WMC/CFB

Wood Manufacturing Council/Conseil des fabricants de bois

THINKING SKILLS
Essential Skills Assessment Tool

Questions and Answers

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Canada

Thinking Skills

Problem Solving

Problem solving involves problems that require solutions. For example, a mechanic solves problems by eliminating probable causes until the correct one is identified and remedied, e.g. the car shakes when driven over 80 km/hr. Most problems concern mechanical challenges, people or situations.

There are **four levels** of complexity based on **four dimensions** of problem solving:

- the complexity of the problem;
- the complexity of identifying the problem;
- the complexity of identifying the solution steps; and
- the complexity of assessing the solution.

Dimension	Level 1	Level 2	Level 3	Level 4
Complexity of the problem	Limited number of factors.	Broad range of factors, most of which are clearly defined.	Broad range of factors, some of which may be vague or ambiguous.	Unpredictable and contradictory factors play a role.
Complexity of identifying the problem	All appropriate information is provided to solver.	Procedures are provided for determining the nature of the problem.	Solver must determine what procedures are to be used to identify the nature of the problem.	Solver must create procedures to identify the nature of the problem.
Complexity of identifying the solution steps	Procedures are given for matching a solution to the problem, once it has been identified.	Solver has to determine which of several available solutions are most appropriate.	May have to modify existing procedures for solving the problems to meet new needs.	Solver must create procedures for solving the problem.
Complexity of assessing the solution	Check that problem has been solved.	Assess efficiency and effectiveness of solution that was used.	Assess efficiency and effectiveness of solution that was used and identify changes needed.	Solver must identify or create criteria for assessing effectiveness of the solution.

Decision Making

Decision making refers to making a choice among options. It occurs during problem solving, but not all decision making is part of problem solving. It is, therefore, presented as a separate thinking skill. For example, buyers for retail outlets regularly make decisions about which suppliers to buy from, i.e., they select among the options for particular types of merchandise. This is not problem solving.

There are **four levels** of complexity based on **six dimensions** of decision making:

- the consequence of error;
- the reversibility of the decision;
- the adequacy of the information available;
- whether there is a set procedure or decision tree to follow;
- whether there is a body of similar, past decisions to compare to; and
- the extent to which judgement is required to make an appropriate decision.

Dimension	Level 1	Level 2	Level 3	Level 4
Consequence of error	Little or no consequence of error.	Errors have some minor consequence, e.g., some loss of money or time, but can be rectified with some minor work plan, inconvenience or cost.	Errors have significant consequences, e.g., significant loss of money or time, but can be rectified.	Errors have significant consequences that are not rectifiable or are only rectifiable at significant cost.
Reversibility of the decision	Decision easily reversed.	Decision can be reversed with some inconvenience or difficulty; decision is reversible but options are reduced.	Decision can be reversed with significant difficulty.	Decision cannot be reversed, or it can be reversed only with major (legal, financial, health) consequences.
Adequacy of the information available	All information relevant to the decision is known.	Most information relevant to the decision is known.	Information about significant elements relevant to the decision is uncertain.	Significant information relevant to the decision is not known.
Whether there is a set procedure or decision tree to follow	There is a set procedure or decision tree to follow, any bases for exceptions are clearly specified.	There is a set procedure or decision tree to follow but there are also grounds for exception that require some discretion or interpretation.	There is a set procedure but it provides significant scope for discretion or interpretation.	There is no set procedure or decision tree.
Whether there is a body of similar, past decisions to compare to	There are similar past decisions that are directly applicable and that are available to the decision maker.	There are similar past decisions but some extrapolation or analysis is required to apply them to the present decision.	There are past decisions but they provide limited guidance only due to their small number or their limited comparability to the present decision.	No comparable past decisions on which to base the present decision
The extent to which judgement is required to make an appropriate decision	Limited or no judgement needed to make an appropriate decision.	Need to consider several well- defined factors to make an appropriate decision in cases where the consequence of error is low. May involve using technical knowledge.	Need to consider many factors in order to make an appropriate decision. These factors may be less well defined and the consequence of error may be higher than at Level 2.	Significant judgement required in making an appropriate decision.

1. A cabinetmaker is delivering a piece to a customer. When the customer checks the piece she informs the cabinetmaker that the wrong veneer species was used to manufacture the product.

   What action should be taken by the cabinetmaker once the customer has been reassured that the issue will be investigated promptly?

   A. Return the customer's money immediately ☐

   B. Verify on the purchase order that the wood type matches the piece ☐

   C. Send the piece back to the shop to be modified ☐

   D. Inform the customer that she must take the piece as is ☐

Item Number:	1
Skill:	Thinking Skills (Decision Making)
Complexity Level:	1
Skill Component Addressed:	Minor consequence of error; consider several well-defined factors to make decision

1.

A. Return the customer's money immediately ☐

B. Verify on the purchase order that the wood type matches the piece ☒

C. Send the piece back to the shop to be modified ☐

D. Inform the customer that she must take the piece as is ☐

Rationale:

A is incorrect. The cabinetmaker should examine alternative options to resolve the customer's issues before refunding the customer and losing the sale.

B is **correct**. The cabinetmaker should always first check with the purchase order to make sure that there is indeed a problem with the piece's wood type before re-making the piece and before deciding on a course of action.

C is incorrect. The cabinetmaker should ensure that there is indeed an issue with the wood type before asking the shop to re-make the piece. Building a new piece will be needlessly costly if there was no discrepancy between the purchase order and the piece.

D is incorrect. This option is good customer service practice. The cabinetmaker should verify if there is indeed a problem to address the customer's concerns and provide adequate explanation and solution to the client to ensure customer satisfaction.

2. An assembler has been asked to assemble a cabinet drawer. He is unable to slide a side panel into the tongue and groove joint due to strong resistance.

   What should the assembler do first to correct the problem?

   A. Attempt to enlarge the groove using the tools available ☐

   B. Force the two pieces together ☐

   C. Throw the piece out and make a new one ☐

   D. Consult the technical drawing to check the measurements ☐

Item Number:	2
Skill:	Thinking Skills (Problem Solving)
Complexity Level:	1
Skill Component Addressed:	Limited number of factors; low complexity of solution effectiveness assessment

2.

A. Attempt to enlarge the groove using the tools available ☐

B. Force the two pieces together using a rubber mallet ☐

C. Throw the piece out and make a new one ☐

D. Consult the technical drawing to check the measurements ☒

Rationale:

A is incorrect. The assembler should first check the technical drawing to examine whether the tongue or the groove are problematic before making arbitrary corrections that could affect the design of the cabinet drawer.

B is incorrect. Forcing the two pieces could damage the drawer by cracking or splintering the wood.

C is incorrect. As replacing parts are costly, the assembler should examine alternate courses of action and see if the problem can be resolved before throwing the piece out.

D is **correct**. The assembler should always first refer to the technical drawing to determine what the problem is before attempting to resolve it to maintain the integrity of the piece and its design.

3. A window assembler must glue two pieces of wood together. The appropriate amount of glue should be applied to ensure that the two pieces stick together properly and the finishing process is not compromised.

   How should the window assembler apply the glue?

   A. Apply according to the glue manufacturer's instructions ☐

   B. Use less glue than required by the instructions to avoid spillage ☐

   C. Utilize more glue than needed wiping off the excess ☐

   D. Use a combination of glues to optimize hardening ☐

Item Number:	3
Skill:	Thinking Skills (Decision Making)
Complexity Level:	1
Skill Component Addressed:	Limited judgement; all relevant information is known

3.

A. Apply according to the glue manufacturer's instructions ☒

B. Use less glue than required by the instructions to avoid spillage ☐

C. Utilize more glue than needed wiping off the excess ☐

D. Use a combination of glues to optimize hardening ☐

Rationale:

A is **correct**. The window assembler should always refer to the manufacturer's instructions to optimize the quantity of glue used and hardening time and avoid waste. In order for the glue manufacturer warranty to apply, the specified quantity has to be used.

B is incorrect. If the window assembler does not use enough glue, it may affect the quality of the joint and the pieces may not stick together.

C is incorrect. If the window assembler uses an excess of glue, the glue may prevent the finish from being properly applied on the wood surface. An excess of glue is also wasteful.

D is incorrect. If the window assembler combines types of glue that may not be appropriate for wood, it will affect the joining process. Combining glues can also change their chemical properties and affect the hardening time and quality of the glue.

4. A cabinetmaker is installing a recessed door. The space between the cabinet frame and the recessed door seems very wide.

   What is the first thing that should be done by the cabinetmaker?

   A. Check with the technical drawing ☐

   B. Continue with the installation ☐

   C. Modify the opening to reduce the gap ☐

   D. Modify the door to enlarge it ☐

Item Number:	4
Skill:	Thinking Skills (Problem Solving)
Complexity Level:	1
Skill Component Addressed:	Limited number of factors; all information provided

4.

A. Check with the technical drawing ☒

B. Continue with the installation ☐

C. Modify the opening to reduce the gap ☐

D. Modify the door to enlarge it ☐

Rationale:

A is **correct**. The cabinetmaker should check with the technical drawing first to determine the cause of the problem before attempting to implement a solution.

B is incorrect. The cabinetmaker needs to resolve the issue first before proceeding with the rest of the installation in case the problem affects other parts of the piece.

C is incorrect. The cabinetmaker must following the technical drawing specifications and not modify the piece in a way that would affect the overall design. Adding wood to reduce the opening would affect the overall aspect of the piece.

D is incorrect. The cabinetmaker should first check with the technical drawing to determine the root cause of the problem before attempting to modify components of the piece.

5. A band saw operator cuts several identical pieces of wood for a custom project. She is using a wood jig to save time while ensuring the accuracy of her cuts. In order to maintain this speed and accuracy, the jig must be calibrated.

   How often should the band saw operator calibrate her jig to ensure that her pieces continue to stay within specifications?

   A. Before cutting each piece ☐

   B. At the end of her shift ☐

   C. At the start of her shift ☐

   D. Only at the initial installation of the jig ☐

Item Number:	5
Skill:	Thinking Skills (Decision Making)
Complexity Level:	1
Skill Component Addressed:	Decision easily reversed; limited judgement

5.

A. Before cutting each piece ☐

B. At the end of her shift ☐

C. At the start of her shift ☒

D. Only at the initial installation of the jig ☐

Rationale:

A is incorrect. There is no need to check the jig before each piece as it would be a waste of time and render the use of a jig mute.

B is incorrect. The jig should not need to be calibrated at the end of the shift.

C is **correct**. There is only need to calibrate the jig at the beginning of her shift. This maximises efficiency while ensuring the calibration of the jig.

D is incorrect. The wood jig is susceptible to de-calibration after multiple use and will need to be checked when the band saw operator starts her shift.

6. A supervisor gives an assembler 10 minutes to assemble a wooden piece requiring glue. The assembler knows that 10 minutes is not enough time for the glue to harden properly.

   What is the best thing to do in this situation?

   A. Change glue type ☐

   B. Dilute the glue ☐

   C. Speak with supervisor to clarify the glue specifications ☐

   D. Read the instructions from the glue manufacturer ☐

Item Number:	6
Skill:	Thinking Skills (Problem Solving)
Complexity Level:	1
Skill Component Addressed:	Limited number of factors; all information is known

6.

A. Change glue type ☐

B. Dilute the glue ☐

C. Speak with supervisor to clarify the glue specifications ☒

D. Read the instructions from the glue manufacturer ☐

Rationale:

A is incorrect. To ensure that the glue is fully effective, it is important to use the appropriate glue for the material being glued. Using glue meant for a different type of material will not be effective.

B is incorrect. If the chemical composition of the glue is diluted, this will change its properties and will affect both the drying time and the glue's effectiveness.

C is **correct**. The assembler's first concern should be the quality of the assembly. If there is not sufficient time to properly join pieces, the assembler should speak with his supervisor inform him of the situation and find an alternate solution.

D is incorrect. The assembler already knows that 10 minutes is not enough time for pieces to glue together.

7. An operator notices that a monitor on a computerized machine is starting to blur. Safety procedures indicate that an operator should notify a supervisor when a machine is not working correctly or needs to be repaired. The supervisor is presently busy speaking with another worker on the line.

What action should the operator take?

A. Call a technician to fix the machine ☐

B. Wait until the supervisor becomes available ☐

C. Continue using the machine ☐

D. Notify the supervisor immediately ☐

Item Number:	7
Skill:	Thinking Skills (Decision Making)
Complexity Level:	1
Skill Component Addressed:	Little or no consequence of error, all relevant information is known

7.

A. Call a technician to fix the machine ☐

B. Wait until the supervisor becomes available ☐

C. Continue using the machine ☐

D. Notify the supervisor immediately ☒

Rationale:

A is incorrect. Calling the technician is typically not the responsibility of an operator and would cost the company for the service call. A supervisor would be required to approve the use of a service technician.

B is incorrect. As the question has stated, the monitor was beginning to blur. This could result in injuries or further issues developing if the employee does not speak to the supervisor immediately.

C is incorrect. The question states that safety concerns should be addressed immediately. Ignoring the blur could cause personal injury, damage to the machine or errors in construction.

D is **correct**. The issue could result in safety incidents and the supervisor should be contacted immediately.

8. A cabinetmaker is assembling a kitchen cabinet. The space required around the drawer is 1.5mm. However, after measuring the space, there is a 2.5mm gap around the drawer.

   Which of the following would be the first step to take in this situation?

   A. Discard the pieces of the drawer ☐

   B. Consult with the supervisor to find a solution ☐

   C. Verify that all pieces of the cabinet fit specifications ☐

   D. Affix extra wood to make the drawer larger ☐

Item Number:	8
Skill:	Thinking Skills (Problem Solving)
Complexity Level:	1
Skill Component Addressed:	

8.

A. Discard the pieces of the drawer ☐

B. Consult with the supervisor to find a solution ☐

C. Verify that all pieces of the cabinet fit specifications ☒

D. Affix extra wood to make the drawer larger ☐

Rationale:

A is incorrect. The cabinetmaker needs to establish whether the issue is with the drawer or the cabinet opening before choosing to discard the drawer.

B is incorrect. The cabinetmaker has the knowledge to determine the source of the problem and should first attempt to fix the problem with solutions available to him before consulting a Supervisor.

C is **correct**. The first step is to check the part specifications to determine the nature of the problem.

D is incorrect. Affixing extra pieces of wood may change the design of the piece. The cabinetmaker should first check that all pieces fit the specifications.

9. An operator notices that one of her coworkers is not wearing safety glasses which are required when working on his machine.

What should be the first action that the operator takes?

A. Record the safety violation in a log ☐

B. Notify the coworker's supervisor ☐

C. Disregard the safety violation since it does not affect others ☐

D. Inform the coworker that he needs to wear safety glasses ☐

Item Number:	9
Skill:	Thinking Skills (Decision Making)
Complexity Level:	1

9.

A. Record the safety violation in a log ☐

B. Notify the coworker's supervisor ☐

C. Disregard the safety violation since it does not affect others ☐

D. Inform the coworker that he needs to wear safety glasses ☒

Rationale:

A is incorrect. This will not result in an immediate solution to the issue.

B is incorrect. This action may be taken after the coworker has been contacted him or herself. Consulting the supervisor could waste his or her time on a simple safety issue.

C is incorrect. Safety is the responsibility of everyone in the workplace. The worker could cause injury to his or herself or others.

D is **correct**. Safety is everyone's responsibility. Depending on the responsibilities given to each worker, other answers could apply but because of the lack of information this is the most correct action.

10. A crate assembler is preparing a piece and notices that she has left a slight tool mark on her crate.

What should the crate assembler do *first* before sending the piece to be stained?

A. Replace the dented piece of wood ☐

B. Lightly sand the area to remove the mark ☐

C. Send the crate back to an operator to replace the piece ☐

D. Leave the dent to be fixed by a finisher ☐

Item Number:	10
Skill:	Thinking Skills (Problem Solving)
Complexity Level:	1

10.

A. Replace the dented piece of wood ☐

B. Lightly sand the area to remove the mark ☒

C. Send the crate back to an operator to replace the piece ☐

D. Leave the dent to be fixed by a finisher ☐

Rationale:

A is incorrect. As the dent is small, the crate assembler should be able to fix the mark rather than replace the piece of wood.

B is **correct**. A light sanding will effectively remove the slight mark.

C is incorrect. The crate assembler can fix the dent by sanding. It is therefore needless to send it back to be replaced.

D is incorrect. The crate assembler should fix any marks prior to sending it to finishing.

11. A recently hired band saw operator is planning to change the type of wood stock he is using on a project from a soft wood to a hard wood.

What is the first thing the operator should do?

A. Read the equipment manual for safety procedures ☐

B. Notify the assembler of the change in wood stock ☐

C. Change the saw blade ☐

D. Use a different jig ☐

Item Number:	11
Skill:	Thinking Skills (Decision Making)
Complexity Level:	1

11.

A. Read the equipment manual for safety procedures ☒

B. Notify the assembler of the change in wood stock ☐

C. Change the saw blade ☐

D. Use a different jig ☐

Rationale:

A is **correct**. The operator should be familiar with the procedures of the machine before beginning work.

B is incorrect. The assembler will have little or no need for this information.

C is incorrect. The band saw operator may or may not have to change the blade but should first check the equipment safety manual.

D is incorrect. The type of jig is not affected by the type of wood used as the jig is used to ensure consistent cuts.

12. A cabinetmaker has assembled a cabinet. After the glue has dried he looks at his project and notices that the sap is leaking from the wood on one of the outfacing door panels.

What should be done by the cabinetmaker in that situation?

A. Send the unit to finishing as is ☐

B. Scrape off and wash the sap and send to finishing ☐

C. Disassemble the unit and replace the affected board ☐

D. Replace the entire door panel ☐

Item Number:	12
Skill:	Thinking Skills (Problem Solving)
Complexity Level:	1

12.

A. Send the unit to finishing as is ☐

B. Scrape off and wash the sap and send to finishing ☐

C. Disassemble the unit and replace the affected board ☐

D. Replace the entire door panel ☒

Rationale:

A is incorrect. This could result in a poor finish and wasted material.

B is incorrect. The sap is likely to continue to leak even if the material is scrapped off. The finish will also not be even.

C is incorrect. It is unlikely that the panel could be taken apart without damaging the materials and wasting time.

D is **correct**. Replacing only the door panel would be the most cost efficient way to remedy the problem.

13. A saw operator is cutting a piece of lumber. How often should the operator check the lumber for grain direction and flaws?

A. Only when marking the piece for milling ☐

B. Before making the first cut ☐

C. Throughout the cutting process ☐

D. After the piece has been cut ☐

Item Number:	13
Skill:	Thinking Skills (Decision Making)
Complexity Level:	1
Skill Component Addressed:	

13.

A. Only when marking the piece for milling ☐

B. Before making the first cut ☒

C. Throughout the cutting process ☐

D. After the piece has been cut ☐

Rationale:

A is incorrect. The piece may not be aligned properly for the cut even if the piece is marked for milling.

B is **correct**. To check the direction of the grain for the cuts required

C is incorrect. The process may be too quick to check

D is incorrect. The process is too late

14. A table assembler is dryfitting a piece when he realizes that he does not have enough clamps to secure the paneled table-top.

Which of the following actions should be taken by the assembler?

A. Press the glued top between heavy boxes ☐

B. Inform the team lead that more clamps are required ☐

C. Use strong tape to secure the glued panels on the top ☐

D. Apply glue and secure when clamps are available ☐

Item Number:	14
Skill:	Thinking Skills (Problem Solving)
Complexity Level:	1
Skill Component Addressed:	

14.

A. Press the glued top between heavy boxes ☐

B. Inform the team lead that more clamps are required ☒

C. Use strong tape to secure the glued panels ☐

D. Apply glue and secure when clamps are available ☐

Rationale:

A is incorrect. This process could be unsafe and may not result in even gluing.

B is **correct**. The team lead is able to find or purchase more clamps for the project.

C is incorrect. This process could damage the wood and may not result in even gluing.

D is incorrect. This may not result in a properly glued product.

15. A gluer is preparing a table top and receives the cut boards from an operator. She notices that the grain on one of the boards does not align.

What should the gluer do next?

A. Keep turning and flipping the boards to get alignment ☐

B. Ask the operator to cut another board for the top ☐

C. Go to the store room and find another matching board ☐

D. Leave the assembly and move on to the next piece ☐

Item Number:	15
Skill:	Thinking Skills (Decision Making)
Complexity Level:	1
Skill Component Addressed:	

15.

A. Keep turning and flipping the boards to get alignment ☒

B. Ask the operator to cut another board for the top ☐

C. Go to the store room and find another matching board ☐

D. Leave the assembly and move on to the next piece ☐

Rationale:

A is **correct**. Grain varies from piece to piece; flipping and turning may give a better match. Discarding wood with odd grain patterns will add unwanted cost and waste material.

B is incorrect. This would result in unneeded waste.

C is incorrect. This would result in unneeded waste.

D is incorrect. The piece needs to be completed to avoid wasted material.