basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

MECHANICAL TECHNOLOGY (WELDING AND METALWORK)

GUIDELINES FOR PRACTICAL ASSESSMENT TASKS (PAT)

GRADE 12

2022

These guidelines consist of 27pages.

TABLE OF CONTENTS

1. INTRODUCTION/BACKGROUND

The 18 Curriculum and Assessment Policy Statement subjects which contain a practical component all include a practical assessment task (PAT). These subjects are:

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

A practical assessment task (PAT) mark is a compulsory component of the final promotion mark for all learners offering subjects that have a practical component and counts 25% (100 marks) of the end-of-year examination mark. The PAT is implemented across the first three terms of the school year. This is broken down into different phases or a series of smaller activities that make up the PAT. The PAT allows for learners to be assessed on a regular basis during the school year and it also allows for the assessment of skills that cannot be assessed in a written format, e.g. tests or examinations. It is therefore important that schools ensure that all learners complete the practical assessment tasks within the stipulated period to ensure that learners are resulted at the end of the school year. The planning and execution of the PAT differs from subject to subject.

The PAT allows the teacher 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% 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.

Any profession requires of its members a thorough grounding in both theory and practice and MECHANICAL TECHNOLOGY is no exception. It is emphasised 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 that should aim to develop the talents of a learner so that he/she can contribute to the well-being of the society by using and developing scientific and technological resources.

To prepare a learner in the MECHANICAL TECHNOLOGY specialisation fields, one must focus on the following:

- An attitude where the learner can selectively use ideas, gather evidence and facts, to drawing logical conclusions to put them to good use creatively and with imagination;
- A capability to express ideas and information clearly by speech, writing, drawing and manufacturing; and
- 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 sciences is essential to equip the MECHANICAL TECHNOLOGY learner with the necessary practical capabilities for the required processes. Practical training is the application 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 to develop the learner physically and mentally. The learner must show his/her initiative, curiosity and persistence in learning. In order to stimulate and develop self-confidence the granting of some degree of responsibility during the practical application is very important.

2. TEACHER GUIDELINES

2.1 Administration of the PAT

Teachers are requested to make copies of the different specialisation PAT documents. These documents need to be handed out to the learners at the beginning of the year. The practical assessment task for Grade 12 is externally set, internally assessed and externally moderated.

Teachers must attach due dates for the different facets of the PAT *(refer to the CAPS document)*. In this manner, learners can easily assess their progress. When formal assessment takes place it is the responsibility of the teacher to administer assessment.

The PAT should be completed within the first three terms. The PAT should be completed under controlled conditions *(refer to Mechanical Technology SPECIALISATION: CAPS Grades 10–12)*.

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

2.2 Assessment of PAT

Frequent and developmental feedback is needed to ensure the necessary guidance and support for the learners.

Both formal and informal assessment should be conducted to ensure that the embedded skills are developed. Informal assessment can be conducted only to monitor the progress of the learners. Formal assessment should always be conducted and recorded by the teachers.

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

2.3 Moderation of PAT

The tasks, projects, assessment criteria as well as the mark sheets must be presented to the moderator during moderation of the PAT.

The moderator should be able to call on a learner to explain and demonstrate the functions, principles and skills during the moderation process.

On completion the moderator will, if necessary, adjust the marks of the group upwards or downwards depending on the decision reached as a result of moderation.

Tasks must be clearly marked with the correct initials and surname of each learner.

2.4 Consequences of absence/non-submission of tasks.

If a learner's practical assessment task is incomplete or unavailable with a valid reason, the learner may be given three weeks before the commencement of the final end-of-year examination to submit the outstanding task. Should the learner fail to fulfil the outstanding PAT requirement, such a learner will be awarded a zero mark 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 fulfil 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 tasks. If any tasks are still outstanding, the learner runs the risk of not being resulted at the end of the year.

2.5 Declaration of Authenticity

NAME OF THE SCHOOL:

_____

NAME OF LEARNER:

_____
(FULL NAME(S) AND SURNAME)

NAME OF TEACHER:

_____

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

_____ _____
SIGNATURE OF LEARNER DATE

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

_____ _____
SIGNATURE OF TEACHER DATE

SCHOOL STAMP

3. LEARNER GUIDELINES

Instructions to the learners

- The practical assessment task (PAT) consists of a specialisation task in **Welding and Metalwork**. The practical work is spread over three terms, as set out in this document. *(See CAPS document.)*
- All tasks must be completed according to the time frames set out in each of the tasks.
- Learners are requested to actively engage in all practical assessment tasks.
- Learners who are uncooperative will receive demerits or a zero mark for that particular section of the work.
- Learners who act unsafely in the workshop and place other learners in danger, will be given additional corrective tasks to improve their safety awareness.
- Your task must be fully completed by end of August 2022 in order to be ready for provincial and/or national moderation.
- Your task must be **clearly marked** with your name and surname.
- Each term must have a completed phase in order to enter a mark on the working mark sheet and per SAMS.

4. WELDING AND METALWORK (SPECIFIC)

TASK: ROCKET STOVE:

Term: 1 to 3
Starting date: January 2022
Completion date: August 2022

Follow the criteria and standards below:

- The design of the rocket stove is shown in the given figures.
- Keep affordability in mind. **(Standard dimensions of sheet metal)**
- The inside grid/mesh is according to own design. Make drawings and templates.
- Overall sizes must be within ±2 mm of the required measurement.
- Tools and equipment must not be damaged.
- All appropriate safety procedures must be adhered to.
- Welded joints must be cleaned of all slag.
- After all dimensions have been marked out, record marks.
- All edges must be cleaned of burrs.
- The project must be well presented.

RESOURCES REQUIRED FOR PAT:

	COMPONENTS	MATERIAL	DIMENSIONS	QUANTITY
1	Base supports	25 x 25 x 3 mm angle iron	350 mm	2
2	Horizontal pipe	100 x 100 x 2 mm square tube	375 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	400 mm	1
5	Charge pipe	100 x 100 x 2 mm square tube	283 mm	1
6	Transition piece	2 mm sheet metal	According to template	4
7	Grid and frame	25 x 25 x 3 mm angle iron	2 250 mm	1
8	Cover flaps	2 mm sheet metal	130 x 130 x 2 mm	3
	Cover flap hinges	Ø10 mm bullet hinges	10 x 60 mm	3

ROCKET STOVE CONCEPT DESIGNS

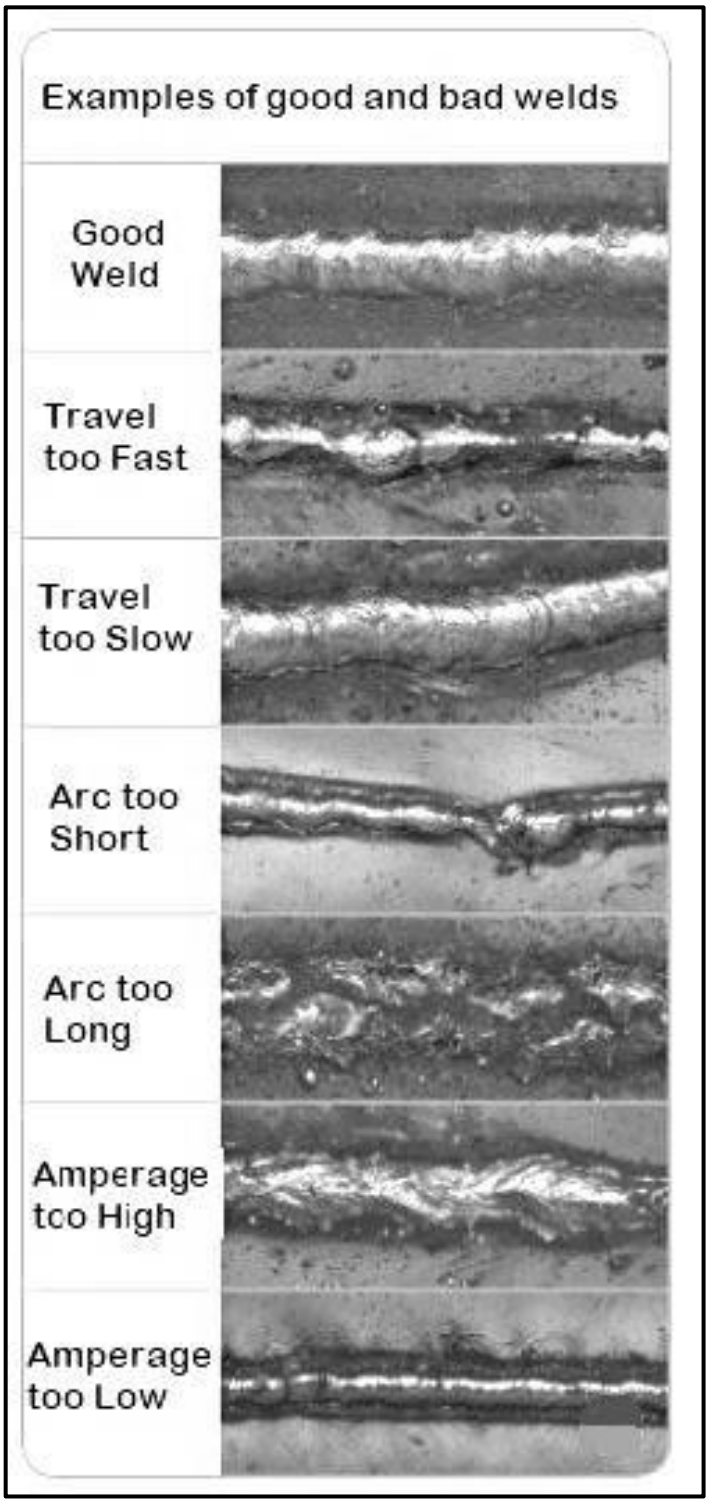
NOTE: The examples below are illustrations for perception only to illustrate the concept of the body design and square-to-square on-set hopper.

EXAMPLE 1: BODY DESIGN

EXAMPLE 2: HOPPER DESIGN

EXAMPLE 3: GRID DESIGN

EXAMPLES OF THE QUALITY OF THE WELDS



EXAMPLE 4

RUBRIC FOR CUTTING, WELDING AND PRESENTATION

CATEGORY	Excellent (5)	Good (4)	Average (3)	Poor (2)	Incomplete (1)
MARKING OF PARTS/PIECES	All parts marked and accurate according to dimensions. ± 1 mm deviation from required dimensions.	Nearly all parts marked and accurate 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. Many welding defects visible. Poor or no fusion achieved. Some burning through metal occurred.	Bad welding. Many welding defects with no fusion and holes burned through.
FINISHING AND PRESENTATION	Weld areas are cleanly and neatly finished, ground and painted. Project presented excellently. Excellent functionality obtained.	Nearly all welded areas are cleanly and neatly finished, ground and painted. Project well presented. Functionality obtained.	Most welded areas are cleanly and neatly finished, ground and painted. Average presentation. Project will function.	Some welded areas are and neatly and cleanly finished, ground and painted. Poor presentation with limited functionality.	No welded areas cleanly and neatly finished, ground and painted. No complete assembly. Bad presentation with no functionality.

FIGURE 1 SHOWS THE ROCKET STOVE

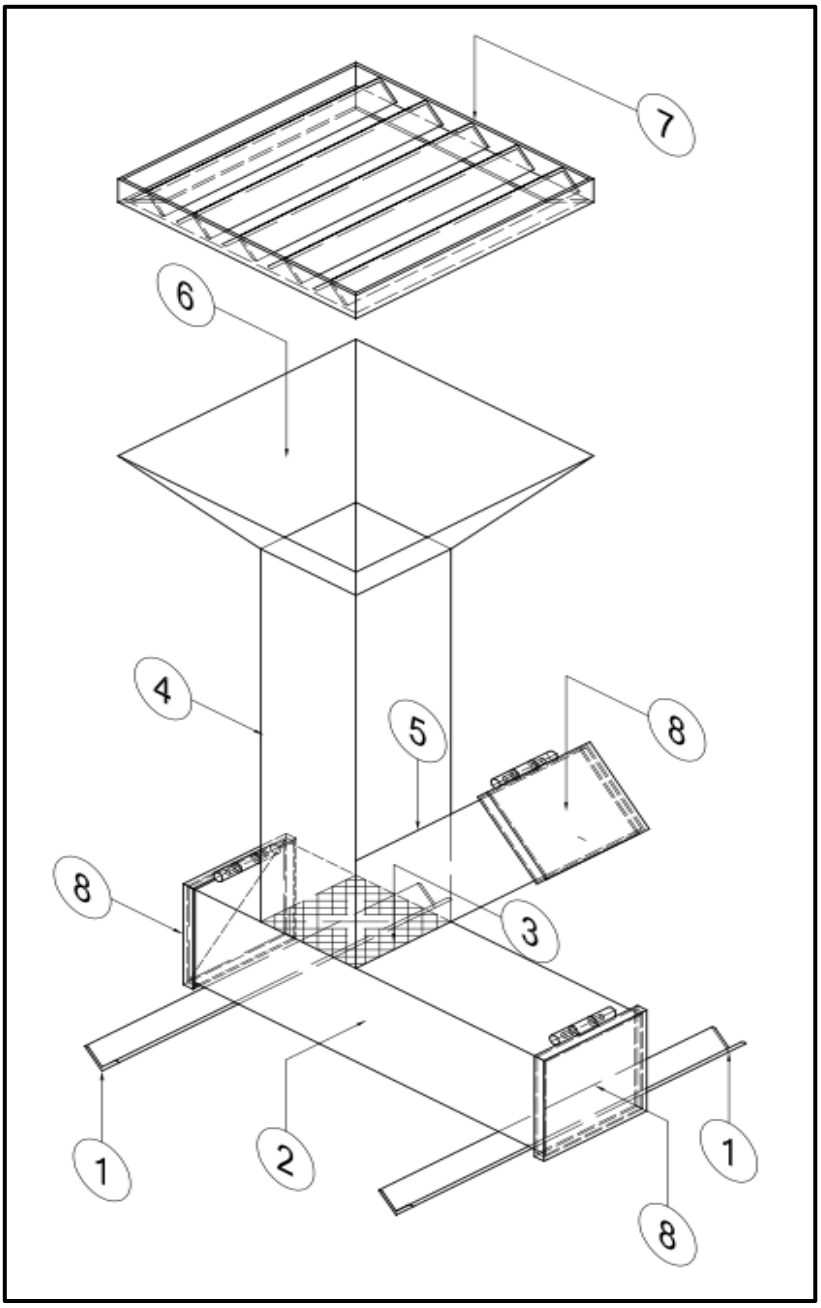


FIGURE 1

PHASE 1: HORIZONTAL PIPE AND BASE SUPPORTS
January–March 2022

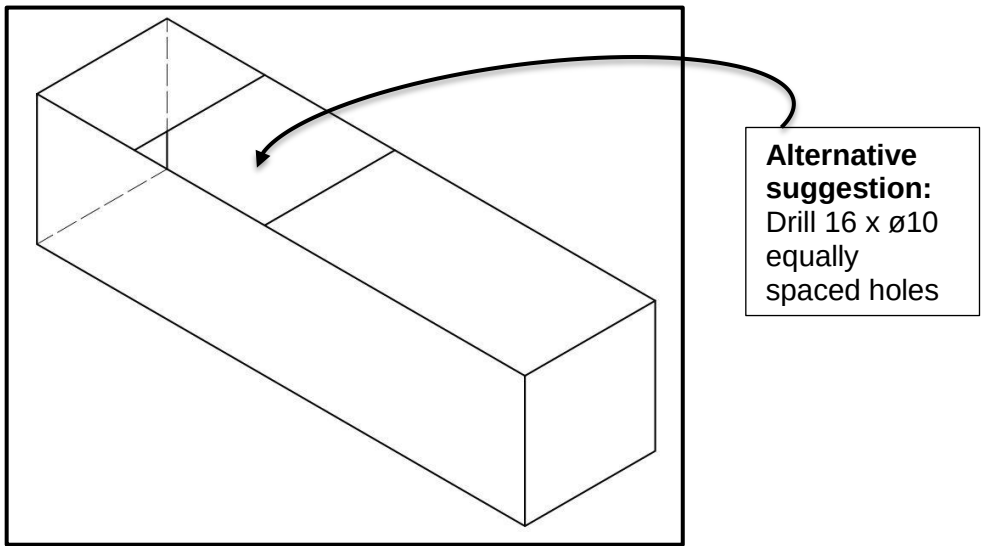


FIGURE 2

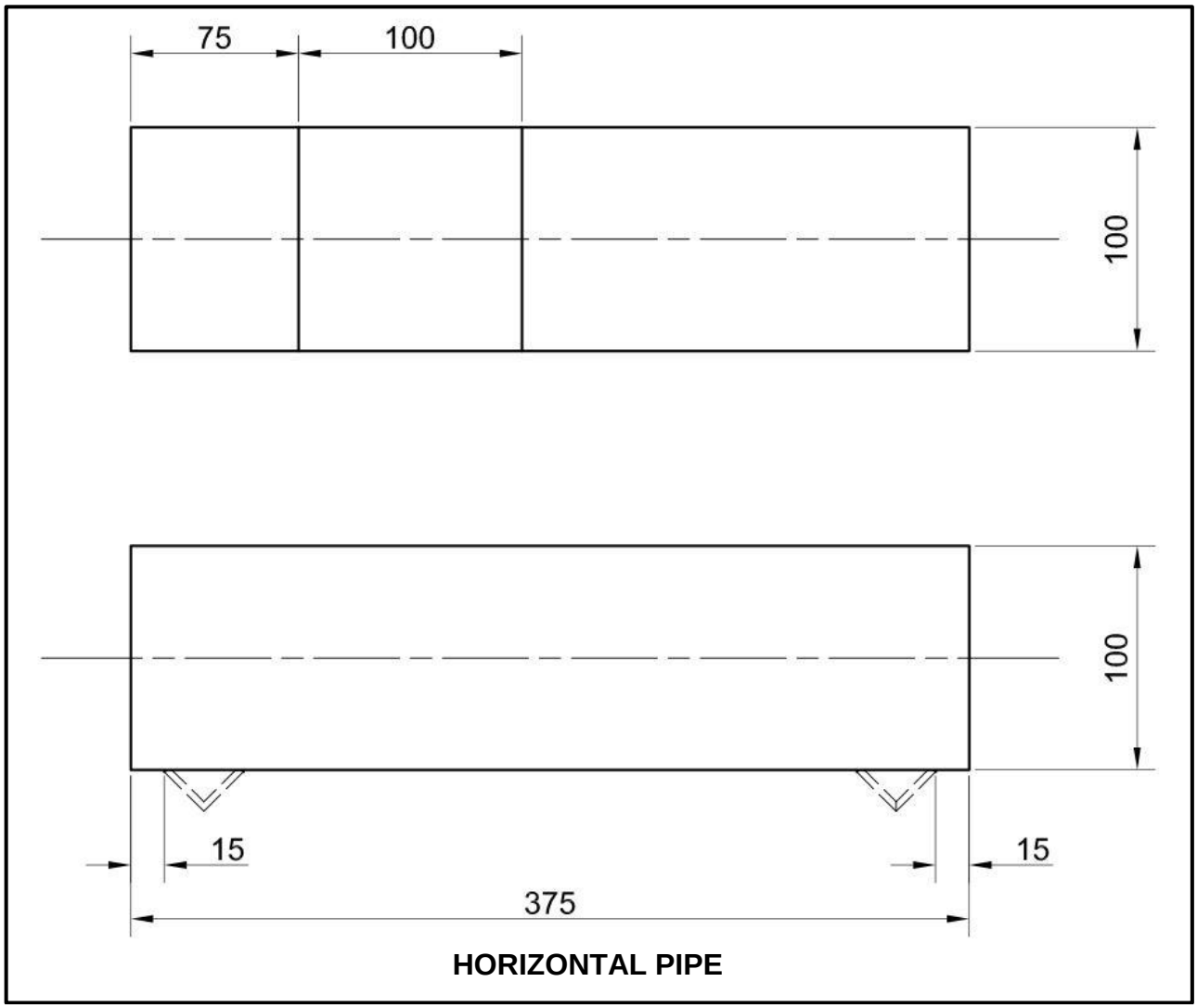


FIGURE 3

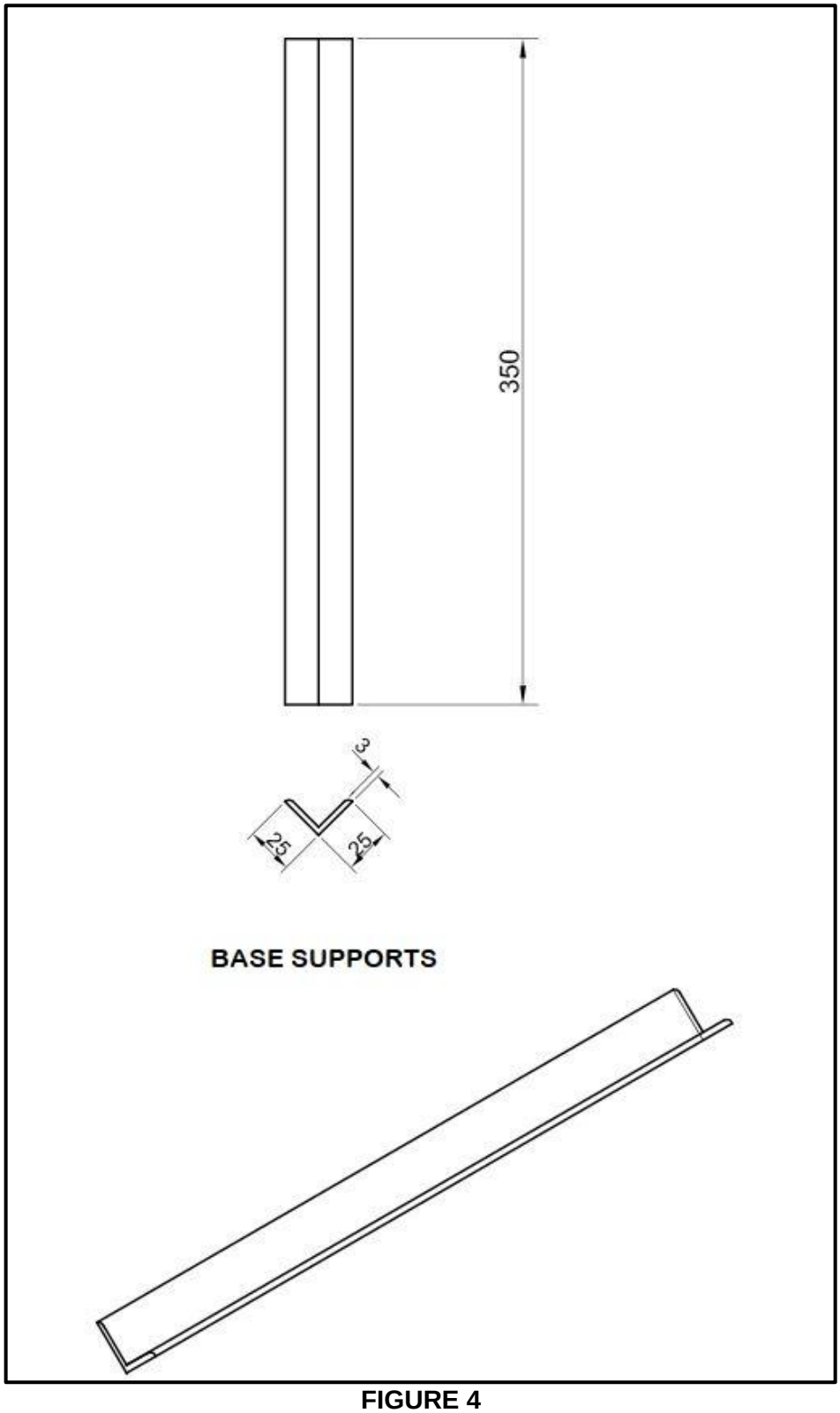


FIGURE 4

MECHANICAL TECHNOLOGY												
WELDING AND METALWORK												
MARK SHEET – BASE SUPPORT AND HORIZONTAL PIPE – PHASE 1												
GRADE	**12**	**DATE**										
PROJECT	**ROCKET STOVE**											
FACETS		**MARKS**	**LEARNERS**									
			1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
BASE SUPPORT	Cut angle iron according to measurements	**5**										
	Remove all burrs from supports	**5**										
HORIZONTAL PIPE	Measure and mark to size 375 mm	**5**										
	Cut to size 375 mm	**5**										
	Measure and cut expanded metal to 100 x 00 mm **OR** Mark 16 x holes to drill	**10**										
	Weld expanded metal into position **OR** Drill 16 x Ø10 equally spaced holes	**10**										
	Weld base supports in position (2 x 5)	**10**										
SUBTOTAL:		**50**										
TOTAL:		**50**										
NAME AND SIGNATURE OF TEACHER												
NAME AND SIGNATURE OF TECHNICAL DEPARTMENT HEAD												
NAME AND SIGNATURE OF SUBJECT MODERATOR												

PHASE 2: VERTICAL AND CHARGE PIPES
April–June 2022

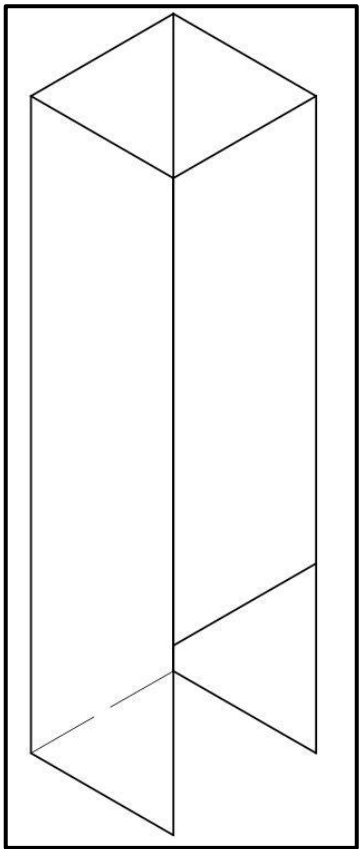


FIGURE 5

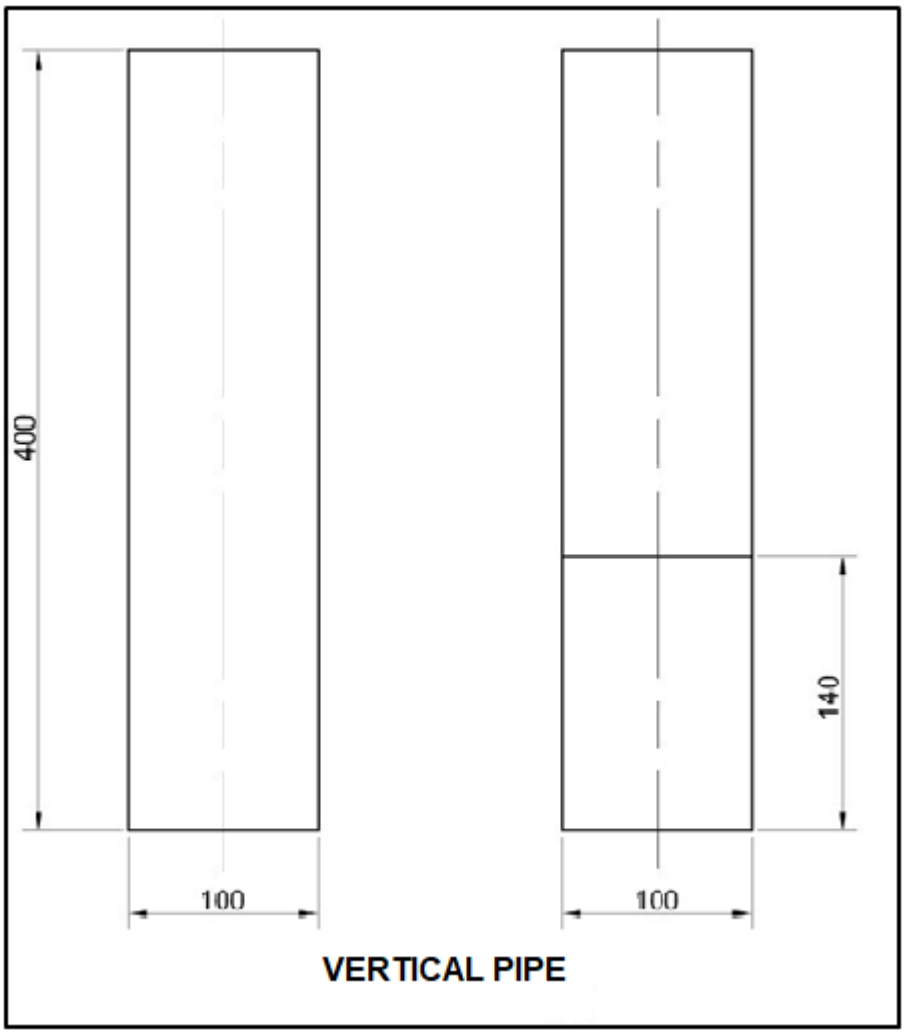


FIGURE 6

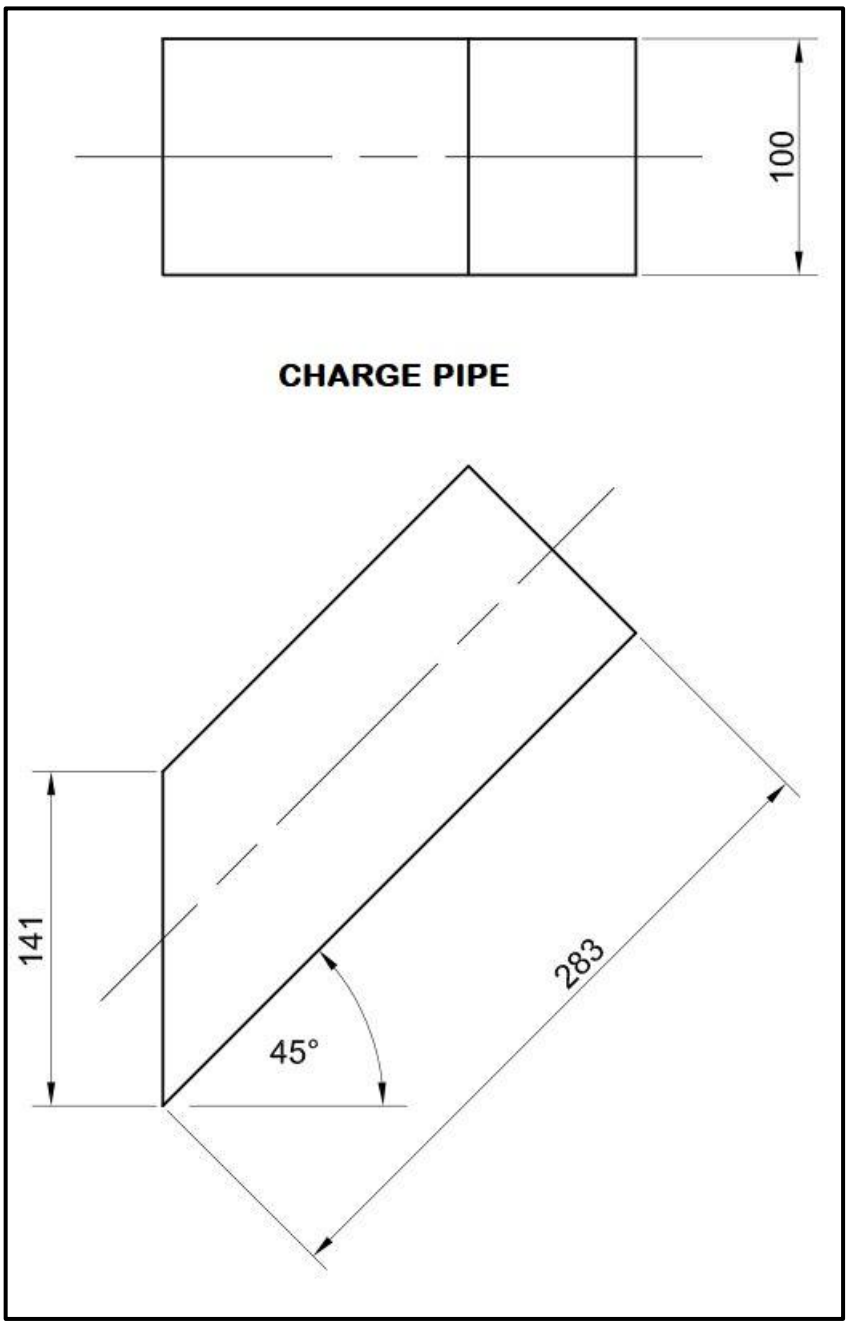


FIGURE 7

MECHANICAL TECHNOLOGY												
WELDING AND METALWORK												
MARK SHEET – VERTICAL AND CHARGE PIPES – PHASE 2												
GRAD	12	DATE										
PROJECT	ROCKET STOVE											
FACETS		MARKS	LEARNERS									
			1	2	3	4	5	6	7	8	9	10
VERTICAL PIPE	Measure and mark to length 400 mm and to cut out 140 mm (2 x 5)	10										
	Cut to size 400 mm	5										
	Cut out 140 x 100 mm	5										
	File all burrs	5										
CHARGE PIPE	Measure and mark to length of 283 mm	5										
	Measure and mark angle to 45°	5										
	Cut to size 283 mm	5										
	Cut 45° angle	5										
	File all burrs	5										
	Weld vertical and charge pipes (3 x 5)	15										
SUBTOTAL:		65										
TOTAL:		50										
NAME AND SIGNATURE OF TEACHER												
NAME AND SIGNATURE OF TECHNICAL DEPARTMENT HEAD												
NAME AND SIGNATURE OF SUBJECT MODERATOR												

PHASE 3: COVERS AND GRID
July–August 2022

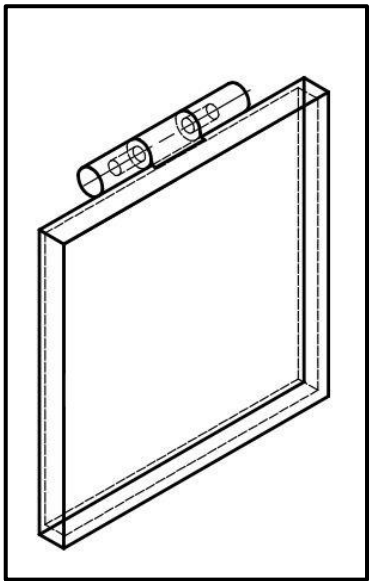


FIGURE 8

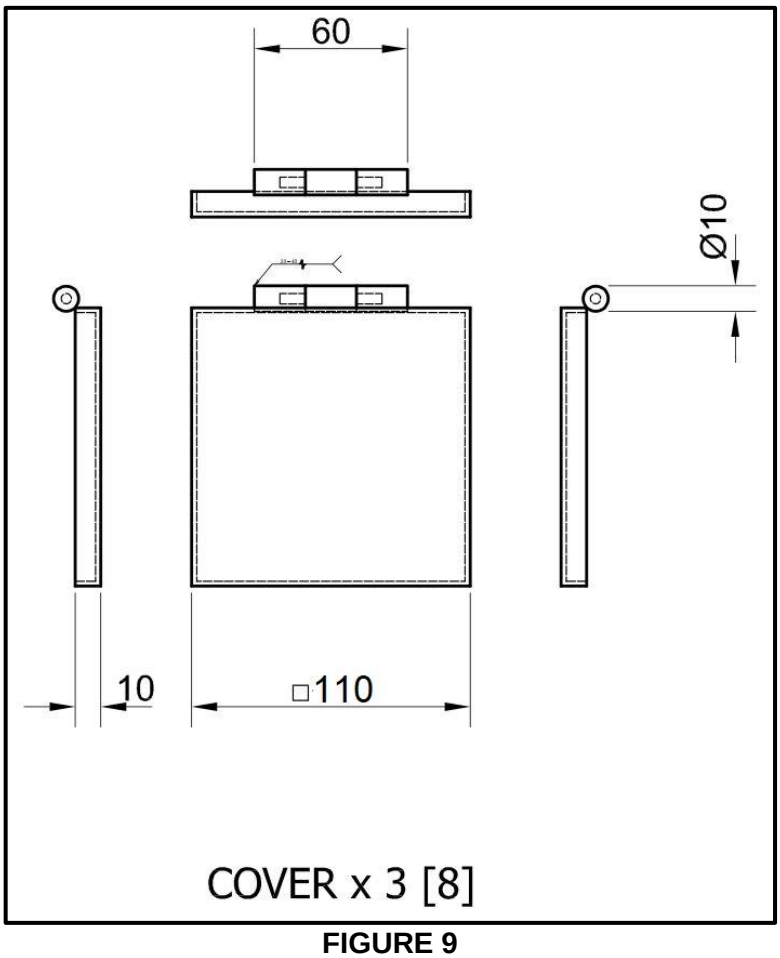


FIGURE 9

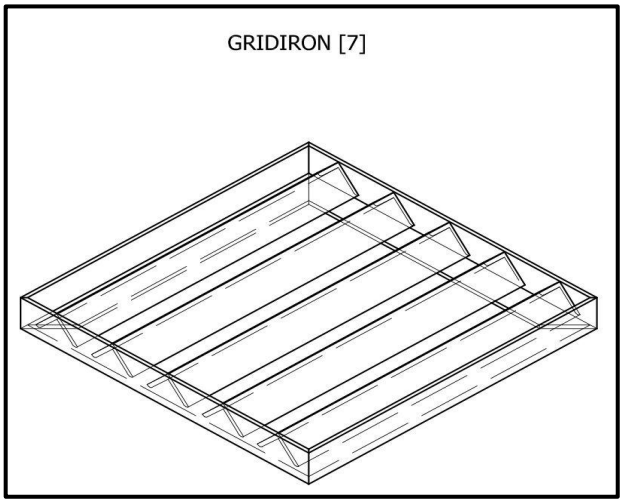


FIGURE 10

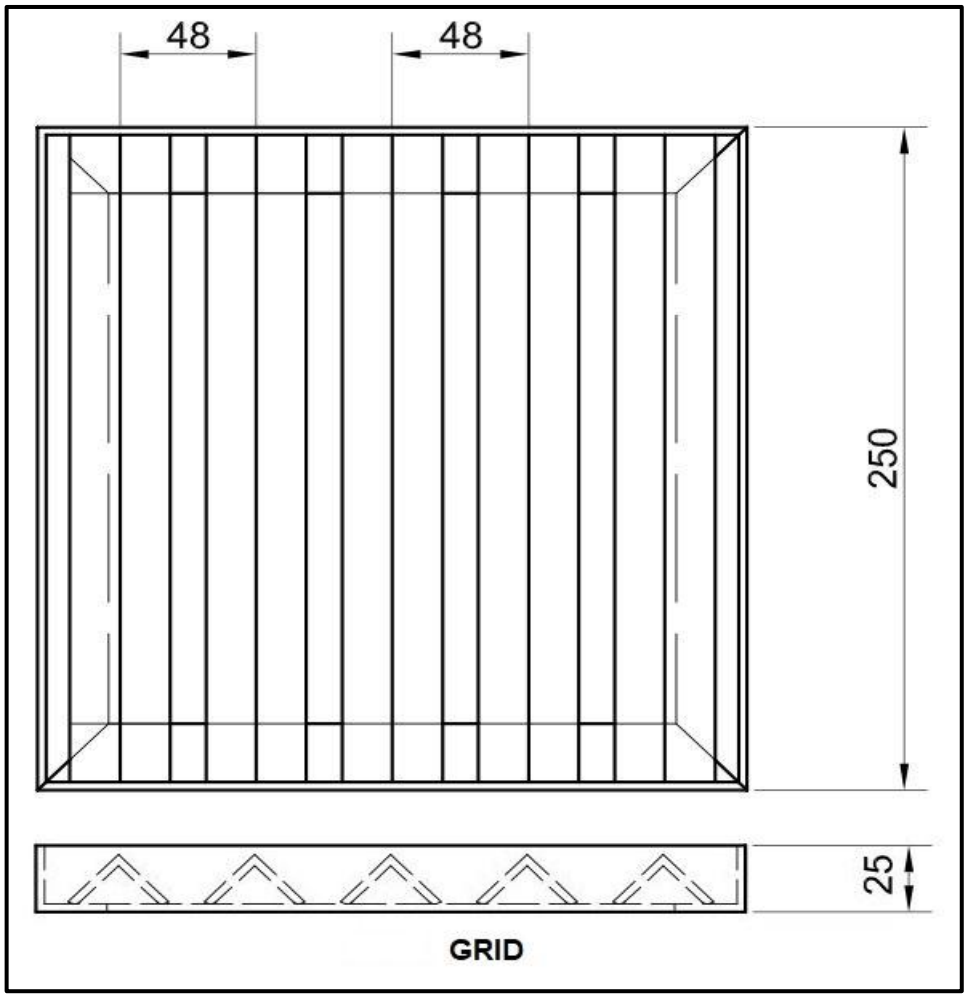


FIGURE 11

MECHANICAL TECHNOLOGY												
WELDING AND METALWORK												
MARK SHEET – COVERS AND GRID – PHASE 3												
GRADE	**12**	**DATE**										
PROJECT	**ROCKET STOVE**											
FACETS		**MARKS**	**LEARNERS**									
			1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
COVER 1	Measure and mark to size	**5**										
	Cut to required size	**5**										
	Bend to required shape	**5**										
	Weld corners	**5**										
	Weld hinges onto cover	**5**										
COVER 2	Measure and mark to size	**5**										
	Cut to required size	**5**										
	Bend to required shape	**5**										
	Weld corners	**5**										
	Weld hinges onto cover	**5**										
COVER 3	Measure and mark to size	**5**										
	Cut to required size	**5**										
	Bend to required shape	**5**										
	Weld corners	**5**										
	Weld hinges onto cover	**5**										
GRID	Measure and mark frame to size 250 mm	**5**										
	Measure and mark braces to 244 mm	**5**										
	Cut to frame to 250 mm	**5**										
	Cut bracing to 244 mm	**5**										
	Mitre 4 corners (4 x 5)	**20**										
	Weld all corners (4 x 5)	**20**										
	Weld angle iron braces (5 x 5)	**25**										
SUBTOTAL:		**160**										
TOTAL:		**50**										
NAME AND SIGNATURE OF TEACHER												
NAME AND SIGNATURE OF TECHNICAL DEPARTMENT HEAD												
NAME AND SIGNATURE OF SUBJECT MODERATOR												

PHASE 4: DEVELOPMENT AN ON-SET HOPPER
January–August 2022

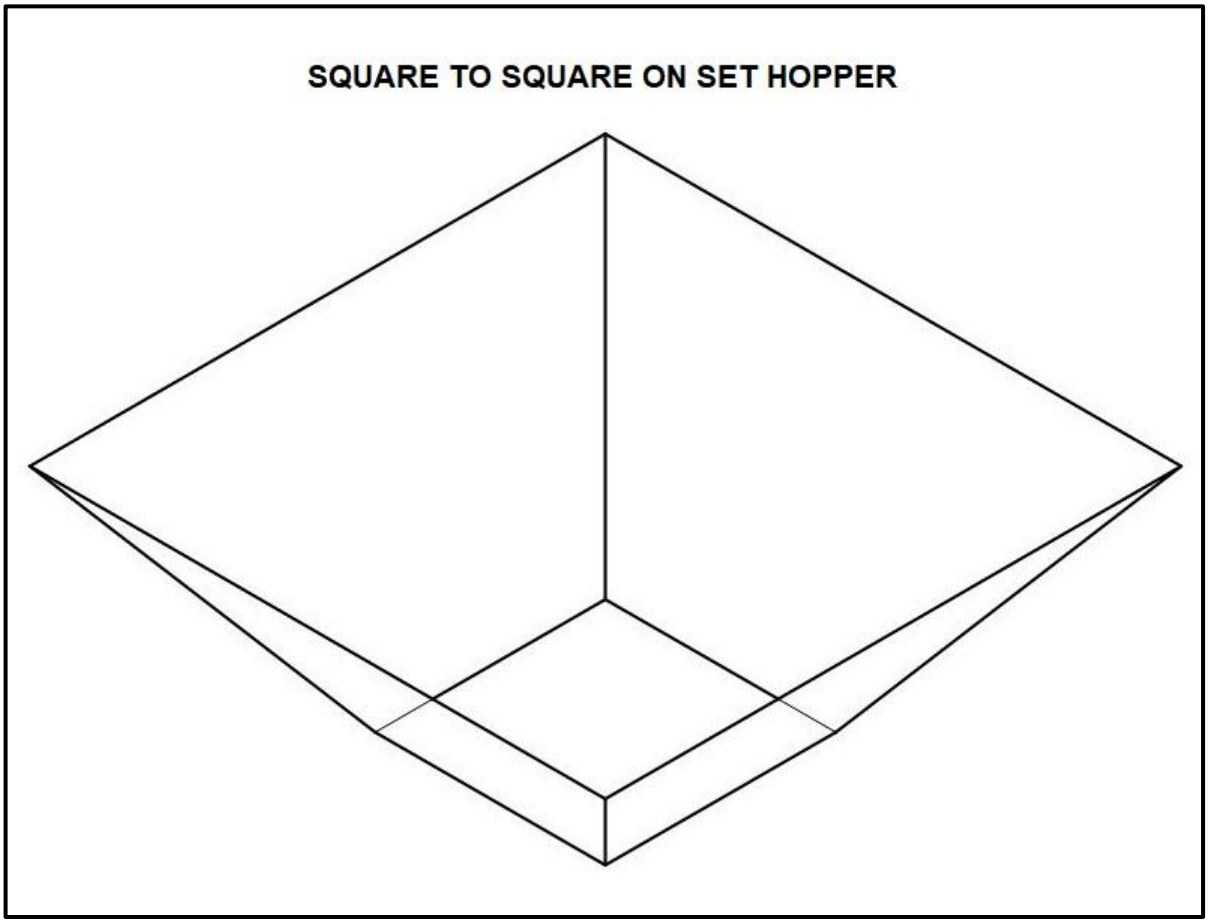


FIGURE 12

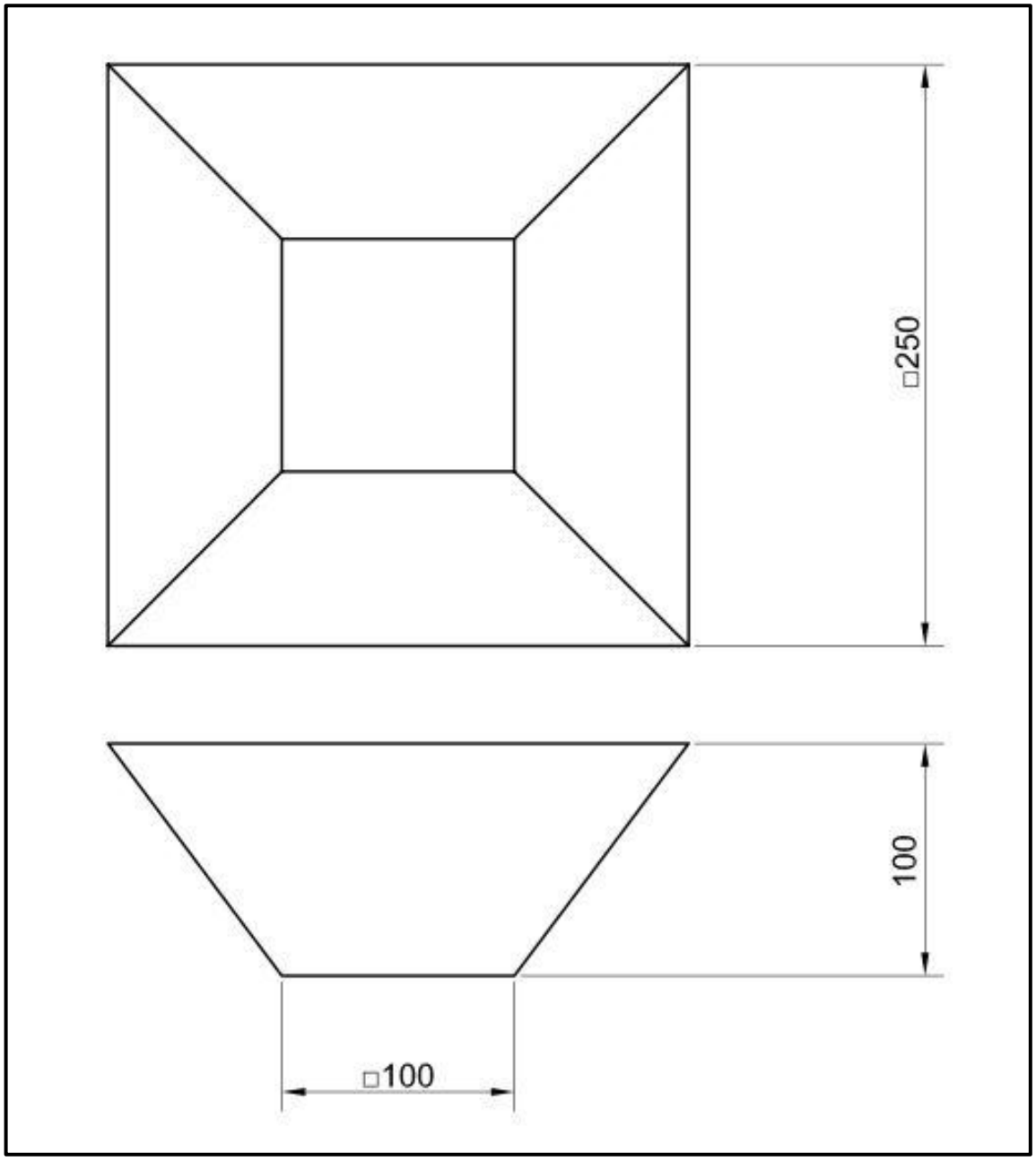


FIGURE 13

MECHANICAL TECHNOLOGY											
WELDING AND METALWORK											
MARK SHEET – DEVELOPMENT AND ON-SET HOPPER – PHASE 4											
GRADE		12		DATE							
PROJECT		ROCKET STOVE									
		LEARNERS									
FACETS	MARKS	1	2	3	4	5	6	7	8	9	10
Template calculations (refer to **ANNEXURE A**)	10										
Marking out of template	5										
Cutting of template	5										
Transfer of template to plate metal	5										
Cutting of transition pieces (4 sides x 5)	20										
Welding of transition pieces – Sides 1–4 (4 x 5)	20										
Welding of transition piece to vertical pipe (4 x 5)	20										
Assembling of vertical to horizontal pipe (4 x 5)	20										
Presentation (sanding-finish of product)	5										
Presentation (painting product)	5										
Functionality	5										
SUBTOTAL	120										
TOTAL	100										
NAME AND SIGNATURE OF TEACHER											
NAME AND SIGNATURE OF TECHNICAL DEPARTMENT HEAD											
NAME AND SIGNATURE OF SUBJECT MODERATOR											

MECHANICAL TECHNOLOGY											
WELDING AND METALWORK											
MARK SHEET – TOTALS											
GRADE		12		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 AND SIGNATURE OF TEACHER		
NAME AND SIGNATURE OF TECHNICAL DEPARTMENT HEAD		
NAME AND SIGNATURE OF PRINCIPAL		
NAME AND SIGNATURE OF SUBJECT MODERATOR		

5. CONCLUSION

On completion of the practical assessment task learners should be able to demonstrate their understanding of the industry, enhance their knowledge, skills, values and reasoning abilities as well as establish connections to life outside the classroom and address real-world challenges. The PAT furthermore develops learner's life skills and provides opportunities for learners to engage in their own learning.

ANNEXURE A – TEMPLATE CALCULATION (10)

NAME AND SURNAME: _____

EXAMINATION NUMBER: _____