EVALUATING
ACADEMIC READINESS
FOR APPRENTICESHIP TRAINING
Revised for
ACCESS TO APPRENTICESHIP

COMMUNICATIONS SKILLS
UNDERSTANDING SEQUENCE

AN ACADEMIC SKILLS MANUAL
for
The The Industrial Maintenance Mechanic Trades

This trade group includes the following trades:
Boiler Maker,
Facilities Maintenance Mechanic & Technician, and
Industrial Maintenance Mechanic (Millwright)

Workplace Support Services Branch
Ontario Ministry of Education and Training

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.

COMMUNICATIONS SKILLS
UNDERSATNDING SEQUENCE

An academic skill required for the study of the The Industrial Maintenance Mechanic Trades

INTRODUCTION

In the industrial maintenance trades, it is essential to follow directions in the right order to complete a job successfully and safely. Develop the skill of accurate reading and accurately following directions. You make accurate choices; you make fewer errors; and you can spot where something went wrong. Most trade material is written in a step by step order called sequence so that you acquire information in a logical manner. This is especially important when you are learning the steps in a procedure.

Sequence *refers to an ordered arrangement in which one step is followed by another***.** A sequence can be the step-by-step description to complete a layout, rigging and welding; it can be a description of the parts, or the use of a power tool. Each piece of information (or step) is part of the whole thing. The steps work together, but you need to understand and follow each on its own.

Practical applications of sequencing skills in your trade are numerous. You use sequencing to use checklists to learn the correct standard operating procedure; to understand both verbal and written instructions; to set up, maintain and operate necessary equipment; to identify and understand correct procedures when using mathematical formulae in calculations; and to use training tools such as on-line programmes or software packages.

In this skill sheet, we will look at trade material to:

- Examine the order of information,
- Identify and follow steps in a sequence, and,
- Identify and follow sequence in diagrams.

PART I
EXAMINE THE ORDER OF INFORMATION

When we are learning something, we usually ask a lot of questions.

> **Example:** Someone in your trade is talking about *stress values*. If you've never heard the term, you'll probably ask: What's that? What do I need to know about it?

Whatever the reasons for our questions, they tend to follow a logical sequence or order. We usually start with basic questions and then ask questions which demand more detailed or difficult answers. The questions should cover most of what we need to know: What is it? How does it work? How do I use it? How do I do this?

Technical material
Technical reading material is set up in a logical order. In many cases, the reason why you need the information comes first. In other words, technical writing often starts by answering the question: What do I need this for? The answer gives you the function, use or purpose of something as it relates to your trade so it is the first information you will see.

Look for information to appear in this or a similar sequence:

- Why do I need this? (purpose)
- What is it? (definition and description)
- How does it work or what is the correct procedure?

The correct procedure or information about "how to do something" often comes last. You get description, explanation and underlying principles so the procedure will make sense as you follow it.

Read it through first
When you read information that contains instructions on how to do a job, read it through to the end *before* starting the job. When you are aware of the order of each step, you can understand how each fits into the whole procedure. Reading through all of the instructions first should become a part of assessing and preparing for any job.

Some passages don't set up the steps so that you can clearly see the sequence. In this case, look for clues. Notice if there are letters and indicators such as commas to separate the points. Look for words such as ***first, then, next.***

Passage 1, N*ondestructive Testing,* illustrates how this might work. Notice the way sequence is used and how the information helps you answer the three questions listed above (why, what and how). In a sense, there are two different kinds of sequence illustrated in this passage:

- the sequence in which the information is presented and
- the sequence of steps used in a specific procedure.

Note: *We have not included all details or diagrams, as we are not asking you to test a spot weld. We are looking at how the sequence of details informs you about your trade.*

Passage 1
Nondestructive Testing

Nondestructive testing is a method of inspecting the strength of spot welds. The simple testing methods below are for general use in shops that do not have the sophisticated equipment needed for most destructive tests.

Nondestructive test: To confirm the welding has been done properly, use a chisel and hammer and proceed in the following way:

Insert the tip of the chisel between the welded plates. See Figure 1. *(It's omitted here.)* Tap the end of the chisel until a clearance of 1/8 to 5/32 inches is formed between the plates. (This clearance applies when the plate thickness is approximately 1/32 inch or .79 mm).

★ If the welded portions remain normal, it indicates that the welding has been done properly. It is necessary to repair the portion of the panel that has been deformed after this inspection.

- See manual for clearance details when using different thicknesses of plates.

Why do I need this information?
Paragraph one explains the purpose of a nondestructive test – it is used to measure the strength of a weld. Reread the first paragraph. You learn that a nondestructive test is used in shops that do not have the equipment needed for destructive testing.

This information is placed in the introduction to let you know why you should pay attention to the details that follow. It answers the question "Why should I learn this?" and it gives you a purpose for your reading.

What is it?
Paragraph two is brief. It sets up the answer to, "What is nondestructive testing?" and prepares you to follow "how to" directions. Reread it to see how this works. It tells you:

- what the test will do,
- what tools to use, and
- that "how to" directions follow.

You now know where this passage is going. It is leading in a logical way to answer, "How do I do it?" This is the next step in understanding.

How do I do it?
Once you know what something is, you then get to the "hands on" stage. Look at paragraph three to see how it guides you in precise steps. It tells you:

1. where to insert chisel tip,
2. to see the diagram as a guide,
3. how far to insert chisel tip,
4. when clearance of 1/8" to 5/32" applies,
5. how to confirm proper weld,
6. what to do after test completed, and
7. where to get details for difference thicknesses of plates (manual).

Sequence of learning
As you read **Passage 1**, you should start to see the general order. It is organized so the learning moves from general information to more specific details. You also see how the practical steps are laid out in a sequence so that the first step comes before the second and so on. As you become aware of the order, you see how all the steps fit together. This leads to an understanding of the whole process.

As you read, think of other questions that may arise. Look for the answers as you go. Observe how information is organized to answer your questions. If it is organized in sequence, you will

find the material easier to understand and act on. Use this system to your advantage. Give yourself enough time to carefully read technical material, noticing how it moves from step to step.

The first information you learn in your trade will become a base that you can later build on. *Because learning expands on what you have previously learned, you need to make sure you understand what you have read before you go on to new material.* You also need to recognize when information is related to something you learned earlier. The best way to understand how individual parts are related to the whole is to first learn the material one step at a time and then think about how all the parts fit together in the correct order.

PART II
IDENTIFY AND FOLLOW STEPS IN A SEQUENCE

In this section, we will look at identifying and following the steps in a process or procedure. An awareness of the correct sequence of steps used in completing a project is necessary to achieve a satisfactory result.

Getting it right

At first, you may not see the reason for the sequence in a set of directions. Always follow the directions exactly as stated. The steps serve a purpose even if you don't know what it is. When you become expert with a process, you can decide if it is appropriate to make adjustments. Even after you become skilled, new products will come on the market with new procedures. You'll need to keep reading and learning to keep current.

> **Example:** Imagine using any order that strikes your fancy to complete a job. What results would you expect if a someone painted a fence and then primed it or you drilled six holes and then read "*no more than four are recommended"*?

Read **Passage 2** for a straightforward example of sequence. You can clearly identify and follow the sequence, acting on each step.

> **Passage 2**
> **Battery Charger**
>
> A battery charger converts 120 volts AC into 13 to 15 volts DC for recharging drained batteries.
>
> Connect as below:
> Connect red to positive and black to negative. The red lead on the charger goes to the positive terminal of the battery. The black lead goes to ground or the negative battery terminal.
>
> After connecting the charger, adjust its settings as needed (12-volt battery, fast or slow charge, etc.). If a battery is low, it is best to slow charge the battery for several hours. A fast charge for a few minutes will not restore the battery charge properly.

The first paragraph answers *what is it*, and *what it is used for* kinds of questions. Though the steps are not numbered, paragraphs two and three give you the "how to" steps:

- connect red to . . . black to . . .
- red lead on charger goes to . . .
- black lead goes to . . .
- after connecting charger, adjust . . .
- if battery is low, it is best to . . .

If you read and follow these steps, you should be able to change a battery correctly. The last sentence adds to your knowledge by explaining why a fast charge does not work as well as a slow charge

Did I miss something?
Passage 3 below is an example of what we mean by building on what has already been taught. An earlier chapter or section has provided answers to these questions:

- What is it?
- Why do I do this?

The passage assumes you have read the previous material. For this reason, you may not understand all the information perfectly. You will be able to recognize the sequence of steps used for installing an anti-friction bearing but some details about the technique and materials may not be clear.

Read the passage and answer the questions which follow. Each question asks about sequence (order). Start at the beginning and read methodically to the end. **Answers to questions are at the end of this skills manual.**

Passage 3

Installing Anti-Friction Bearings
Before placing a bearing onto a shaft, both the bearing and the shaft must be lightly oiled to reduce friction. Once that is complete, place the bearing on the shaft, making sure that it is square to the shaft.

Next, place a clean pipe or mounting tube, slightly larger than the shaft diameter, on the inner ring of the bearing (see Table 2.1). By hand, apply pressure to start the bearing moving into position. Make sure that the bearing is still squarely on the shaft and then press it in to the final position.

As the bearing moves down the shaft, rotate the outer ring by hand. This will check for drag and loss of clearance. If the bearing clearance is lost partway down the shaft, do not press the bearing the rest of the way.

Questions:

1. Which is the correct sequence of activities for pressing a bearing onto a shaft?
   a) oil bearing and shaft, place clean pipe on bearing, place bearing on shaft
   b) place clean pipe on bearing, check that bearing is on squarely, press into final position
   c) place bearing squarely on shaft, oil bearing, place clean pipe on bearing

2. When would you apply pressure by hand?
   a) after the bearing is in the final position
   b) after you have lightly oiled the bearing and shaft
   c) after the mounting tube has been placed on the shaft

3. After you have pressed the bearing into its final position, check to make sure it is squarely on the shaft.

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4. A coating of oil is applied to the bearing before it is placed on the shaft.

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Look back to question 1 above. You are asked to choose the correct sequence of activities. Notice that looking for the correct sequence refers to what comes first, second, third or fourth *in that group* of activities. It doesn't necessarily mean first, second, or third step in the whole project. You know that installing a bearing is a task that does not come first in the sequence of repairing and replacing a shaft.

You may be asked to follow a procedure which comes *in the middle* or *towards the end* of a task. You still follow activities in sequence, but you may pick up the job halfway through the project

You may also need to identify slightly different kinds of sequencing.

Numbered Steps
It is usually easier to follow a sequence when the steps are numbered. Numbering steps also helps you identify areas that seemed clear when you read the sequence, but aren't so clear when you come to do the job. You can figure out where you are getting lost.

If the sequence isn't numbered, as in **Passages 2 and 3**, you can break the information into steps to see the order and note any steps that you don't understand. Or when a procedure is long and only the general steps are numbered, you may want to break the numbered instructions into smaller units to separate each step.

Example: You could number the steps in Passage 3 as follows:

1. oil bearing and shaft
2. place bearing squarely on shaft
3. place correct size mounting tube or pipe on bearing
4. apply pressure by hand
5. etc...

The third paragraph in Passage 3 tells you to check for drag and loss of clearance; however, there is no instruction on the steps or technique for this. There is no "*how to"* guide on this. I*f you did not know how to perform this step, you would have to search for and find "how to" information.*

You may not need to press a bearing into a shaft accurately at this stage. You do need to know how to accurately read and follow a sequence of information and identify when you need

additional, detailed instruction. With this knowledge, you are on the way to learning how to perform a job accurately and how to identify when you need to ask for help.

Questions and relationships
Information is organized in a specific order for a reason. As you read, think about questions related to sequence. Stating the questions and then looking for answers can be a useful way to test your understanding when you are studying for homework or doing a job. The questions below relate to **Passages 1, 2 and 3**. They will also apply when you study other technical material.

1. Which activity or step is first, second, third?
2. Which step starts the process; which concludes the process?
3. What happens **before** or **after** a certain step?
4. What happens if I skip a step?
5. Where do I turn if I can't ...?

Look at and understand the order in which things happen in a project, or task. If you can see the relationship of one step to another you will understand the whole picture and you can apply the information appropriately.

Remember, read it through first
When you read instructions completely *before* starting a job, you will be prepared in several ways. You have a clear idea of the steps involved. You can plan for which ones will be easy and which will need more help. You can plan for the amount of time the job will take.

> **Example:** Passage 3 tells you to make sure the bearing is square to start and to recheck that it is square several more times during the procedure. This task cannot be hurried, you will have to give yourself enough time to do the job properly.

Each of passages 1, 2, and 3 gives you a sequence of activities. Each passage prepares you to work in sequence when you are on the job site.

1. It first prepares you for the task.
2. Next it tells you what you will do:
    - how to prepare,
    - the sequence of tasks, and
    - how to watch for and fix problems.

By reading the entire set of instructions before you start, you can assess the job and prepare for each step.

Before we go - a word about numbering
You will see many directions with numbered steps. Usually numbering indicates the steps in a sequence and their order. Number one (1.) indicates the first step, number two (2.) indicates the second step and so on. In some cases, numbering does not indicate a sequence.

Example:
1. Maintain fire extinguishers to safety standards and place where they will be used.
2. Follow Construction Safety Association of Ontario guidelines.
3. Follow safety guides when working with flammable materials.

As you can see, these numbers do not indicate order. Here they act as a checklist. The tasks on the checklist must all be done, but they are not sequential.

Make it easy for yourself
You know how to number steps in a procedure to make the correct sequence clear. You can also divide information into individual points. This will help you see where the pieces of information belong.

Example: You are reading about preparing a handsaw and workpiece where the information is presented in a long paragraph, you might break it into the points:

To prepare a handsaw and workpiece:
First, choose the correct blade for the job.
Then make sure the blade is mounted properly.
Next, adjust the tension.
Lastly, secure the workpiece.

You can also mentally separate information into a sequence or point form. You will find this useful when you are figuring out how to organize the steps of a project. By taking the time to put things in order before you start working, you will have a clear picture of where you are going and how to get there.

A different order
Earlier we suggested that you start reading new material at the beginning and move forward in a logical sequence to the end. However, once you've read through carefully from start to finish, you may want to look at the information in a different order. When you understand how steps are connected, you can move backwards or forwards in a diagram or passage without getting confused. This is particularly true when you are looking for exact details or when you need to find the causes of or solutions to a problem.

Example: You want to know why the bearing was not squarely on the shaft. To answer this, you need to find out what caused the problem. You may have to start in the middle of the passage and work backwards to find the cause. You may search through another manual to find answers. You are still aware of sequence of steps, but you are jumping around to find precise information about a missed or poorly performed step.

And, so it goes
Example: To troubleshoot a hydraulic system, you need to isolate the problem by taking pressure and flow readings. This is followed by a safe shut down of the

equipment (which means in the correct order), and a check for contamination. And, so it goes. All of this must be done before you start the actual repair.

Example: The following short passage describes three steps you should take to determine welding speed:

In most situations, welding speed is determined by the base metal panel thickness and/or the voltage of the welding machine. Consult Table 1-1 for welding speed.

You can see the steps involved. You have to measure the panel thickness, find the voltage of the welding machine and check the table for the appropriate speed. These steps should be done before you start welding.

What does this have to do with sequence? Even before you start a task, you need to pay attention to the sequences of preparing for the job. When you are doing a job, each step depends on the step before it. If the first (second, third or any other) step is left out, performed too quickly or inaccurately, you will not get the desired results. The finished product depends on the successful outcome of each step.

Application: Taking over in the middle
Consider a situation where you take over from your instructor or co-worker to complete a job.

Example: You are asked to complete a machine repair that someone else has started. You have to find out what was already done and what you are expected to do to finish it.

You go to the instructions. Look them over carefully to check that you understand what you have to do. Examine what has already been done so you know where in the sequence you are starting, and pick it up from there. When you understand the sequence of steps that must be carried out, you can begin at any point in a project. You know where you must start, where you are going, and what you need to do. Looking over the whole process and reading through the steps gives you the ability to accomplish your task.

When you have to step into the middle of project, ask yourself the following questions:

What am I expected to do?
How do I do this?
What is already done?
Where do I start?

Evaluating to make the right choice
To follow a sequence, you must read and follow the directions as they are written. But sometimes, you also need to evaluate the steps and make decisions as you proceed. Look for words that suggest a choice: **if**, **when**, **or.**

Example: Here are some of the first steps for inspection of a scissor lift.

1. Check that guardrails are in place and access ladder is in good condition.
2. Check tires for inflation when applicable.
3. Check for full charge on batteries if electrically powered.
4. If internal combustion engine, check oil /fuel . . .

You can see that you have to follow steps in sequence to properly inspect this type of lift.

However, you may have to interrupt the sequence to follow through on another series of important details:

1. Are the guardrails in place?
2. Is the ladder in good condition?
3. Are the tires properly inflated?
4. Is the battery fully charged?
5. Are the oil and fuel levels good?

You may be diverted from the original situation to find further information or to carry out a different sequence of steps to deal with the rails or the battery. When this task is complete, you can go back to the spot where you left off and continue inspecting the scissor lift.

The results of the finished product depend on the results of each step.

Read Passage 4 and answer the questions which follow. Each question asks about sequence (order). Start at the beginning and read methodically to the end. **Answers to questions are at the end of this skills manual.**

Passage 4
Tapping the threads

Once a tap has been started, it tends to maintain its alignment. Therefore it is essential that a tap is correctly aligned when it first enters a hole. If the tap is started correctly, it tends to remain in alignment. A tap which is out of alignment must be removed and restarted (see diagram 2-3). Pressure must be applied evenly to each end of the tap wrench. Don't try to force the tap into alignment, or it may break.

Start the tap carefully and gently in the hole. It will soon appear to jam. Turn back a little more than one quarter turn, then turn forward to where you were and continue forward a half turn. The turn backwards breaks off the spiral chips formed by the cutting process. The freed chips will then fall away.

Frequent lubrication is required during tapping unless the material being tapped is cast iron. The lubricant reduces friction and prevents excess heating of both the tool and the material. It also prevents excess tool wear and helps wash away chips formed by the cutting.

When tapping is complete, remove the tap. Clean the hole.

Questions:

1. Which of the following is the correct sequence?

   a) Start tap until it jams, turn tap the required number of turns in required directions, remove the tap.

   b) Clean the hole, turn forward gently, continue forward a half turn, turn backwards to break off spiral chips.

2. When would you remove the tap and start over?

   a) when the pressure is applied
   b) when the tap appears to jam
   c) when the tap gets out of alignment

3. At what point in this sequence will you need to make an evaluation and decide whether to continue or go back to redo something?

Sequence in Trade Mathematics

Bedmas

You have to follow the required steps in the proper order to complete any project you are assigned. When you are doing math problems, you also have to work in the correct order. If you accurately complete each step in a problem but if the order is wrong, the answer will be wrong. The proper order of basic math operations is called ***bedmas***.

Bedmas (brackets, exponents, division, multiplication, addition, subtraction) prescribes the order in which you have to do these operations to get the right answer, whether it is determining welding speed or figuring out mathematically how much material is required for a project.

PART III
SEQUENCE in DIAGRAMS

In technical manuals and texts, a diagram accompanies many passages. A diagram can illustrate the sequence of steps in a welding procedure. It can show something you can't see, such as the wiring in a space where ducting is to go. It can show the point when something happens.

Passages with diagrams

It is important to understand diagrams that accompany writing. The passage and the diagram are designed to be used together, but you may examine them separately at first to find out what each has to teach you.

When you read diagrams, your eyes will move between the writing and the diagram – like watching a hockey puck on the rink. Focus on one section until you understand it, and then move to another, repeating this process - until you understand the whole.

Passage 5 and Figure 1 below are taken from instructions about squeeze-type resistance spot welding. Together they make the directions clear to the reader.

Passage 4
Squeeze-type Resistance Spot Welding

The force mechanism begins an electrical signal to the welder control. This switches on the flow of weld current for a preset time and then switches it off. The weld time is usually less than one second making the process very fast.

Consider the following important operational points when using a squeeze-type resistance spot welder:

Spotting sequence: Do not spot continuously in one direction only (See Figure 1). This method results in weak welding because of the shunt effect of the current. If the welding tips become too hot, the tips will change colour. If this occurs, stop welding and let them cool. Note: It is important memorize this welding sequence.

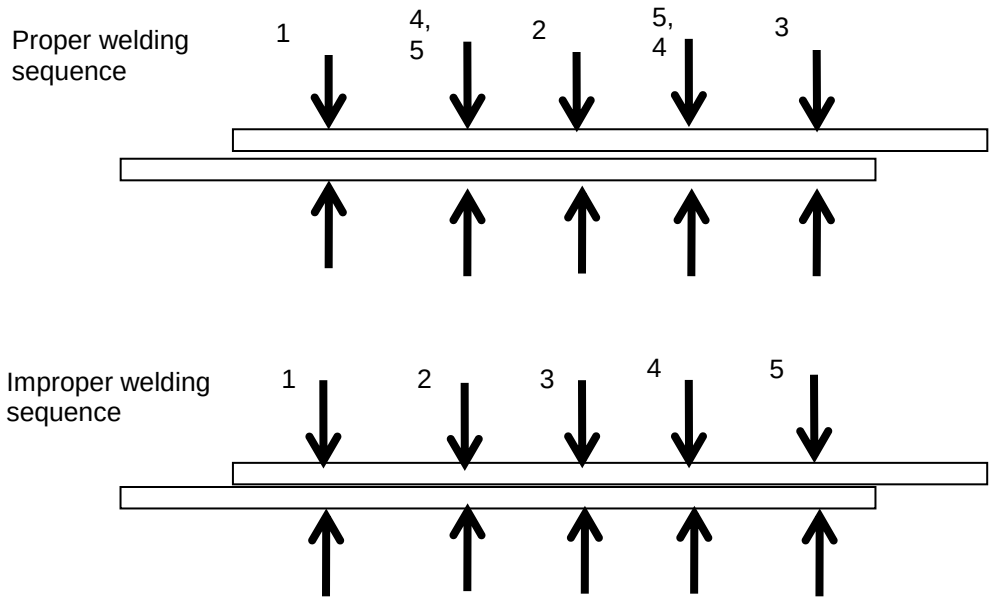

Figure 1: Proper and improper welding sequence

The diagram relates to the information about the correct sequence of spot welding. It clearly illustrates the pattern in which to do the spot welds. In this case, the correct sequence happens to be irregular. You don't weld from one spot to the next but instead, you jump around so the welding tip doesn't get too hot. The arrows indicate the correct direction while the numbers indicate the order in which to do the welds.

To be certain you've understood it, the diagram also shows an incorrect welding sequence. If you were unclear about the words in the passage, "Do not spot *continuously in one direction only"*, the diagram should clear it up for you. It gives a picture to go with the words. As you read, observe **when** to look at the diagram, and **what** to look for. Ask yourself, "What part of the diagram does the sentence or step refer to?"

Focusing on sequence helps you become aware of how a passage or diagram is organized. It helps you see the order of steps in a procedure. Apply the suggestions below when you are

reading a passage that includes a diagram. This way, you get the most information from the passage.

1. Read the whole passage.
2. Look at the diagram.
3. Look back and note how the passage and diagram are organized.
4. Match the diagram to information in the passage.
5. Go through any step-by-step directions, looking at both the passage and diagram to see how the steps described in each are related.

Passage 5 is about the principles of shrinking in welding. Read the passage and look at the diagrams, following the steps listed above. Notice how the diagrams help to explain what is happening to the steel bar at the different stages of the heating and cooling process. The sequence of changes in the bar after heating and cooling are easier to understand because you can picture what is happening and see the order in which they take place. The questions which follow ask you to find the correct sequence. **Answers are at the end of this skills manual.**

Passage 5
The Principle of Shrinking

A steel bar that is free at both ends to expand or contract, will expand when heated and then contract *to its original length* when cooled. See Figure 2.

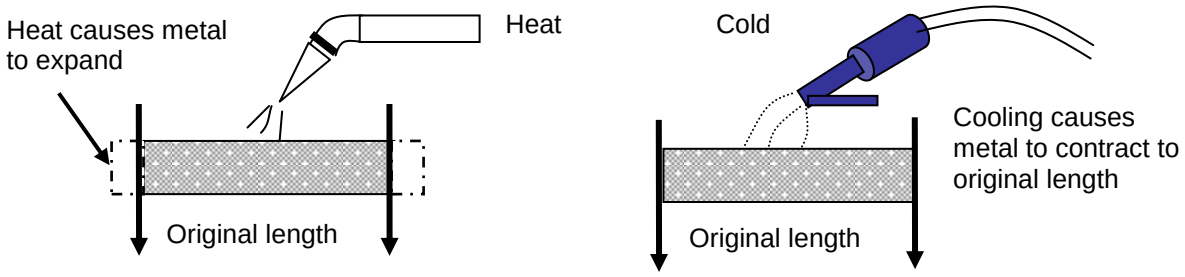

Figure 2: Expansion and contraction of metal when it is heated and then cooled

If the same steel bar is restricted at both ends, it will *decrease in length* when heated and then cooled. The steel bar, when heated attempts to expand (Fig. 3 A) but is restricted at both ends. Thus, a strong compression load is generated inside the bar.

As the temperature is increased, the steel becomes red hot and soft. The compression load concentrates in the red hot area; it is then relieved as the diameter of the red hot area increases (Fig. 3 B).

If the steel bar is suddenly cooled down, the steel contracts and the length of the bar is shortened (Fig. 3 C). Apply this principle of shrinking steel to the shrinking of a warped area in a piece of sheet metal.

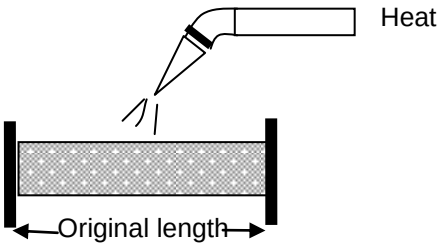

Figure 3A: Restricted metal cannot expand in length when heated

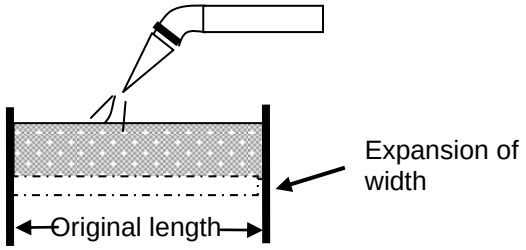

Figure 3B: Restricted metal expands in width when heated

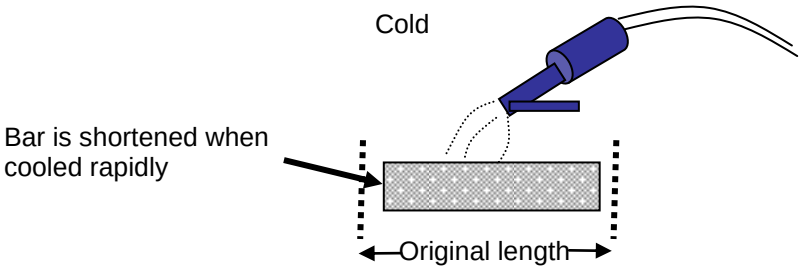

Figure 3C: When metal is cooled rapidly, it contracts

Questions:

1. Which is the correct sequence of events: **A or B**?

A. a) steel bar is restricted at each end
b) heat is applied,
c) compression load is created inside bar
d) the diameter increases

B. a) steel bar is restricted at each end
b) diameter increases from pressure
c) bar is heated
d) compression load is created

2. The following statement describes correct sequence:

a) A steel bar is restricted at both ends
b) Heat is applied
c) It is cooled rapidly
d) This results in a shortening of its length.

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3. Figure 3C shows which of the following:

    a) The thickened diameter of red hot area when heat is applied.
    b) Rapid cooling results in contraction of metal; the length of bar is shortened.

Figures 1, 2 and 3 show in a clear sequence what happens to the metal bar at the different stages. The passage adds information about the process. The diagrams illustrate the same information so that the process is easier to understand and remember.

When answering questions about sequence, whether in written material or in diagrams, go back through the passage. Find the appropriate place and read each step. You may have to trace the steps with your finger while your eyes move back and forth between diagram and passage. You might have to read the section several times to make sure you have the correct match. In some cases, there may be steps that are almost the same. But as shown in **Figure 1**, "almost the same" usually won't get you correct results.

CONCLUSION

Sequence is an essential system for organizing information and procedures. When information is presented in a logical sequence, it is easier to understand. Make sure you read all the steps in a set of instructions before you act on them. You can then follow them in the correct sequence, completing a job correctly and safely.

Keep in mind:

- Information builds on what you have previously learned. Just as you would build a strong house foundation, *make sure your trade foundation is strong.*
- If a passage of information is building on past learning and you don't understand a definition, term or principle, you might have missed something that was already taught. *Find where this information is. Then go back and reread it.*
- You might read steps which clearly outline correct procedure but the precise measurements, techniques or length of time are not laid out. *Know when and where to find this information.*

When you understand the steps or pieces, you can understand the relationship to other steps or pieces; this leads to an understanding of the whole process.

Summary

1. **Ask questions** that guide you through understanding step by step instructions or descriptions.

2. **Technical material is organized so that you can understand it**. It will walk you through a process or principle step by step. Give yourself time. Read carefully.

3. **Information is built up from what you learn**. Follow procedures and understand them to build a strong foundation.

4. **Understand how steps relate to each other**: what is first, second, third; what comes before or after.

5. **Match the steps in a passage to a diagram** and vice versa. Then match everything to the job you are doing.

6. **A sequence of information can explain a principle** and can show you how it applies to your trade.

7. **The result of the finished product depends on each step**.

8. **Evaluate steps to make the right choice.**

9. **Follow accurately** to ensure error-free and safe work habits

ANSWER PAGE

Part II Passage 3, Installing Anti-Friction Bearings

1. Which is the correct sequence of activities for the pressing a bearing onto a shaft?
   b) place clean pipe on bearing, check that the bearing is on squarely, press into final position.

   This is a straightforward order on activity question. Although some steps may be omitted, b) is the correct sequence.

2. When would you apply pressure by hand?
   c) after the mounting tube has been placed on the shaft
   This is a *before /after* type of question. The passage clearly states when to apply pressure by hand.

3. After you've pressed the bearing into its final position, check to make sure it is squarely on the shaft.
   F You must make sure it is squarely on before you press it into its final position.

4. A coating of oil is applied to the bearing before it is placed on the shaft.
   T The passage clearly states this as the first step to take

Part II Passage 4, Tapping the Thread

1. Which of the following is the correct sequence?
   a) start tap until it jams, turn tap the required number of turns in required directions, remove the tap.

   This is a straight forward question. Although some steps may be omitted, **a)** is the correct sequence.

2. When would you remove the tap and start over again?
   c) when the tap gets out of alignment

   This is a *before /after* type of question. The passage states when to remove a tap and start over.

3. At what point in this sequence will you need to make an evaluation and decide whether to continue or go back to redo something?

   Because a tap tends to maintain its alignment after it has been started, it is important to evaluate the alignment almost as soon as the tap has been started. You will have to assess if it is straight and decide whether to continue or to go back and start the sequence again.

Part III Passage 5, The Principle of Shrinking

1. Which is the correct sequence of events: **A or B**?

   A The steel bar increase in width after the heat is applied, not because of being restricted, so B is in the wrong order.

2. The following statement describes correct sequence:

   T A steel bar which is restricted at both ends, is heated in an area, cooled rapidly resulting in a shortening of its length.

3. Figure 3C shows the following:

   b) is the correct answer. A refers to Figure 3B.