GAUTENG PROVINCE
Department: Education
REPUBLIC OF SOUTH AFRICA

MECHANICAL TECHNOLOGY

PRACTICAL ASSESSMENT TASK

WELDING AND METALWORK

GRADE 11

2025

This document consists of 29 pages

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1. INTRODUCTION/BACKGROUND

The 16 Curriculum and Assessment Policy Statements subjects which contain a practical component all include a Practical Assessment Task (PAT), i.e. a Practical or Performance Assessment Task. These subjects are:

- AGRICULTURE: Agricultural Management Practices, Agricultural Technology
- ARTS: Dance Studies, Design, Dramatic Arts, Music, Visual Arts
- SCIENCES: Computer Applications Technology, Information Technology
- SERVICES: Consumer Studies, Hospitality Studies, Tourism
- TECHNOLOGY: Civil Technology, Electrical Technology, **MECHANICAL TECHNOLOGY** and Engineering Graphics and Design.
- MATHEMATICS: Technical Mathematics

A PAT allows the educator to directly and systematically observe applied competence. The PAT comprises the application/performance of the knowledge, skills and values particular to that subject and counts 25% (i.e. 100 marks) of the total promotion/certification mark out of 400 for the subject.

The PAT is implemented across the first three terms of the school year, which is broken down into different practical skills that make up the PAT.

Any profession requires of its members a thorough grounding in both theory and practice, and **MECHANICAL TECHNOLOGY** is no exception. It is emphasized that the goal of the Practical Assessment Task is to produce a skilled learner in each specialisation field. A nation's true wealth is in its manpower and education should aim to develop the talents of the learner so that he/she can contribute to the well-being of society by using scientific and technological resources with the greatest efficiency and by continuing to develop them.

To prepare a learner to develop skills in **MECHANICAL TECHNOLOGY,** in each specialisation field:

- An attitude where the learner can selectively assimilate ideas, gather evidence and facts, and drawing logical conclusions and put them to good use creatively and with imagination;
- A capability to express ideas and information clearly by speech, writing, sketching or drawing;
- A willingness and capability to accept and exercise responsibility, to make decisions, and to learn by experience.

Attributes such as these cannot all be achieved in a classroom. A sound knowledge of engineering science is essential to equip the **MECHANICAL TECHNOLOGY** learner with the necessary practical capabilities for the required processes. Training is the art of acquiring essential skills to bridge between trade theory and practice.

Practical application in the workshop must therefore be made an interesting and challenging experience, mentally and physically, with encouragement to the learner to use his/her initiative, curiosity and persistence in finding things. The giving of some degree of responsibility during practical application is very important as a stimulus and to develop self-confidence.

2. TEACHER GUIDELINES

2.1 Administration of the PAT

Teachers are requested to make copies of the different assessment criteria of the PAT document. These documents need to be distributed to the learners at the beginning of the year. The Practical Assessment Task for Grade 11 is internally set by the PED and moderated.

Teachers must attach due dates for the different terms of the PAT task (refer to the CAPS document). In this manner, learners can easily assess their progress. Instances where formal assessments take place, it is the responsibility of the teacher to administer assessment.

The PAT should be completed in the first three terms. The PAT should be based and completed under controlled conditions (Refer to the Mechanical Technology CAPS Grade 10–12).

Educators MUST build a prototype of the task in order to be able to demonstrate to the candidates how the final product will look like. It will guide the candidates with visual presentation. It provides the educator with insight into possible challenges regarding machines, equipment or material and what possible manufacturing procedures he/she need to follow in the workshop in order to complete the PAT.

2.2 Assessment of PAT

Frequent and developmental feedback is needed to guide and give support to the learner to ensure that the learner is on the right track.

Both formal and informal assessment should be conducted in different terms to ensure that the embedded skills are covered for the PAT. Informal assessment can be conducted only to monitor progress of the term in which the learners are engaged. Formal assessment should always be conducted by the teacher and will be recorded.

On completion of each phase in each term, the marks for the completed phase need to be recorded onto the school administration system.

2.3 Moderation of PAT

During moderation of the PAT, the term tasks will be presented to the moderator with the assessment criteria and marks obtained.

Where required the moderator should be able to call on the learner to explain the function, principles of operation and also request the learner to demonstrate the skills acquired through the capability tasks for moderation purposes.

Upon completion the moderator will, if necessary, adjust the marks of the group up or downwards depending on the decision reached because of moderation.

The task must be clearly marked with the correct initials and surname of each candidate. Internal moderation MUST be conducted on each phase by the internal moderator on school level.

2.4 CONSEQUENCES OF ABSENCE/NON-SUBMISSION OF TASKS.

If a learners' Practical Assessment Task is incomplete or unavailable with valid reason, the learner will be given three weeks before the commencement of the final end-of-year examination to submit outstanding task. Should the learner fail to fulfill the outstanding PAT requirement, such a learner will be awarded a zero for that PAT component.

A learner's results are regarded as incomplete if he/she does not offer any component of the PAT task. He/she will be given another opportunity based on the decision of the Head of the assessment body.

Should the learner fail to fulfill the outstanding PAT requirement, the marks for these components will be omitted and the final mark for Mechanical Technology will be adjusted for promotion purposes in terms of the completed

2.5 DECLARATION OF AUTHENTICITY

NAME OF THE SCHOOL: ……..

NAME OF LEARNER: ……..……...

(FULL NAME(S) AND SURNAME)

EXAMINATION NUMBER: …….

NAME OF TEACHER: …….

SCHOOL STAMP

I hereby declare that the project submitted for assessment is my own, original work and has not been previously submitted for moderation.

_____ _____

SIGNATURE OF CANDIDATE DATE

As far as I know, the above declaration by the candidate is true and I accept that the work offered is his or her own.

_____ _____

SIGNATURE OF TEACHER DATE

3. LEARNER GUIDELINES

3.1 Instructions to the learners

- Learners have the build the following tasks: ROCKET STOVE.
- The PAT must be completed according to the time frames set out in each of the tasks.
    - Phase 1 – Must be completed by end of Term 1
    - Phase 2 – Must be completed by end of Term 2
    - Phase 3 – Must be completed by end of Term 3
    - Phase 4 – Development must start in Term 1 and Phase 4 must be completed by end of September (Term3).

- Learners are required to actively engage in all practical assessment tasks.

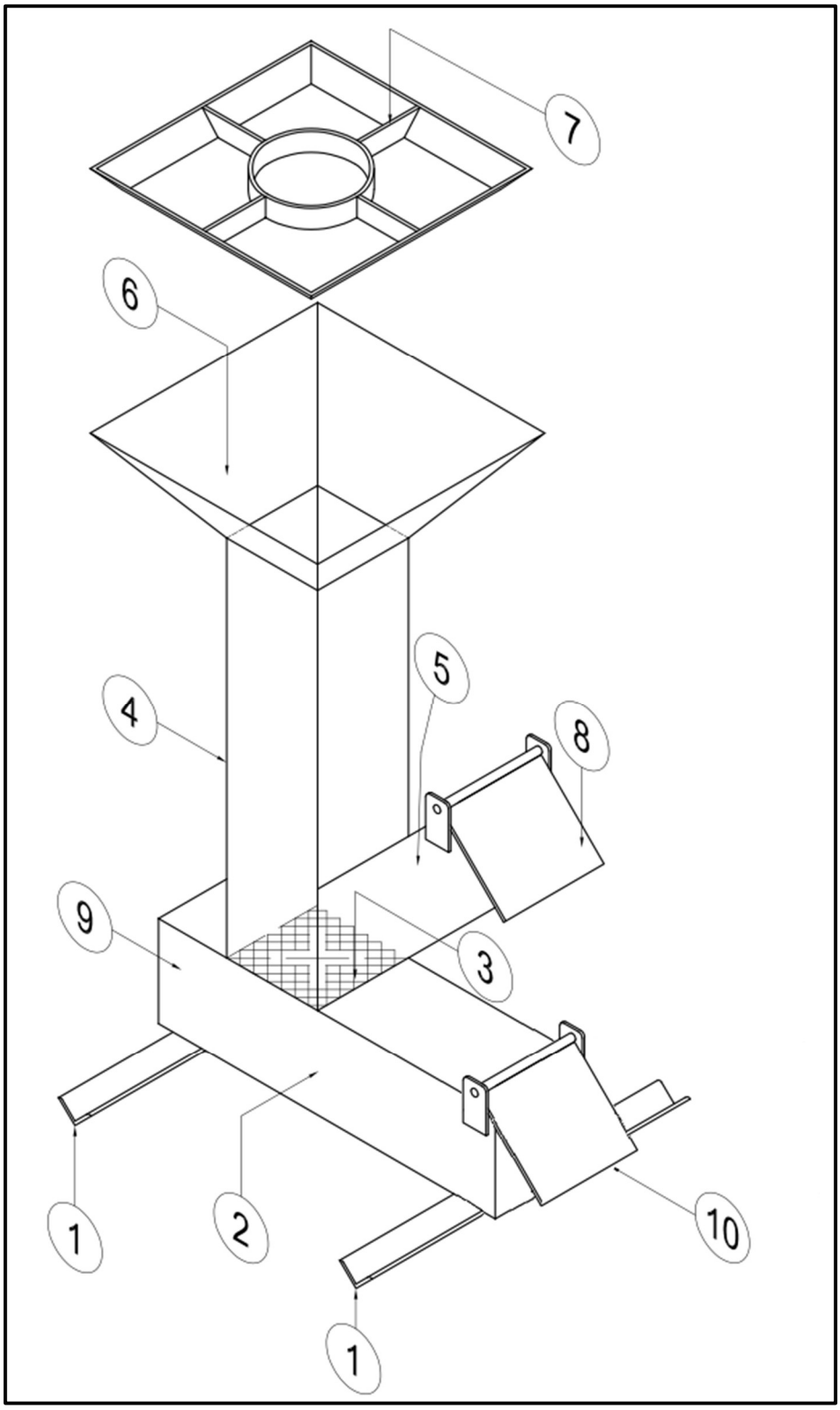
- Learners who are un-cooperative will receive demerits or a zero-mark allocation for that section of the work.

- Learners, who act unsafely in the workshop and place other learners in danger, will be removed from the workshop and given additional corrective tasks to improve their safety awareness.

- Phase 1 – 4 make a complete project. Learners must work attentively and always use all safety precautions.

- You MUST conduct self-assessment in the marking rubric provided BEFORE you take your completed phase for assessment by the educator.

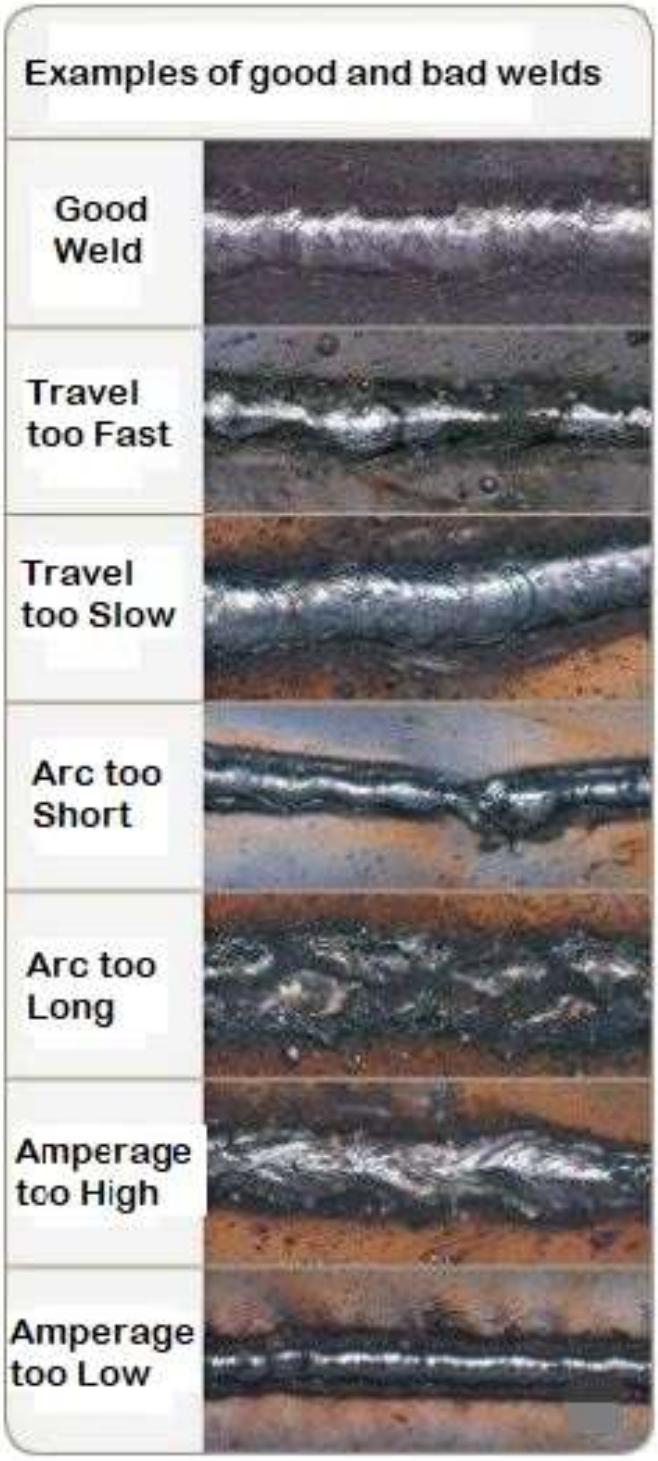
GRADE 11 WELDING & METALWORK PAT:
OPTION 1: ROCKET STOVE



RESOURCES REQUIRED FOR PAT

	COMPONENTS	MATERIAL	DIMENSIONS	QTY
1	Base supports	25x25x3 mm angle iron **OR** 25 x 25 x 1,6 mm square tube	350 mm	2
2	Horizontal pipe	100 x 100 x 2 mm square tube	400 mm	1
3	Inside grid support	Expanded metal / own design	100 x 100 mm	1
4	Vertical pipe	100 x 100 x 2 mm square tube	375 mm	1
5	Charge pipe	100 x 100 x 2 mm square tube	300 mm	1
6	Transition piece	2 mm sheet metal	According to template	4
7	Cooking top	20 x 3 flat bar	1800 mm	1
8/10	Cover flap	2 mm sheet metal	100 x 120 x 2 mm	2
	Cover flap hinge	Ø8 mm round bar	115 mm	2
	Hinge support	20 x 3 mm flat bar / 45 x 2 mm sheet metal offcuts	45 mm	4
9	Fixed cover	2 mm sheet metal	100 x 100 x 2 mm	1

EXAMPLES OF QUALITY OF WELDS



Examples

RUBRIC FOR MARKING, CUTTING, DRILLING, WELDING, FINISHING AND PRESENTATION

CATEGORY	Excellent (5)	Good (4)	Average (3)	Poor (2)	Incomplete (1)
MARKING OF PARTS	All parts marked and accurate according to dimensions. ± 1 mm deviation from required dimensions.	Nearly all parts marked and accurately dimensions obtained. ± 2-3 mm deviation from required dimensions.	Most parts marked and most accuracy obtained. ± 4 mm deviation from required dimensions.	Some parts partially marked / some accuracy obtained. ± 5 mm deviation from required dimensions.	Poor and wrongly marked / inaccurate. ± 6 mm deviation from required dimensions.
CUTTING AND DRILLING	All parts cut/drilled accurately according to dimensions. ± 1 mm deviation.	Nearly all parts cut/drilled accurately. ± 2-3 mm deviation	Most parts marked and cut/drilled accurately. ± 4 mm deviation	Some accuracy obtained with some deviation from dimensions. ± 5 mm deviation	Section poorly cut /drilled inaccurately or wrong dimensions. ± 6 mm deviation
WELDING QUALITY	No welding defects visible. Beading neat and complete fusion of metals achieved. All slag is removed.	Neat welding done. Good beading with some minor defects visible. Good fusion achieved. All slag is removed.	Some beading visible. Presence of some welding defects. Not complete fusion achieved. All slag is partially removed.	Poor welding done. Lot of welding defects visible. Poor or no fusion achieved. Some burning through metal occurred.	Bad welding. Lot of welding defects with no fusion and holes burned through.
FINISHING AND PRESENTATION	Weld areas are cleanly finished, ground and painted. Project excellent presented. Excellent functionality obtained.	Nearly all welded areas are cleanly finished, ground and painted. Project well presented. Will function well.	Most welded areas are cleanly finished, ground and painted. Average presentation. Project will function.	Some welded areas are cleanly finished, ground and painted. Poor presentation with limited functionality.	No welded areas cleanly finished, ground and painted. No complete assembly. Bad presentation with no functionality.

PHASE 1

SECTION C: WELDING AND METALWORK

4: ROCKET STOVE:

4.1 HORIZONTAL PIPE (2) and BASE SUPPORTS (1)

Phase: 1
Start date: February 2025
Completion date: March 2025
Mark allocation: 50 **(50)**

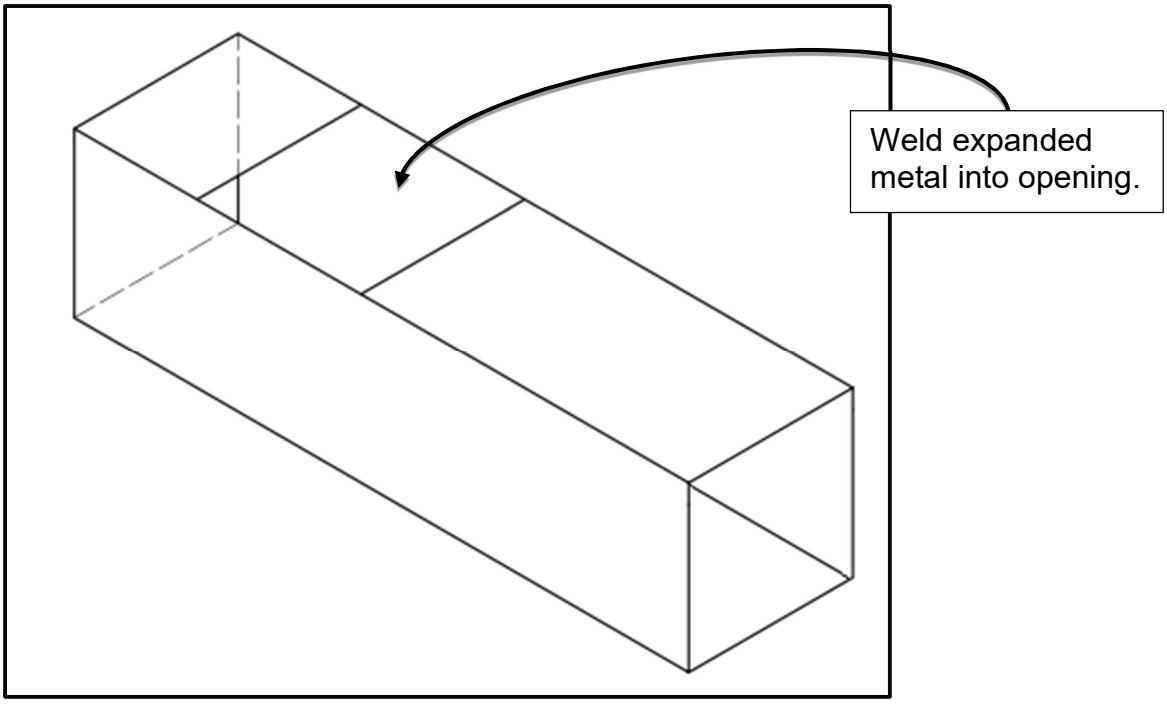


FIGURE 1

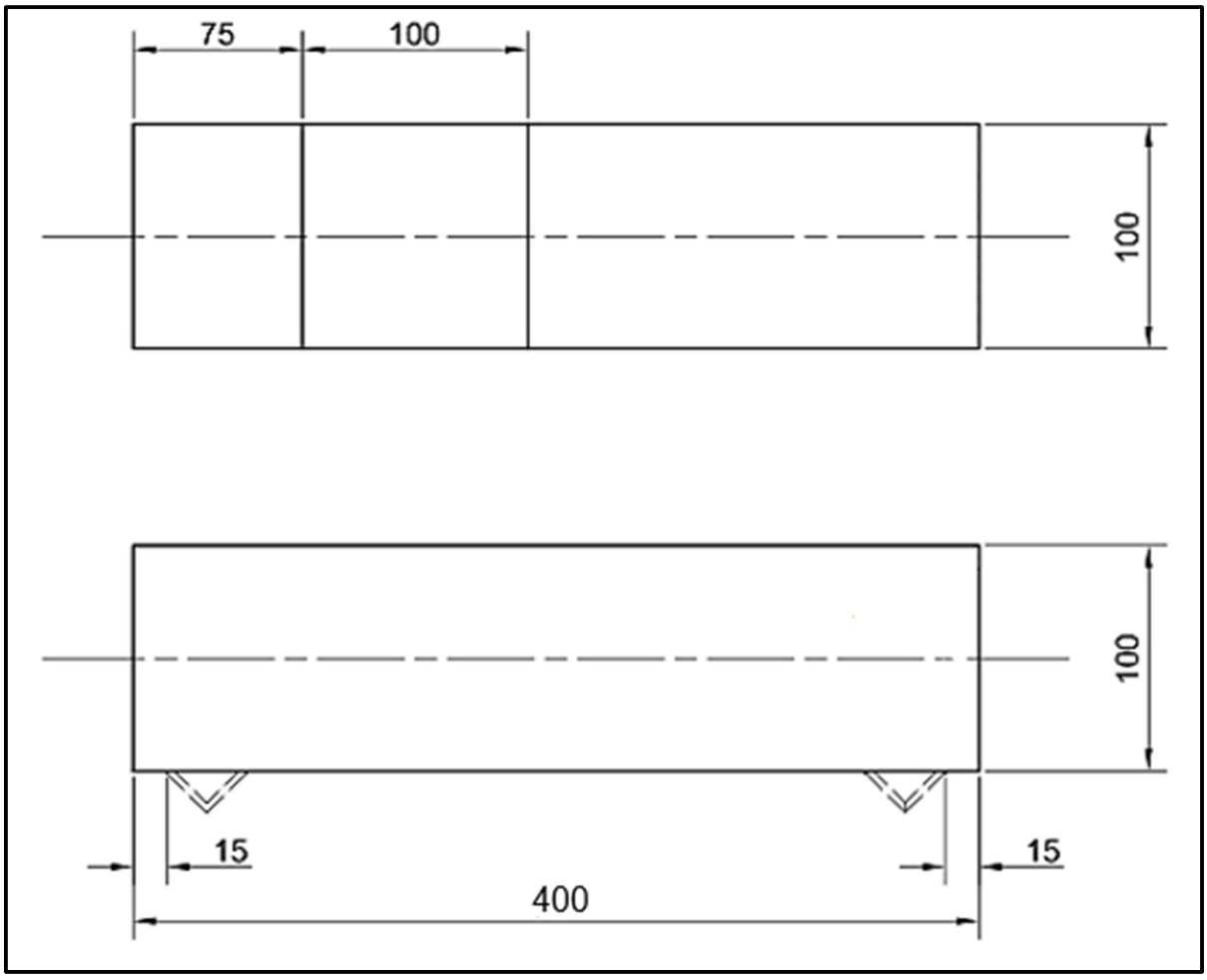


FIGURE 2 – Base

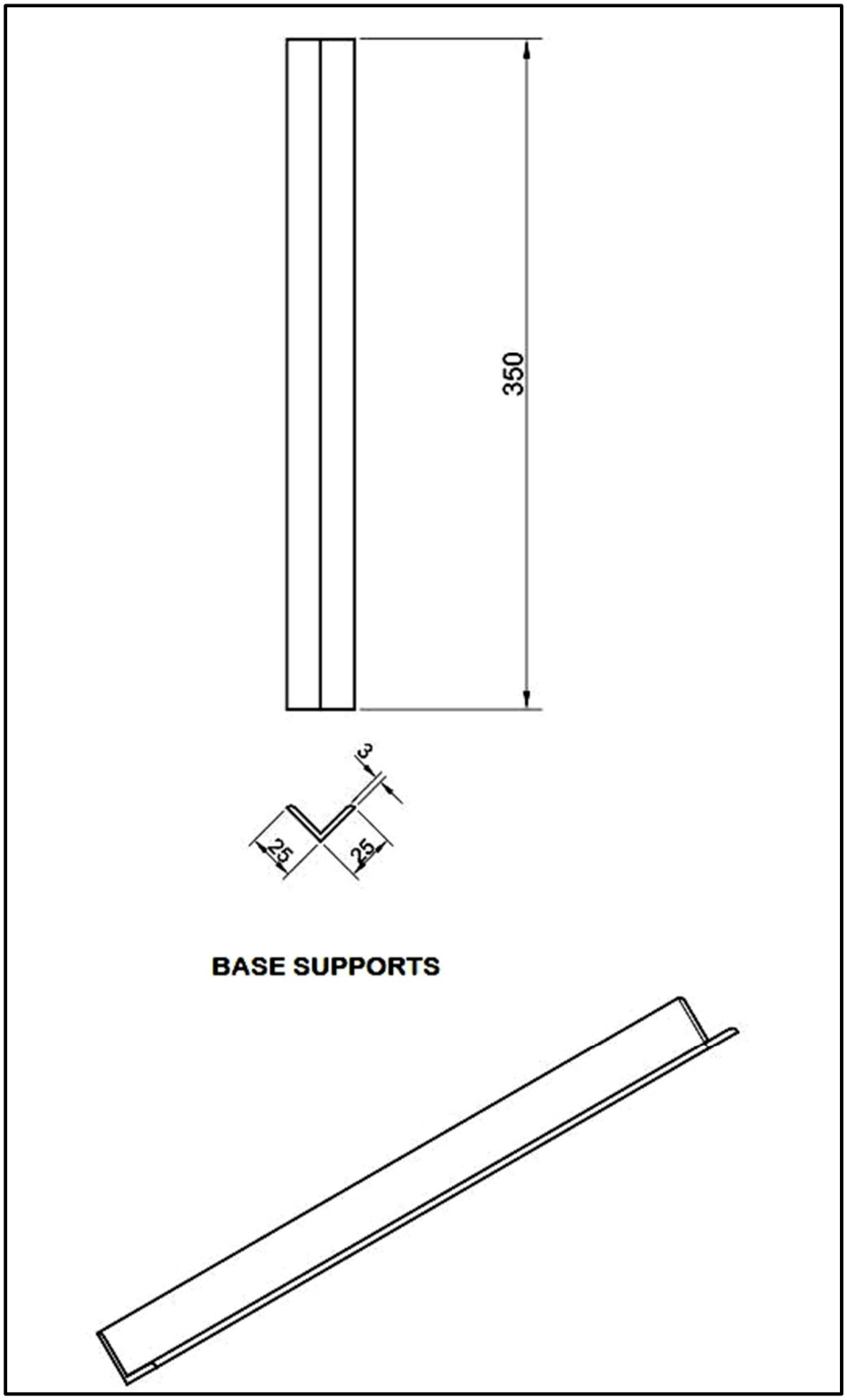


FIGURE 3 – Base supports

MECHANICALTECHNOLOGY			
WELDING AND METALWORK			
MARKSHEET – BASE SUPPORTS & HORIZONTAL PIPE – PHASE 1			
GRADE	11	DATE	
PROJECT	ROCKET STOVE		
LEARNER NAME:			

FACETS		MARKS	Candidate – Self-Assessment	Teacher Assessment	Internal Moderation	Provincial Moderation	External Moderation	TEACHER COMMENTS
			1	2	3	4	5	
BASE SUPPORTS	Cut angle iron/square tubing to size	5						
	Clean 2 supports from all burrs	5						
HORIZONTAL PIPE	Measure and mark to size 400 mm	5						
	Cut to size – 400 mm	5						
	Mark out and cut out 100 x 100 expanded metal	10						
	Weld expanded metal	10						
	Weld base supports in position. (2 x 5)	10						
TOTAL:		50						

MODERATOR COMMENTS:		
NAME & SIGNATURE OF TEACHER		
NAME & SIGNATURE OFTECHNICAL DEPARTMENTAL HEAD		
NAME & SIGNATURE OF SUBJECT MODERATOR		

PHASE 2

4.2 VERTICAL PIPE (4) and CHARGE PIPE(5)

Start date: April 2025
Completion date: June 2025
Mark allocation: 65 **(50)**

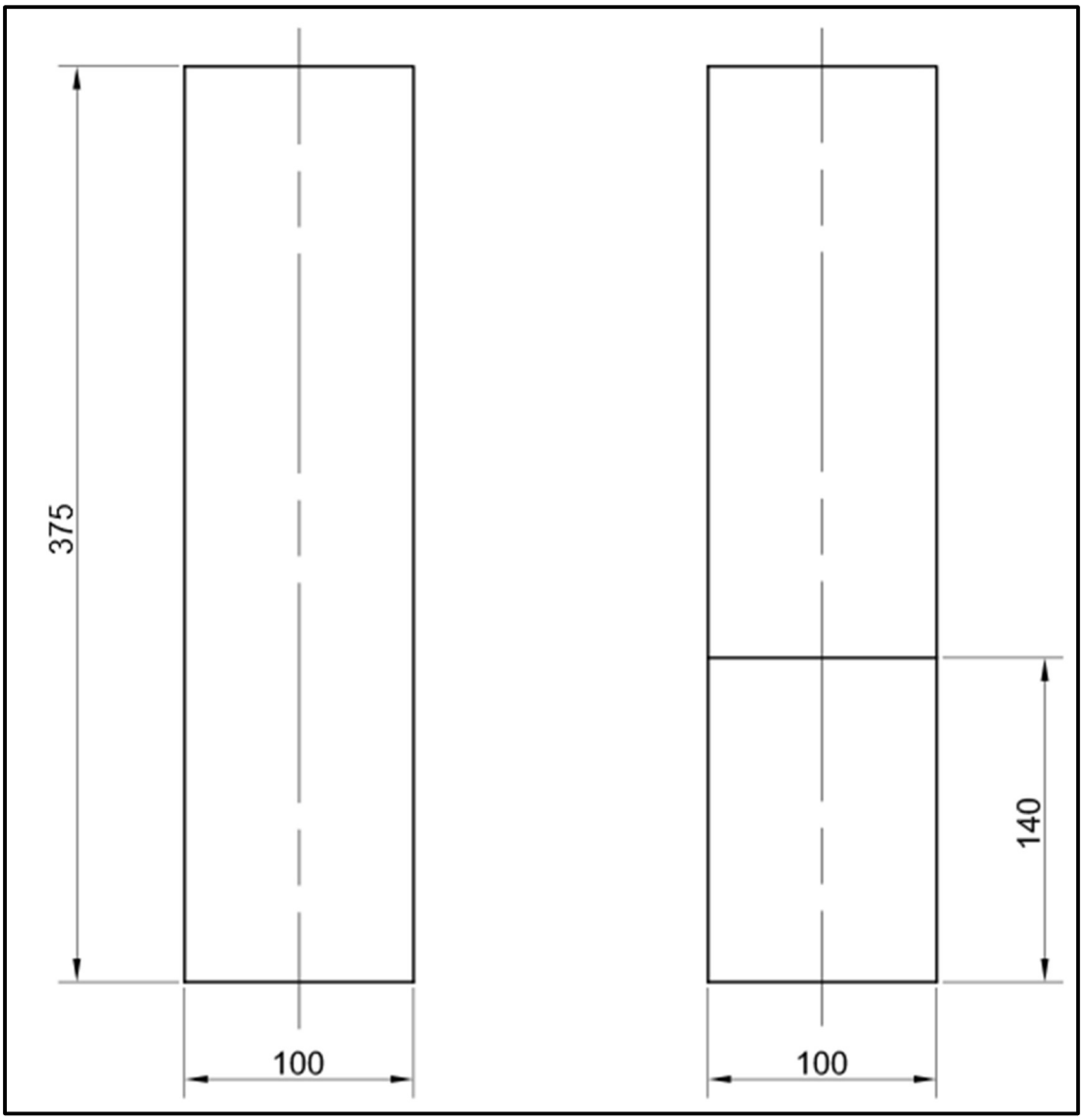


FIGURE 4 – Vertical Pipe

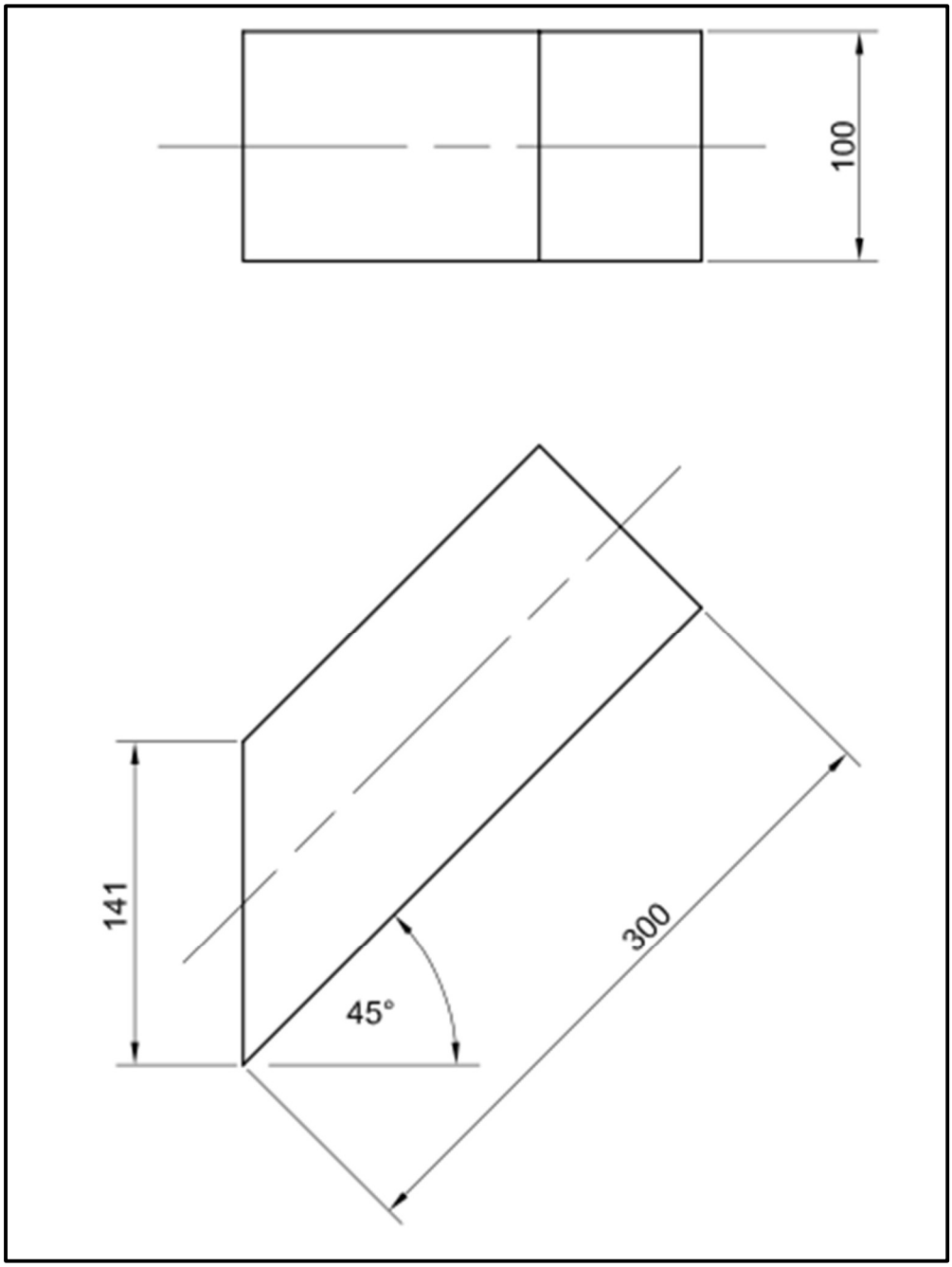


FIGURE 5 – Charge Pipe

MECHANICALTECHNOLOGY			
WELDING AND METALWORK			
MARKSHEET – VERTICAL PIPE and CHARGE PIPE – PHASE 2			
GRADE	11	DATE	
PROJECT	ROCKET STOVE		
LEARNER NAME:			

FACETS		MARKS	Candidate – Self-Assessment	Teacher Assessment	Internal Moderation	Provincial Moderation	External Moderation	TEACHER COMMENTS
			1	2	3	4	5	
VERTICAL PIPE	Measure and mark the length of 375 mm	5						
	Measure and mark the 140 mm opening	5						
	Cut to size 375 mm	5						
	Cut 140 x 100 mm opening	5						
	File all burrs	5						
CHARGE PIPE	Measure and mark length to 300 mm	5						
	Measure and mark 45°angle	5						
	Cut to size 300 mm	5						
	Cut to 45°	5						
	File all burrs	5						
	Weld vertical pipe to charge pipe (3 sides x 5)	15						
Sub- total:		65						
TOTAL:		50						

MODERATOR COMMENTS:		
NAME & SIGNATURE OF TEACHER		
NAME & SIGNATURE OF TECHNICAL DEPARTMENTAL HEAD		
NAME & SIGNATURE OF SUBJECT MODERATOR		

PHASE 3

4.3 DEVELOPMENT – SQUARE TO SQUARE ON–CENTRE HOPPER (6)

Start date: July 2025
Completion date: September 2025
Mark allocation: 100 **(50)**

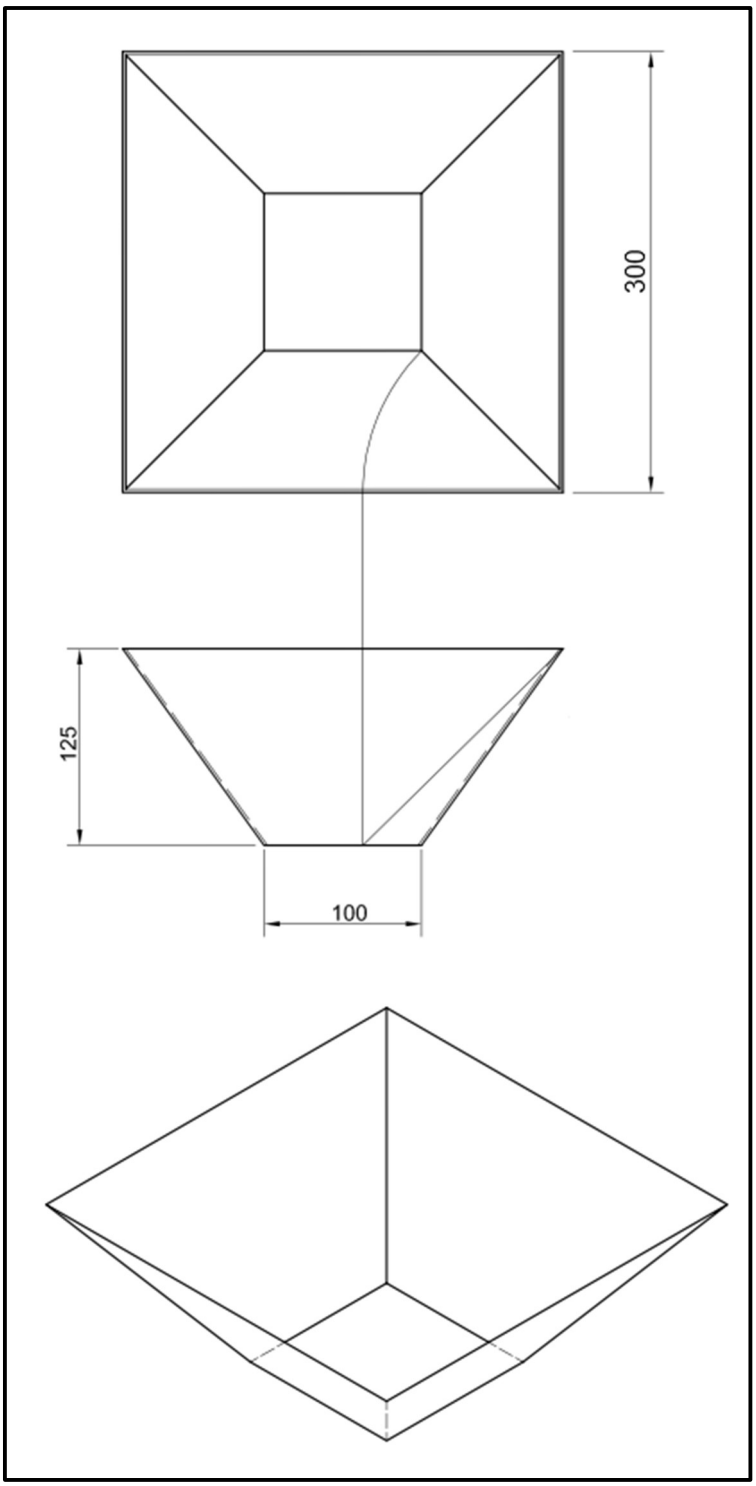


FIGURE 6 – Hopper

Template Development:

1. By the use of Technical Drawing equipment, create a template of a square-to-square transition piece shape with a square dimension on bottom of 300 x 300mm (Vertical height of the transition piece is 125 mm).
2. Use calculations to calculate the correct length of each of the sector lines and create a template which you must use to transfer measurements to a plate when creating the square-to-square transition piece.
3. Label your template with your name and the evidence of all calculations must in your portfolio file.

Procedure:

1. Transfer your template measurements to sheetmetal.
2. When transferring your template to the steel plate, make use of a scriber so that your measurements indicated does not get lost when cutting out of the template occur.
3. By the use of plasma cutter or guillotine, cut out your profile on the outside lines.
4. Finish the template outside perimeter with an angle grinder to specification.
5. Draw your template lines where you need to fold your plate to the correct angle.
6. Bend each side until the two ends meet up perfectly.
7. Tag weld in place and do permanent welding when satisfied of squareness.
8. Attach finished transition to Phase 1/2 shell and weld together.
9. Tag weld onto the formed transition piece.Ensure the pieces are positioned correctly and then weld permanently.
10. Clean any slag of where all welding has taken place.
11. Project can be finished by painting it with heat resistant paint.

N.B. The development of the transition piece can be done as a two part development or four pieces spotwelded and finished welding afterwards.

WORKSHEET 3.1: TEMPLATE DEVELOPMENT.	
LEARNER NAME:	

3.1.1	Measure true length of sides from template and write them down according to scale	
		(5)

NOTE: This worksheet MUST be evident in the candidate's portfolio of evidence.

MECHANICAL TECHNOLOGY							
WELDING AND METALWORK							
MARKSHEET – SQUARE TO SQUARE ON-CENTRE HOPPER – PHASE 3							
GRADE		11		DATE			
PROJECT		ROCKET STOVE					
LEARNER NAME:							
FACETS	MARKS	Candidate – Self-Assessment	Teacher Assessment	Internal Moderation	Provincial Moderation	External Moderation	TEACHER COMMENTS
		1	2	3	4	5	
Template measurements (Worksheet 3.1)	5						
Develop template	5						
Cutting of template	5						
Transfer of template to steel plate	5						
Cutting of hopper parts (4 sides x 5)	20						
Weld of hopper (4 corners x 5)	20						
Weld of hopper to vertical pipe (4 sides x 5)	20						
Weld of vertical to horizontal pipe. (4 sides x 5)	20						
SUBTOTAL	100						
TOTAL	50						
MODERATOR COMMENTS:							
NAME & SIGNATURE OF TEACHER							
NAME & SIGNATURE OF TECHNICAL DEPARTMENTAL HEAD							
NAME & SIGNATURE OF SUBJECT MODERATOR							

PHASE 4

4.4 COOKING FRAME (7), CHARGE PIPE COVER (8 & 10) and FIXED COVER (9)

Start date: February 2025
Completion date: September 2025
Mark allocation: 100

4.4.1 Charge Pipe Covers (8 & 10)

Example – Charge Pipe Cover

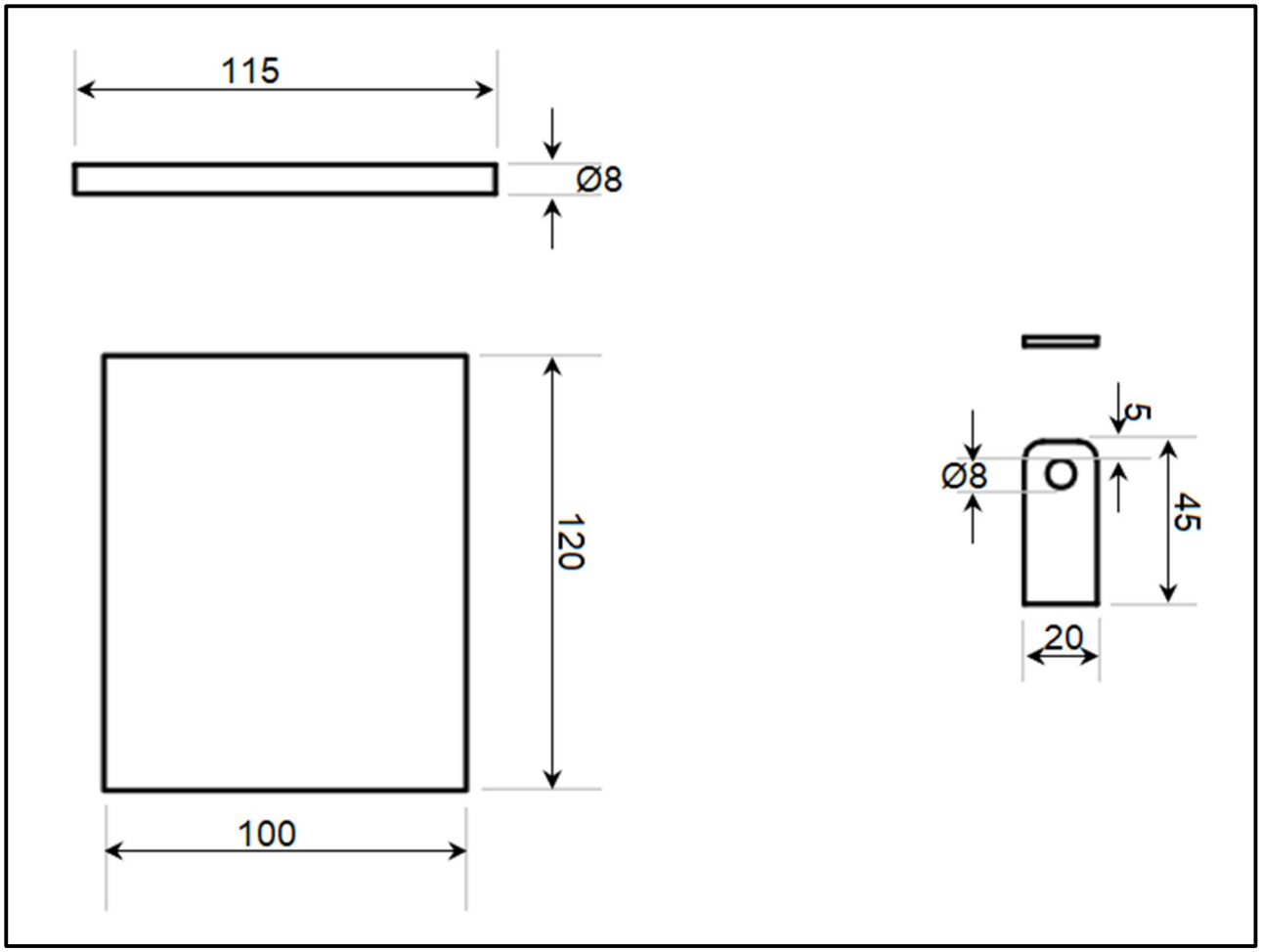


FIGURE 7 - Charge Pipe Cover

4.4.2 Horizontal Pipe Fixed Cover (9)

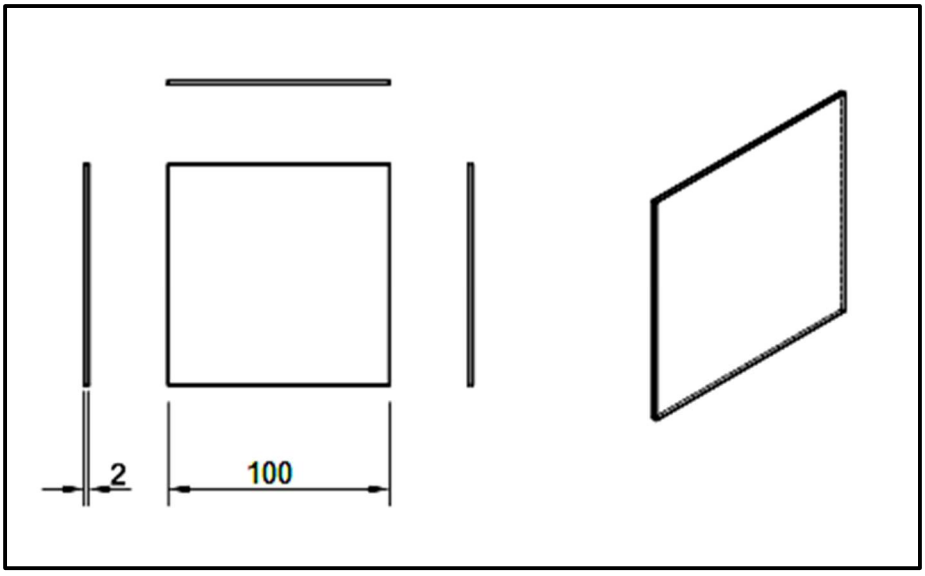


FIGURE 8 - Horizontal Pipe Fixed Cover

4.4.3 Cooking Frame (11)

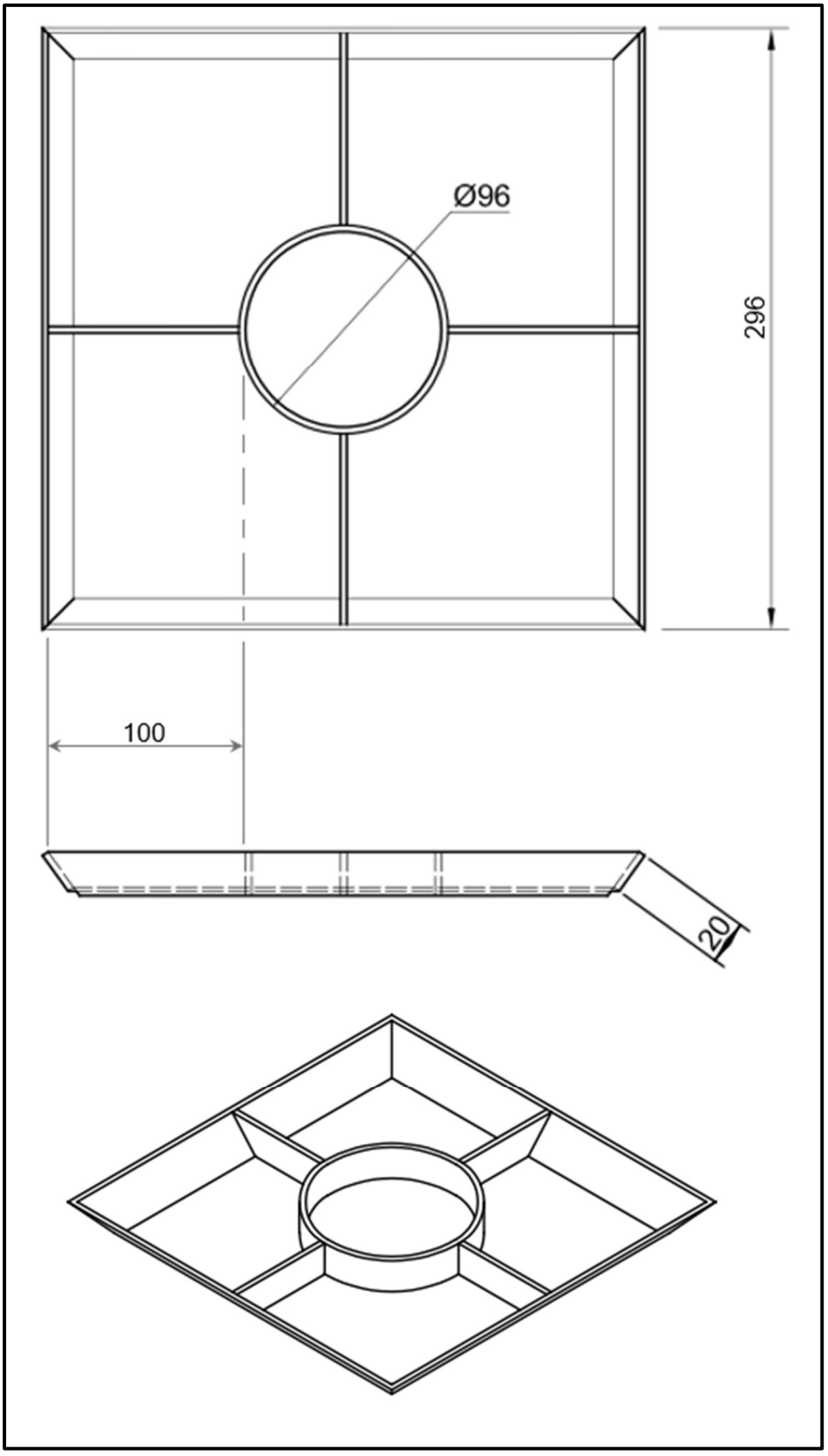


FIGURE 9 - Horizontal Pipe Fixed Cover

WORKSHEET 4.1: COOKING FRAME CALCULATIONS.	
LEARNER NAME:	

4.1.1	Calculate the corner angle and length of frame sides.		
		(5)	

4.1.2	Calculate the true length of circular center support.		
		(5)	

NOTE: This worksheet MUST be evident in the candidate's portfolio of evidence.

MECHANICAL TECHNOLOGY			
WELDING AND METALWORK			
MARKSHEET – COOKING FRAME , CHARGE PIPE COVER and FIXED COVER PHASE 4			
GRADE	11	DATE	
PROJECT	ROCKET STOVE		
LEARNER NAME:			

	FACETS	MARKS	Candidate – Self-Assessment	Teacher Assessment	Internal Moderation	Provincial Moderation	External Moderation	TEACHER COMMENTS
			1	2	3	4	5	
HORIZONTAL PIPE COVER	Cut out cover 100 x 120 mm	5						
	Cut out Ø8 mm shaft to 115 mm length	5						
	Cut out hinge supports – 20 x 45 mm (2 supports x 5)	10						
	Drill Ø8 mm holes in hinge supports (2 holes x 5)	10						
	Weld cover plate to hinge – 3 x 10 mm runs (3 runs x 5)	15						
	Weld hinge supports to charge pipe 2 x welds per support (4 welds x 5)	20						
	Supports 45° to charge pipe (2 supports x 5)	10						
	Horizontal pipe cover sub- total:	**75**						
	SUB-TOTAL 1:	**15**						
CHARGE PIPE COVER	Cut out cover 100 x 120 mm	5						
	Cut out Ø8 mm shaft to 115 mm length	5						
	Cut out hinge supports – 20 x 45 mm (2 supports x 5)	10						
	Drill Ø8 mm holes in hinge supports (2 holes x 5)	10						
	Weld cover plate to hinge – 3 x 10 mm runs (3 runs x 5)	15						
	Weld hinge supports to charge pipe 2 x welds per support (4 welds x 5)	20						
	Supports 45° to charge pipe (2 supports x 5)	10						
	Charge pipe cover sub-total:	**75**						
	SUB-TOTAL 2:	**15**						
HORIZON -TAL PIPE	Cut out cover 100 x 100 mm	5						
	Weld cover in place to horizontal pipe (4 welds x 5)	20						
	Cover 90° in place to pipe	5						
	Horizontal pipe cover sub-total:	**30**						
	SUB-TOTAL 3:	**10**						

COOKING FRAME	Calculate angle of ends of frames (Worksheet 4.1 – 4.1.1)	5						
	Cut out frame sides 296 mm (4 sides x 5)	20						
	Cut out centre supports 100 mm (4 supports x 5)	20						
	Calculate true length of circular centre support of frame (Worksheet 4.1 – 4.1.2)	5						
	Cut circular centre support to length	5						
	Roll circular centre support	5						
	Weld circular centre support	5						
	Weld frame corners (4 corners x 5)	20						
	Weld 4 supports to frame and rolled centre (8 welds x 5)	40						
	Frame corners 90° (4 corners x 5)	20						
	Frame fits in hopper	5						
Cooking frame sub-total:		**150**						
SUB-TOTAL 4:		**50**						
Finishing (grinding-finish and painting)		**5**						
Presentation (functionality)		**5**						
SUB-TOTAL 1:		**15**						
SUB-TOTAL 2:		**15**						
SUB-TOTAL 3:		**10**						
SUB-TOTAL 4:		**50**						
TOTAL:		**100**						

MODERATOR COMMENTS:		
NAME & SIGNATURE OF TEACHER		
NAME & SIGNATURE OF TECHNICAL DEPARTEMENTAL HEAD		
NAME & SIGNATURE OF SUBJECT MODERATOR		

MECHANICAL TECHNOLOGY											
WELDING AND METALWORK											
MARKSHEET – TOTALS											
GRADE		11		DATE							
PROJECT		ROCKET STOVE TOTALS									
		LEARNERS									
FACETS	MARKS	1	2	3	4	5	6	7	8	9	10
PHASE 1	50										
PHASE 2	50										
PHASE 3	50										
PHASE 4	100										
TOTAL:	250										
Total PAT Mark:	100										

NAME & SIGNATURE OF TEACHER		
NAME & SIGNATURE OF TECHNICAL DEPARTMENTAL HEAD		
NAME & SIGNATURE OF PRINCIPAL		
NAME & SIGNATURE OF SUBJECT MODERATOR		