EVALUATING
ACADEMIC READINESS
FOR APPRENTICESHIP TRAINING

Revised for

ACCESS TO APPRENTICESHIP

COMMUNICATIONS SKILLS
DRAWING CONCLUSIONS

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
Ontario Ministry of Training, Colleges and Universities

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
DRAWING CONCLUSIONS

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

INTRODUCTION

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

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

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

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

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

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

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

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

.

PART I
SELECTING INFORMATION FOR VALID CONCLUSIONS

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

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

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

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

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

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

Understanding Relationships

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

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

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

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

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

Passage 2 describes subflooring materials and installation. **Read Passage 2 and answer the questions that follow. Answers are at the end of this skill manual.**

Passage 2
Subflooring

Subflooring is the last stage of the floor frame. Sub-floors give rigidity to the structure, provide a base for the finished flooring material, and provide a surface to lay out and construct additional framing. Materials can be plywood, shiplap, tongue-and-groove or common boards.

Plywood of 1/2"or 5/8" is a smooth, even base that adds strength to the structure. It installs quickly and usually results in squeak-free floors. The long dimension of the plywood should be placed at right-angles to the joists. Joints (where the plywood butt ends meet) should be staggered so joints are not in a straight line, thus creating weakened areas in the sub-floor. Many builders prefer 5/8" plywood. Follow recommended nailing practices.

Sub-floor panels can also be glued to the joists. All nailing must be completed before the glue sets. For 2 x 8 joists and 5/8" plywood, stiffness is increased about 25%, floors are squeak-free, nails do not pop and labour costs are reduced with glued floors.

It is possible to combine sub-floor/underlayment into one system so floor finishes such as tile or carpet can be applied directly. Special tongue and groove plywood panel provides the structural qualities and an adequate base. Maximum support for sub-floor panels is stamped on each panel. Install as directed by the manufacturer.

Questions:

1. Which type of subflooring will ensure a squeak-free floor?

   a) ½" plywood panels using recommended nailing practices
   b) 5/8" plywood using glued/nailed system
   c) combined sub-floor/underlayment panels installed according to manufacturers' directions

2. Which result would you expect if you place plywood panels so the end joints are **not** staggered but line up across the floor?

   a) squeaky floors
   b) weakened areas
   c) slight sags at joints
   d) all of the above

3. If you place the shorter length of plywood at right angles to joists instead of the long dimension, it will **not** affect the strength of the floor.

   T F

4. If you use 5/8" plywood, you can conclude that the floor will have an even base, rigidity or give added strength to the structure.

   T F

Passage 2 describes factors related to materials and installation. You rely on your knowledge about types of material, how they perform and how they should be installed to make decisions about material choices and installation techniques.

Although it is not stated, you can conclude from the passage that if you lay the panels in the wrong direction, the result will not be acceptable. In areas where the length of the subflooring is not supported by a joist, there will be a reduction in the strength and rigidity of the floor. The result will be a weakening of the structure.

You need to pay careful attention to details because a small change can make a big difference. The way you place the subflooring might not seem like an important detail but it makes a big difference to the strength of the floor. If a floor is squeaky or sagging, the information in the passage above could help you determine the cause.

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

PART II
DRAWING VALID CONCLUSIONS

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

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

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

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

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

Read **Passage 3** below. Consider the conclusions you might draw from the information given. **Answer the questions which follow. Answers are at the end of this skills manual.**

Passage 3
Cutting Floor Joists

It is important to understand how stress affects flooring joists before you make holes or cut notches in joists to install plumbing.

When the top of a joist is in compression and the bottom is in tension, there is a point where the stresses change from one to the other. At this point, there is neither tension nor compression. In a rectangular joist, you can assume that this point is midway between the top and bottom. This is an accurate assumption though other factors such as variations in lumber quality may shift the point a bit. Because neither compression nor tension is at the centre, a hole will have little effect on the strength. This is true provided that the hole is no larger than one-quarter the total depth of the joist.

If weight is at the centre of a span, it will produce the greatest bend. Therefore, any weakness is more likely to reduce the strength of a joist or beam if it is near the centre of the span. With this in mind, follow these precautions in cutting joists:

1. When possible, do not cut holes at or close to the centre. If limited to one-quarter of the total depth, no material reduction in strength will result.

2. Where necessary to cut joists, make the cuts from the top. For example, if a 2 x 8 inch joist is cut to a depth of 4 inches, its strength will be reduced to that of a 2 x 4. When a joist is cut, compensate for the

loss in strength by providing headers and trimmers or by adding extra joists. To solve the problem when large plumbing pipes are inserted in joists, fit a block of wood into the cut-out notch above the pipe to take the compression strain.

3. If the cut is made somewhere other than at the centre, the weakening effect will not be as great. Even so, provide as much compensating strength as is lost by the cut.

Questions:

1. If you discover a sag in a joist, what might be a possible cause?

   a) A cut in the joist was made from the bottom towards the top.
   b) The weight of a bathtub is too great for the span.
   c) There is a large hole cut near the centre of the span.
   d) All of the above.

2. A cut can be made to any depth (although not completely through) in a joist provided that a block of wood is set into the cut to restore the strength.

   T F

3. If you observe the correct precautions in cutting floor joists, which of the following is true?

   a) You can prevent weight pressing at the centre of the span.
   b) The result will be a strengthened joist even when placing large plumbing pipes.
   c) You can avoid the problem of weakened joists.

4. A 2 x 8 inch joist cut from the top to a depth of 4 inches has its strength reduced to that of a 2 x 4. If the cut from the top is to a depth of 2 inches, how will its strength be affected?

   a) It will be reduced to that of 2 x 6.
   b) It will not be changed a significant amount.
   c) It will remain the same.

Details Make a Difference

Suppose you have cut holes and notches in the joists where the plumbing is to run. You think you have followed the instructions above but you still find a weak area in the joist which you can't explain. If there is still a problem, you need to examine other possibilities to find the cause.

- Did you measure accurately?
- Are your tools in good shape?
- Did you get all the information?

If you didn't read carefully enough and concluded you knew what to do before you had all the instructions, you may have jumped to the wrong conclusion about some part of the process. The second paragraph of the passages said that a hole cut near the centre of a joist will not have much effect on the strength. If you cut a large notch near the centre of the span, thinking you were following instructions, the joist will start to sag. Something is wrong.

When you reread the instruction, you realize that cutting a notch is different than cutting a hole. Also, you realize that cutting a hole close to the centre of the board is alright but you shouldn't cut a hole close to the centre of the *span*. A slight difference in wording can make a big difference in how a technique works.

If you start a job before carefully considering all the details, you risk jumping to a conclusion that is not valid for that situation. Check to make sure you have the complete picture.

A balancing act

> **Example:** You are asked to do a renovation that includes a south facing room with lots of windows. The homeowners want as much solar radiation as possible to come in during the winter to heat the room. They also want the windows to be as energy efficient as possible to keep the heat from escaping to the outside at night and when the sun isn't shining.
>
> You have heard that triple glazed, low-E, argon-filled windows are the best. But in talking to the manufacturer, you find out that each layer of glazing and the low-E film significantly lowers the amount of solar radiation that comes through the window.
>
> You have a challenging situation. Factors that satisfy the requirement of lots of solar radiation coming through the windows limit their energy efficiency. You have all the details about the type of windows you are considering, but, there is no choice that answers all the requirements. You have to balance the different features when concluding which windows to order.
>
> In this case, with the homeowners' input, you might decide to go with:
> - double glazed, argon-filled windows for the south side
> - triple glazed, low-E, argon-filled windows for the rest of the house.
>
> This is a reasonable choice that should work acceptably.

Sometimes reaching a reasonable conclusion involves making compromises. You still need all the details presented in your information but in these situations, there is no clear, best choice. You use the available information to weigh all the factors and go with the solution that fills more of requirements than any of the other solutions.

Sometimes the information you have doesn't lead you to a conclusion as to the specific technique you should use. Instead, it helps you predict what is likely to happen as a result of an action. In this case, your conclusion will assist you in figuring out what factors will influence your ability to get the result you want.

Passage 4 describes factors that contribute to pressure on formwork. The information in the passage will enable you to make valid conclusions as to how to pour a foundation without creating too much pressure on the framework.

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

Passage 4
Formwork

Fresh concrete exerts pressure on formwork similar to that of liquids. However, concrete starts to set as soon as it is poured. The maximum pressure on formwork can be reduced if the pour rate is slow since the concrete at the bottom will set before the concrete at the top is poured. Otherwise, the forms must be able to withstand the pressure of the full liquid loads if they are filled to the top immediately. Liquid concrete exerts a minimum pressure of 150 pounds/foot^2 times the height.

Factors such as temperature, slump, vibration and admixtures also determine how long concrete remains liquid. For example, concrete sets much more quickly in hot weather than in cold weather. As a result, the same form filled at the same rate may be subjected to greater pressure in winter than in summer.

Concrete pumping may cause additional pressure as well as vibration on forms. The action of the pump sends surges of pressure through the piping system that may be transmitted directly to the forms, especially for narrow walls or columns. Vibration may move the forms or loosen the bracing, ties or spreaders.

Questions:

1. If you pour concrete at a rate that is too quick for it to set at the bottom, what can you conclude is a possible outcome?

   a) The concrete will exert less pressure on the formwork
   b) the bracing might come loose
   c) the concrete will develop cracks.

2. If the action of the pump is vigorous and you want to make sure the maximum pressure on formwork is not exceeded, you can conclude:

   a) the pour rate should be decreased
   b) the temperature should be lowered where the concrete is being poured
   c) that the walls of the framework should be widened

3. The rate at which the concrete sets and the rate at which it is poured are related.

   T F

When you understand the relationships between all the factors, you can predict outcomes and draw conclusions about how to proceed. If you understand the effects of temperature, pouring rate and pump vibration on the framework, you can consider these factors when designing the forms.

Because you know the likely influence of each factor, you can draw logical conclusions and make sound decisions about the job.

- You can design a strong but economical framework that you predict will stand up to the pressure of the poured concrete.
- Or you can change the pouring factors to fit the forms you already have.
- If you are building the foundation in the cool fall, you can specify a slower pour rate to ease the pressure on the forms.

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

Often when you draw a conclusion, you need more testing or examples to be sure it is valid. If an outcome happens once during project, you can't be sure it will always happen that way. More examples are required before you can use that outcome to make future predictions. You would like to know if that particular conclusion is valid in all situations, if it will happen the same way next time.

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

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

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

Expect the unexpected
Sometimes you need to reach a conclusion quickly, perhaps about a product choice. You don't have time to check all the possible results of using the different products. There a few things you can do:

- You can ask other workers what they would choose.
- You can also rely on manufacturers' literature. The information will often tell you what to expect.
- If the company is reliable, you can count on them testing their product and backing them up with a guarantee. Choosing a reliable product increases your odds of getting a satisfactory result.
- But even when you follow the manufacturers' instructions, you should be prepared for occasional, unexpected outcomes.

Example: You install south-facing windows that, on the outside, are metal clad over a wood frame. The literature that comes with the windows says the metal cladding will last the life of the window. It doesn't restrict where you install the windows. But a few cold winters with dramatic changes in temperature between day and night on the south side of the house causes the glue holding the metal on the wood to come loose.

The outcome was unfortunate but unforeseen. You hope the manufacturer will honour its guarantee. If they replace the windows or the metal cladding with a better system, you can predict that they will be good suppliers to deal with in the future. If they are a good company, you can expect them to change the way they apply the metal cladding to the wood.

As you gain experience, it will become second nature to predict outcomes and to draw valid conclusions. Your judgment will become more reliable and your decision making process will result in successfully completed projects.
When you understand a process and the relationship between different components, you can proceed with confidence. You can make ***predictions*** about possible results or outcomes related to your work.

However, if an aspect of the job changes, the results might vary. You might get a result you don't want. Frequently warnings and cautions are included for this reason. Manufacturers provide labels and written instructions to remind you to check look for factors that might cause an unexpected result.

Read Passage 5 and consider what you should do if you received this notice.

Passage 5
Important Safety Notice

A potential problem has been identified on the Brand X and Brand Y circuit breakers. In some circumstances these breakers may not trip; in other cases, the breakers will continue to protect anticipated overloads and short circuits. Under all circumstances, the circuit power can be turned off by moving the circuit breaker handle to the OFF position. If **ANY** of your circuit breakers are the same as those listed above, then please call toll-free **1-555-123-1234**.

From Passage 5, you learn that in some circumstances, the breakers identified will fail to trip and therefore won't protect the system in case of overloads and short circuits. In other circumstances, the breakers are still working and will continue to provide protection. You can't identify which breakers will fail to trip and which are still working. There is too much variation in a product that has to be reliable. An overload or short circuit can cause a fire in the wiring.

In this potentially dangerous situation, you realize that you can't rely on the circuit breaker because its performance can vary. It isn't safe to wait until you can observe whether your breakers are working or not because it would be too late by then. In this case, a call to the toll-free number is the appropriate action to take.

Process of Elimination
The examples in this skills manual illustrate how to use the processes of reasoning and observation to come to a logical conclusion. But if you already have a problem, you may need turn the process of predicting around and *look backwards.* To find the cause of the problem, you use a process of elimination.

If your order sheet shows that you ordered slate tiles and the truck delivered cartons containing porcelain tiles, you know that the supplier made a mistake. You can eliminate the possibility that you ordered the wrong item.

> **Example:** You install a countertop and you notice that it is higher than it should be. You have to check and eliminate possible reasons.
> - Maybe the height of the cupboard is incorrect.
> - Maybe the depth of the countertop is incorrect.
> - You check the different possibilities, eliminate the ones that are correctly done, and are left with the cause of the problem.

There is always the chance that there are other factors that are unusual or hidden from view. In this case, you may need to find someone who is more knowledgeable to help. On your own, you are unlikely to reach a valid conclusion about what is causing the problem.

PART III
RECOGNIZING CONCLUSIONS

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

The language of conclusion

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

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

> **Example:** You noticed that the pumping mechanism that poured cement into a form was vibrating heavily. You now notice that the bracing is loose. You draw the conclusion that the bracing *must have* loosened because of all the vibration. The conclusion is based on what you know about pouring cement and what you observed on the site.

> **Example:** You might say something like this: "The bend in this joist *can't be* from a lumber defect because I checked this out; *therefore, it has to be* from the wrong type of cut or because the cut is too deep." Then you check the two possibilities to see which one is the cause of the problem. Using the language of drawing conclusions helps you become aware of the steps in reaching a likely cause.

The examples below indicate the steps in a logical reasoning process. The words *if, so that, due to, because of* or *since*, set up the situation or condition. The conclusion follows:

Examples:
If the material vibrates too much or shifts during cutting, the saw can run out of control. This can result in damage to the blade and injury to the operator.

Due to clean air regulations, some solvents are no longer used.

Since concrete and masonry materials are not always uniform in consistency or hardness, they may chip when the fastener strikes a spot harder than the rest.

Because the measurement was wrong, the cut board is too short.

Words such as *will then, consequently, therefore, must, as a result* or *thus* complete the conclusion.

Examples:
The sabre saw cuts on the upstroke; *therefore* splintering will occur on the top side of the material being cut. *For this reason*, the good side should face down.

The magnetic field passes more easily through soft iron than through air; *consequently*, the field tends to concentrate in this area.

If a tool uses more air pressure, *it will then* cause the air compressor to wear out faster.

The tool *must be held* at right angles to the base of the material. It will *thus* avoid a ricochet.

Another method of drawing conclusions is by turning information around. For example:

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

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

Although you can turn some information around, be careful not to jump to conclusions on too little information. There may be inexpensive tools available that are a good deal and that work well. Drawing a useful prediction about tools in this situation can take research by talking to others and reading guides that compare tools.

CONCLUSION

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

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

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

Summary

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

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

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

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

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

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

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

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

Answer page

PART I Passage 2, Subflooring

1. Which type of subflooring will ensure a squeak-free floor?

   b) 5/8" plywood using glued/nailed system. For each type of subflooring, you are directed to follow the correct nailing, gluing or installation method. Only one type, Answer b), states the floors will be squeak-free. Answer a) states floors are *usually* squeak-free and Answer c) doesn't mention this feature.

2. Which result would you expect if you placed plywood panels so the end joints are **not** staggered but line up across the floor.

   b) weakened areas. Passage 2 says that staggered joints avoid weakening areas, so Answer b) is correct. Answer d), all of the above, might also be considered a correct answer. If areas are weakened, they might sag; if areas sag, the result may be squeaks in the floor.

3. If you place the shorter length of plywood at right angles to joists instead of the long dimension, it will **not** affect the strength of the floor

   F False is the safe conclusion here. The passage tells you what direction to place the plywood and doesn't mention any exceptions. Unless you are told otherwise, you can conclude that placing the panel with a long unsupported span will affect the strength of the structure.

4. If you use 5/8" plywood, you can conclude that the floor will have an even base, rigidity or give added strength to the structure.

   T Passage 2 states that *many builders prefer 5/8" plywood.* A 5/8" plywood subfloor should be will be even, rigid and strong.

PART II Passage 3, Cutting Floor Joists

1. If you discover a sag in a joist, what might you look at as a possible cause?

   d) All of the above. There may be more than one factor causing the bend. You will have to look closely to find the cause of the bend.

2. A cut can be made to any depth (although not completely through) in a joist provided that a block of wood is set into the cut to restore the strength.

   F You can conclude from paragraph 4, that a cut greater than 1/4 of the total depth will cause "material reduction in strength."

3. If you observe the correct precautions in cutting floor joists, which of the following is true?

   c) You can avoid the problem of weakened joists. By observing correct cutting and compensation for cuts, you can avoid cuts which will cause weakened joints.

4. A 2 x 8 inch joist which is cut from the top to a depth of 4 inches has its strength reduced to that of a 2 x 4. If the cut from the top is to a depth of 2 inches, how will its strength be affected?

   a) it will be reduced to that of a 2 x 6.You can conclude that if a 4 in cut reduces the strength to that of a board 4 inches smaller, a 2 inch cut will reduce the strength to that of a board 2 inches smaller.

Part III **Passage 4, Formwork**

1. If you pour concrete at a rate that is too quick for it to set at the bottom, what conclusion can you come to as to what might happen?

   The answer is b), the bracing might come loose. This is predicted in the last sentence of the passage. Answer a) is wrong because the pressure will actually increase.

2. If the action of the pump is vigorous and you want to make sure the maximum pressure on formwork is not exceeded, you can conclude:

   The answer is a) the pour rate should be decreased

3. The rate at which the concrete sets and the rate at which it is poured are related.

   T