EVALUATING
ACADEMIC READINESS
FOR APPRENTICESHIP TRAINING
Revised for
ACCESS TO APPRENTICESHIP

COMMUNICATIONS SKILLS
DRAWING CONCLUSIONS

AN ACADEMIC SKILLS MANUAL
for
The Construction Trades: Mechanical

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

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

COMMUNICATIONS SKILLS
DRAWING CONCLUSIONS

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

INTRODUCTION

Drawing conclusions *means makings decision through a process of reasoning.* It involves finding facts, examining opinions, and determining causes and effects. From this background, the relevant information is selected and used to reason through to the best conclusion.

For example, your cutting shears won't get through a piece of metal that you need to cut. What conclusion can you draw that might lead to a solution to the problem?

First you look for the relevant information. You check the manual to find out what kind of shears should be used for this type of metal. You observe the strength of the shears and their condition, and the thickness of the metal. You reason that the dull edge on the blade is the cause of the problem. You come to the conclusion that you need to sharpen your shears. You have identified the problem and decided on a solution.

As you can see, this is a useful process when you need to make a decision on the job. When you think about the connection between what you observe and what you already know, you can come to a valid conclusion. You can use this conclusion to guide you in making workplace decisions.

You draw conclusions by comparing information obtained from different sources. Your information might come from texts and manuals, from listening to knowledgeable workers and teachers and from experience gained working on projects. Here is an example from an everyday situation.

> **Example:** The ice on Lake Simcoe is thin, so you decide it won't be safe to snowmobile. Knowing the condition of the ice and the weight of a machine, you conclude there's a risk of an accident. The next day, when the newspaper reports a snowmobiler went through the ice, you realize you made the right conclusion.

In this skills manual, we examine the process of drawing conclusions by looking at the following:

- Selecting information for valid conclusions
- Drawing valid conclusions
- Recognizing conclusions

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PART I
SELECTING INFORMATION FOR VALID CONCLUSIONS

*A **valid conclusion** is one that is reasonable and that is based on fact as much as possible.* The facts you use to draw a conclusion will come from instructors, textbooks, knowledgeable workers and your careful observations. Use this information and your experience to think through to a reasonable answer or solution – in other words, to a valid conclusion.

> **Example:** An *insulator,* or non-conductor, does **not** allow electric current to flow through it whereas current flows easily through a *conductor*. You discover current is flowing in a wire where it shouldn't be; you need to know why because this is a fire safety issue.
>
> If there is no knowledgeable person available to ask, you will have to look at the wiring system for clues. Check any information you have on conductors and insulators. The information you read and your observations should help you draw a reasonable conclusion as to the cause of the problem**.**
>
> If you can't find a simple cause and solution, shut off the power or the switch and wait for an electrician to come. Turning an electrical problem over to a trained technician is a reasonable conclusion in this situation.

Read Passage 1 below as an example of information that might explain the reason for the problem.

> **Passage 1**
> **Conductors**
>
> A material that allows an electric current to pass through it easily is called a *conductor.* Although there is no perfect conductor of electricity, conductors can be divided into three classes: good, medium and poor.
>
> **Insulators (Non-Conductors)**
> If a material does not allow enough electric current to pass through it to be calculated, it is called an *insulator* or *non-conductor*. Although there is no such thing as a perfect insulator, insulators are used to prevent electricity from flowing where it is not desired.
>
> **Note:** Moisture has the ability to change an insulator into a poor conductor; it has the ability to change a poor conductor into a medium conductor.

When you start reading this passage you might think that the problem is with an insulating material – maybe a wire has been nicked.

Then you see the reminder about moisture and recall the dampness in the basement. You conclude that moisture is a more likely source of the problem. Looking for moisture somewhere near the electrical system is the first thing you should do. If you don't find a source of moisture, you need to keep looking for other reasons for the problem, so you can reach a valid conclusion.

Understanding Relationships

Drawing a valid conclusion often depends on understanding the relationship between two things. To discover the connection between the cause of a problem and its effect, such as the situation above, you might follow these steps:

- You look for information and read that moisture has an effect on an insulator.
- You conclude that this effect could be a possible reason for the problem.
- You go back and look for moisture at the site
- If there is moisture, you can conclude that this is a possible cause.
- It there is no moisture, you need to keep looking.
- In either case, you reasonably conclude that this is a situation for an experienced electrician.

These steps are useful when you have a problem to solve.

In many cases, looking at the relationship between different parts of a system will lead you to a reason for the problem. If one thing is not working the way it is supposed to, it can lead to difficulties in many areas. Using the following steps to observe cause and effect relationships can often lead to a solution or even prevent a problem in the first place.

1. You observe the situation
2. You find information about what might cause this situation.
3. You compare your information to what you see.
4. You reach a conclusion about a likely cause.
5. You check to see if the conclusion seems reasonable.
6. You decide on an action based on your conclusion.
7. After carrying out this course of action, you recheck to see if it solved the problem.

In Passage 2, you read about several factors that influence the performance of a Category 5 cabling system. Although this example is more specific to cabling specialists, anyone installing a wiring, system, conduits or water system must take the same kind of care. The questions that follow ask you to draw some conclusions about these factors.

Read Passage 2, and answer the questions that follow. Answers are at the end of this skill manual.

Passage 2
Proper Installation

A Category 5 system may perform below Category 5 compliance, even with high quality products, unless installation is properly and carefully undertaken.

Damage can occur (but not be visible) if pull on cables exceeds the 25 lbf (pound-force) maximum. Excess pull can stretch the cable that can cause untwisting in the pairs of wires. Tension on the cable also increases attenuation. Always use recommended pull techniques, pull cords and cable lubricants to avoid results such as these.

Do not exceed minimum bend radius for the cable being installed. As bend radii for different cable differ, follow the appropriate guidelines. If bends are tighter than recommended, the cable pairs may be flattened or untwisted. This type of damage can increase near end crosstalk (NEXT) at that point.

When terminating cable, remove only as much material and untwist only as much cable as necessary. Never untwist Category 5 more than ½ inch from the termination point. Doing so can increase crosstalk and can also increase electromagnetic (EMI) and radio frequency interference (RFI).

When terminated, cable should be correctly supported to avoid strain on the cable. Cable ties are used to bundle cable and attach it to supporting hardware. Avoid over-cinching the cable ties to prevent flattening of the cables. Cable which is bundled is easier to handle and neater looking.

Questions:

1. You can conclude that high quality products will ensure the system performs at Category 5 levels.

   T F

2. Which result would you expect if a pair of wires was untwisted more than ½ inches from the termination point?

   a) an increase in crosstalk
   b) an increase in attenuation
   c) flattening or untwisting of pairs of wires
   d) a bundle of cable which will require supporting hardware

3. You can conclude that over-cinching the cable or bending with too tight a radius would result in the same type of damage.

   T F

4. If you do **not** use a pull force of 25 lbf, you can conclude that you would stretch the cable.

   T F

Passage 2 describes several factors related to installation. It is important to understand these if you want the right results from any system. They include the following:

- proper, careful installation,
- recommended pull techniques, tools and lubricants,
- recommended bend radius,
- correct amount of material and correct finish at the termination point, and
- correct tension throughout the system.

Each step in the process is important. You need to pay attention to details because a small change can make a big difference. For example, using the wrong method for attaching cable ties or the wrong amount of pull force will affect the quality of the results.

Note important details before you start a job. Read, ask questions, and use the information available to arrive at a practical conclusion as to how to carry out a job. Find out what factors will have an effect on the result. You may need to experiment and do some tests to check that you have drawn a logical conclusion.

PART II
DRAWING VALID CONCLUSIONS

Sometimes you know the result, but not the exact cause.

> **Example:** When you read the newspaper report about the snowmobiler going through the ice on Lake Simcoe, you concluded that the ice was too thin for snowmobiling. This is probably true, but there could also be other factors involved.

You might have a good idea of what happened but you might be missing some of the reasons for the accident. Bad visibility, being unfamiliar with the lake and travelling over an area of strong currents could be factors in the snowmobile accident. Thin ice was the cause of the accident but you don't know why the snowmobiler drove over unsafe ice in the first place.

Getting all the Pieces

The same principle applies to paying attention to all the information concerning procedures you use at your workplace. If you make quick observations or if you skim through your manual, you might go ahead, assuming that you have all the pieces. But there is also the possibility that you have missed something. You can't draw a valid conclusion or find a solution to a problem if you overlook important, available information.

A valid conclusion *relies on having, and examining, all of the information important to that situation.*

Read **Passage 3** below. Consider what conclusions you could draw from the information given. **Answer the questions that follow**. **Answers are at the end of this skill manual.**

Passage 3
Receptacles

Receptacles are housed in metal or plastic boxes, covered by a faceplate and held by a single screw. As with any other component, quality in receptacles is important to the performance of the wiring system. The types of receptacles vary. Some are designed exclusively for outside. Some handle heavy-duty equipment like major appliances. Some are integrated into light fixtures, and some are combined with switches.

When replacing receptacles, wires do not need to be replaced. However, the position of the receptacle in the circuit must be taken into consideration. This will affect the way the receptacle is wired. The box must fall either at the middle or end of the circuit. The position is determined by the number of cables, or sets of wires, that enter the box.

When you buy a new or replacement receptacle, make sure it matches the circuit. Markings and ratings on old and new equipment must match. The following are markings found on receptacles: a certification mark showing that it meets certain safety standards; numbers and figures that indicate the maximum amperage and voltage a receptacle can handle safely and efficiently; the type of current (this will be the only one that the receptacle can use)*; and the type of wire that the receptacle can handle.

*Receptacles in houses and condominiums in the U.S and Canada are marked AC ONLY.

Questions:

1. Which of the following would result if you ignored the markings and ratings on a receptacle?

   a) You could exceed amperage or voltage requirements.
   b) You could install the wrong type of receptacle.
   c) You could use an incompatible type of wire.
   d) All of the above.

2. Receptacles can be used with any type of current.

   T F

3. What might you conclude if a receptacle box was placed at the beginning of a circuit?

   This position would:
   a) affect the way in which the receptacle is wired
   b) determine the number of wires that enter the box
   c) result in problems with the installation
   d) none of the above.

4. You can conclude that amperage, voltage, current, wire type, box position and application are all factors used in selecting the appropriate receptacle for a job.

   T F

Getting the whole picture

Factors which are not stated may also affect the results of a job. For example, suppose you followed the sequence outlined in Passage 3, and still produced a weak or poor weld. Is something else different? Is your equipment up to standard? Is the angle of weld or your technique not what it should be? Is there something you didn't understand?

When looking for the cause of a problem, you usually start with the obvious reasons. But sometimes you need to check out everything. Make sure you don't reach a conclusion based on only part of the information. You want all the available information before drawing a conclusion. Always get the whole picture first.

> **Example:** Suppose you work in an area with gas engines and motors. After a few months you come down with flu symptoms - headaches, dizziness and nausea. The symptoms hang on and you see your doctor. Your doctor asks if there are any factors at work that might cause the symptoms but you say everything seems fine. You and the doctor decide this is just a nasty bug. You carry on at work but the flu symptoms don't go away.
>
> A few weeks later you notice the following warning on a piece of machinery where you are working:
>
> **NOTE: Use only in a well-ventilated area. Fumes from this machine can accumulate in the body and cause flu-like symptoms.**

You wonder if your flu-like symptoms are caused by lack of ventilation. You make sure the window is open and the fan is running from now on when you are working on that machine. You look for changes in your health over the next weeks. Soon your illness is gone.

Can you conclude that lack of ventilation caused the problem? From your observations, it seems likely. You can now act on this conclusion by making sure your work area is properly ventilated.

In this example, your first conclusion was that you had the flu. You based this on your past experiences. It felt like other flu that you have had. However, when the flu didn't get better, you realized that there may be another reason for your symptoms.

From the information about fumes, you learned about another factor that might be causing the problem. You acted on that information by providing better ventilation and your symptoms disappeared. You drew a new conclusion based on further information and observation.

Is it a valid conclusion?
If a first conclusion doesn't provide a practical solution, you have to keep looking. When you add new information, you should then be able to draw a different, and more valid, conclusion. In other words, new information can lead to a new conclusion when the first conclusion is not valid.

Making an estimate about a job is one form of drawing a conclusion. To come up with a reasonable estimate requires several steps:

- You have to know what options are available.
- You have to find out the cost of each option.
- You have to compare the advantages and disadvantages of each option.
- Then you have to weigh the cost against the advantages and disadvantages. You will have to decide what the most important factors are in making this decision.
- Reaching a final estimate involves coming to a conclusion as to what the best option is for the cost.
- You can now present this estimate to the customer along with reasons for your choices.

To make sound decisions in the machining and tooling trade, you study information in texts, manuals and diagrams so that you learn the material and can apply it. You observe different factors in the workplace for the same reason – so you can understand and evaluate what you see. What you read (theory) and what you do (practice) are essential to making good decisions. You read and learn when working with written material; you observe and learn when gaining hands-on experience.

Example: You experience a mild shock while drilling. You take a good look at your drill and notice that the cord is frayed. You know from your reading that frayed cords can cause shocks. After concluding that the frayed cord is the cause of the electrical shock, you unplug the drill carefully and set it aside until the cord is replaced.

Passage 4 describes factors that contribute to correct bend in a type of conduit. **Read the passage and answer the questions that follow. Answers are at the end of this skill manual.**

Passage 4
Rigid PVC Conduit: Bending methods

Rigid PVC (polyvinylchloride) is a thermoplastic material. Between the temperatures of 115°C and 130°C, the material will soften and can be bent. With the right care, the conduit will neither flatten nor kink while being bent. All bends should have a radius at least ten times the conduit diameter.

Open flame can damage the conduit so it must not be used. A heater designed for PVC will warm the conduit to the right temperature and at this point, the PVC can be uniformly bent to the proper angle. It should be bent slightly beyond the correct radius as it will *springback** when cooling. Letting the conduit cool naturally or applying cold water will maintain the shape of the bend.

Other approved heating equipment used to heat PVC conduit is available. The heating blanket can be used for all sizes of conduit. A thermostat controls heat and ensures uniform bending. An electric PVC heater uniformly heats to allow uniform bending. Also, the manufacturer can provide commercially produced bends.

**Springback* describes the ability of a material to return to a shape after it has been bent or stretched.

Questions:

1. When you flatten (or kink) conduit during a bend procedure, what might you conclude?

   a) The conduit was heated to a temperature of 110° C.
   b) The bend has a radius of at least ten times the diameter of the conduit.
   c) An open flame was used to heat the conduit.

2. If conduit does **not** spring back to the correct bend radius, which is the most likely conclusion?

   a) Cold water or natural cooling maintained the shape.
   b) The conduit was bent too far - beyond its springback point.
   c) The heating blanket was used on the wrong size of conduit.
   d) Any of the above.

3. If you follow the guidelines and take the proper care, you should produce PVC bends that are better than those produced commercially.

   T F

When you understand the relationships between various factors, you can draw conclusions about the causes of problems and make decisions about their solutions.

If you discover that the thermostat on a heating blanket is not giving accurate readings, you know bends in conduit may be difficult and may not springback or be uniform. This conclusion will lead you to make the proper checks and adjustments on equipment before each job. When you understand the relationships between such factors, you can draw conclusions that will get you reasonable results.

You can predict that your outcome will be successful if you follow the provided instructions, use the right equipment and give yourself enough time for the job. You can also predict that you will not get the right result if you do not follow the directions exactly or if you work without the required knowledge and skills.

Note: *Because of other factors – unknown to you or overlooked – this may not result in a valid conclusion. If you do not arrive at the correct conclusion, you will have to continue researching until you discover it.*

Look behind
You can turn the process of drawing conclusions around by looking backwards. If you discover a problem, you'll need to go back to find a cause. You may have to go through the instructions sentence-by-sentence. After reading the information again, check your technique and tools, and then observe what is actually happening on the job. This will help you to identify the cause of the problem. Then you can draw a conclusion that will let you figure out how to avoid the problem next time.

Process of elimination
The examples in this unit ask you to use a process of reasoning for several reasons. You might want to:

- decide what is the best way to proceed,
- choose a material,
- find an answer to a question, or
- find a solution to problem.

To come to a reasonable conclusion in these cases, you might use a process of eliminating possibilities. You make a preliminary selection between possible choices as a way of getting started.

- First, you try to eliminate the least likely or the weakest possibilities first.
- Next you look carefully at the more likely possibilities, based on your reading and experience.
- Then you pick what looks like the best choice.
- If you get more information or if your choice doesn't seem to be working out, you start the process over.
- You might have to look for more options to consider.

As you begin to see the relationship between various factors, you can begin to draw conclusions that work for your situation.

> **Example:** You know that a change in altitude means a change in atmospheric pressure. If you are working at a different altitude than sea level, you conclude that a pressure gauge will not give you an accurate reading unless it is adjusted. Drawing this conclusion will lead you to check your equipment before you use it and to make the proper adjustments.

Is this valid?
When you observe what happens in the workplace, you use what you see to draw conclusions about what works and what doesn't. At some point, you have to decide if your conclusions are valid.

Often when you draw a conclusion, you need more testing or examples to be sure it is valid. If an outcome happens once during project, you can't be sure it will always happen that way. More examples are required before you can use that outcome to make predictions. You will know the conclusion is valid if the same thing happens every time you follow that procedure.

> **Example:** You may produce a defective weld because you used the wrong filler material. However, in another situation, a defective weld may be the result of voltage that is too low.
>
> Noticing causes and results, while you are learning and while you are working, adds to your awareness of what is a valid conclusion for a given situation. With experience, you will come to instinctively figure out what is the best way to proceed.

You may have overlooked other factors which affect the outcome of the finished work. If you notice that you have missed something on a project, make sure to take it into account the next time. Each factor will have an effect on the finished product. As you learn how each factor affects the process, you will work hard to develop the skills needed to reach a satisfactory conclusion.

Sometimes you need to reach a conclusion quickly, perhaps about what product to choose. You don't have time to check all the possible results of using the different products. You can ask other workers what they would choose. You can turn to an expert. You can also rely on manufacturers' literature. The information will often tell you what to expect. If the company is reliable, you can count on them to test their product and to guarantee them.

A conclusion may be valid in one situation given the information you have available. It may *not* apply in another situation. Learn to judge each new situation before you draw a conclusion. Look at the relationship between cause and effect. Keep track of what happens in different situations so you have a range of possibilities from which to choose. Consider all the possibilities and keep your mind open when making conclusions.

There are skills you can develop to help in making valid conclusions:

1) Observe and keep records of what happens in different situations on the job.
2) Talk to skilled workers to add to your store of knowledge.
3) Watch and listen as you work.
4) Test your ability to judge a situation.
5) Start to see patterns that can help you make reliable prediction.

As you become more experienced, you will find it easier to reach valid conclusions and make logical decisions.

PART III
RECOGNIZING CONCLUSIONS

You might be reading a text or manual and you want to decide if the information is presented in a way that you can use to draw a conclusion. Experienced workers might talk about different situations and you aren't sure what conclusion to draw from the conversation. There are guides that help you recognize when a conclusion is being made.

The language of conclusion
Some words and phrases provide clues that a conclusion is being drawn. When you examine information, notice when any of these words are used. They will give you a signal that the writer is drawing a conclusion.

The words *therefore, must have (must be)* and *would have to be* often indicate that a conclusion is being drawn:

> **Example:** You see that the pointer on your voltmeter is bent. In trying to find the cause of the problem, you read in a manual "*If the polarity were reversed, the pointer on the meter would reverse direction; this might cause it to be bent or broken.*" You might say: "Perhaps I reversed the polarity on the meter and this is the cause of my problem."

The words *if, so that, due to, because of,* or *since* often indicate that a cause and effect statement will follow. They point out the causes that lead to a result. The conclusion follows.
The examples below indicate some of the steps in a logical reasoning process that lead to a correct

> **Examples:**
> Flexible conduit is not recommended, but *if* you have to use it, increase by one trade size.
>
> *Due to* clean air regulations, some solvents are no longer used.
>
> *Since* guy wires are affected by these sources of current, exposed guy wires must be insulated or grounded.
>
> *Because* chips of metal will lie between the die and conduit and cause tears in the threads, they should be cleared out occasionally.

Words such as *will then, consequently, as a result, must, thus* or *therefore* often indicate a result. Once you know the cause and result of a situation, you can often use the information to reach a conclusion.

> **Examples:**
> Counterweights can be attached to pointers to achieve perfect balance. A well balanced meter *will then* give the same reading whether held vertically or horizontally.
>
> The magnetic field passes more easily through soft iron than through air; *consequently*, the field tends to concentrate in this area.

Several problems may result if the connectors are not properly shielded; *therefore*, every component must be fully and seamlessly shielded.
The seal is the place where the shaft rotates part of the time and rests part of the time; *hence* the seal *must be* designed and installed carefully.

As a result of an overload, the coil may burn out and the springs may be damaged.

Another method of drawing conclusions is by turning the information around:

Example:
Tools of high quality purchased from a reputable manufacturer have a number of advantages. Most
- offer lifetime guaranties against failure,
- are lightweight and easy to handle,
- hold up under use,
- etc.

If the above is true about high quality tools bought from a reputable manufacturer, you might conclude that the opposite is true of poor quality tools. In other words, that they do not offer lifetime guarantees against failure, are not lightweight and are not easy to handle.

But although you can turn some information around, be careful not to jump to conclusions on too little information. There may be inexpensive tools available that are a good deal and that work reasonably well. Before you draw a conclusion about tools based only on price, you might want to do some research by talking to others and reading guides that compare tools.

Read the advice below on caring for measuring tools:

Measuring tools must be handled with the care.
1. Never drop a square as this can ruin accuracy.
2. Always keep it clean.

Precision tools require care. Does this mean you can toss around other instruments and tools? Think about the result of this action. Drawing valid conclusions always requires a certain amount of common sense.

CONCLUSION

To draw valid conclusions, you must first make accurate observations. Then you compare what you see to what the information you have from textbooks and manuals. You might ask a more experienced worker for their opinion of the situation. All this information is used to reason through to a logical conclusion.

After reaching a conclusion, you need to check if it seems valid in other situations. This process will gradually build up a wealth of experience that you can use to make future decisions. You will be able to quickly decide what course of action to take in various situations. This will also be useful in making a reasonable estimate.

Understanding the relationship between cause and effect is a necessary step in reaching a valid conclusion. Skill in drawing conclusions will give you the ability to judge a situation accurately. You will also develop the habit of making sound decisions as you learn. This will help you develop into an efficient and effective machining and tooling worker.

Summary

1. **Use a variety of resources to draw conclusions.** These include experience, observations, advice from experts and all relevant technical reading information

2. **Read technical material carefully** to find information about causes, results and solutions; you can then use the information in the workplace.

3. **Carefully observe** what is happening in the workplace.

4. **Understand the relationship between things** to be able to judge cause and effect.

5. **Understand that a change in a procedure, material or tool often affect something else.** Notice how these changes affect the result.

6. **Consider whether you have all the information** needed to reach a valid conclusion. Are there factors affecting the outcome that you do not understand or don't know about?

7. **Eliminate weak possibilities** to focus on the strongest and the most likely.

8. **Observe language used in drawing conclusions** such as *therefore, thus, would have to be, must be* which set up the situation and then reach a conclusion.

Answer page

PART I **Passage 2, Proper Installation,**

1. You can conclude that high quality products will ensure the system performs at Category 5 levels.

   F Passage 2 states that performance of a system can be reduced *even with* high quality product unless installation is properly and carefully undertaken. From this passage, you can conclude that high quality products *and* proper installation methods will ensure the best system levels.

2. Which result would you expect if a pair of wires was untwisted more than ½ inch from the termination point?
   a) an increase in crosstalk

3. You can conclude that over-cinching the cable or bending with too tight a radius would result in the same type of damage.

   T Over-cinching means tightening something too much. The last paragraph states this can cause flattening of the cable. The third paragraph states that bends that are too tight can also result in flattening

4. If you do **not** use a pull force of 25 lbf, you can conclude that you would stretch the cable.

   F This question asks you to draw a conclusion about pull force. The passage clearly states that *excess* pull force - greater than 25 lbf - could cause a particular type of damage by stretching the cable. However, the passage does not state or suggest that damage would occur if you use *less* force.

PART II **Passage 3, Receptacles,**

1. Which of the following would result if you ignored the markings and ratings on a receptacle?
   d) All of the above.

   The third paragraph describes the variety of information that markings and ratings provide.

2. Receptacles can be used with any type of current.

   F Paragraph 3 specifically says that the markings will tell you *which* current can be used and that the current marked "*will be the only one that the receptacle can use*."

3. What might you conclude if a receptacle box was placed at the beginning of a circuit? This position would:
   c) result in problems with the installation

   Paragraph 2 tells you that the position of the receptacle will affect the way the receptacle is wired, which might make Answer **a)** tempting. However, it specifically says *"the box must fall either at the middle or end of the circuit*." Although the passage doesn't provide you with information as to what could happen if you placed it at the beginning, it would be reasonable to expect problems. Answer **b)** is incorrect because it is the number of wires that determines the position of the receptacle, not the reverse.

4. You can conclude that amperage, voltage, current, wire type, box position and application are all factors used in selecting the appropriate receptacle for a job.

   T The information in all three paragraphs clearly outlines how each factor must be considered when selecting the proper receptacle for a job.

PART III Passage 4, Rigid PVC Conduit: Bending methods

1. When you flatten (or kink) conduit during a bend procedure, what might you conclude?
   a) The conduit was heated to a temperature of 110° C.

2. If conduit does **not** springback to the correct bend radius, which is the most likely conclusion?
   b) The conduit was bent too far - beyond its springback point.

   This question asks you to use a process of elimination. If the bend does not return to the desired shape, investigate how far the conduit was bent *beyond* the required shape. The passage says it should be bent *slightly* beyond the correct radius.

3. If you follow the guidelines and take the proper care, you should produce PVC bends that are better than those produced commercially.

   F The passage offers advice and describes equipment to produce the required bend. It does not state that the bends you make will be better or worse than those commercially produced.