

Residential Construction Student Work Book

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Checklist:

- Do you have your safety pledge passed in to me?
- Do you have a Gmail account set up for each of you?
- Have you passed all of your safety tests?
- Do you know the course breakdown and grading scheme?
- Have each of you submitted your own research?

Module 1

Window and Door Framing

Module Overview

This module will introduce students to the principles of wall framing construction. Students will learn wall construction terminology, measuring practices, wall construction techniques, proper building techniques and proper building practices. They will draw on knowledge gained in Unit 2 in relation to reading blueprints and technical drawings. They will have to interpret a technical drawing, develop a work plan, select proper materials, layout and cut their materials, and then assemble their materials to create a finished wall. They will employ the safe cutting 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 activity will give them real life experience with building projects.

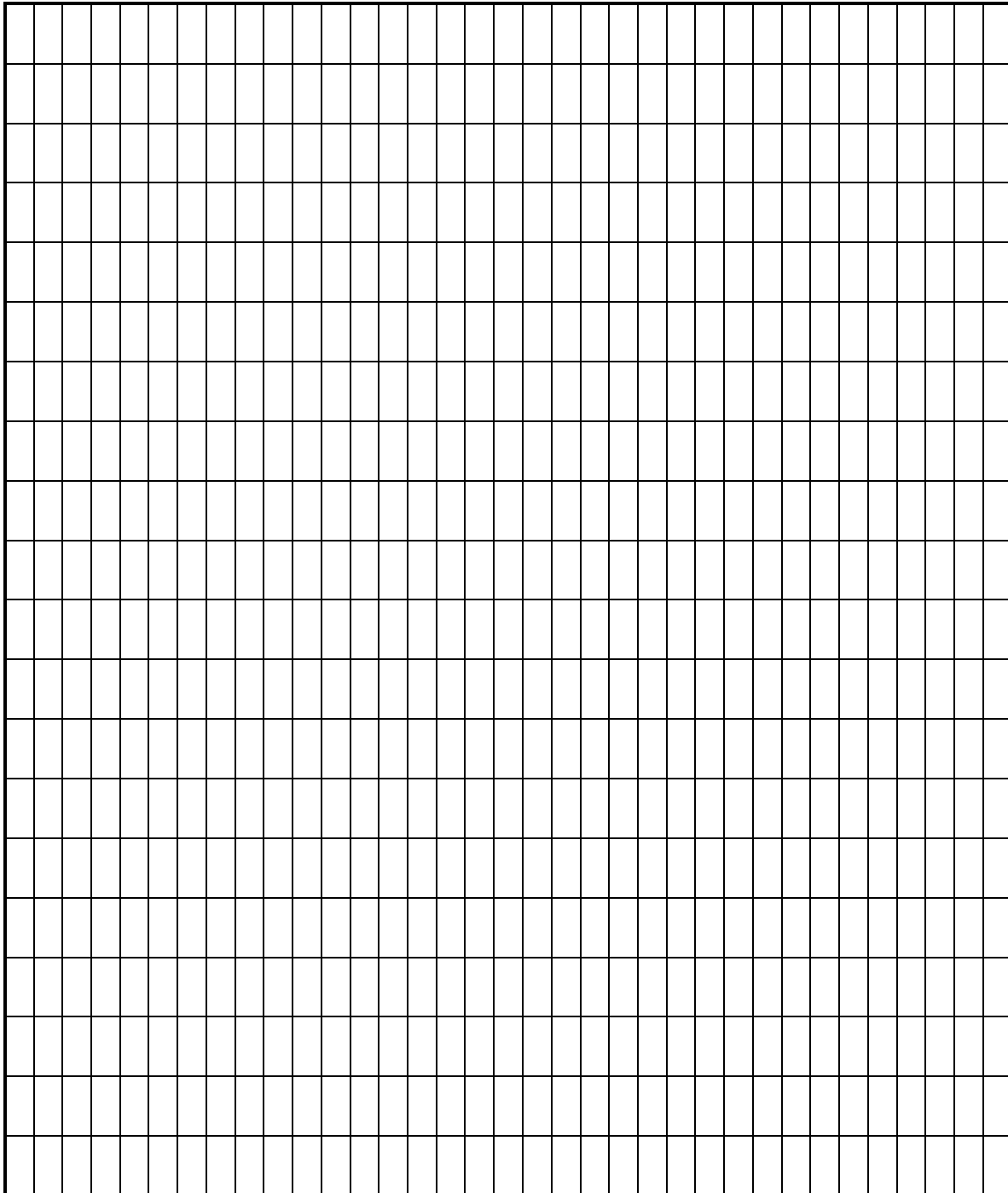
Theory of Wall Framing

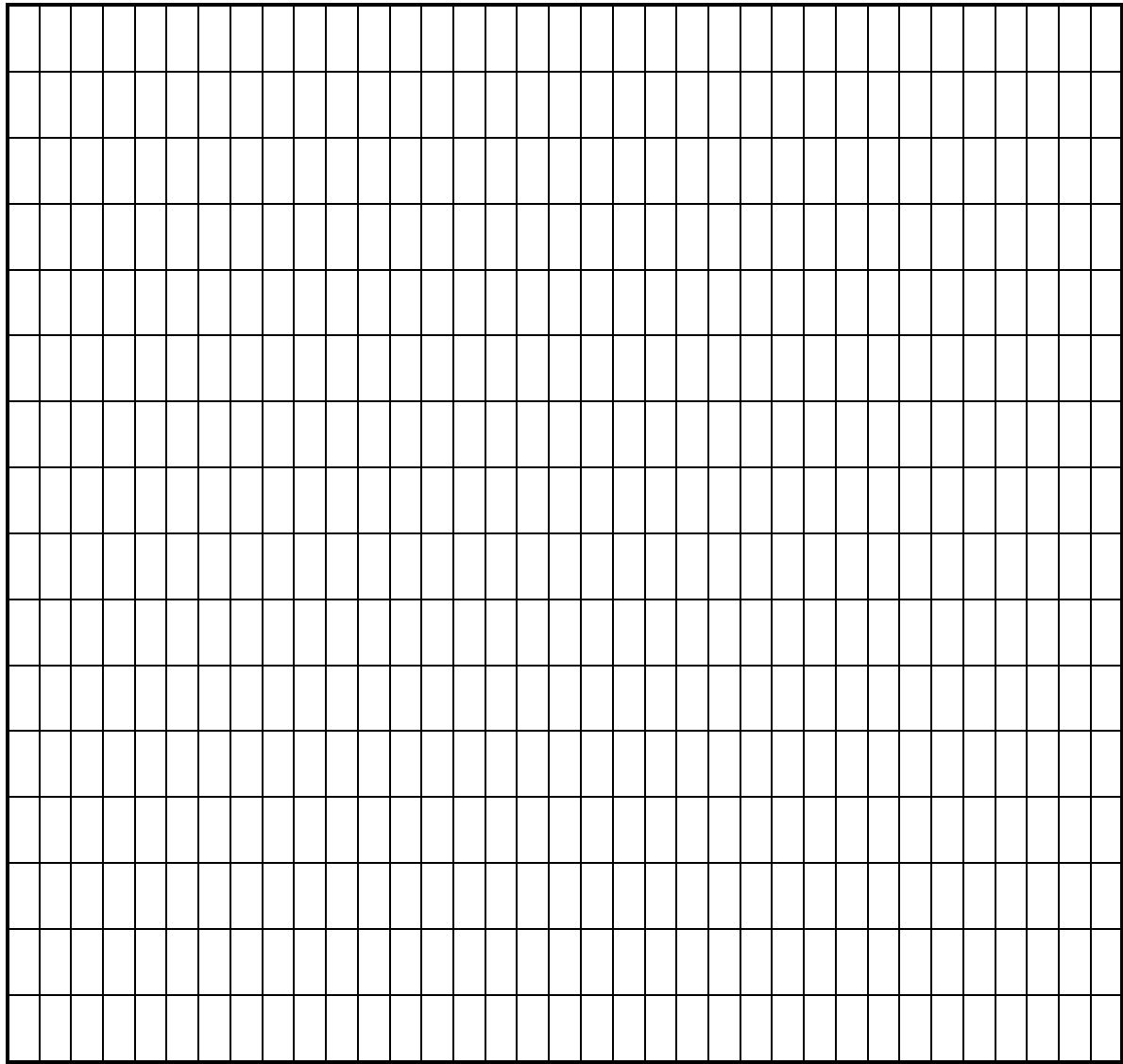
Answer the following questions using the textbook Modern Carpentry. Answer can be hand written, typed, or presented to the instructor using a slide show.

1. What is the most common material used for wall studs?
2. What are the two most common stud spacings used in residential construction?
3. Why is the spacing different for external and interior walls?
4. What are *headers*? Where are they used and what purpose do they serve?
5. Define the following terms:
 - a. Cripple
 - b. Rough Sill
 - c. Trimmer
 - d. Full Stud
 - e. Sole Plate
 - f. Top Plate
6. Explain what is meant by RSO.
7. Why would you place plywood spacers in your headers?
8. What are the possible solutions to the small size of cripple studs when framing large window openings?

Labeling and Defining Wall Components

Sketch a diagram of a wall section with the proper layout for a door and window opening on the grid paper below. Label each door and window member properly and give a brief description of each.



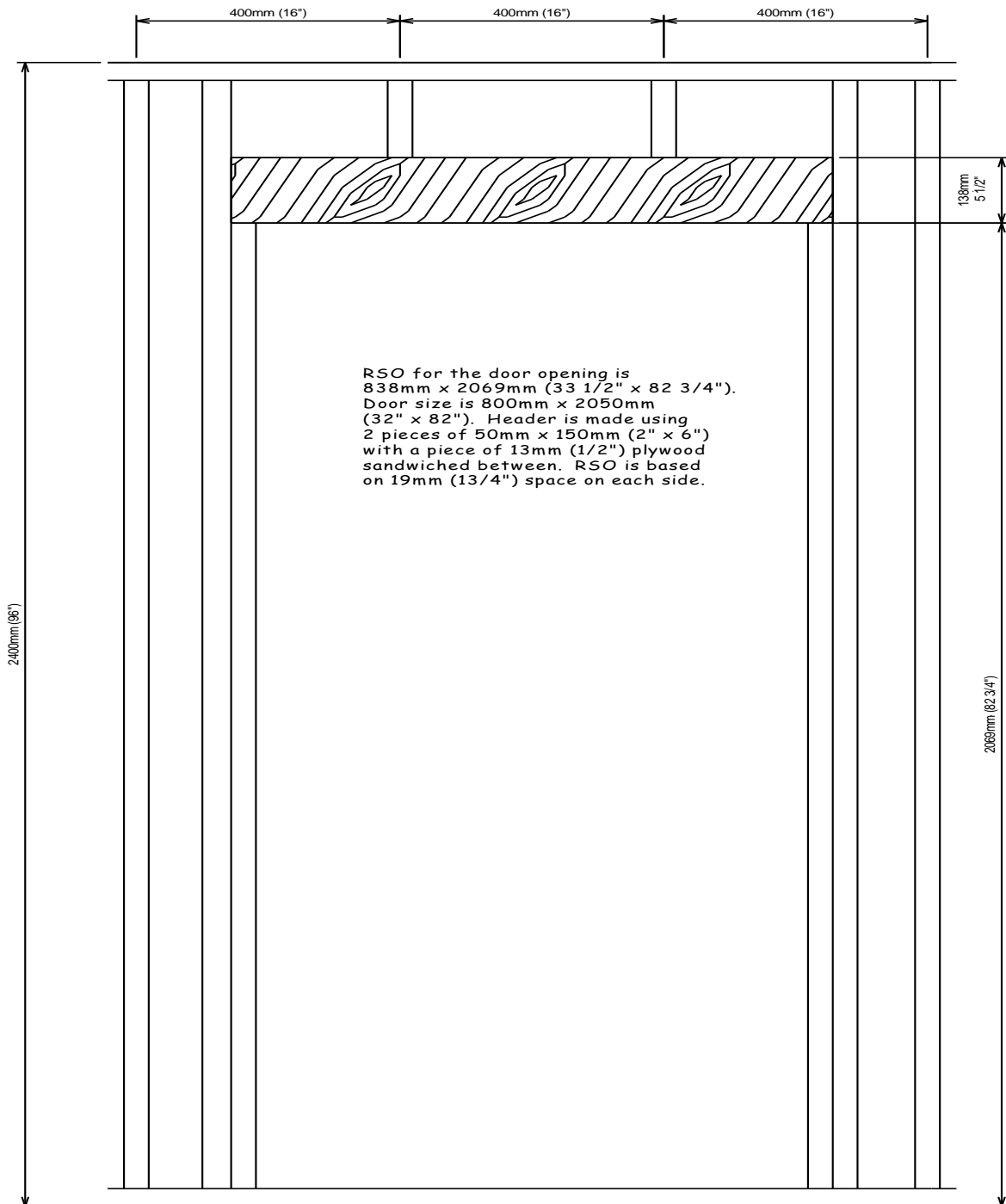


Materials Pricing Activity

Using either Learning Resource Sheet #LRS-M1-T2-Drawing 1 or Learning Resource Sheet #LRS-M1-T2-Drawing 2, provide a cost breakdown for each of the materials used to construct the wall provided. These prices can be obtained using local suppliers, business flyers, or online quotes. Ensure that the total price is comprised of an itemized breakdown for each different material used.

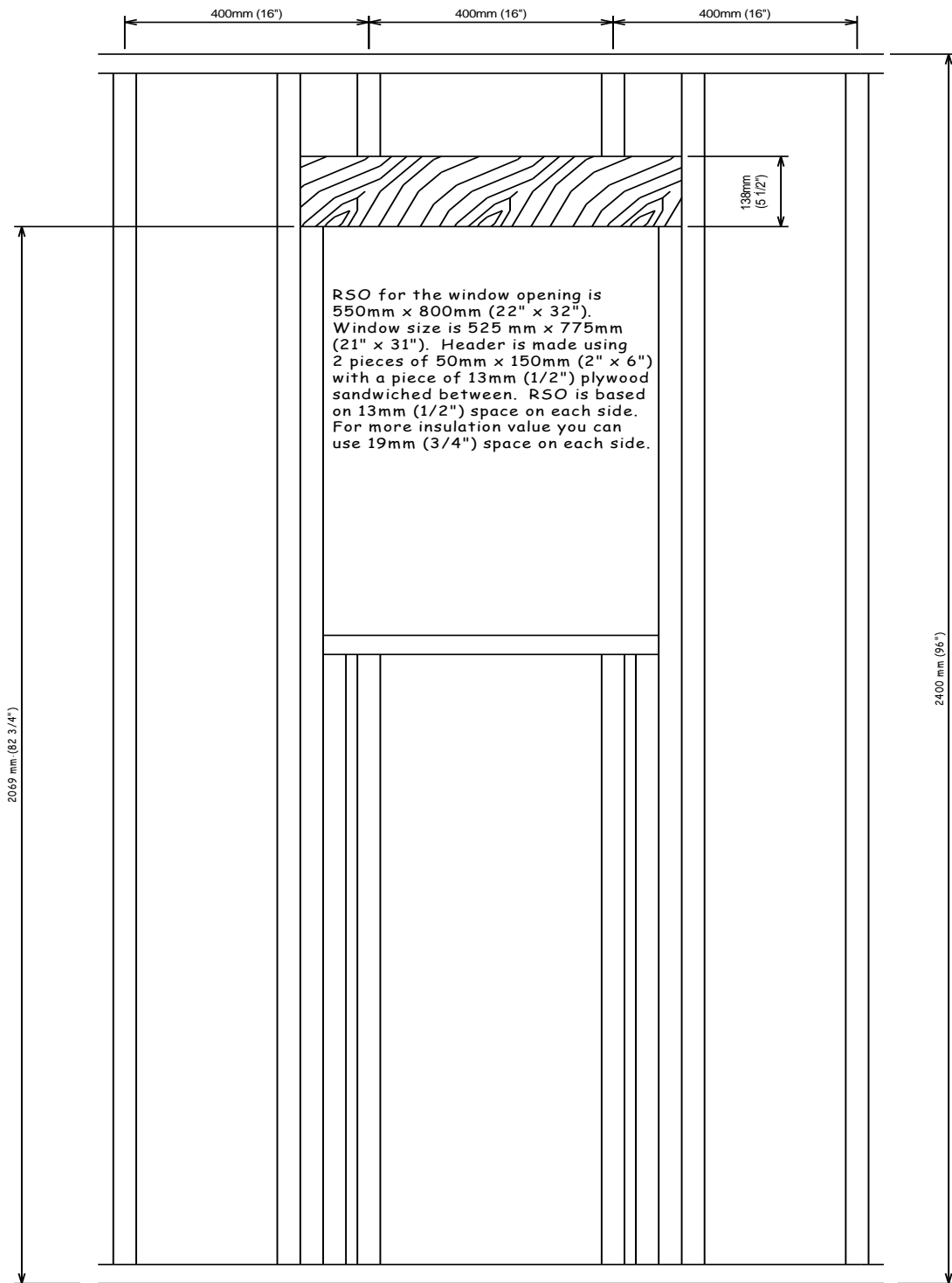
Wall Framing with Door

Learning Resource Sheet #LRS-M1-T2-Drawing 1



Wall Framing with Window

Learning Resource Sheet #LRS-M1-T2-Drawing 2



Reflection: Wall Framing

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

1. If doing the wall framing project again what would you do differently?
2. What are the advantages provided by using power tools as opposed to non-power tools?
3. How could you have divided your duties differently to make the project be more effective?
4. Discuss the advantages of working inside in a shop environment as opposed to outside on a typical jobsite. Give at least three advantages and disadvantages of each.
5. Collate your blueprints and your work plan (completed in Topic 2) to be submitted for grading.

Work Log: Wall Framing

Record of Workplace Skills (LOG)

Name: _____ Module: _____

Workplace Skills Required For Successful Completion of Wall Framing Module	Date	Initials of Instructor
Blueprint Reading and Sketching		
Read basic drawings and diagrams		
Sketch drawings and diagrams		
Interpret specifications		
Wall Framing		
Select proper lumber		
Measure and layout material		
Cut material to proper lengths		
Frame exterior walls		
Erect exterior walls		
Install top plate		

Module 2

Window Installation with Exterior Trimming

Module Overview

This module will introduce students to the principles of window installation and exterior trimming. Students will learn about window installation and trim terminology, how to check for RSO. They will draw on knowledge gained in Unit 2 in relation to reading blueprints and technical drawings. They will have to interpret a technical drawing, develop a work plan, and select proper materials and installation tools. They will employ the safe cutting 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.

Theory of Window Installation and Exterior

Answer the following questions using the textbooks Modern Carpentry and Carpentry and Building Construction. or internet resources.

1. Windows are usually grouped under the following categories sliding, swinging, or fixed. Students should identify and describe the following window styles:
 - Casement
 - Slider
 - Double Hung
 - Bay
 - Hopper
2. What is the typical clearance needed for plumbing and leveling a window?
3. Why is it important to follow manufactures' instructions when installing a window?
4. What is a window schedule?
5. What type and size of nails should you use for installing windows?
6. What are galvanized nails and why and where do you use them?
7. What are shims and where are they used?
8. Outline in detail the steps involved in installing a window. (Knowledge of this section is very important; students will need to know these steps when they actually have to install the window for this module).
9. What are the main types of exterior trim products used for windows?
10. Using the National Building Code identify and state the proper codes for window installation.

Order Form Activity

Sites with sample Order Forms

http://www.mullindirect.com/PDF/alside_replacement_order_form.pdf

http://ruscwindow.com/dealer_order.htm

Students will be provided with a floor plan that illustrates the number and size of windows that have to be installed. They will be then given an order form from a local building company that orders windows. Students will have to correctly fill out the order form

Reflection: Window Installation with Exterior Trim

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

1. What problems did you encounter when installing your window? What would you do differently?
2. What is the purpose of house wrap when installing a window?
3. How could you have divided your duties differently to make the project be more effective?
4. Discuss the advantages of working inside in a shop environment as opposed to outside on a typical job site. Give at least three advantages and disadvantages of each.

Work Log: Window Installation with Exterior Trim

Record of Workplace Skills (LOG)

Name: _____ Module: _____

Workplace Skills Required For Successful Completion of Carpentry Module	Date	Initials of Instructor
Blueprint Reading and Sketching		
Read basic drawings and diagrams		
Sketch drawings and diagrams		
Interpret specifications		
Window Installation		
Measure RSO		
Check and inspect window for defects		
Check Manufacturer's Installation Instructions (could void warranty if installed improperly)		
Attached nailing flanges		
Place window in RSO		
Center window in opening		
Level with shims near the end of window		
Check window for plumb		
Shim the inside of the window from side to side		

Cut shims flush to the wall		
Insulate around Window		
Exterior Trim Installation		
Measure and cut Trim pieces		
Tight mitered corners		

Module 3

Door Installation with External Trimming

Module Overview

This module will introduce students to the principles of exterior door installation. Students will learn door installation terminology, measuring practices and proper building practices. They will draw on knowledge gained in Unit 2 in relation to reading blueprints and technical drawings. They will have to interpret a technical drawing, develop a work plan, select proper materials, and then properly install an exterior door following manufacturer's installation guidelines. They will employ the safe cutting 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 activity will give them real life experience with building projects.

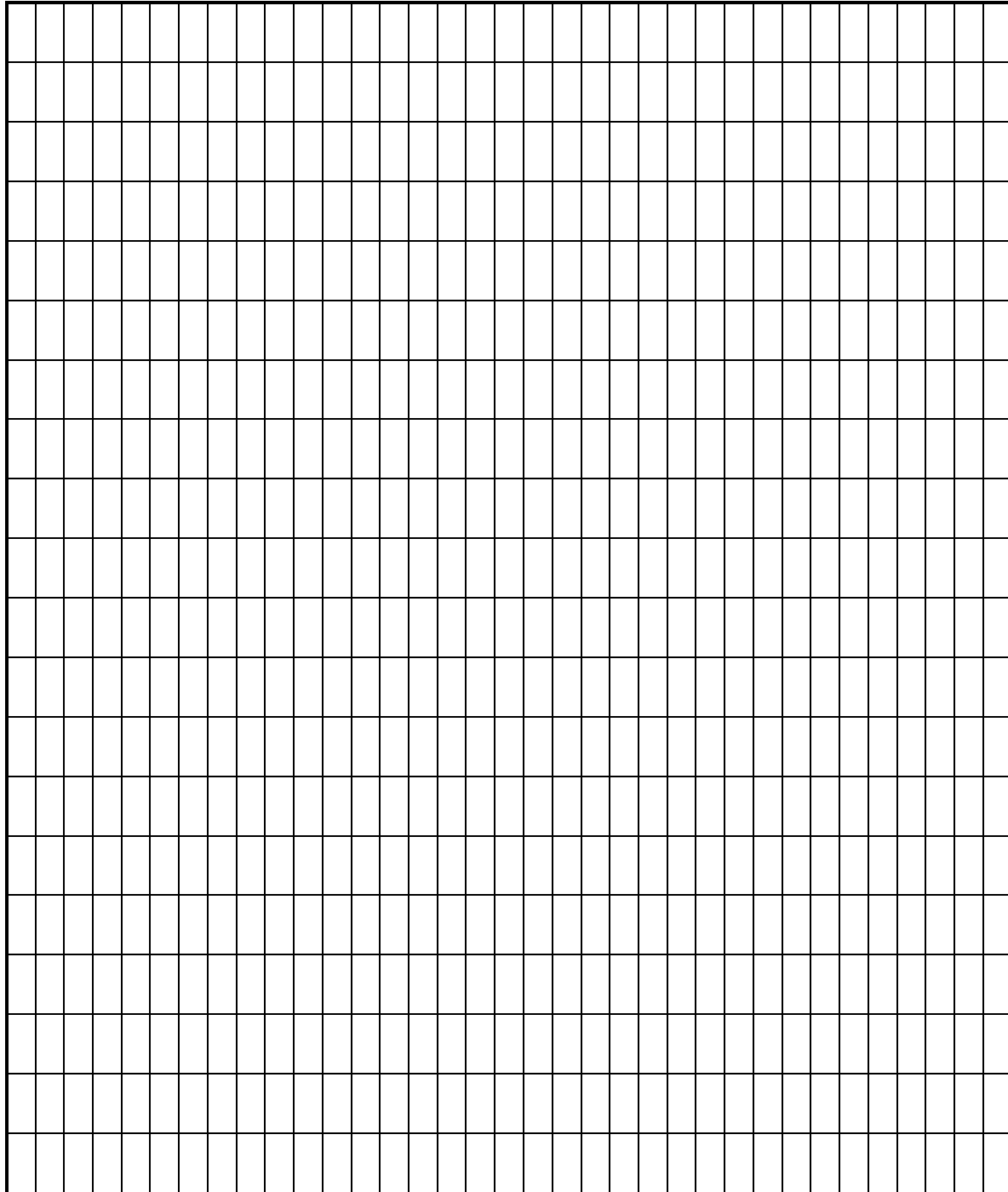
Theory of Door Installation

Answer the following questions using the textbook Modern Carpentry.

1. Explain the term RSO and its importance in the installation of an exterior door.
2. What is the difference between plumb and level?
3. What are shims? Explain their purpose.
4. Why are longer screws required to be installed in the hinges of the door?
5. Explain the purpose of insulating around the door after it is insulated. Give at least two products that can be used for this insulation.
6. Why would you use caulking between the door frame and the j-trim?

Labeling and Defining Door Components

Sketch a diagram of a prehung exterior door including the framing. Include the proper location of shims.



Materials Pricing Activity

Using the list provided below, complete a cost breakdown of the items needed for the installation of a prehung exterior door.

1. Prehung Door with Lockset	
2. Screws (3 ½")	
3. Shims	
4. Spray Foam insulation	
5. Fiberglass pink insulation	
6. J-Trim	
7. Finishing Nails	
8. Caulking	

Reflection: Door Installation

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

1. If doing the door installation project again what would you do differently?
2. What are the advantages provided by using power tools as opposed to non-power tools?
3. How could you have divided your duties differently to make the project be more effective?
4. Discuss the advantages of working inside in a shop environment as opposed to outside on a typical jobsite. Give at least three advantages and disadvantages of each.
5. Collate your blueprints and your work plan (completed in Topic 2) to be submitted for grading.

Work Log: Door Installation

Record of Workplace Skills (LOG)

Name: _____ Module: _____

Workplace Skills Required For Successful Completion of Door Installation Module	Date	Initials of Instructor
Blueprint Reading and Sketching		
Read basic drawings and diagrams		
Sketch drawings and diagrams		
Interpret specifications		
Door Preparation		
Select proper material		
Measure and layout material		
Cut material to proper lengths		
Door Installation		
Select proper material		
Measure and layout material		
Cut material to proper lengths		
Install door to proper specifications		
Install j-trim		

Insulate between door frame and wall frame		
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Module 4

Exterior Cladding (Wood) with VBL

Module Overview

This module will introduce students to the principles of wood cladding installation. Students will learn wood cladding installation terminology, measuring practices and proper building practices. They will draw on knowledge gained in Unit 2 in relation to reading blueprints and technical drawings. They will have to interpret a technical drawing, develop a work plan, select proper materials, and then properly install an exterior door following manufacturer's installation guidelines. They will employ the safe cutting 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 activity will give them real life experience with building projects.

Theory of Wood Cladding Installation

Answer the following questions using the textbook Modern Carpentry.

1. What are the different materials that wood siding is made from?
2. Can siding be applied directly to the studs instead of using wall sheathing?
Explain.
3. What purpose does a rabbeted joints serve when working with wide siding?
Explain.
4. What are the features that are important when selecting material for exterior siding?
5. Why do you lap plain beveled siding? What is the minimum lap?
6. What is a story pole? Explain how to prepare a story pole for siding installation.
7. How do you deal with inside corners when installing wood siding?
8. How do you deal with outside corners when installing wood siding?
9. What is the recommended method of attaching wood siding?
10. How do you guard against splitting when nailing the edge of wood siding?

Types of Exterior Wood Cladding

Using Page 358 of Modern Carpentry sketch diagrams of three different types of siding patterns and give the nominal sizes for each.

Materials Pricing Activity

Using the list provided below, complete a cost breakdown of the items needed for the installation of wood siding on an exterior wall measuring 20' x 8'.

Materials	Price
Wood siding	
Siding nails	
Caulking	
Vapor barrier	
Corner post	

Reflection: Wood Cladding Installation

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

1. If doing the wood cladding installation project again what would you do differently?
2. What are the advantages provided by using power tools as opposed to non-power tools?
3. How could you have divided your duties differently to make the project be more effective?
4. Discuss the advantages of working inside in a shop environment as opposed to outside on a typical jobsite. Give at least three advantages and disadvantages of each.
5. Collate your blueprints and your work plan (completed in Topic 2) to be submitted for grading.

Work Log: Wood Cladding Installation

Record of Workplace Skills (LOG)		
Name: _____ Module: _____		
Workplace Skills Required For Successful Completion of Wood Cladding Module	Date	Initials of Instructor
Blueprint Reading and Sketching		
Read basic drawings and diagrams		
Sketch drawings and diagrams		
Interpret specifications		
Wood Cladding		
Select proper material		
Measure and layout material		
Cut material to proper lengths		
Wood Cladding Installation		
Install trim members		
Install siding		
Correctly space siding		
Set siding nails flush with surface		
Caulk joins		

Module 5

Exterior Cladding (Vinyl) with VBL

Module Overview

This module will introduce students to the principles of vinyl cladding installation. Students will learn vinyl cladding installation terminology, measuring practices and proper building practices. They will draw on knowledge gained in Unit 2 in relation to reading blueprints and technical drawings. They will have to interpret a technical drawing, develop a work plan, select proper materials, and then properly install vinyl siding following manufacturer's installation guidelines. They will employ the safe cutting 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 activity will give them real life experience with building projects.

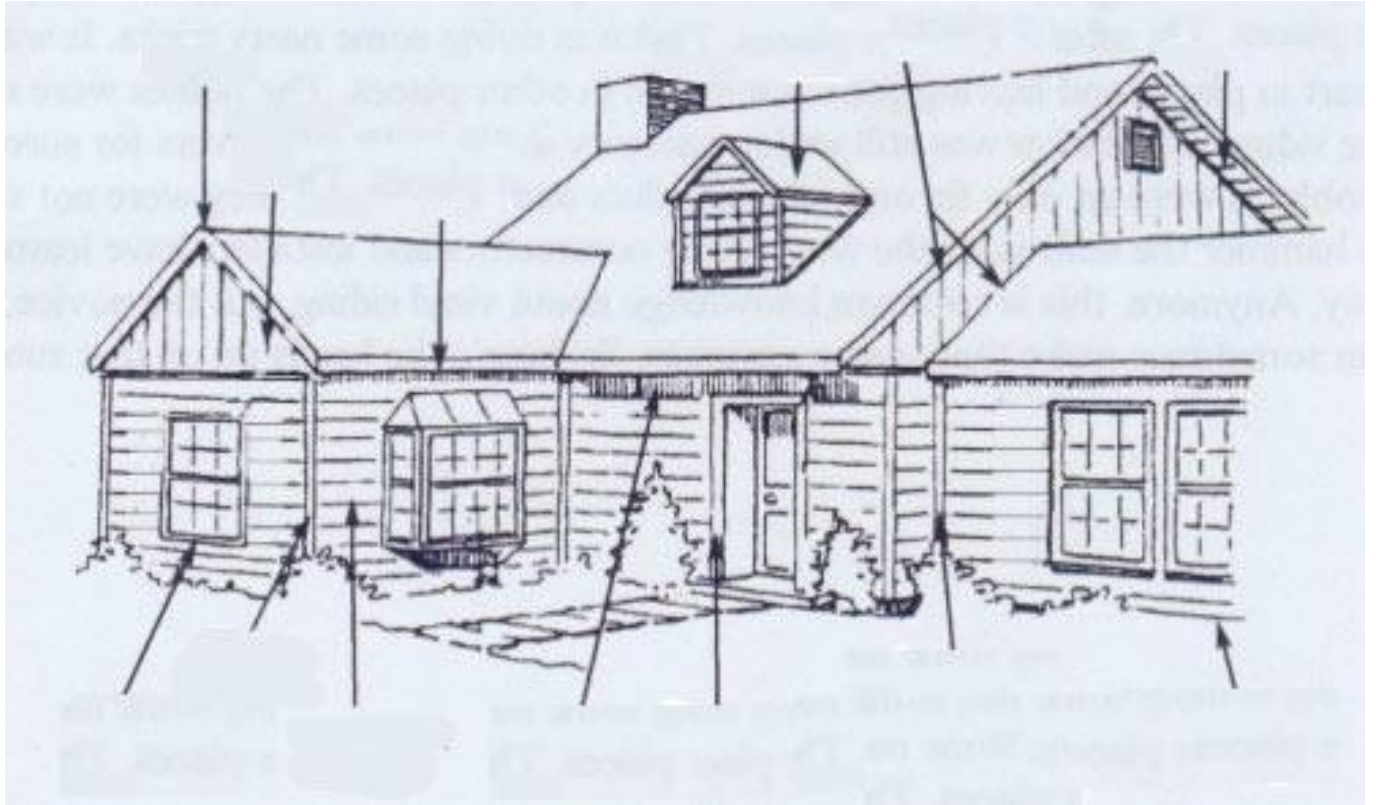
Theory of Vinyl Siding Installation

Answer the following questions using the textbook Modern Carpentry.

1. What purpose does backing board serve in the installation of vinyl siding?
2. List the tools used to cut vinyl siding. Give a brief description of each.
3. Why do you need to leave a $\frac{1}{4}$ " expansion joint when installing vinyl siding?
4. How do you determine the location of your starter strip?
5. Why do you caulk inside the J-trim around windows and doors and also between the window/door trim and the J-trim?
6. When installing vinyl siding do you sink the nails flush or do you leave them raised? Why?

Vinyl Siding Installation Diagram

Using the diagram below sketch out and label all parts of the vinyl siding system for a complete siding installation.



Materials Pricing Activity

Using the list provided below, complete a cost breakdown of the items needed for the installation of vinyl siding on an exterior wall measuring 20' x 8'.

Material	Pricing
Vinyl siding	
J-trim	
Starter strips	
Corner post	
Nails	
Vapor barrier	
Caulking	

Reflection: Vinyl Siding Installation

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

1. If doing the vinyl siding installation project again what would you do differently?
2. What are the advantages provided by using power tools as opposed to non-power tools?
3. How could you have divided your duties differently to make the project be more effective?
4. Discuss the advantages of working inside in a shop environment as opposed to outside on a typical jobsite. Give at least three advantages and disadvantages of each.
5. Collate your blueprints and your work plan (completed in Topic 2) to be submitted for grading.

Work Log: Vinyl Siding Installation

Record of Workplace Skills (LOG)

Name: _____ Module: _____

Workplace Skills Required For Successful Completion of Vinyl Siding Module	Date	Initials of Instructor
Blueprint Reading and Sketching		
Read basic drawings and diagrams		
Sketch drawings and diagrams		
Interpret specifications		
Wall Preparation		
Select proper material (vapor barrier)		
Measure and layout material		
Cut vapor barrier to proper lengths		
Install vapor barrier		
Vinyl Siding Installation		
Select proper material (vinyl siding)		
Measure and layout material		
Cut material to proper lengths		
Install starter strip		
Install j-trim		

Install vinyl siding		
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Module 6

Roof Coverings

Module Overview

This module will introduce students to the principles of roof coverings installation. Students will learn roof covering installation terminology, measuring practices and proper building practices. They will draw on knowledge gained in Unit 2 in relation to reading blueprints and technical drawings. They will have to interpret a technical drawing, develop a work plan, select proper materials, and then properly install asphalt shingles following manufacturer's installation guidelines. They will employ the safe cutting 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 activity will give them real life experience with building projects.

Theory of Asphalt Shingle Installation

Answer the following questions using the textbook Modern Carpentry.

1. Give a brief description of the following roof materials:

- slate
- clay tile
- asphalt shingles
- wood shingles
- metal shingles
- composite materials

2. Define the following terms:

- Square
- Coverage
- Exposure
- Head Lap
- Side Lap
- Shingle Butt
- Rake

3. What purpose does the underlayment serve when installing shingles?

4. Explain how to install an ice and water barrier.

5. What is flashing? Where is it used and what purpose does it serve?

6. What is the purpose of the starter strip?

Shingle Layout Sketching Activity

Using the resource book, Modern Carpentry, sketch the layout for the **six inch method** and the **4 inch method** of shingle installation. **Be sure to correctly label all parts of your sketches.**

Materials Pricing Activity

Calculate the amount of material needed to complete the shingling of a roof using the criteria listed below.

Criteria:

Roof is a total of 1600 square feet. The following material list is needed. You have to figure out the correct amounts and the cost.

Underlayment

Shingles

Roofing Nails

Flange

Reflection: Asphalt Shingle Installation

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

1. If doing the asphalt shingling installation project again what would you do differently?
2. What are the advantages provided by using power tools as opposed to non-power tools?
3. How could you have divided your duties differently to make the project be more effective?
4. Discuss the advantages of working inside in a shop environment as opposed to outside on a typical jobsite. Give at least three advantages and disadvantages of each.
5. Collate your blueprints and your work plan (completed in Topic 2) to be submitted for grading.

Work Log: Asphalt Shingle Installation

Record of Workplace Skills (LOG)

Name: _____ Module: _____

Workplace Skills Required For Successful Completion of Asphalt Shingle Module	Date	Initials of Instructor
Blueprint Reading and Sketching		
Read basic drawings and diagrams		
Sketch drawings and diagrams		
Interpret specifications		
Roof Preparation		
Ensure roof surface is clear of defects		
Measure and layout material		
Cut underlayment to proper lengths		
Install underlayment		
Shingle Installation		
Select proper material (asphalt shingles)		
Measure and layout material		
Install drip edge		
Install 1 st course		
Install other courses using proper spacing		

Install cap		
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Module 7

Stair Construction

Module Overview

This module will involve the proper setup and installation of a set of stairs. The students will be expected to measure and layout a set of stairs. Students will follow accepted practice using the proper tools at each stage of the installation. 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.

Theory of Stair Construction for Residential Construction

Using the resource materials below answer the following questions.

Wagner and Smith. 2003. Modern Carpentry. Tinley Park, Illinois. The Goodheart-Willcox Company, Inc.

Feirer and Feirer. 2004. Carpentry and Building Construction, Sixth Edition. New York, New York. Glencoe/Mcgraw-Hill.

<http://www.woodsthebest.com/Stairs/building-code.htm>

1. Define the following terms: Stringer, Cleat, Headroom, Nosing, Riser, Tread, Newel, Balusters, Winders, Platform. Total Run, Total Rise.
2. Identify the following tools that may be used to fabricate and install a set of stairs
 - Button gauges
 - Framing square
 - Hand saw
 - Nail set
 - Level
 - Jig saw
 - T-bevel

3. Name the two basic types of stair construction and explain their differences.
4. What are the three common elements of stairway construction?
5. What is the minimum headroom required by code?
6. When are handrails required?
7. What are the three general accepted rules for determining rise and run ratios for stair design?
8. What is the maximum and minimum code for rise and run standards?
9. What is the standard width of treads?
10. List and explain the steps involved in laying out stringers for a set of strait stairs. **(This is very important to know to complete your hands on component of this module).**

Calculating a Set of Strait Stairs

Students will develop a plan for the installation of a set of strait stairs that have a total rise of 2937 mm.

- Determine the number of risers
- Determine the size of each riser
- Determine the number of treads
- Determine the size of each tread

Calculating Unit Rise and Unit Run

- The sum of two risers and one tread should be 600mm - 625mm (24" – 25")
- The sum of one riser and one tread should be 425mm – 450mm (17" – 18')
- Risers should be between 175mm – 200mm (7" – 8"). 175mm (7") is most comfortable for the average person.

To determine the size of risers and the number of treads you should:

1. Divide the total rise (the vertical distance from one finished floor to the next.) by 175mm or 7 inches (the ideal riser height).
2. Round to the nearest whole number. This will give you the total number of risers needed.
3. To find the unit rise, divide the total rise by the number of risers.
4. As a general rule, the sum of one riser and one tread should be between 425-450 mm.

Labeling and Identifying Stair Components

Students are to locate a set of stairs in their school and do the following:

1. Measure unit rise
2. Measure unit run
3. Calculate or measure total rise and total run.
4. Measure stairway width

Students must then draw the set of stairs and label the following: tread, riser, stringer, and nosing.

Draw Diagram of Stairs and Label

Reflection: Stair Construction

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

1. If doing the stair construction project again what would you do differently?
2. Why is it important to have acquired basic math skills for stair construction?
3. How could you have divided your duties differently to make the project be more effective?
4. Discuss the advantages of working inside in a shop environment as opposed to outside on a typical job site. 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: Stair Construction

Record of Workplace Skills (LOG)

Name: _____ Module: _____

Workplace Skills Required For Successful Completion of Stair Construction Module	Date	Initials of Instructor
Blueprint Reading and Sketching		
Read basic drawings and diagrams		
Sketch drawings and diagrams		
Interpret specifications		
Residential Stair Construction		
Calculate rise and run of a predetermine height (total rise)		
Calculate number of risers		
Calculate number of treads		
Lay out for stringer		
Accurate cut out for stringer		
Proper use of framing square		
Proper attachment of stringer		
Stairs manufactured to code		

Module 8

Project Management

Module Overview

This module will introduce students to the principles of project management and record keeping. The project management section deals with a variety of roles for students. You can think of the student in this case as being a contractor, OH&S officer, supplier, and clerk all wrapped into one. In the case of each of these roles, students will take on different tasks within the Skilled Trades suite. Each of these roles will have different requirements and should, as the course progresses, ease some of the burdens on the instructor. In this module we will examine the role of the project manager, establish guidelines for their activities and take them through the roles of:

- OH&S Officer
- Contractor
- Foreman
- Supplier
- Manager

Theory of project management

Answers must be typed or presented to the instructor using a slide show.

1. What is project management?
2. What does a project manager do?
3. How does project management aid in the building process?
4. What is the Project Management Triangle?
5. What do you see your role as in this section on project management?

Role of a project manager

Discuss with your teacher what they expect from your role as project manager.

Some of the things you may be involved in are listed below. Next to each item on the list, make notes on what it is you could do in each section.

1. What your observation role would be? (observe)
2. What your action role would be? (act)
3. What your reporting role would be? (report)

Some areas that you should consider are:

- 1) material ordering
- 2) OH&S reports
- 3) worker evaluations based on performance
- 4) equipment inventories
- 5) regular inspection forms of workplace.

Materials Pricing Activity

Using any of the Learning Resource Sheets supplied in topics 1-7, 9-11 provide a cost breakdown for each of the materials used to construct the project provided. These prices can be obtained using local suppliers, business flyers, or online quotes. Ensure that the total price is comprised of an itemized breakdown for each different material used.

These prices should be compared with the group involved in this activity during the module rotation. Over a period of time it is expected that each group will have been “second guessed” by the project management team at least once.

Observations

Module	Student Group	Activity Record

Safety Hazard Report Form

Hazard	Location	Type and Severity
<p>What is the identified hazard?</p> <p>What are the implications for health and safety?</p>	<p>At what module is the hazard?</p> <p>What physical location in the fabrication lab?</p>	<p>Consider severity of hazard and probability of injury, illness, or property damage:</p> <p>Comment on each in the space provided</p>
		<p>Severity :</p> <p>Probability:</p>
		<p>Severity :</p> <p>Probability:</p>
		<p>Severity :</p> <p>Probability:</p>
		<p>Severity :</p> <p>Probability:</p>

OH&S Inspection Report

Answer the following questions in the space provided.

Check fire exits. Are the fire exits free of obstruction and clearly identified?

Check fire extinguishers. Are the fire extinguishers fully charged, clearly marked and easily accessible?

Check dust collection equipment. Is dust collection equipment in good working order and being used in the proper fashion?

Check safety equipment on power tools. Are guards in place? Are safe use instructions clearly displayed? Is equipment in good running order? Is equipment placement proper for safe usage?

Check first aid kits. Are first aid kits available? Are they clearly displayed? Are the kits functional and do they contain the materials necessary?

Reflection: Project Management

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

1. If doing the project management activity again what would you do differently?
2. What are the advantages provided by having a project management team involved in residential construction?
3. How could you have divided your duties differently to make the project be more effective?
4. Discuss the advantages of working inside in a shop environment as opposed to outside on a typical jobsite. Give at least three advantages and disadvantages of each.

Work Log: Project Management

Record of Workplace Skills (LOG)		
Name: _____ Module: _____		
Workplace Skills Required For Successful Completion of Project Management Module	Date	Initials of Instructor
Blueprint Reading and Sketching		
Read basic drawings and diagrams		
Sketch drawings and diagrams		
Interpret specifications		
Supervisory		
Ensure materials present for modules		
Ensure safe practices in lab		
Complete work overview for lab		
Complete OH&S inspection		
Check materials for next groups		
Check tools for next group		

Module 9

H/VAC

Module Overview

This module will introduce students to the principles of heating, ventilating and air conditioning (HVAC). Students will learn HVAC terminology, HVAC installation techniques, various duct systems, duct work fabrication, and the impacts of air flow on HVAC systems. They will draw on knowledge gained in Unit 2 in relation to reading blueprints and technical drawings. They will have to develop a work plan within the specifications of the National Building Code and install a floor register, tie it into the duct work and properly seal the unit for maximum efficiency. Students will learn the value of teamwork and the importance of planning ahead to achieve proper results. The work plan and pricing activity will give them real life experience with building projects.

Theory of HVAC

Answer the following questions using the textbook Modern Carpentry and the Internet as a source of information. Answers may be submitted on paper or can be presented in the form of a PowerPoint presentation

1. Define the following terms:
 - a. ductwork
 - b. trunkline
 - c. CFM
 - d. boot
 - e. register
 - f. HVAC
 - g. Plenum

2. Heating a space can be done several ways. Heat travels three different ways: convection, conduction, and radiation?
 - a. Describe convection, conduction, and radiation.
 - b. How can each principle be applied to heating a home?

3. Conservation measures in heating and cooling houses is important to the overall system as it reduces the workload of the equipment doing the heating and cooling and this translates into lower energy costs. What are four ways that savings in heating and cooling can come about?






4. How does a heat recovery system increase the efficiency of a furnace?

5. Since the energy crisis of 1973, a testing program for appliances was set to determine their efficiency.
 - a. What does EER stand for?
 - b. What information is supplied on an EER label?
 - c. How is this information helpful to a consumer?

6. Heating systems have switched to mostly central heating instead of space heating. List the four main types of heating systems.

Identify Common HVAC Tools

Please identify and describe the tool shown. Check with your teacher for the appropriate texts.

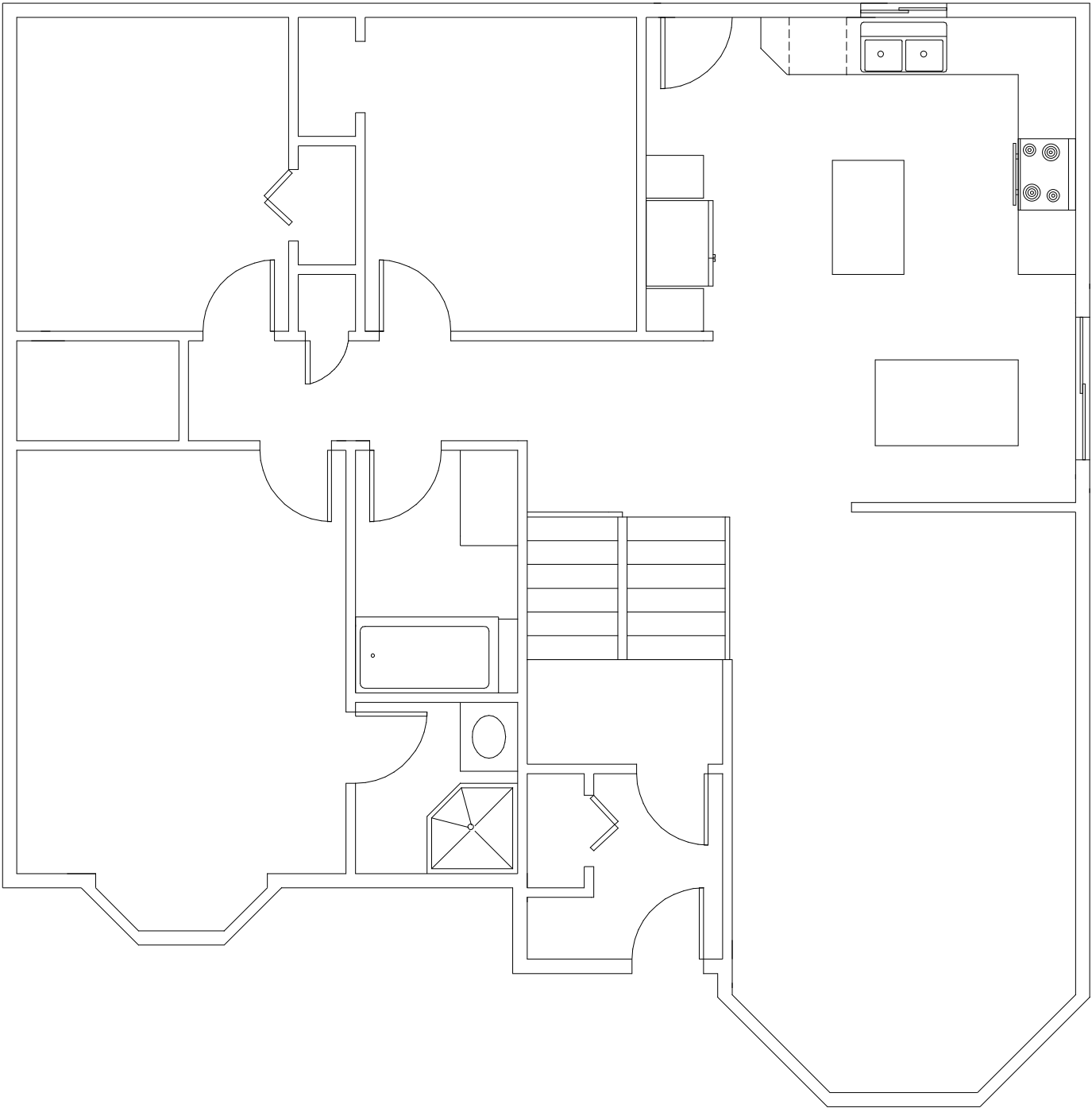
Tool	Identification and Description
	<p>Name of tool: _____</p> <p>Description of what the tool is used for:</p> <p>_____</p> <p>_____</p> <p>_____</p>
	<p>Name of tool: _____</p> <p>Description of what the tool is used for:</p> <p>_____</p> <p>_____</p> <p>_____</p>
	<p>Name of tool: _____</p> <p>Description of what the tool is used for:</p> <p>_____</p> <p>_____</p> <p>_____</p>
	<p>Name of tool: _____</p> <p>Description of what the tool is used for:</p> <p>_____</p> <p>_____</p> <p>_____</p>
	<p>Name of tool: _____</p> <p>Description of what the tool is used for:</p> <p>_____</p> <p>_____</p> <p>_____</p>



Name of tool: _____

Description of what the tool is used for:

Labeling and Defining HVAC Components



Design and layout a HVAC plan with registers, ductwork, and air returns. Using the main floor plan below, lay out the location of floor registers and cold air returns to maximize efficiency and account for the multiple zones on the home.

The location of the furnace should be drawn in as well. All systems will be assumed to be located below this level (in a basement area).

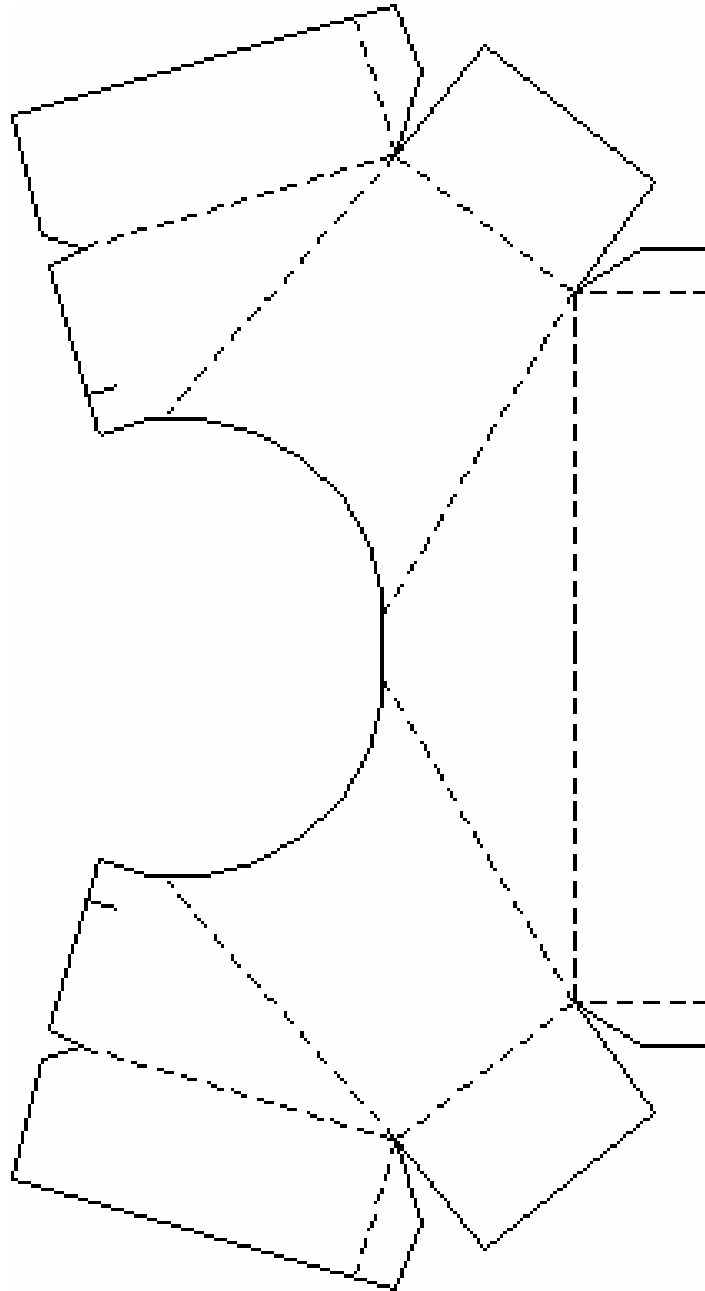
Materials Pricing Activity

Using the scenario above, provide a cost breakdown for each of the materials and components used to heat the above home. Make sure the total lengths of ductwork and plenum are calculated as well as floor registers, air returns, furnace, etc.

These prices can be obtained using local suppliers, business flyers, or online quotes. Ensure that the total price is comprised of an itemized breakdown for each different material used.

Boot Construction Blueprint

Students will need to create the dimensions required for the proper construction of the boot register. They may work from this copy or transfer the image to a template.



Reflection: HVAC

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

1. If doing the HVAC project again what would you do differently?
2. What are the advantages provided by using tools as such as a crimper and a seamer?
3. How could you have divided your duties differently to make the project be more effective?
4. Discuss the advantages of working inside in a shop environment as opposed to outside on a typical jobsite. Give at least three advantages and disadvantages of each.
5. Collate your blueprints and your work plan (completed in Topic 2) to be submitted for grading.

Work Log: HVAC

Record of Workplace Skills (LOG)

Name: _____ Module: _____

Workplace Skills Required For Successful Completion of Smart Home Module	Date	Initials of Instructor
Blueprint Reading and Sketching		
Read basic drawings and diagrams		
Sketch drawings and diagrams		
Interpret specifications		
Ductwork Fabrication		
Correct length of material		
Shear Break and Roll properly used		
Seams properly formed		
End properly crimped		
Boot Fabrication		
Layout of materials ensured minimum wastage		
Cuts all straight and tabs left intact		

Holes properly drilled without reaming		
Bends properly made		
Rivets snugly installed		
Installation		
Followed National Building Code for installation		
Ductwork properly strapped		
Boot properly installed		
Register properly installed		

Module 10

Smart House Wiring

Module Overview

This module will introduce students to the principles of smart houses. Students will learn smart house terminology, wire installation techniques, proper termination of receptacles and proper installation of control panel and devices. They will draw on knowledge gained in Unit 2 in relation to reading blueprints and technical drawings. They will have to develop a work plan, select the proper cabling, install, secure and cut their trunk cable, and then feed to the proper receptacles to create a smart house trunk system. This will be tied back to the main smart house panel box. They will employ the safe drilling and installation 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 activity will give them real life experience with building projects.

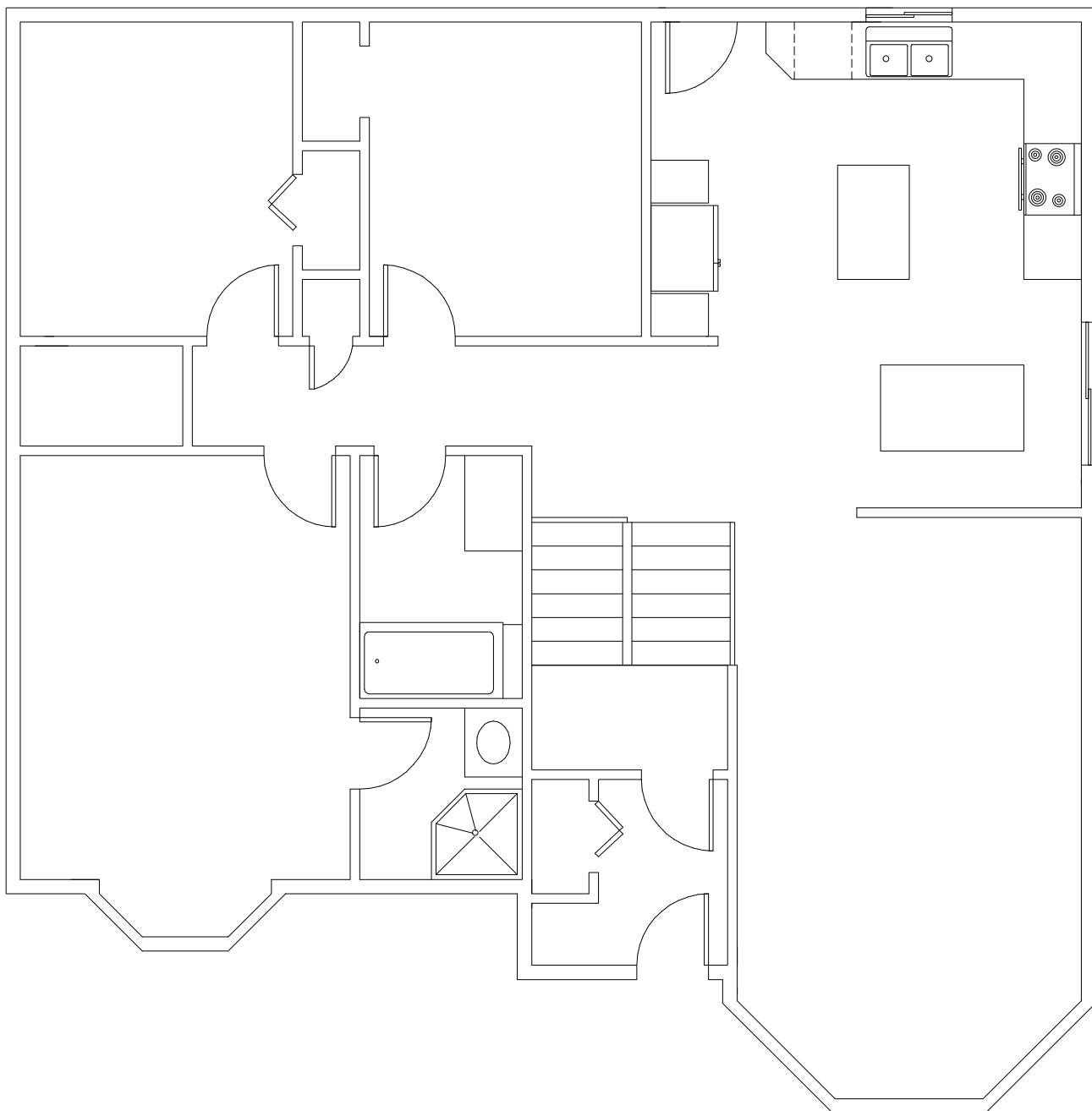
Theory of “Smart Homes”

Answer the following questions using the textbook Wiring Home Networks.

1. What is a home network? What devices can utilize such a network? What does the future hold for such networks?
2. When planning a home network, where is the best spot to locate the network panel? Why is the location important?
3. Why should network outlets and voltage receptacles be at least 300mm apart when installed.
4. What is the maximum that coaxial and CAT 5e cable can be bent? Why is it important to not exceed these limits?
5. Outline the steps involved in pulling a cable or bundle of cables through holes in an open frame environment.
6. What is the difference between open frame installation and installing wiring in a finished room?
7. What is the difference between routing cabling in a basement versus an attic? When routing cable through a basement or attic how far apart should the clips/staples be located?
8. Outline the steps required for installing RJ-45 jacks.
9. Determine when to use a soldered joint in an audio system.

Labeling and Defining “Smart House” Components

Using the floor plans below design and layout a “smart home” plan with a network panel, audio, video, telephone, and network cabling.



Materials Pricing Activity

Using the scenario above, provide a cost breakdown for each of the materials and components used to wire the above home. Be sure to include the control panel, audio, video, network, and telephone cabling as well as the jacks, speaker terminals, and a remote volume control to ensure a complete system setup. These prices can be obtained using local suppliers, business flyers, or online quotes. Ensure that the total price is comprised of an itemized breakdown for each different material used.

Reflection: Smart Home Wiring

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

1. If doing the smart home wiring project again what would you do differently?
2. What are the advantages provided by using tools as such as a tone generator and a multi-meter?
3. How could you have divided your duties differently to make the project be more effective?
4. Discuss the advantages of working inside in a shop environment as opposed to outside on a typical jobsite. Give at least three advantages and disadvantages of each.
5. Collate your blueprints and your work plan (completed in Topic 2) to be submitted for grading.

Work Log: Smart Home Wiring

Record of Workplace Skills (LOG)

Name: _____ Module: _____

Workplace Skills Required For Successful Completion of Smart Home Module	Date	Initials of Instructor
Blueprint Reading and Sketching		
Read basic drawings and diagrams		
Sketch drawings and diagrams		
Interpret specifications		
Video Cabling		
Correct placement of holes for cable runs		
Minimal cable waste occurred		
Jacks at proper height and depth		
Cable terminated properly		
Tied into panel properly		
Cable properly labeled		
Speaker/Telephone Cabling		
Correct placement of holes for cable runs		
Minimal cable waste occurred		

Jacks at proper height and depth		
Cable terminated properly		
Cable terminated properly		
Tied into panel properly		
Cable properly labeled		
Network Cabling		
Correct placement of holes for cable runs		
Minimal cable waste occurred		
Jacks at proper height and depth		
Correct placement of holes for cable runs		
Installed correct cabling		
Cable terminated properly		
Tied into panel properly		
Cable properly labeled		

Module 11

Hardwood Flooring

Module Overview

This module will introduce students to the principles of flooring. Students will learn flooring terminology, flooring installation techniques, and proper flooring installation equipment use. They will draw on knowledge gained in Unit 2 in relation to reading blueprints and technical drawings. They will have to develop a work plan, select the proper materials, layout the flooring properly and then install it. They will employ the safe tool use and installation 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 activity will give them real life experience with building projects.

Flooring Theory

Answer the following questions using the textbook Modern Carpentry.

1. What are three types of wood flooring commonly used? Describe them.
2. What is a period of conditioning? What are the things that must be followed during this period?
3. What is the purpose of using building paper when laying hardwood flooring?
4. Where should the short and long pieces of flooring be used?
5. What is the acceptable moisture content level of hardwood flooring for our region?
6. What size nails should be used in $\frac{3}{4}$ " x $1\frac{1}{2}$ " wood flooring and how far apart should they be spaced?
7. What is the difference between blind nailing and face nailing?
8. Outline the steps for laying out a room with a projection.

Materials Pricing Activity

Using the blueprints provided by your teacher, determine how many bundles of hardwood would be required to complete the installation. Bear in mind any projections.

Once you know how much material you will need, create a price estimate for the cost of installing this flooring. These prices can be obtained using local suppliers, business flyers, or online quotes. Ensure that the total price is comprised of an itemized breakdown for each different material used.

Reflection: Flooring

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

1. If doing the hard wood flooring project again what would you do differently?
2. What are the advantages provided by using tools as such as a wood flooring nailer?
3. How could you have divided your duties differently to make the project be more effective?
4. Discuss the advantages of working inside in a shop environment as opposed to outside on a typical jobsite. Give at least three advantages and disadvantages of each.
5. Collate your blueprints and your work plan (completed in Topic 2) to be submitted for grading.

Work Log: Flooring

Record of Workplace Skills (LOG)

Name: _____ Module: _____

Workplace Skills Required For Successful Completion of Smart Home Module	Date	Initials of Instructor
Blueprint Reading and Sketching		
Read basic drawings and diagrams		
Sketch drawings and diagrams		
Interpret specifications		
Flooring Layout		
Correct placement joins		
Minimal wood waste occurred		
Allowed for projections		
Final board installed correctly		
Tied into panel properly		
Equipment Handling		
Correct use of nailer and nail placement		
Correct use of drill and nail set		

