Required For Successful Completion of Residential Plumbing Module	Date	Initials of Instructor
Blueprint Reading and Sketching		
Read basic drawings and diagrams		
Sketch drawings and diagrams		
Interpret specifications		
Residential Plumbing		
Layout vanity top for sink		
Drill hole and cut sink hole		
Install sink		
Install drain kit using plumbers putty		
Install faucets		
Install Pex supply lines (hot and cold)		
Install shut-offs and water supply (use Teflon tape)		
Install p-trap		
Install sanitary-t		
Measure, cut and install abs pipe		
Check all connections		
Test		