

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

**COMMUNICATIONS SKILLS  
DETAIL EXTRACTION**

**AN ACADEMIC SKILLS MANUAL  
for  
The Construction Trades: Mechanical Systems**

This trade group includes the following trades:  
Electrician, Network Cabling, Painter & Decorator,  
Plumber, Steamfitter, Sprinkler & Fire Protection, and  
Refrigeration/Air Conditioning

*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

## DETAIL EXTRACTION

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*An academic skill required for the study of the  
Construction Trades: Mechanical*

### **INTRODUCTION**

Reading for specific information is similar to shopping through aisles and aisles of items, and then stopping to choose or reject something. ***Detail extraction refers to scanning material to pull out, and then carefully examine, only the information you need.*** In your work, you extract details from descriptions of procedures, from codes and data sheets, and from drawings and blueprints. You also extract details when you make notes from texts and class material, and when you study and review information for tests. When you select the right details from your trade materials and textbooks, you can use the information to get the results you want.

In this unit, we will look at the following approaches to successfully extracting details from technical reading material:

- ◆ Know your purpose
- ◆ Use a method to find details
- ◆ Understand the nature of details
- ◆ Build on your experience

### **PART I**

#### **KNOW YOUR PURPOSE**

##### **Details**

***Details are the small parts of something.*** They are individual points, parts, components or items. When you find a detail by itself, you may not recognize what it is used for or whether it's important. When you see a detail in its correct place - as a part of the whole thing - you are more likely to recognize its use and its importance. When details are combined, each contributes to the whole idea, process or principle.

##### **Extraction**

***Extraction means pulling something out.*** A geologist extracts gold from rock; a dentist extracts a tooth from your jaw. Extraction of details may be difficult and it may take some effort, but you have a good reason for making this effort.

##### **Your purpose**

Think about your reasons for reading before you begin:

- ◆ What am I looking for?
- ◆ What have I been asked to do?
- ◆ What am I expected to know?

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When you understand **why** you are reading, you can focus on the parts of the text that provide the information you need. When you know what you are looking for, it is easier to recognize the information when you find it. Then you can select the parts that answer “what should I do” or “what should I know.” By skimming through unnecessary material, you can quickly get to the information that focuses on your purpose for reading. This is detail extraction.

### Getting all the facts

Sometimes you need all the details provided, especially when you are told to follow a certain procedure. If you skim through the steps, you will miss something essential. When you are following specific directions, you need to extract all the details.

#### Examples:

Follow steps 1 through 4 for correct hammering technique.

Read these directions before you start preparation.

In both these cases, you need to read and follow *all* of the details in the directions. Paying attention to these details will give you a clear picture of all steps involved in completing the task. It will also help you make decisions related to the job.

You may see statements like these:

- Ask for help if you don't understand these directions;
- See Chart 2 for a comparison of insulating materials;
- Make adjustments by following the guide on page 3.

These statements direct you to where you can find more information. The extra information is often graphic material that helps you “see” details. Details in diagrams or charts used together with the text can lead to a better insight into the larger picture.

You may have several reasons for reading selected material. You might want to learn how to do a new procedure. Then later, you might read the same material to memorize it for an exam. In both cases, detail extraction requires you to first identify your purpose and, then, *to carefully read to extract the details*.

Sometimes you read technical material so that you can **answer questions** related to the material. By answering the questions correctly, you show that you have grasped the information. In order to answer the questions, you will need to read and extract specific details.

**Passage 1** below describes how to check voltage on a battery. Think about your purpose in reading this. It may be to do any or all of the following:

- understand a measuring device
- accurately follow directions
- identify parts on a diagram
- understand the sequence of events

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**Read Passage 1 and answer the questions that follow. Answers are at the end of this skills manual.**

**Passage 1  
Checking Voltage**

Checking voltage is a different way of testing a battery. It involves measuring the cell voltage with an accurate multimeter set on a voltage setting or with a high-rate discharge tester. (See note).

With a high-rate discharge tester, each cell must be checked in turn. The battery is good if the voltage checks out from 1.95V to 2.08 V. The battery must be replaced if there is a difference of .05V between any of the cells.

If you are checking a sealed lead acid battery, a multimeter set on a voltage setting can be used. When checking the voltage, the male terminal of the connector plug is the negative terminal and the female terminal is the positive. Check the in line fuse for continuity when checking the battery in the system. If the battery is good, connect the negative lead of the multimeter into the male end of the plug on the wire harness and the positive lead into the female pin of the wire harness.

If the battery is fully charged, it will indicate 13.0V on the meter. The battery needs charging if it reads between 11.0V and 13.0V. If the meter reads less than 10.0V, the battery will need to be replaced as it is unlikely to accept a charge.

*Note:* the tester puts a heavy load on the battery for three seconds.

**Questions:**

1. Which of the following is an accurate statement about testing battery voltage?

- a) A multimeter checks individual cell voltage.
- b) Use a high-rate discharger to check the in line fuse continuity.
- c) When using a multimeter, the male and female terminals must be plugged into the correct ends of a lead acid battery.

2. When using a high-rate discharge tester, all cells must be individually checked against the standard and then compared to each other before you know if the battery voltage is good.

**T            F**

3. You could test a battery's voltage by using high-rate discharge tester after reading this passage.

**T            F**

4. A battery needs to be replaced if its voltage reads 10.5V on a meter.

**T            F**

**What I want . . .**

As you read, you will often find that your purpose changes or expands in some way. Think about the passage above. As you read the information, you may have stuck to your original purpose, to understand more about batteries and different testing methods. However, you couldn't answer two of the questions from the information in the passage. You realize that you need more details if you need to know how to use a high-rate discharger or when to replace a battery. After reading

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the passage, you may also want to find a diagram that shows the difference between a multimeter from a high-rate discharger, and so on.

Now you have a new purpose for further reading – to find details from various sources that tell you more about these topics. You will continue to pay attention and learn from new materials. You may also find details that you would like explained more clearly.

**Example:** In **Passage 1**, you read, “cell voltage can also be tested with a high-rate discharge tester”. You may not have heard of doing this and want a better explanation. You are directed to the note at the bottom of the passage that gives more details. It is your job to find the note and read what it tells you.

Your expanded purpose leads you to find **more details**. *Searching to find those details and reading them carefully is important to the understanding of your trade.*

Your purpose tells you **why** you are looking for details. Once you have found the details you need, you can then use them in an appropriate way, whether you memorize them, record them for later, or act on them.

### **Purposes for reading**

When you read for the purpose of detail extraction, your reason is to locate facts, data or information for **any of the purposes** below. You can always add to this list.

- to understand a new standard or building code
- to compare products or equipment
- to prepare for a test on a chapter
- to learn a math formula,
- to understand a procedure
- to explain a procedure to a supervisor

## **PART II**

### **USE A METHOD**

Purpose directs your search for details as you ask: *What do I need or want? What am I going to do? What is expected of me?* Your search for details should be guided by a method. The method below will help you search for the right details. In this method, we use four steps to locate and extract the right information.

#### **Four steps**

1. **Define your purpose.** Your purpose might be to understand a process or to answer questions.
2. **Preview the reading.** Look over the whole piece. Pause to read or notice items: **bold** or *italic* print, diagrams, headings.
3. **Read quickly** to get a general understanding of the material.
4. **Locate details that are relevant to your purpose.** Reread this part with attention in order to understand the details of this specific information.

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Passage 2 below describes a process – handling power tools. Your purpose is to understand this process because it relates to working safely, and to answer the questions. **Read Passage 2 and answer the questions that follow. Answers are at the end of this skill manual.**

### **Passage 2** **Electrical Tool Safety**

Electrical tools must meet CSA standards and comply with WSIB regulations. When using electrically powered tools, make sure the terminal in the electrical outlet and the ground pin or terminal on the power cord are in place and in good repair (see WSIB regulation 22.32).

Some hand-held electric tools are referred to as “double insulated.” In these tools, the power cords have no ground pin in the plug, but the plug may be polarized to fit into the socket one way only. You must correctly identify these tools before using them.

When using electrical tools, prevent electric shock by making sure the insulation on the power or extension cord is not cut or frayed. Do not operate them in wet locations. Do not lift or move them by their power cords. Always remove a plug by grasping the plug and pulling it straight out of the receptacle, not by jerking on the cord. Always disconnect, unplug or lock out any electrical equipment before making any kind of adjustment or performing maintenance.

### **Questions**

1. Electrically powered tools should not be used in wet sites.

**T      F**

2. Which of a) or b) correctly lists details for making sure electrical tools are being used properly?

a) Make sure the ground pin or terminal is in good repair, do not use a frayed cord in a wet area, and disconnect the cord before performing maintenance.

b) Check to make sure the cord is not cut or frayed, lift the tool by its handle, and remove the plug by taking hold of the plug, not the cord

3. If a power or extension cord was cut or frayed, what could you expect?

4. Explain what is meant by “*polarized*.”

5. If you need

6. to change a saw blade in a power saw, you should disconnect the power source before proceeding.

**T      F**

### **Types of details**

Notice that the questions ask for different types of detail or information.

*Question 1 asks you whether a statement is correct (true or false). To answer the question, find the place where you read the information, reread it, examine the details and decide if the statement is accurate.*

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*Question 2 asks about the accuracy of details in a list.* Find where the items in two lists are described. Compare the details carefully, noting the correctness of each item. When you do this, you are using details to make comparisons and draw conclusions. You do this to understand when and why you would use different products, steps or techniques to complete a job.

*Question 3 asks you to find a result.* This involves the relationship of one or more details to what might happen. You look for cause and effect to avoid mistakes, to find the cause of a problem (diagnosis) or to come to a conclusion.

*Question 4 asks you to explain what something means.* This is a vocabulary detail about a word commonly used in your trade. Assume you don't know what *polarized* means. Look up the word in a dictionary or glossary. Use your own words or a simple sketch to make sure you understand it. A good test of your understanding is to explain it to someone else.

*Question 5 asks you to evaluate information.* You need to see how a detail fits into a larger category to come to a safe decision about what to do when changing a saw blade. You have to consider what might happen if you don't first disconnect the power source.

### **Preview your reading material**

We have suggested you use the four steps to guide your ability to extract details. In technical reading, it is a good practice to browse the entire reading before you start (Step 2). When you preview a textbook or manual, *you get an overview of the whole.*

This *preview* gives you a sense of the whole before you focus on the details. It can help you find the passages, chapters or sections that answer your questions. Previewing also gives you a sense of the range of information available.

### **A reminder about questions**

We suggested earlier that you ask questions to help you extract the right details. Asking questions helps you understand each detail as you go.

**Example:** You might ask, "Do I understand:"

<i>polarized</i>	Yes or No?
<i>insulated</i>	Yes or No?
<i>ground pin</i>	Yes or No?"

If the answer to your question is **No**, *you need to continue your search to extract the right details to understand the words.*

## **PART III**

### **THE NATURE OF DETAILS**

Details cover a great range of information – anything from the history of electrical power or telecommunications in Canada, to procedures for installing a waste disposal or an air conditioning system. Some details relate to a general topic; others refer to a very specific subject.

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### Details: General to specific

The passage below is organized in a way that common to technical material. It starts with general information and descriptions. Then it examines specific details. The first part of a passage generally introduces the topic. The “*how to*” details of a procedure or the specifics of a material then follow. Read **Passage 3**, paying attention to the way information is organized.

#### Passage 3 Threaded Fasteners

There are many kinds of threaded fasteners. Some are common and others are designed to perform particular functions under different conditions. A **thread** is an inclined plane wrapped around a cylinder and is called a **helix** (see Figure 1). A thread must be the same as the incline of the nut or threaded hole into which it is placed. The tightness or tension of a threaded fastener is very important (see **torque** discussed later in this chapter).

Screws are threaded fasteners used to hold parts together by passing through one part and threading into another. There are many common types of screw heads: hex, round, fillister, oval and flat. Flat screws must be set into a countersunk hole, flushing the head with the surface.

Self-tapping screws are not as common. They will cut their own threads in a pre-drilled hole if the diameter is of the appropriate size. **Tapping** is the process of cutting threads in a hole and **threading** is the process of making external threads on an external cylindrical surface (see Figure 2). These screws have a grooved point that forms the threads in the hole and they are made of hardened steel because, in addition to being a fastener, they perform as a cutting tool.

**Note:** The figures have been omitted. We will look at diagrams later in Part III.

### General details

Look again at paragraph one. It gives you some general information about threaded fasteners, such as:

- thread
- helix
- tension

### Specific details

The details in the second and third paragraphs are more specific. Paragraph two gives precise details about the common types of screws - hex, round, fillister, oval and flat. It briefly tells you how to install flat-head screws - flat head screws are countersunk so their heads are flush with the surface

Paragraph three continues with a similar kind of detail. It focuses on the functions of self-tapping screws and details related to them – what they are made of and how they are different from common screws. It also directs you to a diagram.

### From General to Specific

Most technical material is organized in a similar way:

- ◆ Passages start with general information that gives a basic understanding of what something is or what it does; often you find out **why** you need to learn about it.

- ◆ You then read details that describe some aspect of the topic, such as differences between types of fasteners.
- ◆ Further on you may find specific details that take you through more specific details.

Each part of the material develops and builds from the general to the specific.

### Extracting details from graphics

**Graphics refer to any type of diagram or picture used to present information.** They are often labelled as *Figures*, *Charts* or *Tables*. Graphics organize and display details so that information is easy to locate and easy to understand. Detailed, complicated information is often clearer when it is presented in graphic form.

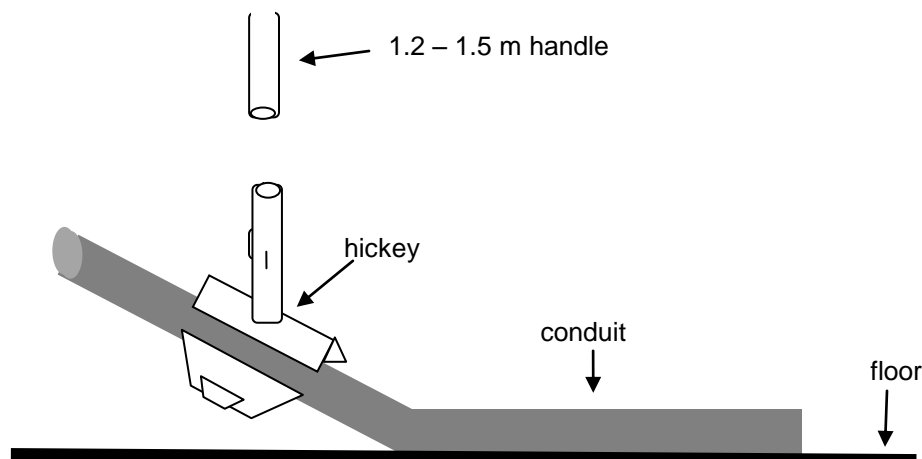
Diagrams present details in a visible way. You can see how parts fit together or how one detail relates to another in a diagram. It is often easier to remember as well. For example, you may understand terms such as *wire-nut*, *crimped*, *split-bolt* and *solder* better if you see a diagram showing each type of connector. You may remember the steps of tube bending if you see a diagram illustrating each bend.

**Passage 4** and **Figure 1** below show you how details in a passage and in a diagram work together. Review the four steps and apply the steps to **Passage 4**.

#### Passage 4 Bending Conduit

Bending and forming conduit systems must be done carefully and precisely. In order to master this art, the installer must put in many hours of practice.

Conduits of up to 25mm internal diameter are usually formed manually. This is done with the use of a bending tool called the *hickey* (see Figure 1). The hickey is available in standard conduit sizes, and for the best results, the proper size should be used. Larger conduit will usually require the use of a hydraulic conduit bender. Information on the proper bending tools and methods can be found in chapter 5.



**FIGURE 1:** Manual conduit bender

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Bends must be formed without reducing the internal diameter of the conduit. Kinks in the bend will make the installation of conductors difficult and might even damage the insulation.

By extracting details from both the passage and the figure, you get a general understanding of conduit bending. Make certain when the text directs you to “see” something in a diagram, you look at that detail. If you can’t figure out a detail in a diagram, find other information that will make it clear.

When you look at **Figure 1** above, use all the information available to:

- ◆ extract details
- ◆ improve your understanding
- ◆ remember a definition (or principle)

Look at what is available in **Figure 1**. You can see the floor, the conduit, the hickey and the handle. It shows you where the hickey is applied, and you can see the bend in the conduit. As you “read” or examine this drawing or any other, extract each detail. Each piece of information in the figure relates to the description in the text. Any text or notes below the figure will also add important details. Examining all of the information will improve your understanding, and help you remember information.

#### ***PART IV*** ***BUILD ON EXPERIENCE***

Experience will teach you what questions to ask and where to look for answers so that you fully understand what's expected of you. As you become familiar with your trade material, you will figure out what kind of details you are expected to memorize, and what kind you need to search for and extract from material only when you need them.

You need to be aware of a large amount of technical information, from facts about the tools of your trade and general safety rules to technical terms. You likely won’t memorize every detail about procedures, measurements or building materials, but you can learn to look up information and find the details relevant to your task. It is the same way that you select and use the right tools for each job.

#### **Organizing your notes**

When you take notes in class or on the job, you write down details related to the task. Developing the skill of extracting details will make note taking easier. As you work at organizing your notes, you develop a note-taking system that is efficient and that makes the details quick and easy to find and to study.

A table format with headings organizes details in a useful way, making it easy to find and extract them when needed. A table shows in a clear way the differences between systems. Making a table is a good strategy for study notes and for keeping track of lots of details.

You can see how facts are related in a system. You can note how as one detail or measurement changes, other details might change in a regular pattern. It is also a useful method of organizing

information that includes a lot of measurements. When you are studying for a test, facts can be easier to memorize when they are arranged in a table.

You can make the table your own by highlighting details you use often so you can retrieve them quickly. Underline the ones you need to memorize. In short, you can use this table in a variety of ways.

**Example:** Examine the table below to see how it organizes details and makes it easy to extract information.

TABLE 1: NATIONAL BUILDING CODE RECOMMENDED SIZES AND SLOPES FOR DRAINS.  
 Adapted from Table 11.5.2 National Building Code.

DIAMETER OF PIPE (IN.)	MAXIMUM LOAD FACTOR THAT MAY BE CONNECTED TO ANY PORTION OF A BUILDING DRAIN OR SEWER*			
	FALL PER FOOT			
	1/16	1/8	1/4	1/2
2			21	26
2 1/2			24	31
3		20*	27	36
4		180	216	250
5		390	480	575
6		700	840	1000
8	1400	1600	1920	2300

(\*) Not more than two water closets.

Did you read the note below **Table 1** above? The \* at the end of the Table heading is called a *footnote*. It could be a <sup>(1)</sup>, or some other symbol. It tells you that there is a *note* or more information about this item. Look right under the table or at the bottom of the page. Make sure you read any footnotes because they add important details.

When making your own notes, you might list details using numbers or bullets. You might place a star, \*, beside the details you use all the time and a bullet, •, beside the details you need to review frequently. Developing a system to organize information will help you find details when it's time to review, to prepare for exams, or to make on-the-job applications.

### Getting it wrong

When you set out to extract details to suit your purpose, you know what details to look for and how to retrieve them. But, sometimes your purpose may not be so clear. For example, your purpose may be to study for a test about motors. What details should you study? Using the four steps outlined on page 4 will be a useful guide.

As you read through to search for information, you may find that you missed key details because you skimmed over them, or you picked the wrong details. If this happens, stop and check:

- ◆ Did you preview and read all the material before picking out details?
- ◆ Did you highlight the details you extracted?

If you answered no to either question, you have to go back and, carefully, find what you missed.

If you still are picking the wrong details, check your purpose again. Be sure you know what you should be learning from the material. Be sure you understand after rereading? If not, find someone who can help you?

Each time you approach new material, ask yourself questions to make certain that you are extracting the right details. And be prepared to ask for help as part of the process.

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

### **Passage 5 Electricity**

An electrician is concerned with two common types of electricity: *static electricity* (usually defined as electricity at rest) and *current electricity* (electricity that flows through conductors or wires). A good example of *static electricity* occurs when you walk across a carpet (charging yourself with electricity), touch a lamp and get a shock (the electricity is dissipated and you may see and hear a spark). Static electricity affects the technician when dealing with condensers with capacitor type electric motors. *Current electricity* is used in homes and in industry to drive motors, weld and start engines. It is usually produced by coiled wires moving in an electromagnetic field.

There are two types of current electricity. These are direct current (dc) and alternating current (ac). The continuous flow of electrons in the same direction is known as *direct current*. It is used in automobile starting, lighting and ignition, and is used in most solid-state circuits. *Alternating current* is the flow of electrons along a conductor in one direction and then in another. It is used for most power and light applications.

1. All types of electricity can be defined in the same way.

**T      F**

2. Highlight the definition of *current electricity*.
3. List all the types of electricity named throughout the passage.
4. What type of electricity would be used to power a reading lamp – direct or alternating current electricity?
5. How is direct current different from alternating current?

Building strong reading skills and strategies will keep you on top of your trade. Over your career, techniques and materials will change, but with a solid reading foundation, you will know how to continue finding and using relevant details. Mastery of extracting details and the associated note-taking and study skills are a useful preparation for your chosen trade.

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## **CONCLUSION**

Detail extraction means pulling out the details you need for a specific purpose. Once you clearly understand the purpose of your reading, you can extract the right details and you will know what to do with them. Taking notes, creating tables, interpreting diagrams and highlighting key information are useful strategies for detail extraction. Being able to find relevant details in an efficient way can help you become a focused reader, a better student, and a master of the information you need to be successful in the mechanical construction trade.

### **Summary**

1. **Know your purpose.** Think about what you need before and during the reading.
2. **Use a four step method to extract details:**
  - a) Define your purpose.
  - b) Preview the reading by examining the whole piece.
  - c) Read everything carefully to understand the whole piece.
  - d) Locate details that answer your questions. Read with attention to identify and understand the right details.
3. **Understand the nature of details:** they move from general and specific.
4. **Extract details from diagrams and illustrations** to understand procedures, various parts and their relationships. Combine this information with your text reading.
5. **Organize your own data** in notes, including tables or charts for study and retrieval purposes.
6. **Ask questions based on your experience;** use everything available to you.
7. **Be prepared to follow up if information is not clear.** Talk to an expert in the trade, a teacher or use a different text or manual. All are excellent resources.



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2. Which of a) or b) correctly lists details for making sure electrical tools are being used properly?

**b)** check to make sure the cord is not cut or frayed, lift the tool by its handle, and remove the plug by taking hold of the plug, not the cord.

You are not looking for a sequence of events, but for steps to take and exact details. In answer a), one of the steps is not correct in all details. It says, "...do not use a frayed cord in a wet area." Electrical tools should not be used on a wet site, whether the cord is frayed or not. Also, a frayed cord should not be used on any kind of site. Pay attention to *exact* wording.

3. If a power or extension cord was cut or frayed, what could you expect?

This question asks for a cause and effect detail. Using a frayed or cut cord could result in an electric shock.

4. Explain what is meant by *polarized*.

This is a vocabulary detail that is not explained in the passage. However, the passage does say "the plug may be polarized to fit into the socket one way only." You could guess that polarized means to be oriented in one direction. The dictionary definition of polarize is: *to give magnetic or electric polarity to (a substance or body)*. Thinking of the poles of a magnet or battery can also give you a general idea but you will need to follow up to understand what this means in relation to handling electric tools, in other words, the application to your trade.

5. If you needed to change a saw blade in a power saw, you should disconnect the power source before proceeding.

**T** Changing a blade is the kind of adjustment you would do when performing maintenance. Although the passage doesn't specifically say, "change a saw blade" this procedure fits into the general category of maintenance.

#### **PART IV Passage 5, Electricity, page 11.**

1. All types of electricity can be defined in the same way.

**F** The passage begins by telling us that there are two different types of electricity, and it then proceeds to define them.

2. Highlight the definition of *current electricity*.

Highlight the words in the second set of parentheses (brackets) in the first sentence. (... *electricity that flows through conductors or wires*).

3. List all the types of electricity named throughout the passage.

In order, the types of electricity are static electricity and current electricity. Current electricity includes direct current electricity and alternating current electricity.

4. What type of electricity would be used to power a reading lamp – direct or alternating current electricity?

Alternating current electricity. The passage states that current electricity is “used in homes...” and that alternating current electricity is “used for most power and light applications.” Although it mentions lighting in direct current applications, this is for automobiles. Looking carefully at the details can help you extract this kind of information.

5. How is direct current different from alternating current?

Direct current electricity is a continuous flow of electrons in the same direction, while alternating current is the flow of electrons in one direction and then another.