EVALUATING
ACADEMIC READINESS
FOR APPRENTICESHIP TRAINING

Revised for

ACCESS TO APPRENTICESHIP

COMMUNICATIONS SKILLS
COMPARISON OF INFORMATION

AN ACADEMIC SKILLS MANUAL
for
The Construction Trades (Structures)

This trade group includes the following trades:
Drywall & Acoustical Applicator, General Carpenter,
Mason (Brick & Stone and Restoration), Reinforcing Rod Worker, Roofer,
Terrazzo, Tile & Marble Mechanic

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
COMPARISON OF INFORMATION

An academic skill required for the study of the Construction Trades (Structures)

INTRODUCTION

Every day on the job, you make comparisons. You compare size when you pick a 2x6 instead of a 2x4. You compare techniques when you decide to use screws instead of nails to secure a piece of plywood. You compare long-term costs when you install a steel roof because it is more durable than asphalt shingles.

*When you make a **comparison**, you examine two or more things to find out how they are similar and how they are different.* While comparison examines both similarities and differences, contrast only looks at differences. Once you have made your comparison or contrast of the different options available, you are in a position to evaluate what is the best choice for a given situation.

In the construction trades, you compare products and equipment for a variety of reasons: to decide which one is more durable, which is safer or which will work better in a specific situation. You learn to compare techniques and procedures through your reading, from listening to teachers, supervisors and skilled tradespeople, and through your experience on the job.

In this skills manual, we will look at the following aspects of comparison:

- How comparison works
- Words that compares and contrasts
- Using text and graphics to compare
- Making choices

PART I
HOW COMPARISON WORKS

From general to specific

Most comparisons start with general information about a topic. This general information is your base. The topic could be anything from framing techniques to power tools. From this foundation, you move to more specific topics such as methods of connecting the floor plate to the foundation or uses of a table saw.

As you read about a topic such as floor framing, you begin with explanations, definitions or descriptions that apply to the large body of information about this technique. This gives you an overview of the topic.

From this foundation, you learn more specific information such as types of beams. As you learn the characteristics of each type, you see what different beams have in common and how they differ

Moving from the general to specific information leads you to make useful comparisons. The more detailed information about a topic gives a comparison of features, operation procedures, conditions or costs of each item in the group. You can then compare the advantages and disadvantages of each. You are now in a good position to choose the best method or product for a specific job.

Passage 1 shows this typical pattern. It gives general information about starting to frame a floor and goes on to providing details about wooden and steel girders.

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

Passage 1
Floor Framing
Work can begin on floor framing when the foundation is complete and the concrete has set properly. Most builders have the area outside the walls backfilled to rough-grade levels so access to the building is easier and lumber can be delivered and stacked.

Girders (beams): Joists rest on top of foundation walls to support the floor frame. Additional support is provided by *girders* (beams) which rest on foundation walls, posts or columns. Girders may be solid timbers, built-up lumber or steel beams. The size of girders depends on the load. The span of a girder can be shortened to allow an increase in the load. After girder load is calculated, select the proper size as directed by local codes. Wood beams vary according to depth, width, species and grade.

Steel beams: In some localities, steel beams are used instead of wood. The size of steel beams depends on the load. Calculate this in the same way as for wood girders. Use the applicable table and code after you determine the size. Wide-flange (W) steel beams are usually used in residential construction. Steel beams vary in depth, width of flange and weight.

Questions:

1.According to Passage 1, you could increase the load, if you:

a) use wide-flange steel girders
b) use built-up lumber
c) shorten the span of girder
d) use a combination of girders

2.Steel beams or built-up lumber could be used as a substitute for solid timbers.

T **F**

3.Wood beams vary according to the following:

a) depth, width and weight
b) width of flange, weight and depth
c) depth, width, species and grade

4.You use a different method to calculate the size of the load for different types of beams (steel and wood).

T **F**

When you read Passage 1, it doesn't say anywhere that types of beams will be compared, but this is what is happening. We will look at Passage 1 in more detail to see how the comparison is organized.

> Work can begin on floor framing when the foundation is complete and the concrete has set properly. Most builders have the area outside the walls backfilled to rough-grade levels so access to the building is easier and lumber can be delivered and stacked.

In paragraph one, you learn:

- when work can begin on floor framing
- jobs to do before starting to frame

This information is a starting point, or base, from which to work. It will be true in most situations. For specific comparisons, you have to read on.

The next paragraphs give you details about each rotary machine types of girder. You discover:

- that steel beams are used in some localities instead of wood, although the passage doesn't say why,
- that wood beams vary in depth, width, species and grade, while steel varies in depth, width of flange and weight,
- that the size of steel and wood beams depends on load,
- types of girders – solid timbers, built-up lumber and steel beams.

In Passage 1, you discover why you would use one type of beam instead of another. You learn that different girders have different uses because of their different features. For this reason, each is suitable or recommended for different situations.

When you learn information about construction materials such as girders, you get knowledge that enables you to make useful comparisons. You could explain to someone else what to expect if you substituted one beam for another. Comparing results can also show why an inappropriate choice for a given load could produce an unsuitable outcome, such as a too weak support.

As you learn about one thing, in this case, floor framing, be prepared for information about the features and use of other framing techniques. Use this information to think about similarities and differences in framing jobs. Consider making your own list of advantages and disadvantages of different techniques so you have a handy reference.

Classification

An important method of comparison is *classification*. ***Classification*** *is a method of grouping things according to their similarities*. Classifying materials, tools and techniques is a good way of keeping things organized. It also helps you see how things are related and how they differ.

Read Passage 2 below to see how this works.

Passage 2
Simple Machines

A *machine* is a device that makes work easier by changing the speed, direction or amount of force. A *simple machine* magnifies the effects of an applied force.

Levers
Levers are the simplest of basic machines. The point where the lever pivots is the *fulcrum* of the lever. There are three classes of levers:

Class 1: These levers have a fulcrum between the resistance force and the effort. Crowbars, bolt-cutters, jacks, pliers and scissors are all examples of Class 1 levers.

Class 2: The resistance in these levers is between the fulcrum and the effort. If you lift an object by one end, it is a Class 2 lever. Wheelbarrows are an example.

Class 3: The effort in these levers is applied between the fulcrum and the resistance. The effort arm is shorter than the resistance arm, and the effort is always greater than the resistant force. If you use your hand and arm to carry something, this is an example of a Class 3 lever. Cranes, backhoes and hammers are also examples.

Passage 2 sets up comparison in a series of steps. Paragraph one starts with general information.

1. It introduces the large classification, *machines*, and defines what a machine is.
2. It then describes a more specific classification: *simple machines*.

Then the passage focuses specifically on one type of simple machine – levers.

- You already know what a *simple* machine is or does. You can apply these facts to levers.
- You learn the definition of a lever.
- You also learn there are three classes of levers.

Next, you get a definition for each of the three classes of levers.

- You can compare each of the three types of levers as to:
    - fulcrum points,
    - the relationship between resistance and effort, and
    - how it operates.
- You are also given examples of each class of lever.

By the end of Passage 2 you know how the different classes of levers are similar and how they different. You also know how each type is used.

This description moves you gradually to a more detailed understanding. It is organized so that you build your knowledge gradually. *Comparison through classification* leads you to recognize the ways that something is similar to and different from others in its category. You can then use this information to generalize about how each will function in the workplace.

Tables, Charts and Lists

Tables, charts and lists are used to organize and compare information. The information is easy to use for comparisons because it is already organized into categories. You will find tables in manuals, texts and on-line.

Tables cover a wide variety of material from metric and imperial measurement to categories of fasteners and sizes of lumber. You can use tables or lists to organize and compare information such as characteristics of wood or care of tools.

For learning and studying purposes, you can convert information from a text into table. After organizing material into a table, you can quickly recognize differences and similarities between products or techniques. You can also add row or columns to your table as you learn more about the topic.

Table 1 below compares the recommended handling and protection of masonry materials for cold weather construction. Read the headings and any footnotes shown below.

Look at how Table 1 is organized and what it compares. Answer the questions that follow. Answers are at the end of this skills manual.

Table 1 **Cold Weather Construction**

If Air Temperature is below:	How to Handle Materials	How to Protect Placed Masonry
40°F	Heat mixing water. Keep mortar temperatures at 40°F to 120°F	Cover walls and masonry to protect from moisture and freezing. Use canvas or plastic.
32°F	As above, but also: Heat sand to thaw frozen clumps. Heat wet masonry units to thaw ice.	Make windbreak for workers when wind speed above 15 mph. Cover walls and materials overnight to protect against wetness and freezing. Keep masonry temperature above 32°F. Use heaters or insulated blankets for 16 hours after placing of units.
20°F	As above, but also: Heat dry masonry units to 20°F.	Enclose structure and heat the enclosure to keep temperature above 32°F for 24 hours after placing masonry units.

Note: Recommendations of the Portland Cement Association for the temperatures listed. Concrete needs temperatures of 50°F to 70°F when it is placed. When temperatures fall lower than 40°F and blocks are being placed, the materials require some shelter and heat on the site.

Answer the questions that follow. Answers are at the end of this skills manual.

1. At what temperatures would you heat the mixing water?

   a) below 40°F and 32°F
   b) below 32°F and 20°F
   c) below 40°F and 20°F
   d) all of the above

2.Which instruction is correct for construction at temperatures below 32 F, but **not** below 20 F?

a) heat sand to thaw frozen clumps; heat dry masonry
b) heat sand to thaw frozen clumps; keep masonry above 32°F for 16 hours after placing of units
c) cover walls and masonry; enclose structure and heat.

3.Handling and protection would be the same for temperatures below 40 F and below 20 F.

T F

4.At temperatures below 20 F, you would use all the steps listed under **Handling Materials**.

T F

5.When placing blocks at 35°F, you require heat and shelter on the site.

T F

Know your purpose
If your purpose is to select the correct procedure to use when handling masonry at different temperatures, you can look across the rows and headings in Table 1 to compare methods. Someone has tested and compared these methods under a variety of different conditions and then listed the information. *The table is a comparison in brief,* so you can quickly find information.

Comparisons presented in a table do some of the work for you when you are selecting the most suitable tools, materials and processes. Look carefully to compare characteristics, details and applications. This will enable you to make the best choice.

Build from the base up
Comparison comes in a variety of forms – some obvious and some not so obvious. However, the purpose remains the same: *to give you a base of knowledge and then to show you similarities and differences.*

PART II
WORDS THAT COMPARE AND CONTRAST

In Part II, we look at some of the words and phrases that you can use to recognize when something is being compared or contrasted. Remember, c***omparison*** means both similarities and differences while c***ontrast*** means differences only.

If someone says to you, "I drive the same car as you do," you immediately know a lot about their car. You take what you know about your own car and apply that information to their car.
To compare them thoroughly though, you have to ask some questions. You might compare this type of detail:

- make, model and year,
- engine size,
- colour and condition,
- number of kilometres,

Direct Comparison

Words and phrases that compare and contrast

Some words and phrases immediately signal that a comparison or a contrast is to be made. When a comparison is signaled in this way it is called a ***direct comparison*.**

Words such as *same, like,* and *all* tell you that two things are similar.

Examples:

If sheet materials are on the floor, use the *same* technique for lifting them as for long lumber.

Both types of beam must be supported properly either on posts or stud walls that incorporate a heavy top plate.

Like woodcutting saws, hacksaw blades have a set.

All hard blades are heat treated all over. This makes them very brittle and easily broken if misused.

Some comparisons show similarities and then point out differences using words such as *some, many, most, different* and *unlike*. For example, if *some* snips cut heavier gauge metals, it means that *some others* will not.

Examples:

Composite panel *closely resembles* plywood. The *difference* is in the middle ply whose core is made or oriented wood fibres.

Plywood comes in different types and grades. *In addition*, hardwood plywood is made with different core constructions.

Use the *same* process for putting out these fires**,** provided the extinguishing material is electrically non-conductive.

The next example uses the word *relative* to compare different items.

Example:

Iron is ***relatively*** more active than copper.

Also watch for these general comparison words:

less ...than	The dressed size is ***less than*** the nominal size as a result of planing.
more ...than	ICF buildings provide ***more*** R factor ***than*** standard frame construction.
least	Veneer cores are the ***least*** expensive.
as. . . as	Particle board is not ***as*** *heavy* ***as*** hardboard.
er ending	While heavier metal is drilled, the ***lighte****r* sheet metal is usually punched.
and est	That is the ***strongest*** adhesive we have.

Words and phrases such as *while, except, unless, on the other hand, whereas, instead of, however* set up comparison while pointing out contrasting features, uses, design or applications.

Example:
Similar layout procedures are used for valley jack rafters; ***however***, it's best to start layout at the building line.

While spacing of 24" OC is common, other designs may require different spacing.

Some comparison/ contrast words and phrases restrict you, or tell you not to do something. Words like: *only as stated*: *exclusively*, *excluded*, and *only*, tell you when something is allowed or permitted.

Examples:
Use precision measuring tools ***only*** for the uses and in the manner described.

Some metals are ***excluded*** for this use because of corrosion.

Indirect Comparison
Sometimes, a comparison is not obvious.

Example:
Experienced installers know the advantages of tools of high quality purchased from reputable manufacturers. Most do the following:

- offer lifetime guarantees against failure,
- are made from quality materials,
- hold up under use.

Although no comparison is stated here, turn the information around to discover indirect comparison. The information indirectly implies that the *opposite* is true about poor quality tools. Although you might later find other opinions, you could conclude that many poor quality tools:

- **do not** offer lifetime guarantees against failure.
- are **not** made from quality materials,
- **do not** hold up under use,
- **do not** enable installers to do better work.

Watch for information that is not directly stated. You may have to pull out the details.

Example:
The disadvantage of open-end wrenches is that they only grip two faces of the nut. This rounds off the nuts and may cause injury to hands.

Use comparison and contrast to gather information. If open-end wrenches have these disadvantages, another *more suitable* tool may be available. To avoid the above problems, select the proper tool.

Math language
In math, the concepts of *proportion*, *ratio*, *decimals* and *percentages* are forms of comparison. Each of these terms is used to compare one amount or measurement to another. They are

fundamental to mixing products, determining slope or finding safe bearing weights. They are also used to compare quality, strength of materials and costs.

Example:
The run of a valley cripple jack is equal to two times the distance from the centerline.

Material A costs 10% more than Material B,

PART III
TEXT AND GRAPHICS

Comparisons using Text and Graphics

Text and graphics often work together to compare different aspects of a relationship. The text explains and gives examples while graphics list items or illustrate specific parts or procedures. When you use both sources of information, they work together to provide you with complete data on which to then base your comparison.

Read Passage 3 and Table 2 below to compare the relative activities of metals. **Use the text and the table to answer the questions that follow**. **Answers are at the end of this skills manual.**

Passage 3
Galvanic Corrosion

When two dissimilar metals are in contact with each other, *galvanic corrosion* occurs. The metal that is more chemically active will corrode. See Table 2. For example, zinc will corrode, cover, and thus protect, steel.

TABLE 2: Relative Activity of Metal

Magnesium	**Most Active**
Aluminum	▲
Zinc	
Chromium	
Iron	
Cadmium	
Cobalt	
Nickel	
Tin	
Lead	▼
Copper	**Least Active**

With other metals, galvanic corrosion can cause problems. For example, the coatings on galvanized steel and tin plate are corrosion resistant. If the seams of these metals were welded, the welding process would burn off the protective coating. This would result in a product that fails. For

wood-shingled roofs, only rust resistant nails are recommended. Hot-dipped, zinc-coated nails with the strength of steel and corrosion resistance of zinc are recommended.

Questions:

1.According to Passage 3 and Table 2, aluminum is more chemically active than nickel.

T F

2.If iron and nickel are in contact with each other, the nickel will corrode.

T F

3.Galvanic corrosion may cause problems even when dissimilar metals are in the *least chemically active* range.

T F

4.Complete the sentence with one of the following. Zinc-coated nails:

a) are the best choice for general carpentry.
b) offer corrosion resistance and strength.
c) are recommended for roofing.

Text and graphics work together

When information is complex, using both text and graphics to compare and contrast helps you *get the whole picture.* Text and graphics - diagrams, tables, charts, illustrations, photos- work together to describe and illustrate what you need to know in order to make good choices in the workplace.

PART IV
MAKING CHOICES

To follow steps correctly, to double-check work or to understand a problem, you are constantly making comparisons. Think about how this works. To follow instructions, you have to compare what you are reading in a manual to what you are actually doing. Comparing what is shown in the text to the results in front of you will help you decide if you are on the right track

The list below suggests questions you might ask when you are making a decision:

- What features do these products or methods have in common?
- How do they differ?
- Is one better in certain situations than the others? Why?
- How do costs compare?
- Which is the better choice for my situation? Why?

Passage 4 compares and contrasts features of two types of wrench. **Answer the questions that follow. The answers are at the end of this skills manual.**

Passage 4
Wrenches

Box-end wrenches have a closed end for better holding power. The jaws fit completely around a bolt or nut and grip each point on the fastener. The box-end wrench is thus the safest. More force can be applied without slipping and causing damage to the bolt or nut head.

The 6-point wrench is the strongest because it completely surrounds the hex nut and brings force to bear on all six sides and points. The 12-point wrench also grips the six points but does not bear on the face surfaces of a hex nut; this means there is a greater potential for slippage. The advantage of a 12-point wrench is that the wrench can grab the nut in twelve different positions. In confined spaces, the additional engagement points increase the possible turning radius. The handle of a box-end wrench is often offset 10 to 60 degrees to reach down into an area without the handle hitting the part.

Questions:

1. The box-end wrench is described as the safest type. According to Passage 6, why is this true?

    a) The wrench does not bear on the face surfaces of a hex nut.
    b) The handle is least likely to hit a part and cause damage.
    c) It is least likely to slip and cause damage to the bolt or nut head.

2. In confined spaces, the 6-point wrench will give an increase in turning radius.

    T **F**

3. Both the 12-point and 6-point wrench have equal grip on a bolt or nut.

    T **F**

4. Which wrench would you choose for greatest strength?

    a) either 6 or 12-point
    b) 6-point
    c) 12-point

A final point about how comparisons work.

When you start with good basic knowledge about something, you can understand and evaluate the details that follow. You will be ready for each new idea as it is presented. When you know how a tool or fitting works, you can understand why it is designed the way it is. This foundation will also help you decide which tool or fitting to choose.

Once you know how to select a girder, you are on your way to learning to frame. Textbooks, manuals and supervisors assume you understand basic information as you move through the course. If you are missing basic information, then you may find you can't make effective comparisons as new ideas are presented. *Make sure your basics are sound before going on*.

And remember, a change in a routine or a product might affect the outcome. For example, you might always get 80% or more on tests. If you change the number of hours you study, or skip breakfast, your results may be different. If you compare such cause and effects over a period of time, you learn something about the relationship between behavior and outcome. This can lead you to think about how you make choices in your learning and your job.

CONCLUSION

Information in your texts is set up so you can create a base of knowledge. From your base, you can compare and contrast the different materials, tools, procedures and methods that you have learned.

When reading technical material, look for words that compare and contrast. They can alert you to comparisons. This enables you to make sound choices as to what is most suitable for each situation

Charts and table provide easy ways to compare and contrast because the information is organized into categories

Principles and measurements may not change but tools, applications, materials, equipment, conditions and seasons do. To adapt to change, compare the old with newer information. This will enable you to keep up to date in the metal trade and have happy employers and clients.

Summary

1. **Understand how comparisons work**:
    - from the large topic to an item by item comparison,
    - through classification, and
    - through tables and charts

2. **Build from a solid base**. If you do not understand something – stop and get help before going on.

3. **Look for patterns and language that compare and contrast**. Watch for tables and passages that compare without telling you (indirect comparison).

4. **Use text (written) and diagrams together** to compare information. Use all details available to you.

5. **Remember, change in one area results in change to another area.** Compare details to make the right adjustments to adapt to the change.

6. **Compare what you read with what you do.**

Answer page

PART I **Passage 1, Floor Framing,**

1. According to Passage 1, you could increase the load, if you do the following:
c) shorten the span of girder

According to this passage, you can increase the load on a girder if you shorten the span. There is no indication that a wider flange or built-up lumber will support heavier loads.

2. Steel beams or built-up lumber could be used as a substitute for solid timbers.

T The passage states that some localities use steel beams instead of wood. The passage does **not** suggest this is a matter of code requirements, so it is probably safe to answer True. The information is incomplete, you may want to find the reasons for the different choices.

3. Wood beams vary according to the following:
c) depth, width, species and grade

The last sentence clearly lists the ways in which wood beams can vary.

4. You must use a different method to calculate the size of the load for different types of beams (steel and wood).

F After the heading, **Steel beams**, you see this: *The size of steel beams depends on the load. Calculate this in the same way as for wood girders*. Note that, although the method is the same for the different types, you are told to use the *applicable table and code*. These are **not** the same.

PART I **Table 1, Cold Weather Construction,**

1. At what temperatures would you heat the mixing water?
d) all of the above

The question asks you to compare instructions in the second column. You heat the mixing water for each temperature listed. The instructions for temperatures below 32°F and below 20°F say, "As above, but also ... " which means you must include all of the steps in the categories above.

2. Which is correct for construction at temperatures below 32 F but **not** below 20 F?
b) heat sand to thaw frozen clumps; keep masonry above 32°F for 16 hours after placing units

To answer this question you must compare information given for two different temperatures, 20°F and 32°F.

3.Handling and protection would be the same for temperatures below 40 F and below 20 F.

F Compare the second and third columns for **Air Temperature below** 40°F and **below** 20°F. At temperatures below 40°F, you do not need to enclose the structure and heat it.

4.At temperatures below 20 F, you would use all the steps listed under **Handling Materials**.

T The first instruction under **handling Materials** for 20°F is "As above.." and adds one more step. In this case you must refer to the instructions for 40° and for 32° as well as the specific instruction for 20°.

5. When placing blocks at 35°F, you would require heat and shelter on the site.

T The information is found in the **Note** at the bottom of the chart. The question reminds you to read all available details.

PART III Passage 3, Galvanic Corrosion Table 2, Relative Activity of Metal

1. According to Passage 3 and Table 2, aluminum is more chemically active than nickel.

T Find each metal on Table 2 and compare its position to the others. The metals at the top are in the most active range.

2. If iron and nickel are in contact with each other, the nickel will corrode.
F The metal which is more chemically active will corrode. The more active metal in the table is iron. The nickel, therefore, would not corrode.

3. Galvanic corrosion may cause problems even when dissimilar metals are in the *least chemically active* area.

T If dissimilar metals are in contact, galvanic corrosion can occur and this can lead to problems. The passage does not explain the specific problems to expect.

4. Complete the sentence with one of the following. Zinc-coated nails:
b) offer corrosion resistance and strength.

Passage 5 states that zinc-coated nails are recommended for use on wood shingles. It offers two reasons: they offer *the corrosion resistance of zinc and the strength of steel.*

PART IV Passage 4, Wrenches

1.The box-end wrench is described as the safest type of wrench. According to Passage 4, why is this true?
c) It is least likely to slip and cause damage to the bolt or nut head.

2.In confined spaces, the 6-point wrench will give an increase in turning radius.

F It is stated that a 12-point wrench increases the possible turning radius. The passage doesn't tell us about the turning radius of a 6-point wrench.

3.Both the 12-point and 6-point wrench have equal grip on a bolt or nut.

F Paragraph two describes different types of grip and advantages of a 12- and 6-point wrench; however, they do not have equal grip. Because the 12-point does not bear on the face surfaces of a hex nut, it is more likely to slip.

4.Which wrench would you choose for greatest strength?
b) 6-point. This is found in paragraph 2.