

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

**COMMUNICATIONS SKILLS
UNDERSTANDING SEQUENCE**

**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
Ontario Ministry of Training, Colleges and Universities*

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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

UNDERSATNDING SEQUENCE

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

INTRODUCTION

In all construction trades, it is essential to follow directions in the right order to complete a job successfully. The skills that enable you to read technical material and then follow the steps of a procedure are essential. Most trade material is written in a step by step order called sequence. It is set up this way so that you acquire information in a logical manner. This is especially important when you are learning the stages in a procedure.

Sequencing refers to an ordered arrangement in which one step is followed by another. A sequence can be the step-by-step description of how to carry out a complicated repair or it can be an ordered description of how to use a power tool.

Following the correct sequence is essential to such tasks as: interpreting schematics; following accurate installation procedures; and, describing and applying systems theory to the operation, maintenance and troubleshooting of systems. Each piece of information (or step) is part of the whole thing. The steps work together, but you also need to understand the importance of each individual step and the part it has in the whole system.

In Parts I through IV of this manual, we will look at trade material to:

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

PART I

EXAMINE THE ORDER

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

Example: Someone is talking about *ampere balance*. 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 and 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 first so the procedure makes 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 or indicators such as commas to separate the points. Look for words such as *first, then, next*.

Passage 1, *Fishing Cable Along a Wall*, 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 perform this task.

Passage 1 Fishing Cable Along a Wall

At times, electricians and network cabling specialists need to work on an upper floor, where there is no attic, basement or crawl space. In these situations, access openings need to be cut along the walls, in order to run the wiring.

Prior to attempting this, you must see the procedure for opening lath and plaster walls. This procedure involves extensive repairs. The following are steps to take in order to fish cable:

The first step involves locating and cutting a hole for each new electrical box. The baseboards are removed and the stud position located (the boxes lie between the studs). In standard construction,

studs are 16 inches on centre, but sometimes they are spaced 12 to 18 inches apart. Mark each stud with a rectangle 2 inches high and 4 inches wide. Note that width is critical so the drill can be inserted. Once the rectangle is cut out, both sides of the stud should be exposed. If working on drywall, use a utility knife, if not, refer to page 70. With the studs exposed, drill a 3/4 inch hole from side to side in each stud. An angled drill chuck may be required.

Fish the cable from the first box, to the access hole in the wall and then thread the cable through the hole in each stud, until you reach the next opening. Make electrical connections to the outlets or switches and then make patches to cover the access holes. This procedure is covered on Page 90.

Why do I need the information?

Paragraph one explains why you may need to fish cable – there is no attic, basement or crawl space. Reread the first paragraph. You learn, in order, to do this job, you will have to make access panels so you can bring wire up through the walls.

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.

You need to ask more questions, but the answers to "Why learn this?" and “What needs to be done?” gives you a basic understanding of what you will have to do.

What is it?

Paragraph two is short. It sets up the answer to “How do I do this?” and gets you ready to follow the directions. Reread this to see how it works. You find out:

- Before you start, you should refer to previous information on working with lath and plaster walls, in case this is the type of walls you will be working on.
- And, the instructions for fishing cable are found in the next paragraph.

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 are ready get to the “hands on” stage. Paragraph 3 guides you in precise steps. It tells you to:

1. Locate and cut a hole for each new box by removing baseboards and locate the stud position.
2. Mark each stud with a 2" by 4" rectangle.
3. Cut out the rectangle to expose the stud.
4. Use a utility knife for drywall. (Refer to p70 if working on plaster and lath.).
5. Drill a 3/4" hole from side to side in each stud.
6. Fish cable from the first box to the access hole.
7. Thread the cable through the hole in each stud until the next opening is reached.
8. Make electrical connections.
9. Patch access holes (see page 90).

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 given in a set of directions. Even so, always follow the directions exactly as stated, especially if it your first time through. The steps serve a purpose that you may not be aware of. After you have become skilled at a procedure, you can decide whether to make adjustments. Even after you become skilled, new products will come on the market requiring new procedures. You'll need to keep reading and learning to stay current.

Example: Imagine using any order that strikes your fancy to complete a job. What results would you expect if you painted a wall before the electrical boxes were installed or if you drilled six holes and then read "*only four holes 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 Testing and Replacing Relays

In general, relays should be replaced, not repaired. Therefore, the service technician must determine if the relay is defective. A motor starting relay tester will test both current and potential type relays and may be used on both 120V and 240V circuits:

Begin by connecting the numbered leads from the numbered jacks on the tester, to the same numbered terminals on the relay. Test on the 120V switch before using the 208 V to 240 V switch. The relay should open in about three seconds if working properly.

If the relay must be replaced, first disconnect the power supply. Use the correct sized screwdriver and label each wire as it is disconnected so that connecting the new relay is easy. If an exact replacement isn't available, use one of a lower voltage (90% of rating).

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

1. Connect the numbered leads from the tester to the same numbered terminals on the relay.
2. Test the switches in sequence:
 - a. First 120V switches,
 - b. then 240V, and
 - c. then 280.
3. Relays take about three second to open if they are working.
4. If relays are not working:
 - a. disconnect power with the correct screwdriver,
 - b. label each wire as you disconnect it so connecting the new relay is easy, and
 - c. if you don't have the exact replacement, use a lower voltage one.

If you read and follow these steps, you should be able to correctly test and replace a relay.

This passage assumes that you will reconnect the wires by matching the labels although it does not tell you to do that. Following sequence often requires that you use knowledge you already have. If you don't understand a direction like this, you will need to get help from another manual, a text, a co-worker or a supervisor.

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 starting a tap 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
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. The chips will fall away once you turn the tap forward for half a turn.

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4. Lubrication is required once the tap has been started.

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Look back to question 1 above. You are asked to choose the correct sequence of tapping threads. 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 tapping is a task that likely does not come first in the sequence of installing a heating and cooling system.

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.

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. When a procedure is long and only the general steps are numbered, you may also want to break the numbered instructions into smaller units to separate each step.

If the passage isn't numbered, as in **Passage 2 and 3**, you can break the information into steps to see the order and note any steps that you don't understand. Notice how we numbered the steps from **Passage 1**, even though they weren't numbered in the passage.

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

1. start tap carefully and gently,
2. turn back a little more than one quarter turn,
3. turn forward to where you were and then continue forward half a turn,
4. etc.

The third paragraph in **Passage 3** tells you to make sure to use lubrication; however, there is no instruction on the steps or technique for this. Although the passage doesn't say when or how to lubricate, it does tell you the consequences if you skip these steps or do them incorrectly. *If you do not know how to perform this step, you have to search for and find the "how to" information.*

You may not need to tap a thread at this stage. You do need to know how to accurately read and follow a sequence of information and identify when you need more, 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: apply pressure evenly to each end of the tap wrench, don't try to force it into alignment or it may break, start the tap carefully and gently, and keep it well lubricated. 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 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 1 indicates the first step, number 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 carefully read through 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 a tap went out of alignment. To answer the question, 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: 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.

And so it goes. Before you can start the job, you must prepare.

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 repair on a water heater that someone else has started. You have to know how to find the place in the instructions and to continue the steps. You have to find out:

- Where do you start?
- What are you expected to do?
- What's already been done?

Go to the instructions; look them over carefully. Check that you understand what you have to do. Find the last step that was completed, and pick it up from there. When the sequence is clear, you can begin following the information at any point.

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's 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 one 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.

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 metal is required for a project.

PART III

SEQUENCE IN DIAGRAMS

In technical manuals and texts, many passages are accompanied by a diagram. 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 4 and Figure 1 below are taken from instructions on 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.

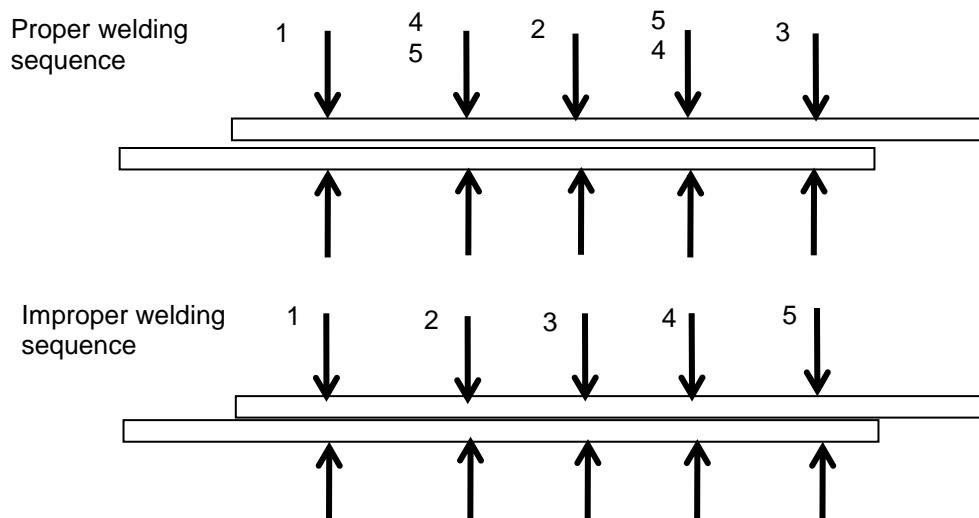


Figure 1: Proper And Improper Welding Sequence

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 to 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 covers information on 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.

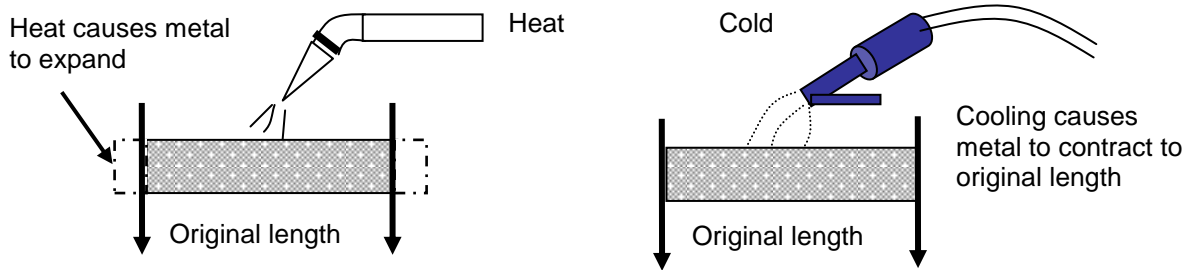


Figure 2: Expansion and contraction of metal when it is heated and then cooled

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.

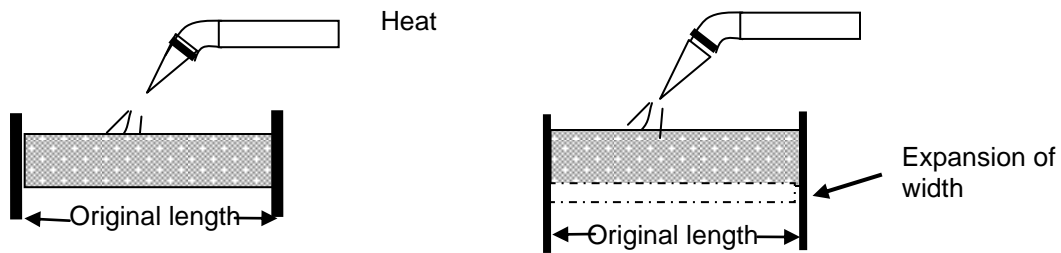


Figure 3A: Restricted metal cannot expand in length when heated

Figure 3B: Restricted metal expands in width when heated

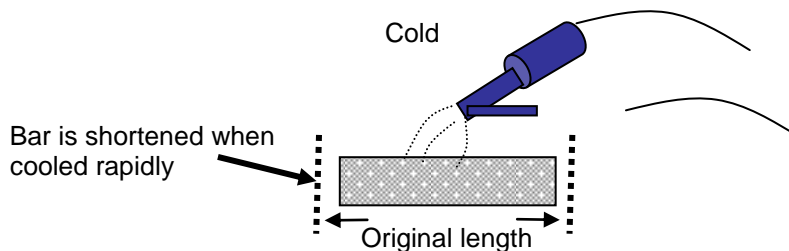


Figure 3C: When metal is cooled rapidly, it contracts

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, and
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

Sequencing 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** such as **why** steel expands and shrinks and can show you **how** this applies to your trade.
7. **Evaluate steps when necessary to make the right choice.** The result of the finished product depends on carrying out each step at the right time.
8. **Follow steps accurately** to ensure error-free and safe work habits.

Answers

Part II Passage 3, Tapping the Threads

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. The chips will fall away once you turn the tap forward for half a turn.

F The cutting turns create the chips. The turn backwards breaks off the chips formed by the cutting process.

4. Lubrication is required once the tap has been started.

F You must answer false for this question because the passage only tells you that frequent lubrication is required. To find out when, you would have to do more research.

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.