

**EVALUATING  
ACADEMIC READINESS  
FOR APPRENTICESHIP TRAINING**  
Revised for  
**ACCESS TO APPRENTICESHIP**

**COMMUNICATIONS SKILLS  
EVALUATION OF INFORMATION**

**AN ACADEMIC SKILLS MANUAL  
for  
The Metal Work Trades**

This trade group includes the following trades:  
Heat & Frost Insulator, Iron Worker,  
Precision Metal Fabricator, Sheet Metal Worker, and  
Welder and Fitter

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

*Revised 2011*

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.**

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# COMMUNICATIONS SKILLS: EVALUATION OF INFORMATION

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*An academic skill required for the study of the  
Metal Work Trades*

## **INTRODUCTION**

**Evaluation of information** means careful consideration of information in order to make a judgment about its purpose, meaning, or accuracy. We evaluate information to understand and solve a problem, to plan a job, or to choose a material, a tool or a method to do a job. As you learn your trade, and as you work, you will use this skill to make the best possible decisions about how to use information.

In order to make the best choices you need the best information. During training, and on the job, you will have many sources of information including textbooks, manuals, tables, diagrams as well as your teachers, supervisors and co-workers. You will decide if the information you have been given is accurate, or if it is just someone's opinion. And, you will decide how to use that information.

In this unit, we will examine evaluation of information under the following headings:

- ◆ Getting the right information
- ◆ Selecting relevant information
- ◆ Cause and effect
- ◆ Fact and opinion

## **PART I**

### **GETTING THE RIGHT INFORMATION**

In order to work through a project in an organized and effective way, you need to assess or *evaluate* the steps required to successfully reach your goal. Start by thinking about and planning the whole project before you begin any work.

**Example:** You have a job to complete. You need to plan how you will proceed from the beginning of the job through to the end. Identifying safety or problem areas is probably a good first step. Next, you have to organize information, tools, materials, and equipment. Once you have all of the information, make a list in your head or on paper of how to proceed with the job. Now you are ready to actually start working.

Approach your work systematically. The first step in a systematic approach is to evaluate your situation. Size up the job to identify safety or problem areas. Next, organize the information, tools, materials, and equipment. The goal is to think about and plan the project *before you begin*.

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### **The Right Information**

Once your purpose is clear, you can gather the right information from the right texts and manuals, manufacturers' guides and suppliers. Choose the table or text that is relevant to the job.

#### **Examples:**

If you work in Ontario, you need Ontario's codes.

If you work with metric tools, follow the guides for the metric system – not U.S. or Imperial systems.

### **Making evaluated choices**

When you have found information that seems relevant, you have to evaluate whether it is exactly what you need.

**Example:** Workplaces are supplied with safety equipment such as fire extinguishers. The choice of safety equipment is based on evaluating your working conditions and matching the equipment to the situation. To determine the class or type of fire extinguisher needed on the work site, you need to know information such as:

- the square footage of the work area,
- the presence of heat, combustibles, flammable products, chemicals, liquids, gases, etc. and
- legal requirements such as up to date regulations and fire and safety codes for your jurisdiction (your city, county or province).

Next you need information about types or classes of fire extinguishers such as the following:

- size,
- discharge times,
- approximate range of extinguisher, and
- the types of extinguisher used for different types of fire.

Now you can evaluate the situation and make a decision as to which types of fire extinguishers are required.

*The right choice is based on an evaluation of all the information gathered.*

General steps used in making sound decisions include:

1. evaluate the situation,
2. get up-to-date information,
3. make sure you understand the information, and,
4. use it to make your decision

Read Passage 1 below. It is about sheet metal snips. Several areas need to be evaluated .We will look at these at the end of the passage. **Answer the questions that follow. Answers are at the end of this skills manual.**

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### Passage 1 Snips

Sheet metal workers require both practice and knowledge to make clean cuts on sheet metal in a variety of situations. Your first cuts may have jagged and rough edges. These rough edges can affect the quality of the finished job, so mastering snips is essential. To get expert results in sheet metal, read the following rules on use and care of snips. Practice proper care and the correct hand techniques to ensure a skilled completion of the job.

1. The *small piece of metal* should be kept *over the bottom blade* of the snips. The real problem in cutting the metal is getting the snips into the end of the cut. One piece of metal must slide over the bottom blade and up over the snip handle. If the sheet of metal is large, it will resist bending which will make it very difficult to get the snips into the end of the cut. This makes it difficult to control the snips. However, if the metal is narrow, it will curl over the blade and so stay out of your way as you cut.

#### Questions:

1. Even if you have read the instructions, your first cut may be ragged.

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2. Why is it important to master snips?

- a) to get the right type of curl in sheet metal when cutting
- b) to ensure long life for this tool
- c) to get expert quality in the finished product

3. In regards to cutting sheet metal with snips, which is more important?

- a) practice
- b) knowledge
- c) both practice and knowledge

4. It should be easier to cut a large piece of sheet metal with snips than it is to cut a narrow piece.

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#### Evaluation

This passage describes the difficulties of making clean cuts with metal snips. It also gives directions for doing one of the two things which could help overcome the difficulties.

The passage also suggests that *both knowledge and practice* are required to acquire a particular skill. While the passage can explain what to do and why (knowledge), it cannot give you the practice.

- You will have to acquire this by trying the correct hand techniques and then practicing them *in a variety of situations*.
- You will know when your cuts are clean by evaluating each cut you make.

Generally, if you are aware of what to watch for, you can be prepared to react to correct any problems when they start to happen. You will evaluate your work as proceed.

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When you are learning your trade, you will look for instructions from texts and advice from instructors or experienced workers. You practice a skill, evaluate the results, and practice again, until you are satisfied with the result.

### **Learning one step at a time**

Passage 1 reminds us that it is important to assess or evaluate our skill, experience and knowledge in any area. The quality of the end product, depends on the technician's skill, experience and knowledge about how a material behaves or how a tool is used.

Evaluation of your understanding as you learn and then practice new skills is important. You assess how well you know the theory of a skill and then assess your practice of the skill to ensure that you understand and can carry out a task using the skill.

This is a gradual learning process, of – study – evaluate – practice – evaluate. It takes time but the results will be worthwhile. It is the step by step learning that all skilled trades people go through.

### **In Brief**

You evaluate any task as you make decisions about how to handle it. The evaluation includes, but is not limited to, the following:

- the purpose of the task,
- the understanding of each factor affecting the task,
- the manufacturers' recommendations,
- where to find complete information, and
- your own skill and knowledge.

### **Following up**

When information leaves you with one or two unanswered questions, you need to search for answers.

**Example:** You read this:

The experience of the welder often has a bearing on the size of the electrode. In particular, for out-of-position welding, the welder's skill determines the size of the molten pool that he/she can control.

Now you need to know, how is the size of the molten pool controlled? Finding the answer should lead you to the right sources to find out what controls molten pool size.

When you look for answers to questions, you accomplish two things:

- 1) You do the job you've been hired to do with the right tools, equipment and metals.
- 2) You develop your research skills which increases your knowledge of the trade.

You may get information that tells you that you need to evaluate your experience and /or be prepared to try, or to try again.

**Example:**

It is easy to operate the slip-roll forming machine but difficult to produce well formed rolls – that is, unless the operator is experienced. Experiment to determine how to set the rolls to form so you achieve the required curvature.

You may need to evaluate how information applies to you, you have to evaluate what you know.

**Example:**

In many cases, the weld timing can be left to the discretion of the operator.

Consider: When can I use my judgment instead of a guideline?

**Observing What's Important**

*Evaluating information means being observant.* Trade materials use a variety of methods to emphasize important information. You may see words such as **NOTE:** or **Caution.** You may see boxed information, different sizes or types of print, or symbols such as ►, !, or ▪. These are signals used to catch your attention so you read the information that comes next carefully.

Use the signals to make sure you observe all essential points or steps. Look over the material first to note the highlighted information. Signals give advance warning about an important safety issue or an essential procedure. Reread these points and make sure you follow any instructions.

**Examples:**

Use utility knives with *retractable blades only*. Utility knives cause more cuts than any other sharp-edged cutting tool.

**WARNING: Do NOT interchange thread types. Damage will result to the bolt or to the threads of the part.**

**Many accidents occur to workers while getting on or off ladders. Loss of footing causes up to 40% of these accidents.**

The **bold print**, CAPITAL LETTERS, **coloured type**, and box make information stand out. Pay attention! The information is designed to keep you safe and your materials in good shape.

**PART II**

**SELECT RELEVANT INFORMATION**

As become familiar with technical information, your ability to identify and select the right information improves:

- ◆ You distinguish between general rules that apply to most situations and unique situations where you have to figure out the best way to proceed.
- ◆ You notice that patterns and principles you use today also can apply to future tasks.
- ◆ You see the *relevance* of information you come across.

### Charts and Tables

Charts and tables give you quick information. They are designed to be orderly, simplified, and usually in a list format. You can see all the information and select what fits your situation.

Tables can guide you in selecting a drill bit, or tell you what pressure settings you need. Tables rate tools to help you decide which to use for a job, or ones you might want to buy. Tables also compare materials, or can show you the advantages and disadvantages of a procedure or product.

**NOTE:** Information in a table should be reliable, but it may not cover all the information you need. If it doesn't, make sure to use a number of sources to get a complete picture. Be sure you use current tables and up-to-date information suitable for the task.

Table 1 below illustrates the clear and simple organization of tables. The row headings clearly tell you what the numbers mean. The table allows you to find what you want quickly.

Read Table 1. Glance over everything before reading so you know what is being compared.

**Table 1 Mechanical Specifications: Maximum Welding Force**

Actual Throat Depth in Inches	6	12	18	24	30	Etc.
Maximum welding force in lbs. Foot-operated welders	975	540	375	290	235	etc.
Maximum welding force in lbs. Air-operated welders	975	540	375	290	235	etc.

**Note:** All welding forces are adjustable to a minimum of 10% of the indicated maximum values. Maximum welding forces of air-operated welders are based on 80 pounds per square inch (psi) air line pressure. Foot pedal can be adjusted to a maximum of 35° either side of centre.

In Table 1, you see the following information:

- two types of welder,
- maximum welding force for each (in pounds), and,
- any differences between welding force for foot- and air-operated welders (in this case, they are the same)

Did you also read the **Note:** at the bottom of the chart? If not, read it now. To evaluate *how*, *when* or *whether* to use any information, it is important to *read everything available to you*. The note at the bottom provides more details.

Be sure to read all notes and decide how or if they apply to your job. The note with Table one tells you this:

- the limits of adjustments,
- what the maximum welding force is based upon, and:
- how much you can adjust the foot pedal

### **Notes with tables**

Notes (or footnotes) that are with tables include essential information. Much more information is available to you when you combine footnotes with the table details. When you have more information to work from, you can decide how or if they apply to your assignment. You can *evaluate*. There is always a good reason for footnotes, so make sure you get all the details.

*Notes explain terms or abbreviations.*

**Example:**

*Note:* PSIG stands for pounds per square inch gauge.

*Notes point out exceptions to a use.*

**Example:**

**Note:** Some metals are excluded from this use because of corrosion.

*Notes guide you to the information you need.*

**Examples:**

**NOTE:** See Chart 5 for Imperial. – Metric conversions.

See the Welder's Guide for complete information.

*Notes guide you to make correct adjustments.*

**Example:**

The note with Table 1 guides you to avoid incorrect adjustments and, thus, problems. You can check that you have determined welding force accurately, that equipment is operating to mechanical specifications (80 psi air line pressure), and that you apply the specified force to get the results you expect.

*Notes may tell you where to find more details.*

**Examples:**

*See Figure 3-1 for a cross section of this diagram.*

*Consult the torque guideline when using lubricants X, Y or Z.*

### ***How And When To Use Information***

To decide *how and when* to use information, it is important to evaluate whether it is relevant to a specific situation. The information must:

- ◆ be reliable,
- ◆ be complete, and
- ◆ answer all the questions about the situation.

You may need to read from more than one source to get the information you need. When you have enough information to work from, you can decide how it applies to your task.

### Diagrams and Text

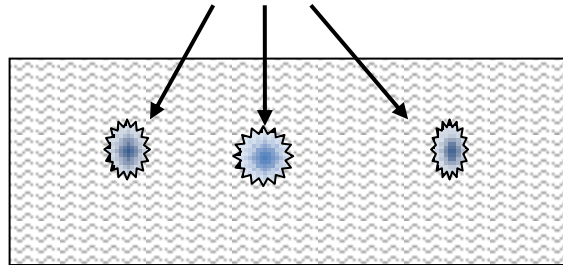
**Passage 2** below describes the difficulties of getting a perfectly round hole when drilling through thin metal and what can be done about it. As you carefully read, think about tool selection and drilling techniques. In short, *evaluate what you read*.

**Read Passage 2 and answer the questions that follow. Answers are at the end of this unit.**

#### Passage 2 Drilling Thin Material

Drilling holes in sheet metal is difficult, and the results may be damaged work. This is especially true with standard twist drills over 12.7 mm (½ in) in diameter. The standard twist drill has a tendency to "hook" into the thin metal. This "hooking" action is caused by the rake angle created by the helix of the flutes and the drill point. A clean, round hole is not produced by the standard twist drill (See Figure 1).

Ragged holes produced by standard twist drill



**FIGURE 1:** Standard twist drill should not be used to drill holes in sheet metal

Special drills and specially ground twist drills should be used when drilling thin material.

A low helix drill or a straight-fluted drill which has no rake angle improves the quality of drilled holes in thin materials. A standard twist drill can be modified by grinding a short flat on the lip of the drill to remove the rake angle if a straight-fluted or low helix drill is not available.

Another factor affecting the quality of the hole is the manner in which the drill point is ground. Grind so there is a small point in the centre to position the drill in the punch mark. Then grind the rest of the drill point to an angle of 5° from the flat with a lip clearance of about 12°. As the drill point penetrates the work, the outer edges act as a trepanning tool and result in a round, almost burr-free hole.

#### Questions:

1. A specially ground twist drill will produce approximately the same results as a standard twist drill.

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2. By referring to Figure 1, you can understand how “the rake angle created by the helix of the flutes and the drill point” creates the “hooking” action.

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3. Which topic below does Passage 2 give you the *least* information about?
- a) how to modify a standard twist drill
  - b) how to produce a burr-free hole in thin material
  - c) the causes of “damaged work”
4. Passage 2 gives enough information for you to understand helix of the flutes and trepanning tool.

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### Evaluation

You need to get the expected results from a project – drilled holes of the right size and quality. You need to avoid damage to tools, to the material and other classes of problem. To do all of this, you depend on a clear understanding of clamping, drilling, equipment and materials. *Your purpose is to select the right information to come to this understanding.*

Passage 2 is an evaluation of a drilling operation and a type of problem. It directs you to Figure 1 to show you the problem. The passage describes the problem, looks at the cause and offers a solution.

In a passage like this, someone has evaluated a task and a problem you might face. This kind of evaluation will direct you to correct procedures, directions, tools and materials. It may help you to do a job efficiently or to avoid a problem you might otherwise encounter.

### There’s a bit missing

It is just as important in any evaluation to recognize when a piece of information is missing.

In some instances, you read information that causes you some difficulty or uncertainty.

**Example:** You might read this about tension:

Materials can withstand a certain amount of stress before they break or weaken.

What exactly does *a certain amount* mean? The information doesn’t explain it, so how do you know?

**Example:** In a table on characteristics, uses and properties of copper, you find this:

It has relatively high strength but is difficult to cold work.

The note doesn’t explain what *relatively high strength* means, or what metals copper is compared to. Is it difficult for an apprentice *to cold work* or for everyone?

Something is missing: you may know what these directions or notes mean, but if you don't, how

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can you evaluate the strength of a metal, or the difficulty you would have working with it, or your own safety?

Up-to-date information should be reliable. But, if information is not clear to you or details are missing, you cannot evaluate thoroughly. New developments and materials in your trade mean that products and techniques, standards and codes change. Make sure you keep up to the standards. Make sure you know who to ask for explanations or clarification to get the whole picture.

### **PART III** **CAUSE AND EFFECT**

When we refer to **cause and effect**, we are evaluating a relationship between two events. We want to see if one event is responsible for causing another event to happen. The connection between the two happenings can be established:

- by careful evaluation based on repeated observation,
- by referring to recognized standards and manuals, and
- by talking to respected supervisors and workers in the trade.

Safety on the job often means being aware of cause and effect. If a careless step can cause you harm, you should know the effects of that action. Safety warnings often highlight the cause and effect relationship in some way, especially if the effects are serious.

A warning might tell you to avoid doing something that can *cause* a danger. The warning may also state the consequences *effects* and general safety directions.

#### **Example:**

Avoid stringing wires for temporary circuits. Frequent relocation of circuits can loosen connections. This can break insulation, creating fire and other hazards.

Remember that electricity is **always** a potential source of danger. Consider all electrical wires and equipment to be live until they are tested.

Recognizing cause and effect relationships can help you understand:

- ◆ what action causes a problem,
- ◆ what action solves a problem without creating a new one, and,
- ◆ what action can prevent a problem from happening in the first place.

A problem happens because something causes it. When you search for the cause of a problem, look at the relationships between actions that are closely related to the problem. As you search for solutions, think about how to change the factors that have caused the problem. When planning a project, think ahead to the logical order of procedures so that you can avoid any action that has the potential to cause a problem.

### **Who (or what) caused it?**

In the sentence below, it is clear what happened.

*Fred threw a snowball and it went through the shed window.*

Fred threw a snowball. The result, or effect was, it broke the shed window. You can reverse the order of the sentence and still make sense of the relationship: *The window was broken because Fred threw a snowball through it.*

Cause and effect relationships can be very clear. In the next example, you see a cause/ effect relationship between a drilling operation and a drill bit:

#### **Example:**

*Do not spin the drill bit too fast or press too hard.*

*This will result in overheating which can quickly soften and ruin the bit.*

In this example:

- The first sentence gives you a cause – a drill bit that spins *too fast* or has too much pressure applied.
- The second sentence tells you the effect of the action – overheating and softening of the bit.

We can reverse the order of the sentences and still make sense of what happened:

*A drill bit can soften and be ruined if it overheats from spinning too fast or being pressed too hard.*

But we cannot reverse the order of the relationship and still make sense. In other words, the result is not the cause. We cannot say:

*A drill bit which softens and is ruined from overheating **will cause** the bit to spin too fast and with too hard a pressure.*

And, we cannot say: “*A broken window caused a snowball to be thrown.*”

It doesn't make sense if you mix up the cause and result. The events occur because of a cause and effect relationship. You have to keep this relationship in mind as you troubleshoot. As you search for problems and their solutions, remember to note the order of the actions even if the *sentence order* is changed.

### **Take two directions to study cause and effect**

In practice, we often work in two directions – backwards and forwards – when we talk about cause and effect. Sometimes we know what happened (the *effect* or *result*), but we don't know why (the *cause*). Sometimes we know what action we are taking (the *cause*), but we don't know the effects or results of it.

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**Example:** As you are driving on a winter's night along an unfamiliar concession road, think ahead. Predict the likely results of your actions. You may do any of the following:

- a) skid into a ditch,
- b) miss a turn and get lost,
- c) hit an icy patch and spin, or,
- d) be lucky and arrive safely.

You have worked from your present actions forward to predict the probable or possible effects. The purpose in doing this is to evaluate the likelihood of an event taking place - of *a, b, c, or d*. When you evaluate the effects of what you are doing now, you can change your behaviour to avoid or prevent a problem.

**Example:** Knowing that improper care and/or use of steel rulers will reduce their value as accurate measuring tools, you can adopt practices that will avoid this result. You can evaluate your own practices compared to recommended (proper) handling and use. So when caring for tools:

- handle with the same care as for precision instruments,
- check ends and corners for wear,
- use only for measuring – never as a screwdriver or lever, and,
- observe how experts handle and store this and other tools.

Passage 3 outlines a relationship between cause and effect. The purpose is to understand and, therefore, avoid poor or ruined work. **Read Passage 2 and study Table 2. Answer the questions that follow. Answers are at the end of this skills manual.**

### **Passage 3 Pneumatic Tool Maintenance**

Tools and equipment cannot operate correctly unless you take proper care of them. Although air tools do not require much upkeep, basic maintenance will prevent problems. For example, storing a tool with water in it will cause moisture to gather in the lines and to be blown into the tool when next used. Also, rust will form resulting in a shortened life for this tool.

See Table 2 for a troubleshooting guide to air tools.

Maintain tools and equipment. *More jobs are ruined because of poor care than by any other single cause!* If a tool is not functioning properly, fix it.

These are the most common causes of pneumatic or air tool malfunction:

- poor or lack of proper lubrication,
- excessive air pressure or lack of it,
- excessive moisture or dirt in air lines.

Follow the recommended air pressure for all air tools. An overworked tool will wear out faster. It may cause a series of problems as well: if a tool with worn parts is used, it will use more air pressure; the air compressor may become overworked and put out air that is not clean or dry which may shoot back into the tool. And so on....

<b>Problem</b>	<b>Probable Cause</b>	<b>Recommended Action</b>
Tool does not run, air flows freely from exhaust, spindle turns freely.	Rotor vanes stuck with dirt or varnish.	1. Check for dirt in inlet. 2. Pour liberal amount of air tool oil in air inlet. 3. Operate trigger in short bursts. 4. Disconnect air supply; then turn empty and closed drill chuck by hand. Reconnect air supply. 5. If still not operating, have tool checked by authorized service centre.

**Questions:**

1. According to this passage, a technician or mechanic could avoid most of the causes of ruined tools and equipment.

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2. Which is the most likely cause of shortened pneumatic or air tool life?
  - a) the formation of rust
  - b) storing the tool with water in it
  - c) reduced or excessive air pressure
  - d) all of the above
3. If you cannot fix an air drill yourself, you should replace it immediately.

**T F**

4. Which is **not** a common source of a ruined pneumatic tool?
  - a) frequent use
  - b) lack of air pressure
  - c) dirt or varnish in the rotor vanes
  - d) worn out parts

***Troubleshooting Guides***

Troubleshooting guides list common causes of problems and solutions so you can find and solve them quickly. Table 2 is an example of a cause and effect guide found in your trade.

Look for the places the problem could have occurred. As you eliminate possible causes, narrow in on the most likely ones. This process will help you find the cause of tool malfunction in a logical manner. The cause will lead you to the solution such as a changed method, a different technique, or a tool replacement.

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## Test your abilities

Evaluate the situation and yourself.

If the troubleshooting process leads you to the limits of your own expertise, you may have to find another source of information. Tables and manuals can help you make this assessment.

**Example:** Under the heading, *Recommended Action* in **Table 2**, step # 5, you read this: *have tool checked by an authorized service centre*. Now, you know to go to a service centre for more help.

Directions in manuals may say something like:

- *if the tool is not functioning properly...*
- *Maintain tools...*
- *use proper lubrication*

These directions assume that you know what *functioning properly*, *maintaining tools*, and *proper lubrication* mean, and that if you don't know, you will find out. An important part of evaluating a situation is to figure out when you have to look something up, or when you have to find further information. It also means knowing where to go for help.

## Looking for more causes

Be aware that there may be more than one cause of a problem. A problem such as a badly maintained air drill may be the cause of another problem such as an overworked air compressor. If you have not lubricated the air drill properly, or you used the wrong type or quantity of oil, this problem may lead to another in the compressor.

## PART IV

### FACT AND OPINION

A **fact** is based on something that can be measured or proven. When you can explain a statement based on solid information, you are presenting a fact.

#### Examples:

Aluminum, galvanized or cadmium plated steel nails are used for outside finish work to avoid rust.

The Maple Leafs did not win the Stanley Cup last year.

An **opinion** is based on an unproven belief. When we base an idea on an opinion, we need to look closely to find our reasons for thinking the way we do.

#### Examples:

Fords are better than Hondas.

The Maple Leafs will win the Stanley Cup.

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### **Know the difference**

When you evaluate information, you need to look closely at your reasons for thinking the way you do.

**Example:** Are tools produced for professional use better than tools produced for ordinary use? In what ways? For which situations? Explain your answers.

If you can explain the answers to these questions by drawing on facts that support what you say, your answer will be true.

If you explain your answer by saying “I think “ or “I heard that ...”, you are stating an opinion. It may or may not be true.

When someone tells you something is wrong with a finished product, they are probably giving you valuable information. It’s your job to evaluate this information. Can you get reliable details about where and when the product failed, with an accurate description? Or, is it an opinion? Something like, “This bin doesn’t seem like the other ones.” In evaluating any situation, keep an open mind and ask questions and include information from a variety of quality sources.

### **Know your sources**

Table 2, *The Trouble Shooting Guide*, is an example from a repair manual that includes directions to use *recommended* air pressures and *authorized* service centres.

It is important when you evaluate information to find out who wrote it. A maintenance manual provided by the manufacturer is a very reliable source. An article in a respected trade magazine is another. A chat room on the internet may not contain dependable information. *An important rule is to only use reliable sources to provide your information..*

You will seek advice from experts and experienced professionals. But even the time-honoured practices of seasoned trades people come under occasional review that can lead to a new and better way of doing things. You need to learn and respect traditional methods but be open to new ideas. New and better ideas can only develop by someone carefully observing the actual relationship between cause and effect in the work site.

### **Language**

Just as some words make a cause and effect relationship very clear, some words and phrases make rules and codes very clear. In some situations, the language tells you that there is no room for opinion.

Words such as *never*, *always*, *must (not)*, *shall (not)*, *are prohibited*, make it very clear that the information presented is not open to opinion, debate or evaluation. Your experience may not give you enough information to understand or evaluate the reasons for every direction. The language tells you what to do; it tells you there is no decision-making necessary.

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**Examples:**

Never use a chisel for prying!

Gasoline must never be used as a cleaning agent. It presents an extreme fire hazard.

Employees must wear approved safety equipment.

Never attempt to make repairs to extinguishers.

Always maintain and use tools properly. A defective tool is a dangerous tool.

Words like *should be*, *ought to*, *is recommended* and *make a reasonable effort*, offer suggestions or offer opinions. They offer advice that you will consider and evaluate. There may be some room for decision-making based on opinion:

**Examples:**

Tools should be good quality.

In some cases, two people ought to work together.

A metatarsal type safety shoe is recommended.

Make a reasonable effort to contain the fire.

**In Brief**

As you learn about your trade, make observations with a clear, open mind. Constantly evaluate your ideas or materials. Assess your skill level in carrying out a project. What do you still need to learn? Based on your experiments and observations, you will learn to make evaluations based on useful facts, not unsupported opinions.

**CONCLUSION**

The steps in a procedure may be straightforward, but you still have to evaluate information as you make decisions about materials, equipment, costs and time or when you look for trouble spots. To solve most problems, you first need a clear understanding of how something is supposed to work. Through experience, you will discover causes of and solutions to problems. You will also learn to use experience to evaluate the effectiveness of each solution as you try it.

Materials, installation techniques, equipment and codes are constantly changing in the trades. You have to keep up with these changes. You have to differentiate between someone's opinion and reliable facts. Check with inspectors, suppliers and manufacturers to learn about the latest products and information. Learn to recognize the relevance of the information you read by evaluating how it relates to your trade and to the job you are doing.

Sound decisions depend on knowing your sources and on your ability to take advantage of all the available resources. Information can come from written material, from lessons with experts and

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from your own experience. Learn to evaluate what you learn so you can choose the information that best fits the situation.

### ***Summary***

1. **Evaluate the situation from every angle** and choose information, products and rules that fit the job.
2. **Understand the relationship of the information in a table, diagram and the text.** Use it all and relate it all to what you are doing or learning.
3. **Assess your skills, experience, information, and how you are applying the information.** Evaluation is one of the best learning tools we have.
4. **Understand what cause is, and what effect is.** Work backwards to find cause and work forward to predict the effect, or the result. Your object is to prevent problems.
5. **Weigh the facts you have available and make appropriate choices at every step,.**
6. **Learn the difference between fact and opinion.**

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## ANSWER PAGE

### **PART I** Passage 1, Snips

1. Even if you have read the instructions, your first cut may be ragged

**T** Making smooth cuts takes both knowledge and practice.

2. Why is it important to master snips?

c) to get expert quality in the finished product. The passage gives several reasons: 1) to make clean cuts; 2) to get a quality finished product; 3) to get expert results; 4) to ensure skilled completion. Answer c) combines the second and third reason.

3. In regards to cutting sheet metal with snips, which is more important?

c) both practice and knowledge. The passage states that sheet metal workers require practice and knowledge.

4. It should be easier to cut a large piece of sheet metal with snips than it is to cut a narrow piece.

**F** The passage states that a large sheet of metal will not bend easily, creating difficulty getting the snips in the right position to get started and keeping the cut straight. This will not be problems with a narrow piece of metal because it will curl up over the snips.

### **PART II** Passage 2, Drilling Thin Material

1. A specially- ground twist drill will produce approximately the same results as a standard twist drill.

**F** Paragraph one states that “a clean round hole is not produced by a standard twist drill” and that “special drills and specially ground drills should be used”.

2. By referring to Figure 1, you can understand how “the rake angle created by the helix of the flutes and the drill point” creates the “hooking” action.

**F** By referring to Figure 1, you can see the effects of the hooking action (a ragged hole) but it does not show *how* this occurs.

3. Which topic below does Passage 2 give you the *least* information about?

c) the causes of “damaged work.” We get one type of damage and one cause of this type. We do not know about any other types.

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4. Passage 2 gives enough information for you to understand rake angle and low helix drill.

**F** There's really nothing in Passage 2 to explain, describe or illustrate either term above. This goes back to the answer to question 2.

**PART III**      **Passage 3, Pneumatic Tool Maintenance**  
**Table 2: Troubleshooting Guide for Air Drills**

According to this passage, a tradesperson can avoid the common problems which cause air tools to malfunction or function badly.

**T** Passage 3 lists the most common causes of pneumatic or air tool malfunction. A tradesperson can avoid these. Furthermore, the passage states what to do if the tool is not functioning properly so the tradesperson avoids ruining a job.

1. Rust will form in air tools for the following reason:  
c) tool is stored with water in it

This is the only cause listed for rust problems although there may be others. The solution is to plan time for routine upkeep and to store tools correctly. Answers a), b) and d) will cause problems and should be corrected.

2. An air tool which requires more air pressure may cause damage to the air compressor.

**T** This is a cause and effect question. The best bet is to avoid the problem in the first place. Usually, one problem causes another or a continuing problem. As each problem can affect a final result, troubleshoot to find and solve it.

3. The air flows freely from the exhaust in your air drill and the spindle turns, but your air drill does not run. According to Passage 2, which action below will **not** correct the problem?  
a) drying the water in it before storing,

The answer is found in Table 2. Answer a) is the only action that does **not** correct this problem. Eliminate wrong choices or actions to focus on the correct or most likely solutions. The right solution – either b), c) or d) will eliminate or prevent this problem.