EVALUATING
ACADEMIC READINESS
FOR APPRENTICESHIP TRAINING
Revised for
ACCESS TO APPRENTICESHIP

COMMUNICATIONS SKILLS
SYNTHESIS OF INFORMATION

AN ACADEMIC SKILLS MANUAL
for
The Construction Trades (Structures)

This trade group includes the following trades:
Drywall & Acoustical Applicator, General Carpenter,
Mason (Brick & Stone and Restoration), Reinforcing Rod Worker, Roofer,
Terrazzo, Tile & Marble Mechanic

Workplace Support Services Branch
Ontario Ministry of Training, Colleges and Universities

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In preparing these Academic Skills Manuals we have used passages, diagrams and questions similar to those an apprentice might find in a text, guide or trade manual.

This trade related material is not intended to instruct you in your trade. It is used only to demonstrate how understanding an academic skill will help you find and use the information you need.

COMMUNICATIONS SKILLS
SYNTHESIS OF INFORMATION

An academic skill required for the study of the Construction Trades (Structures)

INTRODUCTION

An *alloy* is a substance you get when you combine two or more metals, along with other elements such as carbon. This combination, or *synthesis,* produces a new metal. The new metal has different qualities such as corrosion resistance, toughness and hardness. Stainless steel and brass are examples of alloys. Using a synthesized alloy enables you to avoid unwanted weaknesses in the original metals, such as softness or brittleness.

Synthesis of information *means combining pieces of information to arrive at an integrated whole*. If you manage to synthesize all the complex parts of the addition, you will have a successfully completed project. In your training and in your work, you read texts, manuals, guides and handbooks to find out how and why you do things in specific ways. You learn skills and techniques working on the job. You synthesize all this information to see how it fits into the bigger picture – that is, how it fits into the construction trades. By synthesizing your information, you get results you wouldn't get from one source alone.

Practical applications of *synthesis of information* range from writing clear and concise work orders and accident reports to selecting and applying information from blueprints and working drawings. You have to bring different types of information together to create sketches or to outline the steps for an installation. When you are in charge of a project, you have to bring together information, people and materials. It is your job to synthesize all the different parts of the task.

In this skill sheet, we look at the following aspects of *synthesizing information*:

- Order of Synthesis
- Combining Information
- Using Synthesis To Determine Priorities

PART I
ORDER OF SYNTHESIS

Where do I Start?
Often a good place to start is to ask questions.

> **Example:** When you learn about wood, you might want to know how the growth patterns come about. Or, you might ask how it is cut, milled and seasoned or about the characteristics of different species of woods. Once you have figured out what questions should be asked, the next step is to begin answering those questions.

To answer these questions, you will find and collect information from sources such as texts, tables, manuals, code books, teachers, and supervisors.

> **Example (continued):** You will learn details about the physical properties of wood, lumber terms, stress values, grades of softwood and hardwood, types of plywood and so on.

Then, you will organize all the information so it is available and useful. You synthesize it.

> **Example (completed):** You understand how wood is used through this process, which leads to an understanding of how to build rafters or cabinets. From definitions of general terms, such terms as stress, you gain an understanding of stress loads and their relation to climate conditions.

1. Gathering Knowledge

When you begin to study your trade, you will probably learn information in the pattern set by instructors and your texts and manuals. Information is usually presented in a logical order. Texts and manuals start with general ideas and go on to more specific details and procedures. You proceed through the classes and texts systematically to cover all the relevant material.

> **Example:** You are learning about a construction material in the same order that is set up in your textbook. You read about various types of the material in chapter 3. In chapter 4 you find a table about gauges and measurement. Chapter 5 has information about characteristics along with drawings and photos that show you how to recognize different types of the material. The text tells you when to go to the different sections, chapters, tables or figures. Your instructor may add handouts or recommend a certain book for more information about a topic.

You learn this material by:

- reading,
- making notes,
- listening to your teachers and other students,
- discussing ideas
- answering questions.

You will use a number of strategies to help you learn and to organize the information so that you remember it and can use what you already know when you come across a new idea.

You will gather pieces of knowledge about all the aspects of your trade. You will learn:

- facts
- theories, and
- practice.

2. Combining Knowledge

You will combine this information in several ways. In some instances, you add to information in the same order as it is presented in a textbook or other resource. In the same way you that you reassemble a piece of equipment you are repairing, you combine the pieces systematically, to get the complete picture.

Your job will be to put all of that information together, you will start to synthesize it. You will:

- compare ideas,
- classify products and procedures according to how similar and different they are,
- evaluate the relevance and usefulness of a material,
- summarize the information, and
- draw conclusions from what you have found.

These strategies will help you organize and remember what you are learning. Each thing you learn will fit into the whole body of knowledge about your trade. Sentence moved to using knowledge

3. Using Knowledge

Once you have foundational knowledge, you will be asked to complete assignments or projects in the shop that require you to use a synthesis of that information. You will have to figure out what procedures or tools to use to complete a task. You will have to plan the order. To do these things you will:

- think through what you already know about the subject,
- perhaps get more information to find solutions to problems
- talk to people who can help you clarify anything you are unsure about,
- set priorities and,
- finally, combine all this information to suit the situation.

Synthesizing information so that it is useful is a lifelong task. It requires relevant background information, and an ability to observe and learn from your experience. As you try out new ideas and procedures, you rate how they work in different situations. Gradually you build up a storehouse of ideas you know are good. You can pick which technique to use in which situation. You get to know who is a good resource to talk to for answers. Now you can ***synthesize***, that is combine, all your sources of information until you have a complete picture.

Example:
When you understand the grade and classification of one type of material, you can relate it to a system of grading a different material.

- You can compare the way each material is used and understand why it is used that way.
- You can learn what you found out about grading systems to more easily learn about a third and then a fourth kind of grading system.

Each new piece of information adds to your knowledge. Just as importantly, it may change your understanding of a situation.

> **Example:** You learn about fasteners used in construction. You start with descriptions of types of fasteners, their physical properties, terms to describe them, and how to identify each. As you develop an understanding of the uses and characteristics of various fasteners, you move to an understanding of their reactions to climatic conditions and to stresses and to their uses as building materials.
>
> When you understand a characteristic of one kind of fastener you can relate it to the characteristic of another. Then you can compare the way these woods are used. You compare new or unfamiliar products to older, familiar ones. You to read up on techniques for using a new material so that you can adjust your tools, practices and time estimates, and so you understand its advantages or disadvantages.

After you have gathered and then combined the pieces of information, you should be ready to answer some questions about the topic. You will be tested on how well you have synthesized all this material through answering chapter questions, handing in assignments and writing tests.

> **Example:** You have been learning about a grading system of one type of lumber and have been given some questions to answer:
>
> 1. What does the grade *Select Structural* mean?
> 2. What is the difference between a Select Structural grade and a Commercial grade?
> 3. Which species belong in each grade?
> 4. What do I need to know about how defects affect each grade?
> 5. How does moisture content affect compressive strength of Wood A?
> 6. Which products are used in the climate conditions I work in?

The first question is a "What is it?" type that asks you to identify, define or describe something.

The second and third questions are comparisons. They ask you to recognize similarities and differences between two things.

The last three questions ask you to synthesize. You are expected to understand factors such as defects, moisture content or climate conditions so you know how materials behave or react in different applications.

Note: *You could answer questions like these on any subject.*

4. Applying Knowledge

At some point you will take all of this information and apply it to a project, or a job. You will have to collect and organize information, not as it is set out in a text or in your training program, but *as you need it for that project*.

Example: You use synthesis of information to help organize an assignment. Some steps you might take include:

1. Decide on what the job involves. It could be to select a drill bit, solve a power tool problem, develop a pattern, or understand a computer process.
2. Make a list of materials required and estimated costs.
3. Find and collect information from various sources: texts, manuals, charts, experts, sales people at the local store and your own experience.
4. Organize and compare this information to bring all the steps together.

Example: You have been given a special fabricating project that involves welding, Before you start the project, you need information from several sources, and you need to do a little experimenting t o be sure you meet the goal. The following might be required:

- Understand the design of the item to be built.
- Find the gauge of metal recommended and the measurements of the pattern to be followed.
- Understand what happens when joining (welding) the selected metal.
- Find and consult the right table with amperage figures for welding.
- Note whether the table gives adequate information or whether you need specifics from a supplier.
- Fine-tune amperage settings;
- Experiment with a scrap of the same thickness.
- Compare your results on the scrap with the expected results before proceeding.

The information you gather will relate to your purpose and the specific application. What will the finished product be used for? What stresses and conditions must it meet? What codes apply so that the final product meets industry standards? You need to ask all the questions that are relevant to the situation.

Each new piece of information adds to your knowledge. Synthesizing this information allows you to plan for factors such as shrinkage in metal and understand how designs for fittings serve their purpose.

As your experience grows, you are able to deal with more difficult situations as you meet them. You accumulate knowledge and you use that knowledge to acquire the *skills* of the trade. This process does not stop. You will update and upgrade both knowledge and skills throughout your career.

Tables and Synthesis

Tables synthesize information into a concise format. Table 1 below is an example of a brief, useful synthesis of information. It includes types of abrasive disks, their general use and recommended materials. The details about this topic are brought together and organized so you can compare performance, uses and care. The headings tell you the topic and the information is presented in a clear format. The note at the bottom adds more important details.

Study Table 1 and answer the questions that follow. The answers are at the end of this skills manual.

TABLE 1: ABRASIVE DISKS

Type	Uses	Materials
Concrete	**All-round use. Most economical to cut concrete and masonry. Water-cooling recommended:** increases disk life, reduces dust.	Concrete, stone, masonry products. Cast iron, brass, cables, hard rubber, plastics.
Metal	Mainly for steel. Not suited for masonry products. **Water-cooling not recommended.**	Steel, steel alloys, other hard metals such as iron.
Diamond abrasive	Faster cuts than other abrasive disks. Creates less dust. **Water-cooling essential:** prevents heat buildup.	Stone, all masonry, concrete products. Not recommended for metals.
Dry-cut diamond	Etc.	Etc.

Note: Disks and blades must be compatible with saw. They must be rated for maximum rpm of saw. Disks or blades may fly apart if rpm is not matched to saw rpm. Consult operating manual or reputable supplier.

Questions:

1. If you needed to decide if water cooling is necessary, where would you look?

2. If you didn't want to spend much money and you only wanted to buy one general purpose disk, which type would you choose?

3. What happens if the rpm of the disk and the rpm of the saw are mismatched?

   a) Disk life will be reduced.
   b) Heat build-up can cause the disk to disintegrate.
   c) Disk can fly apart.
   d) All of the above.

4. Which abrasive disk is recommended for cutting hard metals?

   a) concrete
   b) metal
   c) diamond

The headings in a table clearly and briefly direct you to the information. The heading at the top of Table 1 tells you what it covers. The headings in teach column tells you exactly what information you will find in that column.

Footnotes offer more information. Did you read the note at the bottom of the table? If not, go back and read it now. It tells you that disks and blades must be compatible with saw and rated for

maximum rpm of saw. It warns about the consequences of not doing this and tells you where to find the information you need so you can do it.

The table is a summary, so it does have limitations.

> **Example:** A table might be an adequate source to select the right classification and grade of lumber for framing or for beams but be careful. The table may not be adequate for your purposes.

Because the information is usually brief, tables may send you to other sources for further details. If you don't know how to do something or don't understand it, you will have to consult another manual or guide, or talk to an expert.

Taking your own notes
Just as you would gather all of the tools necessary to do a particular job, you also need to gather all of the information required to do the job, then apply it correctly. It is a challenge to your note-taking and organization skills to gather information and then find it when you need it.

Some information will be essential for *every job* you do, but, *it may not be repeated*.

> **Example:** You find this instructions about safety procedures.
>
> Find updated health and safety procedures in Section IV. Refer to these procedures when using hand and power tools, when welding, soldering or cutting.

You would have to find out what is in Section IV. *More importantly*, you have to apply the safety procedures.

Trades people use different methods to organize and file information under a topic. You might photocopy or write out the details and keep them in a notebook that is always with you on a job. You might use a sticky note (with words like *soldering/ safety*) to mark the pages. You might examine this section before each job to prepare yourself. Whatever method you use, make sure you keep your information close at hand

Problems?
Do not be discouraged by problems: When you have problems with a tool, or with splits in boards or a choice you've made in a product, it's an opportunity to learn more about your trade. Search for more information to find the reasons for a problem and the solutions to it.

Synthesized information contributes to your overall knowledge and skills. You will know *why* it is essential to follow correct maintenance for tools or use the right grade of board when you understand *how* one thing relates to another. You can see why the correct guides and tables are essential to getting you there.

PART II
COMBINING INFORMATION

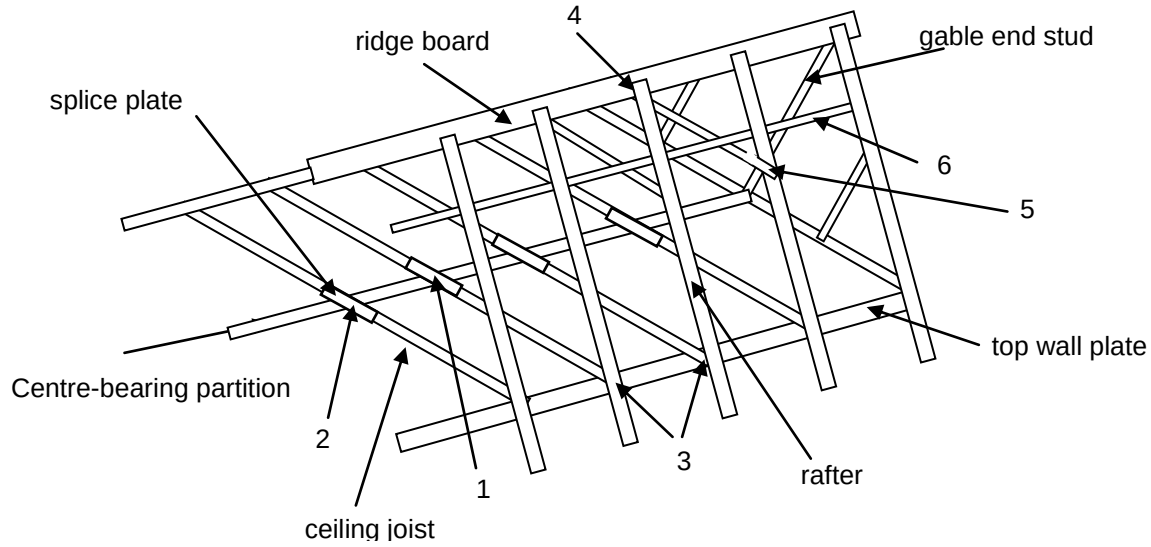
In this section, we'll combine details from a passage that contains text, a diagram and a footnote. Then we'll combine information from two different texts.

Read **Passage 1**. Combine the information from the text with **Figure 1** to understand the design and assembly of a gable roof. Read the legend and the footnote. Notice how the text and diagram form a synthesis. **Answer the questions that follow. The answers are at the end of this unit.**

Passage 1
Pitched Roofs

The simplest form of pitched roof is the gable. Rafters are all cut to the same length and pattern. Erection is straightforward, (See Fig. 1 for framing).

FIGURE 1: Ceiling and Roof Framing with Ridge Board
Ceiling joists butted with splice plate over centre bearing partition.



Legend:

1. Ceiling joists toe nailed to top wall plate with 82mm* nails, one each side.
2. Ceiling joists butted with splice plate over centre-bearing partition; joists are also nailed to each part of rafters. See Table 3 for nailing practice.
3. Rafters nailed to plate with three 82mm* nails.
4. Each rafter toe nailed to ridge board with four 57mm* nails or end-nailed with three 82mm* nails.
5. Collar brace used as intermediate support for rafters, nailed to each pair of rafters with three 82mm* nails at each end.
6. 19 x 89mm strip nailed to top of collar braces at their centre with two 57mm* nails when braces are more than 2400mm* long.

Note: Refer to appropriate tables for nailing pattern.

To assemble a roof frame, rafters, ridge boards and temporary bracing should be close at hand. Make sure rafters for the gable end are straight and nail in place at the wall plate. With another worker

supporting the rafters, install a second rafter on the opposite side. Place the ridge between the two rafters and nail it temporarily in place. Move about five rafter spaces from the end and install another pair. Plumb and brace the assembly and adjust the nailing of the first rafters if necessary. Follow the nailing pattern recommended.

Initial assembly can also be done by attaching the ridge board to several rafters on one side. The assembly is raised and rafters are nailed to the plate (Number 3 in Figure 1). Rafters are then installed on the opposite side.

Note: *These passages are examples of trade information. Changes in your trade may mean that standards, guides, equipment and materials also change. For example, most roofing now is done with premade trusses. It is your responsibility to stay up to date.*

Questions:

1. Do the following steps outline the correct procedure to start a gable roof frame assembly? Answer true or false.

   Nail both gable rafters in place at wall plate
   Attach ridge to gable rafters with temporary nailing
   Move five rafter spaces and attach two more rafters to the ridge
   Plumb and brace the rafters and ridge

   T F

2. Are the steps outlined in question 1 the only way to start framing a gable roof?

3. Find a collar brace on Figure 1 by reading the legend and looking at the diagram. Describe its purpose and how it is fastened.

4. Do you think you could assembly a roof frame by yourself by following the directions in the passage?

Passage 1 with Figure 1 is an example of how text and graphics work together so that you can synthesize information. It begins with a statement about gable roofs and briefly describes two framing methods. The graphic shows you the basic roof design, and the parts are named or numbered. The numbers in the legend below correspond to the numbers in the diagram. Here you will find the names of the part and how they are attached.

Observe that you will have to look up some information that is not detailed in **Passage 1**. The passage tells you to use the appropriate tables for nailing. You will have to find these tables using guides such as Table of Contents, appendix or indexes.

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You can see an asterisk (*) after nail sizes, for example, 82mm* and 57mm*. Because there's no explanation for the *, you have to look through your text or manual to find out what this means. You might find this explanation in the introduction:

An asterisk (*) follows dimensions when no decision has been made by the industry about conversion to metric.

There is a lot of content in the text, diagram, legend and footnote of this passage. If you understand how to use each of the parts and how it all fits together, you can combine the details into valuable information about an aspect of the construction trade. Of course, you also need to remember the note after the passage. Make sure the information you are synthesizing is relevant to the situation you are working on and is up to date.

Passage 2 below describes the function of ceiling joists with details about sizing. **Passage 3** describes a support to ceiling joists. Use the information in them to add to your understanding. **Synthesize information in the two passages to answer the questions. The answers are at the end of this skills manual.**

Passage 2
Ceiling Joists

The ceiling frame is the assembly just below the roof that carries the ceiling surface. Joists are lighter than for floors though the length of span and spacing also determines their size. Spacing of 16" OC is commonly used to co-ordinate with walls and to allow for flexibility in choice of surface materials. Check plans and specifications with local building codes.

Usually, ceiling joists run across the narrow dimension of a structure. The upper corner of each joist end must be cut at an angle that matches the slope of the rafter. If the slope requires only a small amount of trim cut, these cuts can be made after the joists and rafters are in place. If the joists run parallel to the roof edge, the outside joist will often interfere with the slope, especially if the roof is a low-pitched hip roof. In this case, frame with stub ceiling joists at right angles to the regular joists and at right angles to the end wall. In some situations, it is possible to run joists in different directions (at right angles) to each other to reduce the length of the span.

Passage 3
Strongbacks

A ceiling joist that covers a long span may require a *strongback*. A strongback is an L-shaped support made with two pieces of dimension lumber. It attaches across the top of joists providing support and strength. It also maintains the proper spacing between joists.

Step 1: Mark the correct spacing (16" or 24" OC) on a 2 x 4. Position it across the ceiling joists, maintain correct spacing, and nail with two 16d nails at each joist.
Step 2: Turn a straight 2 x 6 (or 2 x 8) on its edge, place against the 2 x 4 and fasten one end to the 2 x 4 with a 16d nail. Work across the strongback. Nail to each joist aligning as you go.

*Refer to Chart 1 for spacing of joists and for size figured for a normal dead load and a live load of 20psf (pounds per square foot). Check this chart with local building codes.

Questions:

1. Based on Passage 2 and 3, a carpenter would choose to run joists at right angles to each other for which reason:

   a) to provide greater strength to the joist
   b) to reduce the amount of material required
   c) to reduce the length of the joist span

2. According to these passages, a carpenter can choose between two methods to support long joist spans. The carpenter can either run joists at right angles to each other or build strongbacks.

   T **F**

3. Both passages mention joist spacing and both tell you to check which spacing to use. Combining information from both passages, where should you check?

   a) Chart 1
   b) local building codes
   c) both sources

Passages 2 and 3 describe some common practices for ceiling joists. They explain how size and span are determined, and remind the carpenter to check plans against local codes. The builder must refer to the appropriate guides and codes as related to this building project.

The passages refer to the effects or consequences of such things as roof slope on ceiling joists and nailing practices so you need to use the information from Passage 1 to understand.

The information in each passage will combine to give an explanation of how something is built. The diagram illustrates some of the concepts, show what is happening and add information.

There are still questions you might want answered as to how the concept applies to your work. You might want to know:

1. There are two methods described. Which is best? Why?
2. Should an apprentice learn one of the two methods first?
3. When does a low-pitched hip roof not interfere with the joist at the roof edge?
4. How does snow load affect roof slope and finishing materials?
5. What guides and practices do local builders follow?

These questions will send you on an information search. You will need to find and combine new details to add to your information. The point is that you need good information before you can synthesize the details into a complete picture. You need the whole picture – a synthesis – before you can plan and then successfully complete a project.

Note: *Use the index and table of contents when looking for information in your textbook and service manuals. It will save you time.*

Keep an Open Mind

Sometimes when you read several sources or different passages, you may get reasons or explanations that differ from each other. As you read, keep an open mind. Often new details force you to rethink what you already know. Sometimes, what you read conflicts with what you have already learned. Look at this positively; maybe you are being offered information you hadn't considered before or something more up to date. On the other hand, maybe you are getting outdated information.

Check other reliable sources and continue to learn. Use all sources available to find the right guides, to understand equipment, safety and principles of concepts such as load and stress, and to find causes of problems. As you add information from a variety of sources and combine this with your experience, your understanding of the whole picture will continue to grow.

You do have to eventually decide what information to use in order to get started. When you understand scientific theory such as stress or compression, it can help you understand what is correct and what is misleading. If you understand *how* something works, you can understand *how* it will withstand a load or when it requires a different construction. When you see the relationship between what you do and the consequences to the structure, you understand how to proceed. When you combine all the details and guides at hand, you can get on with the job.

Fact or Opinion
Synthesis will help you deal with information that isn't directly stated. Sometimes, you get a sense of a writer's attitude – whether he or she has a dislike for a certain method or a preference for a particular tool. You may pick up from a construction worker that a certain way of doing something is the best. Another worker might suggest that the same procedure is not so important. Here you will need to bring together all your information to make your own evaluation.

> **Example:**
> Wall reinforcement is not required by codes, but it is *becoming standard* with *good* builders.

As the construction trades change, you may encounter this kind of information. Look at the words *becoming standard* and *good*. You need some guidance to find out whether wall reinforcement a necessary step for you as a "good*"* worker or whether this is just someone's opinion.

> **Example:**
> Fibreglass or polypropylene mesh are used more frequently. Manufacturers claim that crack widths and spalling can be reduced.
>
> Does this mean you should use mesh to reduce crack widths or spalling? Is this just a manufacturers' claim or do most good builders use it? To answer this, you need to refer to up to date manuals and talk to builders to discover what the best practice is.

> **Example:**
> Codes set minimum **not** maximum standards. Builders should consider upgrading their design mix to meet variable site conditions and differing construction practices.
>
> This example reinforces the message that it is might be a good idea to use standards higher than building code standards in some cases.

Recognize when information does not offer you a choices:

> **Example:**
> Local building codes will set out the maximum runs allowed for rafter slope. Have this information before planning.

It's a good habit to ask the question" *why"* a lot. First, you will find out why something is done a certain way. Second, you can give clear explanations to clients so they understand what you are doing and what they are paying for.

It's important to know the source of any information and be aware of the differences between trade tips that may not be backed up by reliable data and advice that is backed up by facts. An up to date, approved trade text, an expert in the field, a manufacturer's guide and a shop manual are examples of usually reliable sources. Check your sources routinely to see that they are dependable and current. Check with trade experts to ensure that your trade approves any Internet source.

You do all this information searching and source checking so that you have reliable material to gather into a synthesis. Before you combine details into a comprehensive picture, you need to be sure that you can count on their validity. Then you can use the synthesis as a base from which you make your decisions about the different aspect of your construction work.

PART III
USING SYNTHESIS

Setting priorities

*A **priority** is something that is first in importance*. When you *set a priority*, you decide on the importance of something by comparing it to something else. You also decide on the sequence in which different steps are ordered. Rating or setting priorities is important on the job. Synthesizing information helps you do this successfully.

When you set priorities, you decide on questions such as the following:

- In what order should I plan out the steps of the job?
- What needs to be done first?
- What safety and code issues should I be aware of before I start?
- Which client's needs are most pressing?
- What time commitments have I made to clients?

Safety first

A caution or warning indicates the information is essential to your safety on the job, so find out about it before you proceed. It also helps you set a priority in your planning for a project.

Example:

Warning: If suppliers or employers do not supply details on ingredients, health effects, handling or other aspects of this and other hazardous products call the Construction Safety Association of Ontario at 1-800- .

Example:

Caution! *Do not pour near open flame or combustible materials*.

You might need to know if a container which once held a flammable material is considered a *combustible material.*

You might need to know the general reactions of combustible materials and products, so you handle and use these products safely in all situations. You could ask:

- How does this material behave in confined or poorly ventilated spaces?
- Is it safe near pilot lights or switches?

You will need *all* the details and you need to get them from the correct source so you are safe on the job. Track directions that send you to a different source. Of course, you will follow these directions, but it's important to understand them completely as they will apply in other situations.

Example: You read the following:
Select the correct respirator for construction activities from the selection guide. If the guide is unavailable, contact the manufacturer.

- To follow up, you would find and read the appropriate selection guide. If you needed more information, you would phone the manufacturer.

Example:
Supports must comply with the Canadian Electrical Code Part XX, Section YY. Follow the procedures exactly as listed.

- You should consult the code. Make sure you have the most recent version and refer to the correct section.
- Then follow all directions *exactly*.

A direction may suggest a different practice or standard

Example:
Codes set minimum standards for compressive strength at 15MPa (2200 psi) for foundation walls and basement slabs. The Canadian Home Builders' Association (CHBA) and Canadian Standards Association (CSA), however, recommend a higher strength of 20MPa (2900 psi).

- This direction gives two different concrete strength standards for basement walls and slabs, one given by the codes and one recommended by two construction associations.
- Before you decide you which strength to use, you should investigate the reasons for these recommendations.

Some safety instructions do not give directions on how to carry them out:

Example:
Find the health and safety procedures directed to carpenters in Section IV. Refer to this section when using hand and power tools, when cutting or doing formwork.

- When a direction like this is given, it's your job to find each code or reference guide, read it, understand it and apply the information to ensure safe performance of tools.

Pay attention to directions that send you somewhere else – to a different chapter or source. The information in a *warning* will be essential to the operation you are performing right now, so follow up before you proceed. Just as you gather all the correct materials and equipment to do a job, gather all the information required and apply it correctly.

Priorities for the task
You set priorities when you plan your work. If you have four jobs to do, which one comes first? Maybe you always do jobs in the order they come in or as materials become available. Maybe you start with the easiest and work through to the hardest. Other factors also play a part. For example, you would probably install safety fencing around a pool before you finish trim for someone else.

One aspect of setting priorities is deciding the order in which to carry out the different steps of a job.

> **Example:** A customer tells you they want a good insulation material with the highest R-value (resistance to heat loss). You read up on newer insulation materials and compare them with each other and with older types. After comparing information, you feel ready to choose a type of insulation that will meet all the job requirements. You then read this:
>
> Insulation materials must be properly handled and installed according to the manufacturer's instructions. Insulation will not provide its rated resistance to heat flow (R-value) if directions are not followed.
>
> This note describes an essential condition so that insulation provides its rated R-value. Using the manufacturer's guide to for plan the installation now becomes one of your priorities.

In another situation, you may need to co-ordinate work with other trades people.

> **Example:** A plumber cuts into framing members for plumbing. A carpenter will have to check on the structure to see if reinforcement is needed. If so, the reinforcement becomes a priority before the plumbing is installed and the work continues.

It's up to you to consult the appropriate tables, codes, labels and manufacturers' instructions, and then apply the information to the project. You have to synthesize *all* directions and explanations before setting your priorities and going ahead with a job.

Ranking the Details
***Ranking** means that you put details in order*. The order could be first to last, strongest to weakest or most important to least important. To do this:

1. Find the relevant details.
2. Put the details into groups or categories.
3. Compare them.
4. Draw conclusions that enable you to synthesize the information.

You probably already use a ranking system to compare tools, materials or building methods. For example, you might compare types of wood for stress or rot resistance for decks. From this comparison, you can decide which to recommend to your customer – and give reasons for your preference. You compare how suppliers rate for price, expertise and delivery times. To compare materials and installation methods, you will draw on an expert's advice, manufacturers' guides and your own experience. Then you bring all your information together to make your decisions as to what has priority.

Once you have organized details, you can use this synthesis to figure out the causes of problems. You can also use it to figure out how to solve your problems by developing a sense of what's important in setting priorities.

Ask questions, learn from experience, continue to read, and talk to experts. This way you will continue to add to your knowledge about the construction trade. As you acquire an understanding of the trade, you will be able to use your synthesis of all this information so that you can set proper priorities.

CONCLUSION

Synthesis of information involves combining different pieces of information to compare and evaluate information, to set priorities or to solve problems. Your ultimate purpose is to produce the best results on the job.

Summary

1. **Ask questions** directly related to the assignment or job.

2. **Research and collect information** from all sources. Note and follow any directions that tell you to look somewhere else for information.

3. **Organize, compare, set priorities, and evaluate information** in relation to the questions you need to answer.
4. **Find answers to all questions** and be prepared to review your steps to answer new questions that arise.

5. **Notice the difference between fact and opinion** when searching for answers.

6. **Combine information from several sources** to provide answers or instructions that you would not find using one source only.

ANSWER PAGE

PART I Table 1, Abrasive Disks

1. If you needed to decide if water cooling is necessary, where would you look?

   The answer is found in Table 1 under the heading **Uses**. It lists which disks should be water cooled. Concrete disks are water cooled to increase disk life and to reduce dust. Diamond abrasive disks must be cooled with water to prevent heat buildup which can cause the disk to disintegrate. Cooling with water is not recommended for metal disks.

2. If you didn't want to spend much money and you only wanted to buy one general purpose disk, which type would you choose?

   You would choose a concrete disk because it can be used as an all round disk and it is inexpensive.

3. What happens if the rpm of the disk and the rpm of the saw are mismatched?
   c) Disk can fly apart.

   The note at the bottom states that the consequence of a mismatch may be a disk or blade that flies apart. This is a serious consequence and you must make sure the disk and saw are matched. There may be other less serious consequences such as a reduction in disk life

4. Which abrasive disk is recommended for cutting hard metals?
   b) metal

   Metal disks are the only ones recommended for this material.

PART II Passage 1, Pitched Roofs, Figure 1

1. Do the following steps outline the correct procedure to start a gable roof frame assembly? Answer true or false.

   T Passage 1 describes these steps in describing an assembly procedure. You have to read the information and organize it into the correct steps.

2. Are the steps outlined in question 1 the only way to start framing a gable roof?

   No, the passage describes an alternative method. Paragraph 3 describes another way to start roofing framing, beginning with "Initial assembly can also be done …"

3. Find a collar brace in Figure 1 by reading the legend and looking at the diagram. Describe its purpose and how it is fastened.

To answer this question, look at the legend or numbered list below the figure. After each number, you find the name of the part, a brief description and the nailing pattern used. Number 5 in the list identifies a collar brace and gives a description. A collar brace is *used as intermediate support for rafters.* It is *nailed to each pair of rafters with three 82mm nails at each end.*

4. Do you think you could assembly a roof frame by yourself following the directions in the passage?

   No, the passage indicates that at least one helper is necessary to safely and efficiently assemble the roof frame.

PART II **Passage 2, Ceiling Joists**
Passage 3, Strongbacks

1. Based on Passage 2 and 3, a carpenter would choose to run joists at right angles to each other for which reason:
   c) to reduce the length of the joist span

2. According to these passages, a carpenter can choose between two methods to support long joist spans. The carpenter can either run joists at right angles to each other or build strongbacks.

   T Both Passage 2 and Passage 3 state that the two options are used to reduce or support long joist spans.

3. Both passages mention joist spacing and both tell you to check which spacing to use. Combining information from both passages, where should you check?
   c) both sources

   Passage 2 mentions checking local codes while Passage 3 says to refer to chart 1 and then check with local codes. Combining both sources indicates you should use both references