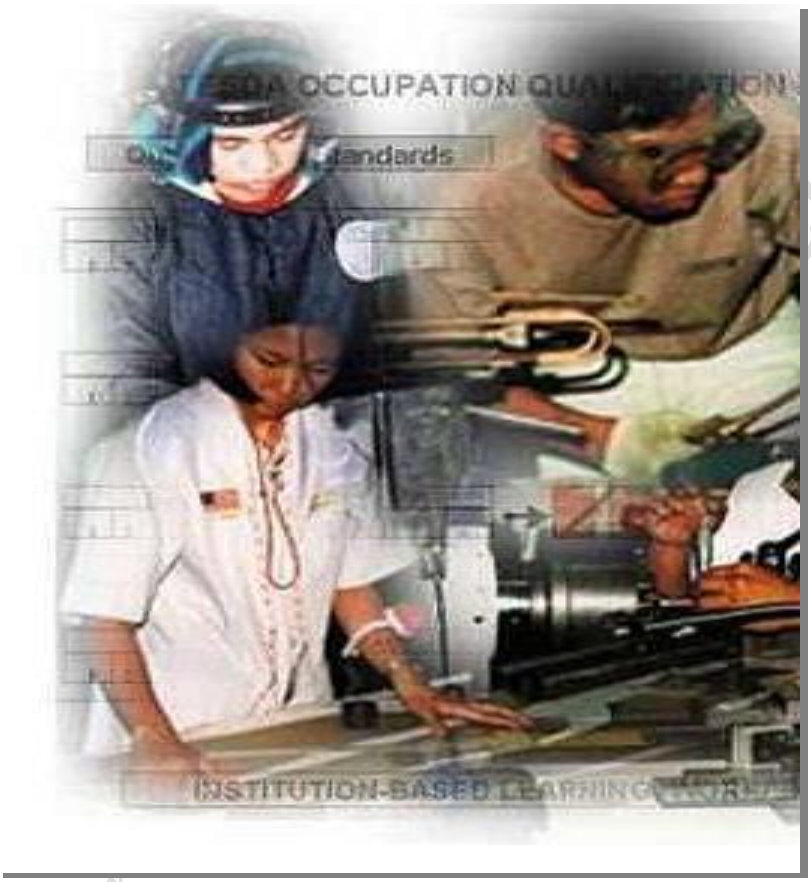
TECHNICAL EDUCATION AND SKILLS DEVELOPMENT AUTHORITY

BASIC COMPETENCIES



CRITICAL THINKING AND PROBLEM SOLVING

DEFINITIONS

BASIC COMPETENCIES

Refer to non-technical skills (knowledge, skills and attitudes) that everybody will need in order to perform satisfactorily at work and in society and are considered portable and transferable irrespective of jobs and industrial settings.

CRITICAL THINKING AND PROBLEM SOLVING

Competency which covers knowledge, skills and attitudes required when solving issues and concerns in the workplace; applying higher order thinking skills and metacognition.

NC I

UNIT OF COMPETENCY : SOLVE/ADDRESS ROUTINE PROBLEMS

UNIT CODE :

UNIT DESCRIPTOR : This unit of covers the knowledge, skills and attitudes required to solve problems in the workplace including the application of problem solving techniques and to determine and resolve the root cause of problems.

ELEMENTS	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Identify the problem	1.1 Changes from desired operating/output parameters and quality are identified 1.2 Extent, cause and nature of the problem by observation and investigation are defined 1.3 Problem are stated and specified clearly	1.1 Competence includes a thorough knowledge and understanding of the process, normal operating parameters, and product quality to recognize non-standard situations 1.2 Competence to include the ability to apply and explain, sufficient for the identification of fundamental cause, determining the corrective action and provision of recommendations 1.2.1 Relevant equipment and operational processes 1.2.2 Enterprise goals, targets and measures 1.2.3 Enterprise quality, OHS and environmental requirement 1.2.5 Enterprise information	1.1 Using range of formal problem solving techniques 1.2 Identifying and clarifying the nature of the problem

		systems and data collation 1.2.6 Industry codes and standards	

ELEMENTS	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
2. Determine fundamental causes of the problem	2.1 Problem-solving tool appropriate to the problem and the context is selected 2.2 Possible causes based on experience and the use of problem-solving tools/analytical techniques are identified 2.3 Possible cause statements are developed 2.4 Fundamental cause is determined	2.1 Competence includes a thorough knowledge and understanding of the process, normal operating parameters, and product quality to recognize non-standard situations 2.2 Competence to include the ability to apply and explain, sufficient for the identification of fundamental cause, determining the corrective action and provision of recommendations 2.2.1 Relevant equipment and operational processes 2.2.2 Enterprise goals, targets and measures 2.2.3 Enterprise quality, OHS and environmental requirement 2.2.4 Enterprise information systems and data collation 2.2.5 Industry codes and standards	2.1 Using range of formal problem solving techniques 2.2 Identifying and clarifying the nature of the problem
3. Determine corrective action	3.1 All possible options are considered for resolution of the	3.1 Competence includes a thorough	3.1 Using range of formal problem solving techniques

	problem 3.2 Strengths and weaknesses of possible options are considered 3.3 Corrective actions are determined to resolve the problem and possible future causes	knowledge and understanding of the process, normal operating parameters, and product quality to recognize non-standard situations	3.2 Identifying and clarifying the nature of the problem 3.3 Devising the best solution 3.4 Evaluating the solution 3.5 Implementation of a developed plan to rectify the problem

ELEMENTS	**PERFORMANCE CRITERIA** *Italicized terms* are elaborated in the Range of Variables	**REQUIRED KNOWLEDGE**	**REQUIRED SKILLS**
	3.4 ***Action plans*** are developed identifying measurable objectives, resource needs and timelines in accordance with safety and operating procedures 3.5 Recommendations for ongoing monitoring and testing are developed	3.2 Competence to include the ability to apply and explain, sufficient for the identification of fundamental cause, determining the corrective action and provision of recommendations 3.2.1 Relevant equipment and operational processes 3.2.2 Enterprise goals, targets and measures 3.2.3 Enterprise quality, OHS and environmental requirement 3.2.4 Principles of decision making strategies and techniques 3.2.5 Enterprise information systems and data collation 3.2.6 Industry codes and standards	
4. Communicate recommendation/s	4.1 Report on recommendations are prepared 4.2 Recommendations are presented to	4.1 Competence includes a thorough knowledge and understanding of	4.1 Using range of formal problem solving techniques 4.2 Identifying and clarifying the nature

	appropriate personnel. 4.3 Recommendations are followed-up, if required	the process, normal operating parameters, and product quality to recognize non-standard situations	of the problem 4.3 Devising the best solution 4.4 Evaluating the solution 4.5 Implementation of a developed plan to rectify the problem

ELEMENTS	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
		4.2 Competence to include the ability to apply and explain, sufficient for the identification of fundamental cause, determining the corrective action and provision of recommendations 4.2.1 Relevant equipment and operational processes 4.2.2 Enterprise goals, targets and measures 4.2.3 Enterprise quality, OHS and environmental requirement 4.2.4 Principles of decision making strategies and techniques 4.2.5 Enterprise information systems and data collation 4.2.6 Industry codes and standards	

RANGE OF VARIABLES

VARIABLES	RANGE
1. Analytical techniques	1.1. Brainstorming 1.2. Intuitions/Logic 1.3. Cause and effect diagrams 1.4. Pareto analysis 1.5. SWOT analysis 1.6. Gant chart, Pert CPM and graphs 1.7. Scattergrams
2. Problem	2.1. Non – routine process and quality problems 2.2. Equipment selection, availability and failure 2.3. Teamwork and work allocation problem 2.4. Safety and emergency situations and incidents
3. Action plans	3.1. Priority requirements 3.2. Measurable objectives 3.3. Resource requirements 3.4. Timelines 3.5. Co-ordination and feedback requirements 3.6. Safety requirements 3.7. Risk assessment 3.8. Environmental requirements

EVIDENCE GUIDE

1. Critical aspects of Competency	**Assessment requires evidence that the candidate:** 1.1. Identified the problem 1.2. Determined the fundamental causes of the problem 1.3. Determined the correct / preventive action 1.4. Provided recommendation to manager These aspects may be best assessed using a range of scenarios what ifs as a stimulus with a walk through forming part of the response. These assessment activities should include a range of problems, including new, unusual and improbable situations that may have happened.
2. Resource Implications	2.1. Assessment will require access to an operating plant over an extended period of time, or a suitable method of gathering evidence of operating ability over a range of situations..
3. Methods of Assessment	**Competency in this unit may be assessed through:** 3.1. Written Test 3.2. Interview The unit will be assessed in a holistic manner as is practical and may be integrated with the assessment of other relevant units of competency. Assessment will occur over a range of situations, which will include disruptions to normal, smooth operation. Simulation may be required to allow for timely assessment of parts of this unit of competency. Simulation should be based on the actual workplace and will include walk through of the relevant competency components.
4. Context for Assessment	4.1. In all workplace, it may be appropriate to assess this unit concurrently with relevant teamwork or operation units.

NC II

UNIT OF COMPETENCY : **SOLVE/ADDRESS GENERAL WORKPLACE PROBLEMS**

UNIT CODE :

UNIT DESCRIPTOR : This unit of covers the knowledge, skills and attitudes required to apply problem-solving techniques to determine the origin of a malfunction and plan for its resolution.

ELEMENTS	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
5. Identify routine problems	1.1 Identify routine problems or procedural problem areas 1.2 Define and determine problem to be investigated 1.3 Identify and document current conditions of the problem	• Current industry hardware and software products and services • Industry maintenance, service and helpdesk practices, processes and procedures • Industry standard diagnostic tools • Malfunctions and resolutions.	• Identifying current industry hardware and software products and services • Identifying current industry maintenance, services and helpdesk practices, processes and procedures. • Identifying current industry standard diagnostic tools • Describing common malfunctions and resolutions. • Determining the root cause of a routine malfunction

ELEMENTS	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
6. Look for solutions to routine problems	2.1 Identify potential solutions to problem 2.2 Develop, document, rank and present recommendations about possible solutions to ***appropriate person*** for decision	• Current industry hardware and software products and services • Industry service and helpdesk practices, processes and procedures • Operating systems • Industry standard diagnostic tools • Malfunctions and resolutions. • Root cause analysis	• Identifying current industry hardware and software products and services • Identifying services and helpdesk practices, processes and procedures. • Identifying operating system • Identifying current industry standard diagnostic tools • Describing common malfunctions and resolutions. • Determining the root cause of a routine malfunction
7. Recommend solutions to problems	3.1 Plan implementation of solutions 3.2 Plan evaluation of implemented solutions 3.3 ***Document*** recommended solution and submit to appropriate person for confirmation	• Standard procedures • Documentation produce	• Producing documentation that recommends solutions to problems • Following established procedures

RANGE OF VARIABLES

VARIABLES	RANGE
4. Appropriate person	May Include: 1.1 Supervisor or manager 1.2 Peers/work colleagues 1.3 Other members of the organization
5. Document	May include : 5.1. Electronic mail 5.2. Briefing notes 5.3. Written report
6. Plan	6.1. Priority requirements 6.2. Co-ordination and feedback requirements 6.3. Safety requirements 6.4. Risk assessment 6.5. Environmental requirements

EVIDENCE GUIDE

5. Critical aspects of Competency	**Assessment requires evidence that the candidate:** 1.1 determine the root cause of a routine malfunction 1.2 identify solutions 1.3 produce documentation that recommends solutions to problems 1.4 follow established procedures 1.5 refer unresolved problems to support persons.
6. Resource Implications	6.1. Assessment will require access to an operating plant over an extended period of time, or a suitable method of gathering evidence of operating ability over a range of situations..
7. Methods of Assessment	**Competency in this unit may be assessed through:** 3.1 Written Test 3.2 Interview The unit will be assessed in a holistic manner as is practical and may be integrated with the assessment of other relevant units of competency. Assessment will occur over a range of situations, which will include disruptions to normal, smooth operation. Simulation may be required to allow for timely assessment of parts of this unit of competency. Simulation should be based on the actual workplace and will include walk through of the relevant competency components.
8. Context for Assessment	8.1. In all workplace, it may be appropriate to assess this unit concurrently with relevant teamwork or operation units.

NC III

UNIT OF COMPETENCY : **APPLY CRITICAL THINKING AND PROBLEM SOLVING TECHNIQUES IN THE WORKPLACE**

UNIT CODE :

UNIT DESCRIPTOR : This unit of covers the knowledge, skills and attitudes required to solve problems in the workplace including the application of problem solving techniques and to determine and resolve the root cause of problems.

ELEMENTS	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
8. Identify the problem	1.1 Variances are identified from normal operating parameters; and product quality 1.2 Extent, cause and nature are of the problem are defined through observation, investigation and ***analytical techniques*** 1.3 ***Problems*** are clearly stated and specified	1.1 Competence includes a thorough knowledge and understanding of the process, normal operating parameters, and product quality to recognize non-standard situations 1.2 Competence to include the ability to apply and explain, sufficient for the identification of fundamental cause, determining the corrective action and provision of recommendations 1.2.1 Relevant equipment and operational processes 1.2.2 Enterprise goals, targets and	1.1 Using range of formal problem solving techniques 1.2 Identifying and clarifying the nature of the problem

		measures 1.2.3 Enterprise quality, OHS and environmental requirement 1.2.5 Enterprise information systems and data collation 1.2.6 Industry codes and standards	

ELEMENTS	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
9. Determine fundamental causes of the problem	2.1 Possible causes are identified based on experience and the use of problem solving tools **/** analytical techniques. 2.2 Possible cause statements are developed based on findings 2.3 Fundamental causes are identified per results of investigation conducted	2.1 Competence includes a thorough knowledge and understanding of the process, normal operating parameters, and product quality to recognize non-standard situations 2.2 Competence to include the ability to apply and explain, sufficient for the identification of fundamental cause, determining the corrective action and provision of recommendations 2.2.1 Relevant equipment and operational processes 2.2.2 Enterprise goals, targets and measures 2.2.3 Enterprise quality, OHS and environmental requirement 2.2.4 Enterprise information systems and data collation 2.2.6 Industry codes and standards	2.1 Using range of formal problem solving techniques 2.2 Identifying and clarifying the nature of the problem
10. Determine corrective	3.1 All possible options are considered for	3.1 Competence includes a	3.1 Using range of formal problem

action	resolution of the problem 3.2 Strengths and weaknesses of possible options are considered 3.3 Corrective actions are determined to resolve the problem and possible future causes	thorough knowledge and understanding of the process, normal operating parameters, and product quality to recognize non-standard situations	solving techniques 3.2 Identifying and clarifying the nature of the problem 3.3 Devising the best solution 3.4 Evaluating the solution 3.5 Implementation of a developed plan to rectify the problem

ELEMENTS	**PERFORMANCE CRITERIA** ***Italicized terms*** are elaborated in the Range of Variables	**REQUIRED KNOWLEDGE**	**REQUIRED SKILLS**
	3.4 ***Action plans*** are developed identifying measurable objectives, resource needs and timelines in accordance with safety and operating procedures	3.2 Competence to include the ability to apply and explain, sufficient for the identification of fundamental cause, determining the corrective action and provision of recommendations 3.2.1 Relevant equipment and operational processes 3.2.2 Enterprise goals, targets and measures 3.2.3 Enterprise quality, OHS and environmental requirement 3.2.4 Principles of decision making strategies and techniques 3.2.5 Enterprise information systems and data collation	

		3.2.6 Industry codes and standards	
11. Provide recommendation/s to manager	4.1 Report on recommendations are prepared 4.2 Recommendations are presented to appropriate personnel. 4.3 Recommendations are followed-up, if required	4.1 Competence includes a thorough knowledge and understanding of the process, normal operating parameters, and product quality to recognize non-standard situations	4.1 Using range of formal problem solving techniques 4.2 Identifying and clarifying the nature of the problem 4.3 Devising the best solution 4.4 Evaluating the solution 4.5 Implementation of a developed plan to rectify the problem

ELEMENTS	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
		4.2 Competence to include the ability to apply and explain, sufficient for the identification of fundamental cause, determining the corrective action and provision of recommendations 4.2.1 Relevant equipment and operational processes 4.2.2 Enterprise goals, targets and measures 4.2.3 Enterprise quality, OHS and environmental requirement 4.2.4 Principles of decision making strategies and techniques 4.2.5 Enterprise information systems and data collation 4.2.6 Industry codes and standards	

RANGE OF VARIABLES

VARIABLES	RANGE
7. Analytical techniques	7.1. Brainstorming 7.2. Intuitions/Logic 7.3. Cause and effect diagrams 7.4. Pareto analysis 7.5. SWOT analysis 7.6. Gant chart, Pert CPM and graphs 7.7. Scattergrams
8. Problem	8.1. Non – routine process and quality problems 8.2. Equipment selection, availability and failure 8.3. Teamwork and work allocation problem 8.4. Safety and emergency situations and incidents
9. Action plans	9.1. Priority requirements 9.2. Measurable objectives 9.3. Resource requirements 9.4. Timelines 9.5. Co-ordination and feedback requirements 9.6. Safety requirements 9.7. Risk assessment 9.8. Environmental requirements

EVIDENCE GUIDE

9. Critical aspects of Competency	**Assessment requires evidence that the candidate:** 9.1. Identified the problem 9.2. Determined the fundamental causes of the problem 9.3. Determined the correct / preventive action 9.4. Provided recommendation to manager These aspects may be best assessed using a range of scenarios / case studies / what ifs as a stimulus with a walk through forming part of the response. These assessment activities should include a range of problems, including new, unusual and improbable situations that may have happened.
10. Resource Implications	10.1. Assessment will require access to an operating plant over an extended period of time, or a suitable method of gathering evidence of operating ability over a range of situations. A bank of scenarios / case studies / what ifs will be required as well as bank of questions which will be used to probe the reason behind the observable action.
11. Methods of Assessment	**Competency in this unit may be assessed through:** 11.1. Case studies on solving problems in the workplace 11.2. Observation The unit will be assessed in a holistic manner as is practical and may be integrated with the assessment of other relevant units of competency. Assessment will occur over a range of situations, which will include disruptions to normal, smooth operation. Simulation may be required to allow for timely assessment of parts of this unit of competency. Simulation should be based on the actual workplace and will include walk through of the relevant competency components.
12. Context for Assessment	12.1. In all workplace, it may be appropriate to assess this unit concurrently with relevant teamwork or operation units.

NC IV

UNIT OF COMPETENCY : **DEVELOP HIGHER ORDER THINKING PROCESSES AND APPLY TECHNIQUES IN THE WORKPLACE**

UNIT CODE :

UNIT DESCRIPTOR : This unit of covers the knowledge, skills and attitudes required to use fundamental critical thinking skills.

ELEMENTS	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
12. Examine the value of curiosity and questioning	1.1 Appraise the ***value of curiosity and questioning*** in both work and life situations 1.2. Consider how ***different types of questions*** and styles of questioning apply in diverse situations	• different types of questions and their relevance to different situations • techniques to assist in forming the habit of asking questions and taking responsibility for answers • typical blockers to the critical thinking process • why questions are important and the benefits of asking good questions for individuals, businesses and communities (the importance of critical thinking).	• communication skills to actively listen and to ask questions of others in a constructive way • critical thinking and problem-solving skills to formulate and ask relevant questions, and come up with appropriate answers • comprehension skills to interpret and distil key information of relevance to a given situation.

ELEMENTS	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
13. Develop the habit of asking questions and wondering why	2.1 Reflect on and wonder about issues and situations 2.2. Ask ***questions of self*** to challenge and expand individual thinking 2.3. Ask ***questions of others*** in a constructive way to seek broader knowledge and understanding 2.4. Identify ***situations when too much wondering and questioning may be inappropriate or ineffective*** 2.5. Assess the best ways to structure questions for different situations	• different types of questions and their relevance to different situations • techniques to assist in forming the habit of asking questions and taking responsibility for answers • typical blockers to the critical thinking process • why questions are important and the benefits of asking good questions for individuals, businesses and communities (the importance of critical thinking).	• communication skills to actively listen and to ask questions of others in a constructive way • critical thinking and problem-solving skills to formulate and ask relevant questions, and come up with appropriate answers • comprehension skills to interpret and distil key information of relevance to a given situation.
14. Contribute to answers as well as questions	3.1 Take ***responsibility for answering questions*** as well as for asking them 3.2. From many possible questions, determine the ***key question to be answered*** 3.3. Identify and access ***information needed to answer the question*** 3.4. Sort the facts from ***other information*** in developing a response 3.5. Check own ***preconceptions and assumptions*** and determine their	• different types of questions and their relevance to different situations • techniques to assist in forming the habit of asking questions and taking responsibility for answers • typical blockers to the critical thinking process • why questions are important and the benefits of asking good questions for individuals, businesses and communities (the importance of critical	• communication skills to actively listen and to ask questions of others in a constructive way • critical thinking and problem-solving skills to formulate and ask relevant questions, and come up with appropriate answers • comprehension skills to interpret and distil key information of relevance to a given situation.

	validity 3.6. Reach a well-considered conclusion or answer, without ruling out more questions or further exploration 3.7. Use conclusions and answers in positive, practical and timely ways	thinking).	

RANGE OF VARIABLES

VARIABLES	RANGE
10. Value of curiosity and questioning	May include; 1.1 developing a more efficient way of doing something 1.2 developing a new idea 1.3 developing and improving products and services 1.4 enhancing skills and career opportunities 1.5 enhancing the physical environment 1.6 financial benefit 1.7 greater personal satisfaction 1.8 improving interpersonal relationships
2. Different types of questions	May include: 2.1 accuracy 2.2 breadth 2.3 clarity 2.4 depth 2.5 emotion 2.6 fairness 2.7 logic 2.8 meaning 2.9 precision 2.10 relevance 2.11 significance 2.12 social engagement 2.13 society 2.14 style

3. Questions of self	May include: 3.1 am I being distracted by irrelevant information? 3.2 are claims warranted? 3.3 are there any unstated assumptions? 3.4 could I do this differently or better? 3.5 do I have any ideas to share about this? 3.6 have I seen something that may have application here? 3.7 how can I do that? 3.8 how can I fix this? 3.9 how long will that take? 3.10 if they are doing that, could I? 3.11 is this a reliable source? 3.12 is this relevant to me? 3.13 was I fair? 3.14 what are the real facts of this situation?
4. Questions of others	may include: 4.1 do we have a budget? 4.2 how did you come up with that? 4.3 how do you feel about that? 4.4 how does that work? 4.5 what does it mean? 4.6 why do you want me to do it like that? 4.7 why do we do it like that? 4.8 why is it so?
5. Situations when too much wondering or questioning may be inappropriate or ineffective	may relate to: 5.1 contractual agreements 5.2 extreme time pressure or non-negotiable deadlines 5.3 financial limitations 5.4 procedures determined by laws or other regulations 5.5 safety issues 5.6 when others are totally closed to new ideas

6. Responsibility for answering questions	May involve: 6.1 acknowledging shared responsibility 6.2 adopting a positive 'can do' attitude 6.3 following up on practical details 6.4 pro-actively seeking information 6.5 suggesting a new approach 6.6 talking to others about possible answers
7. Key question to be answered	may be determined by: 7.1 constraints of the broader context and environment 7.2 overall goal - what needs to be achieved 7.3 personal hopes and expectations
8. Information needed to answer the question	May include: 8.1 accessed by observing people 8.2 already inside own head 8.3 in journals, books or other printed materials 8.4 in workplace documents 8.5 in a hardware store 8.6 on the internet 8.7 with colleagues 8.8 with friends or family
9. Other information	May include: 9.1 opinions 9.2 own assumptions or those of others 9.3 personal prejudice 9.4 spin or public relations
10. Preconceptions and assumptions	May relate to: 10.1 assumptions about the way others are thinking 10.2 established ways of doing things 10.3 existing ideas, products and services 10.4 risk aversion 10.5 self-imposed limitations on what is possible

EVIDENCE GUIDE

13. Critical aspects of Competency	**Assessment requires evidence that the candidate:** 1.1 application of a conscious process of questioning to achieve new understandings 1.2 knowledge and understanding of how critical thinking and questioning impacts on individual lives, the broader community and work situations.
14. Resource Implications	14.1. interactions with specific challenges and situations to demonstrate the application of critical thinking (this would usually involve interactions with others).
15. Methods of Assessment	**Competency in this unit may be assessed through:** 3.1 direct questioning combined with review of portfolios of evidence and third party workplace reports of on-the-job performance by the candidate 3.2 evaluation of a candidate blog exploring different ideas and questions 3.3 review of candidate response to scenarios that allow the candidate to apply critical thinking techniques to a particular life or work situation, and to demonstrate ability to portray curiosity and exploration of new concepts 3.4 evaluation of candidate response to the challenge of adopting different perspectives on a situation, and ability to both develop and respond to questions from those perspectives 3.5 observation of the candidate participating in a group problem-solving session 3.6 oral or written questioning to assess knowledge of typical blockers to the critical thinking process.
16. Context for Assessment	16.1. In all workplace, it may be appropriate to assess this unit concurrently with relevant teamwork or operation units.

NC V

UNIT OF COMPETENCY : EVALUATE HIGHER ORDER THINKING SKILLS AND ADJUSTS PROBLEM SOLVING TECHNIQUES

UNIT CODE :

UNIT DESCRIPTOR : This unit of covers the knowledge, skills and attitudes required to develop problem solving skills of individuals within an organization and as a consequence the problem solving capability of the organization as a whole. The unit does not supply the skills to undertake formal problem solving on individual problems.

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ELEMENTS	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Develop an appropriate organisational framework	1.1 Determine or review available problem finding strategies in the organization 1.2 Analyze the current selection and application of problem solving tools and gauge effectiveness 1.3 Determine preferred problem solving strategies for the organization 1.4 Determine or review the desired outcomes from use of selected problem solving strategies 1.5 Review organizational structure to facilitate improvement in problem solving 1.6 Develop a training strategy to improve	Competitive systems and practices principles Competitive systems and practices at both a strategic and tools level, including: ○ value stream mapping ○ 5S ○ Just in Time (JIT) ○ mistake proofing ○ process mapping ○ establishing customer pull ○ breakthrough improvement and continuous improvement (kaizen and kaizen blitz) ○ setting of key	Reviewing current operations and procedures to determine if problems are being identified as early as possible Reviewing current operations and procedures to determine if problems are being defined appropriately Identifying and quantifying desired outcome from improved problem solving capability, such as: ○ improved customer service and delivery ○ defect elimination ○ capacity improvement

	problem solving ability 1.7 Develop reporting framework and guidelines 1.8 Develop corrective action identification and tracking systems 1.9 Obtain support from relevant process/system owners for proposed changes	performance indicators (KPIs)/metrics ○ identification and elimination of waste (muda) ○ six sigma and lean six sigma A range of problem solving methodologies, including: ○ cross-functional problem solving team ○ cross-functional nominal group (virtual team) ○ consulting and or brainstorming with members from outside the organization on some basis ○ input from other members of the value stream ○ the use of known/proprietary problem solving approaches or some synthesis of methods ○ own or commissioned research either in whole or in part Organization strategy and vision, value stream and value as defined by the organization's customers Corrective action tracking methods	○ cost reduction ○ safety improvement ○ improved complaint resolution Establishing appropriate reporting arrangements for formal problem solving, including: ○ appropriate metrics (e.g. incident frequency and incident consequences) ○ trigger criteria for conducting problem solving activity ○ problem definition and quantification ○ cause and effect diagrams (or similar) Solutions identified reviewing organisational structure, value stream and customer alignment in order to set performance indicators for organisation problem solving capability

ELEMENTS	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
2. Improve problem solving ability	2.1 Implement training strategy 2.2 Ensure problem solving occurs using groups or teams 2.3 Provide resources to ensure problem solving occurs 2.4 Confirm with teams and groups that training and resources deliver capability to solve complex problems 2.5 Monitor problem solving to determine if improvement in developing problem solving solutions is achieved 2.6 Provide resources to ensure solutions are implemented 2.7 Ensure reporting and corrective action tracking occurs	Competitive systems and practices principles Competitive systems and practices at both a strategic and tools level, including: ○ value stream mapping ○ 5S ○ Just in Time (JIT) ○ mistake proofing ○ process mapping ○ establishing customer pull ○ breakthrough improvement and continuous improvement (kaizen and kaizen blitz) ○ setting of key performance indicators (KPIs)/metrics ○ identification and elimination	Reviewing current operations and procedures to determine if problems are being identified as early as possible Reviewing current operations and procedures to determine if problems are being defined appropriately Identifying and quantifying desired outcome from improved problem solving capability, such as: ○ improved customer service and delivery ○ defect elimination ○ capacity improvement ○ cost reduction ○ safety improvement ○ improved complaint resolution Establishing appropriate

		of waste (muda) ○ six sigma and lean six sigma A range of problem solving methodologies, including: ○ cross-functional problem solving team ○ cross-functional nominal group (virtual team) ○ consulting and or brainstorming with members from outside the organization on some basis ○ input from other members of the value stream ○ the use of known/proprietary problem solving approaches or some synthesis of methods ○ own or commissioned research either in whole or in part	reporting arrangements for formal problem solving, including: ○ appropriate metrics (e.g. incident frequency and incident consequences) ○ trigger criteria for conducting problem solving activity ○ problem definition and quantification ○ cause and effect diagrams (or similar) Solutions identified reviewing organisational structure, value stream and customer alignment in order to set performance indicators for organisation problem solving capability

		Organization strategy and vision, value stream and value as defined by the organization's customers Corrective action tracking methods	
3. Review problem solving effectiveness	3.1 Review corrective action tracking 3.2 Determine benefit/cost from solutions 3.3 Analyse interactions of multiple problems with each other and the organization 3.4 Review problem solving strategy 3.5 Make improvements to problem solving strategy and approach	Competitive systems and practices principles Competitive systems and practices at both a strategic and tools level, including: ○ value stream mapping ○ 5S ○ Just in Time (JIT) ○ mistake proofing ○ process mapping ○ establishing customer pull ○ breakthrough improvement and continuous improvement (kaizen and kaizen blitz) ○ setting of key performance indicators (KPIs)/metri	Reviewing current operations and procedures to determine if problems are being identified as early as possible Reviewing current operations and procedures to determine if problems are being defined appropriately Identifying and quantifying desired outcome from improved problem solving capability, such as: ○ improved customer service and delivery ○ defect elimination ○ capacity improvement ○ cost reduction ○ safety improvement ○ improved

		cs ○ identification and elimination of waste (muda) ○ six sigma and lean six sigma A range of problem solving methodologies, including: ○ cross-functional problem solving team ○ cross-functional nominal group (virtual team) ○ consulting and or brainstorming with members from outside the organization on some basis ○ input from other members of the value stream ○ the use of known/proprietary problem solving approaches or some synthesis of methods ○ own or commission	complaint resolution Establishing appropriate reporting arrangements for formal problem solving, including: ○ appropriate metrics (e.g. incident frequency and incident consequences) ○ trigger criteria for conducting problem solving activity ○ problem definition and quantification ○ cause and effect diagrams (or similar) Solutions identified reviewing organizational structure, value stream and customer alignment in order to set performance indicators for organization problem solving capability

		ed research either in whole or in part Organization strategy and vision, value stream and value as defined by the organization's customers Corrective action tracking methods	

RANGE OF VARIABLES

VARIABLES	RANGE
11. Organizational structure	May include; 1.9 operational and support functions and departments 1.10 links with value stream members 1.11 super-users and facilitators 1.12 roles and responsibilities with regard to problem solving 1.13 plans to broaden the users of problem solving approach 1.14 plans to improve the problem solving performance of personnel
3. Problem finding strategies	May include: 2.1 problems before they become obvious or cause significant non-conformance or risk 2.2 situations not initially considered a problem but which may be hindering greater performance 2.3 strategies for finding opportunities for improvement

4. Complex problem	May include: A complex problem may be described as one which has several of the following characteristics: 3.1 requires going into the extended value stream for data/information 3.2 is wider than just applying to a single job 3.3 applies to less common solutions or problems 3.4 requires a higher level of knowledge and skill (which may or may not be possessed directly by the person solving the problem), such as: 3.5 significant specialist knowledge 3.6 significant specialist skill 3.7 more theory/understanding of technology or process 3.8 data is not easily available and may need particular strategies to obtain, such as: 3.9 overcoming resistance from people, including employees, customers or suppliers 3.10 extracting data not regularly reported from SCADA or similar systems 3.11 the problem and/or proposed solutions require reporting or authorisations from a Board or external authorities, such as licensing or regulatory bodies
5. Effective solutions	may include: 4.9 prevent recurrence 4.10 be within the control/ability of the organization to implement 4.11 meet organization goals and objectives

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17. Critical aspects of Competency	A person who demonstrates competency in this unit must be able to provide evidence of the ability to: 1.1 analyse and improve problem finding capabilities of the organisation 1.2 improve the problem solving capability of the organisation 1.3 set KPIs for organisation problem solving 1.4 ongoing review of systems and processes relevant to problem solving 1.5 increasing problem solving capability through identification of appropriate strategies, including where required, identifying: o training needs in problem finding and solving o changes in organisational structure, decision making and processes o appropriate metrics o need for outside assistance.
18. Resource Implications	Assessment of performance must be undertaken in a workplace using or implementing one or more competitive systems and practices. Access may be required to: 2.1 workplace procedures and plans relevant to work area 2.2 specifications and documentation relating to planned, currently being implemented, or implemented changes to work processes and procedures relevant to the assessee 2.3 documentation and information in relation to production, waste, overheads and hazard control/management 2.4 reports from supervisors/managers 2.5 case studies and scenarios to assess responses to contingencies.

19. Methods of Assessment	**Competency in this unit may be assessed through:** 3.1 demonstration in the workplace 3.2 workplace projects 3.3 suitable simulation 3.4 case studies/scenarios (particularly for assessment of contingencies, improvement scenarios, and so on) 3.5 targeted questioning 3.6 reports from supervisors, peers and colleagues (third-party reports) 3.7 portfolio of evidence. In all cases it is expected that practical assessment will be combined with targeted questioning to assess underpinning knowledge. Where applicable, reasonable adjustment must be made to work environments and training situations to accommodate ethnicity, age, gender, demographics and disability.
20. Context for Assessment	20.1. In all workplace, it may be appropriate to assess this unit concurrently with relevant teamwork or operation units.