

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

**COMMUNICATIONS SKILLS  
DETAIL EXTRACTION**

**AN ACADEMIC SKILLS MANUAL  
for**

**The Motive Power Equipment Trades**

This trade group includes the following trades:  
Heavy Duty Equipment Mechanic, Motive Power Technician,  
Motive Power Parts Person, Transmission Mechanic,  
Truck & Coach Technician, and Truck & Trailer Service Technician

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

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

**The information in them is not intended to instruct you in your trade. Trade related material 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  
Motive Power Equipment Trades*

### **INTRODUCTION**

Reading for details is similar to shopping through aisles of items and then finding and taking something you need. **Detail extraction** refers to finding information you need and then carefully reading it to pull out and use the specific points you need.

In your trade, you extract details from descriptions of procedures, policies, and a variety of codes, data sheets, on line databases, diagrams and schematics. You also extract details when you make notes from texts and class material, and when you study and review information for tests.

Detail extraction is the skill you need when you scan specification tables to determine operating capacities and specifications for tools and products and to read manuals for precise information about the expected operation of equipment. 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 methods to successfully extract 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 the individual points, parts, components, or the bits. When you find a detail by itself, you may not recognize what it's used for or whether it's important. When you see a detail in its correct place – as part of a whole – 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 may be difficult and it may take some effort. You have a good reason for making this effort.

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### **Your purpose**

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, you recognize the information when you find it. Then you can select the parts that answer “what should I do” and “what should I know.” This is detail extraction. If you know what you *don't* need, you can skim through unnecessary details and get to the purpose for reading.

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 ?

### **Getting all the facts**

The skill of extracting details requires you to identify your purpose and, then, *carefully read to extract the details*.

Often you need all the details provided, especially when you are told to follow a procedure. If you skim through them, you will miss something essential. When you are *directed* what to do, you will need to extract all the details.

#### **Examples:**

Follow steps 1 through 4 for correct hammering technique.

Read these directions before you start preparation.

Statements like these tell you where to find the details and what you need the details for. They give you a purpose for finding and using details. You will need to find and use the details they point you to, especially if you need to learn correct hammering procedures or to understand how to do a job.

Statements that send you for information provide you with a purpose for reading. Among other things, they might tell you:

- ◆ to get help with a procedure,
- ◆ to compare details, or
- ◆ to make the correct adjustments (in products, measurements, etc.).

You may have two or three purposes for reading selected material, such as to memorize a new procedure or to learn more about a technique or to take an exam. An added, but common, purpose for reading technical material is *to answer questions* to show that you have grasped the information, or details, in the material you have read.

Passage 1 below describes how to check voltage on a battery. Think about your purpose in reading this information. 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, or
- answer some questions.

**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.

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As you read the passage, you may have stuck to your original purpose, to understand more about batteries and different testing methods. And, you may have wanted to see a diagram that shows the difference between a multimeter and a high-rate discharger, and so on. These new purposes will send you to another text, manual or an expert to find the details you want.

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. You will use the details in an appropriate way based on your purpose, whether you memorize them, record them or act on them.

### **Purposes for reading**

For *detail extraction*, you read to locate facts, data or information for *any of the purposes* below. You will find other reasons of your own to add to this list.

- to understand a new standard or 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 TO FIND DETAILS***

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 and/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 carefully* to understand the whole piece.
4. *Locate details that answer the questions.* Reread with attention to select (and understand) the right details.

Passage 2 below describes a process. – electrical tool safety. Your purpose is to understand this process because it relates to working safely, and to answer the questions.

**Use the four steps as you read Passage 2. Then answer the questions that follow. Answers are at the end of this skill manual.**

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**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 on 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 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.

*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.

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*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*** ***UNDERSTAND THE NATURE OF DETAILS***

Details cover a great range of information – anything from the history of automotive manufacturing in Canada to the procedures for installation of cylinder block plugs. Some details are general in nature; some are very specific.

### ***Details: General to specific***

The passage below is organized in a way that is common to technical material. It starts with general information and description then examines specific details. The general information often introduces the "*how to*" details that you would find in a procedure.

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**Read Passage 3.** Pay attention to the way information is organized in the passage.

**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**

Look at how the second paragraph provides more precise detail. It tells you:

- that screws are used to hold parts together,
- the common types of screw heads are hex, round, fillister, oval and flat, and
- flat screws must be countersunk.
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Paragraph three continues with details about one type of screw. It focuses on its functions, what they are made of and how they are different from common screws. It also directs you to a diagram. These details build your understanding step-by-step so you have exact knowledge about an aspect your trade.

***From General to Specific***

Most technical material is organized in this 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 provide a visual representation of information. Graphics extract specific details that focus on what you need to know. When you use graphics, in conjunction with text, you learn the important information.

It is generally easier to understand and remember steps in a procedure, differences in material or how one part relates to another, when it is illustrated in a diagram.

**Example:** You might understand terms such as *rawhide-face*, *plastic-tip*, *dead-blow* and *ball-peen* better if you see a diagram showing each type of hammer.

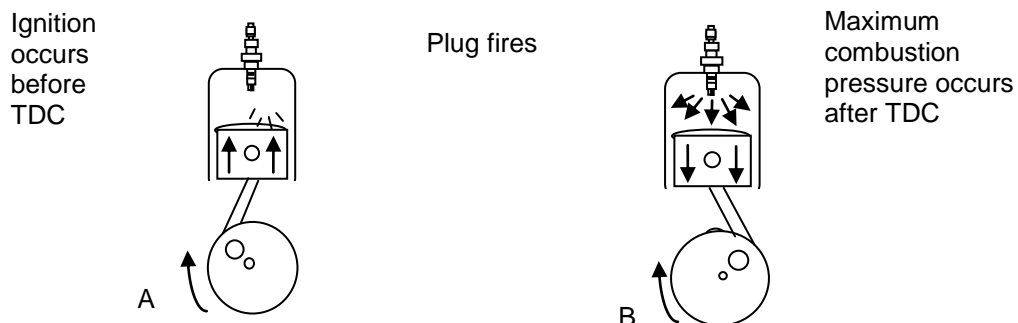
**Example:** You may remember the steps and materials for servicing valves, seats and guides if you see a diagram illustrating each stage.

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 them as you read the passage and study the diagram.**

#### Passage 4 Ignition Timing

In all ignition systems, a switching device triggers the spark (see Figure 1). Depending on its location (crankshaft, camshaft or idler), this switching device determines the frequency of spark (360 or 720 degrees). Usually, a means of adjusting ignition timing is provided, and the triggering device can be rotated in relation to the crankshaft, camshaft or idler.

Because combustion is a controlled burning process, it must begin at the proper moment – near the end of the compression stroke, before top dead centre (TDC). Combustion takes time for completion, and ignition must occur so that the maximum cylinder heat and pressure develops immediately after TDC (See Figure 2). In Figure 2A, the spark occurs with the piston travelling up on the compression stroke and then in Figure 2B, combustion has formed the maximum heat and pressure needed to force the piston down in the cylinder for the power stroke.



**FIGURE 2: Combustion**

Combustion must begin before TDC so that maximum heat and pressure develops just after TDC

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As the engine speed increases, the piston will be moving faster and thus, ignition timing will occur earlier. There would be less time for the air fuel mixture to burn. (See Figure 3).

**Note:** Figure 1 and Figure 3 are omitted here.

Extract details in the text *and* in the Figure to get the complete details and understanding. Make certain that when the text directs you to “see” something in the diagram, you look at that detail. If you don’t understand each aspect of the diagram, find other information to help you

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 the detail available in **Figure 3 and Passage 4**. You can see:

- the ignition occur,
- the plug fire,
- the combustion, and
- the direction of motion.

The passage and diagram give you a sense of what the process looks like. You gain more information from the text and diagrams than from either on its own.

### ***Text and graphics***

**The text** gives definitions and details about a procedure, process or practice.

**The graphic** lets you see the details explained in the text. As you study a graphic, extract each detail and compare it to details in the text. Each piece of information in it relates to something in the text. Text or notes below a figure will add important details. Examine all of the information.

By combining information in the text with information in the diagram you get a more detailed understanding of camber than you would from using either the text or diagram on its own.

## ***PART IV***

### ***BUILD ON EXPERIENCE***

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

**Example:** You need to memorize hand symbols, the tools of your trade, general safety rules, and technical terms. You can't memorize every detail about procedure, measurement, or material. But you can learn to look up information and find the details you need

## Organize your notes

When you take notes in class or on the job, you write down details that are related to the task. Developing the skill of extracting details will make note taking easier. As you organize your notes, you develop a note-taking system that is efficient and that makes the details quick and easy to find and to study. Creating your own lists and tables work well for this purpose.

Whether you use tables or lists to organize your notes and study materials, you can highlight, or mark (with checks or bullets) details that are important or related to each other. Developing a system to organize details will help you as you learn new information; a system will help you find details when it's time to review.

## Tables

A simple table with clear headings lets you organize details and then find (extract) them again when needed. You will organize details better if you remind yourself about your purpose.

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

**TABLE 1: TRUCK WEIGHT CLASSIFICATIONS**

Class <sup>(1)</sup>	Gross Vehicle Weight
Class 1	2 721.6 kg
Class 2	2 722 – 4 536 kg
Class 3	4 536.45 – 6 350.4 kg
Class 4	6 350.85 – 7 257.6 kg
Class 5	7 258 – 8 845.2 kg
Class 6	8 845.65 – 11 793 kg
Class 7	11 794 – 14 968.8 kg
Class 8	14 969.25 kg

<sup>(1)</sup> **Note:** Classes 1 and 2 are known as light-duty, 3 to 6 as medium-duty, and 7 and 8 as heavy-duty.

Details are easy to find in a table. The columns are labelled so you know what kind of detail each one has in it. This way you can look down a column to the information you want. And look across that row to the column where the information is.

Did you read the note below Table 1 above? The <sup>(1)</sup> which follows *Class* in the column heading directs you to a *footnote*. A footnote adds important detail. Make sure you read any footnotes.

## Getting it wrong

As you 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 bits you extracted?

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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, who can help you?

Each time you approach new material, ask questions to make certain that you are extracting the right details from the start. Always be prepared to ask for help. It is part of the process

**Read the passage below and answer the questions. Use the four steps to guide you. Answers are at the end of this skills sheet.**

### Passage 5

#### Shaft Stresses

A shaft can undergo several stress conditions at the same time. These stresses may be torsional shear stress and bending stress. As well, axial loads may cause vertical shear stresses and direct normal stresses. Note that the stresses on a shaft are not distributed evenly - some sections will experience no stress; in other areas, the stress can be so concentrated that it will affect the integrity of the shaft.

All stress can be defined in the same way:

*Stress is the internal resistance offered by a unit area of a material to an externally applied load.*

Two normal stresses - tensile and compressive - are defined below.

1. If the shaft tends to stretch (lengthen) as a result of the stress (load), it is called *tensile stress*.
2. If the shaft tends to shorten (compress) as a result of the stress (load), it is called *compressive stress*.

#### Questions:

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

**T F**

2. Highlight the definition of *compressive stress*.
3. List the types of stress named in the first paragraph of the passage.
4. What causes vertical shear stresses?
5. How are stresses on a shaft distributed?

Building strong reading skills and strategies like detail extraction 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 drawing 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 efficiently can help you become a focussed reader, a better student, and a master of the information you need to be successful in your 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.
  - e) 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, processes, various parts and their relationships. Combine this information with your text reading.
5. **Organize your own data** in a table or chart 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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## ANSWER PAGE

### **PART I Passage 1, Checking Voltage**

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

c) When using a multimeter, the male and female terminals must be plugged into the correct ends of a lead acid battery.

By extracting details about how to plug in a multimeter, we come up with the correct answer.

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** If you read carefully, you will note that two steps are required in testing a battery using a high-rate discharger. First, you need to see if the voltage of each individual cell is between 1.95V and 2.08V. If any cell is not, the battery is no good. Next, you need to compare each cell reading to see if there is a difference of more than .05 between any two cells. If there is, then the battery is once again no good.

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

**F** Passage 1 tells you what a high-rate discharge tester does, but there are no specific details as to what it looks like, or how to operate it. We need more information before we can be certain.

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

**?** This is a tricky question because of the way it is worded. In the passage, it says that a battery needs to be replaced if the metre reads less than 10.0V and that it needs charging between 11.0V and 13.0V. The question gives us a situation when the meter reads 10.5V. This is a grey area and before proceeding, we should get help from another manual or an instructor.

### **PART II Passage 2, Electrical Tool Safety**

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

**T** This question asks you to search through a passage to find details. Although this is the first question, the answer is in the third paragraph. Answers may not always be where you expect them.

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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." A frayed cord should not be used, whether the site is wet or not. Also note that electrical tools should not be used on wet sites, even if the cord is in good condition. 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, Shaft Stresses**

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

**T** *Stress can be defined as the internal resistance offered . . . etc.*

2. Highlight the definition of *compressive stress*.

Highlight the last sentence in the passage beginning, "If the shaft tends to shorten (compress) as a result of the stress . . . etc."

3. List the types of stress named in the first paragraph of the passage.

In order, the types of stress: torsional shear, bending, vertical shear, direct normal.

4. What causes vertical shear stresses?

Axial loads may cause vertical shear stress.

5. How are stresses on a shaft distributed?

Stresses on a shaft are not distributed evenly. Some sections experience no stress; others experience concentrated stress that affects shaft integrity.