



# **basic education**

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Department:  
Basic Education  
**REPUBLIC OF SOUTH AFRICA**

## **MECHANICAL TECHNOLOGY (FITTING AND MACHINING)**

### **GUIDELINES FOR PRACTICAL ASSESSMENT TASKS**

**GRADE 12**

**2024**

**These guidelines consist of 24 pages.**

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## 1. INTRODUCTION

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 candidates 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 candidate 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., test or examination. It is therefore important that schools ensure that all candidates complete the practical assessment tasks within the stipulated period to ensure that candidate 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.

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 candidate in each specialisation field. A nation's true wealth is in its manpower and education that should aim to develop the talents of a candidate so that he/she can contribute to the well-being of the society by using and developing scientific and technological resources.

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

- An attitude where the candidate 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 candidate with the necessary practical capabilities for the required processes. Practical training is the application of acquiring essential skills to bridge the gap between trade theory and practice.

Practical application in the workshop must therefore be made an interesting and challenging experience to develop the candidates both physically and mentally. The candidates must show their initiative, curiosity and persistence to 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 candidates 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, candidates can easily assess their progress. It is the responsibility of the teacher to administer formal 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 Grade 10–12.)

Should the candidate make mistakes on a specific task, or the specific PAT phase is not done according to instruction, the candidate can be given an extended opportunity within the allocated timeframe of the phase to redo the task so that it is of satisfactory quality.

**Teachers MUST build a prototype of the task to be able to demonstrate to the candidates what the final product will look like.** It will guide the candidates with visual presentation. It provides the teacher 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.

All tasks are to be completed onsite under teacher supervision. No PAT tasks are supposed to leave the site until the external moderation has been conducted.

### 2.2 Assessment of the PAT

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

Both formal and informal assessment should be conducted to ensure that the embedded skills are developed. Informal assessments must be conducted to monitor the progress of the candidates. On completion of a phase, the candidate must use the rubric and complete the provided mark sheet under the heading of self-assessment to conduct his/her own informal assessment before the teacher conducts formal assessment. The candidate must sign and date the mark sheet on completion of each self-assessment.

After completion by the candidate of his/her own informal assessment, the teacher must then use the same mark sheet in the candidate's portfolio of evidence to complete the formal assessment and provide feedback comments (if needed) to the candidate.

All mark sheets in the candidate's portfolio of evidence must be signed by the teacher, departmental head and moderator (if the candidate was moderated). The formal mark must be recorded on the composite mark sheet. The composite mark sheets **MUST** be signed by the teacher, departmental head and the principal before external moderation commences.

On completion of each phase in each term, the marks for the completed phase need to be recorded onto the South African School Administration and Management System (SASAMS).

### **2.3 Moderation of the PAT**

Internal moderation by the departmental head of the school **MUST** be conducted for each completed phase of the task. Evidence of moderation reports must be available in the teacher file and be available as proof for provincial and external moderation. The internal moderator must use the same mark sheets as which are available in the candidate's portfolio of evidence whereby the candidate has conducted self-assessment and formal assessment by the teacher.

Marks must be recorded in the provided space for internal moderation. The marks on the school administration system, captured by the school, must be verified by the moderator against the composite mark sheet. 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 candidate 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.

Each project must be clearly marked with the correct initials and surname of the candidate.

### **2.4 Consequences of absence/non-submission of tasks.**

If a candidate's practical assessment task is incomplete or unavailable with valid reason, the candidate may be given three weeks before the commencement of the final end-of-year examination to submit the outstanding task. Should the candidate fail to fulfil the outstanding PAT requirement, such a candidate will be awarded a zero mark for that PAT component.

A candidate's results are regarded as incomplete if he/she does not present 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 candidate 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 candidate runs the risk of not being resulted at the end of the year.

**2.5 Declaration of Authenticity**

NAME OF THE SCHOOL:

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NAME OF CANDIDATE:

---

(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 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

SCHOOL STAMP

### 3. CANDIDATE GUIDELINES

#### Instructions to the candidates

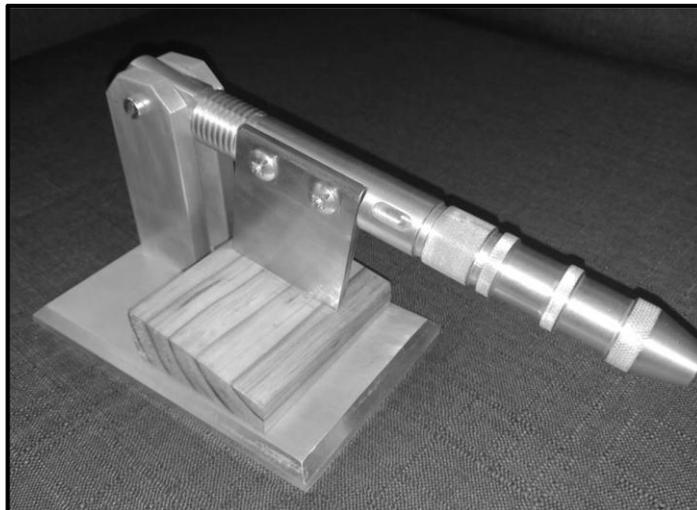
- The PAT consists of a specialisation task in **Fitting and Machining**. The practical work is spread over three terms, as set out in this document. (See CAPS document.)
- All tasks must be completed according to the time frames set out in this document.
- Candidates are requested to actively engage in all practical assessment tasks.
- Candidates who are uncooperative will receive demerits or a zero mark for that particular section of the work.
- Candidates who act unsafely in the workshop and place other candidates in danger, will be given additional corrective tasks to improve their safety awareness.
- Your task must be fully completed by the end of August 2024 to be ready for provincial and/or national moderation.
- Your task needs to be **clearly marked** with your name and surname.
- On completion of a phase, you need to conduct self-assessment by using the provided marking rubric in this document.
- After your self-assessment is completed, you must present your completed project and portfolio of evidence to the teacher for formal assessment and feedback.
- Candidates **MUST** complete the **Declaration of Authenticity** to declare that the project they presented for formal assessment is their own work.
- Each term must have a completed phase in order to enter the mark on the working mark sheet and the South African School Administration and Management System (SASAMS).

**4. SPECIALISATION: FITTING AND MACHINING (SPECIFIC)**

**TASK: BILTONG CUTTER**



**FIGURE 1**



**FIGURE 2**

**Term: 1 to 3****Start date: January 2024****Completion date: August 2024****The following standards must be achieved:**

- All sizes must be within the given tolerance.
- There must be no damage to tools and equipment.
- All appropriate safety procedures must be adhered to.
- The project must be well presented.

**RESOURCES REQUIRED FOR THE PAT:**

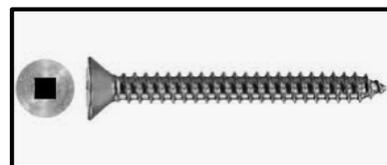
CONSUMABLE MATERIALS REQUIRED PER CANDIDATE					
Part	Material	Cutting list	Quantity per candidate	No. of candidates	Total quantity
Baseplate	Mild steel/Aluminium 100 x 10 mm flat bar	162 x 96 x 10	1		
Side plates	Mild steel/Aluminium 40 x 10 flat bar	102 x 40 x 10	2		
Blade	Mild steel/Stainless steel 60 x 3 flat bar	72 x 3	1		
Cutting block	Nylon/Wood	88 x 72 x 30	1		
Handle	Mild steel/Aluminium/ Brass Ø25 mm round bar	Ø25 x 255	1		
Bolts	Mild steel/Stainless steel	M6 x 35	1		
Countersink bolts	Mild steel/Stainless steel	M6 x 20	4		
Bolts	Mild steel/Stainless steel	M6 x 10	2		
Self-tapping countersink screws	Mild steel/Stainless steel	8 gauge (4,2 mm)	2		
Nylock nut	Mild steel/Stainless steel	M6	1		

**EXAMPLES:**

**FIGURE 3**  
M6 hex bolts

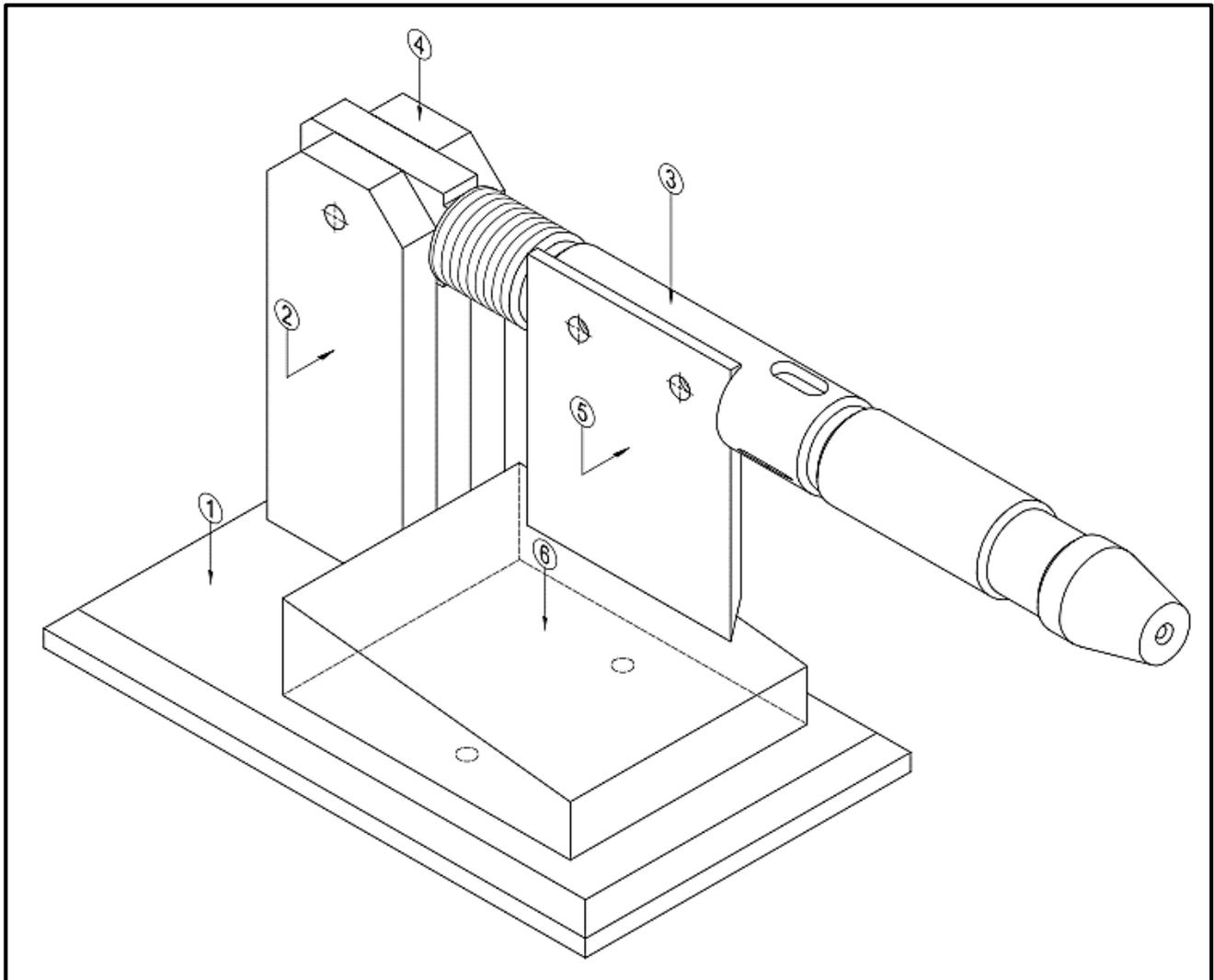


**FIGURE 4**  
M6 Nylock nuts



**FIGURE 5**  
Countersink screw

**ISOMETRIC VIEW**



**FIGURE 6: ISOMETRIC DRAWING**

PARTS	
1	Base plate
2	Side plate
3	Handle
4	Side plate
5	Blade
6	Cutting block

**RUBRICS****DRILLING AND TAPPING**

**NOTE:** Use RUBRIC A below for assessment of all holes to be drilled.

<b>RUBRIC A – DRILLING OF HOLES</b>	
<b>Assessment facet</b>	<b>Mark</b>
Hole drilled in correct position on work piece	1
Drilling of correct diameter of hole	1
Depth correctly drilled (blind or open hole)	1
Hole perpendicular to work piece	1
Hole clean and without burrs	1
<b>Subtotal:</b>	<b>5</b>

**NOTE:** Use RUBRIC B below for assessment of all screw threads that have been tapped.

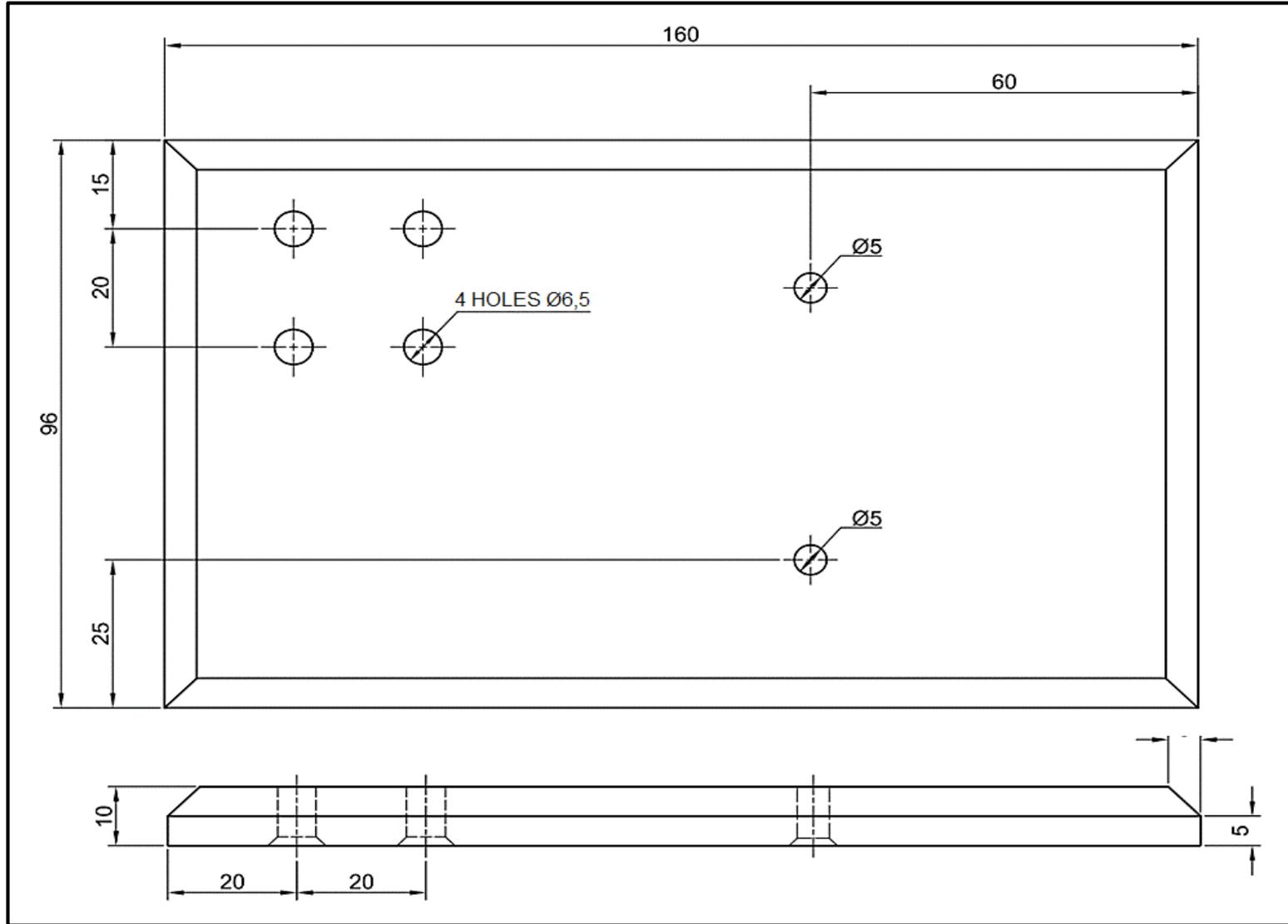
<b>RUBRIC B – TAPPING OF SCREW THREADS</b>	
<b>Assessment facet</b>	<b>Mark</b>
Cut correct screw thread	1
Screw thread perpendicular to work piece	1
Screw thread has no burrs on outside	1
Depth/Length tapped correctly	1
No defects (e.g. cross thread)	1
<b>Subtotal:</b>	<b>5</b>

**TOLERANCE RANGES****LENGTHS AND DIAMETERS**

**NOTE:** On all the lengths and diameters candidates will lose 1 mark for every 0,1 mm deviation from the basic size. Use RUBRIC C for assessment of all lengths and diameters.

<b>RUBRIC C – LENGTHS AND DIAMETERS</b>	
<b>Deviation</b>	<b>Mark deductions</b>
0–0,1	-0
0,1–0,2	-1
0,2–0,3	-2
0,3–0,4	-3
0,4–0,5	-4
0,5 and more	-5

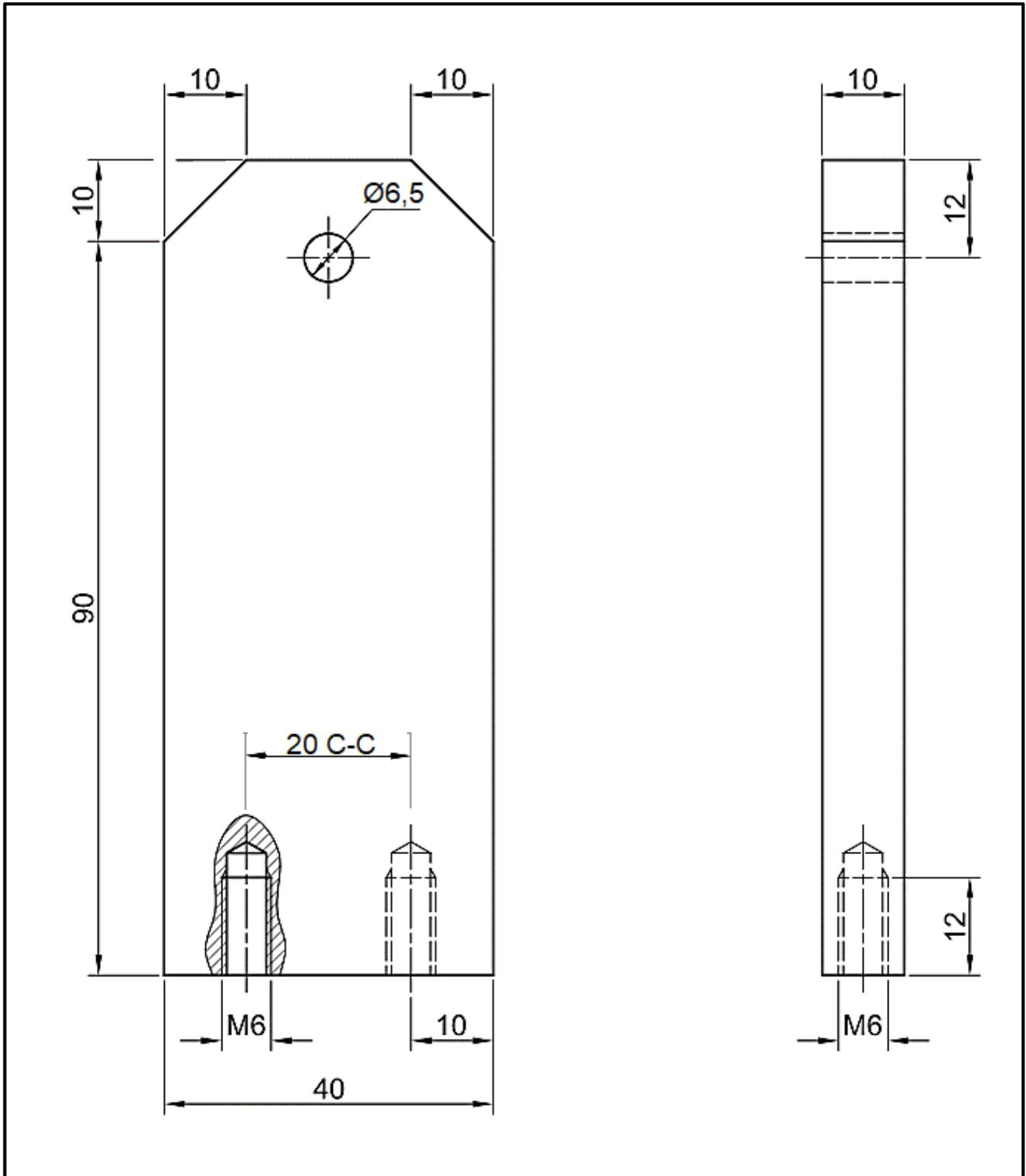
**PHASE 1: BASEPLATE**  
**January–March 2024**



**FIGURE 7: BASEPLATE**

MECHANICAL TECHNOLOGY							
FITTING AND MACHINING							
MARK SHEET – BASEPLATE – PHASE 1							
GRADE	12	DATE					
PROJECT	BILTONG CUTTER						
CANDIDATE NAME							
FACETS	MARKS	Candidate – Self-assessment	Teacher Assessment	Internal Moderation	Provincial Moderation	External Moderation	TEACHER COMMENTS
		1	2	3	4	5	
Measure and cutting/machining the size (160 mm x 96 mm)	10						
Drill 4 x Ø6,5 mm holes according to the correct measurements.	20						
Milling the 45° (assess the 5 mm vertical height on two sides)	10						
Drill the 2 x Ø5 mm bottom holes for the cutting block according to the correct measurements.	10						
Finishing	5						
<b>Subtotal:</b>	<b>55</b>						
<b>PHASE 1 TOTAL:</b>	<b>50</b>						
<b>MODERATOR COMMENTS:</b>							
<b>NAME AND SIGNATURE OF CANDIDATE</b>							
<b>NAME AND SIGNATURE OF TEACHER</b>							
<b>NAME AND SIGNATURE OF TECHNICAL DEPARTMENTAL HEAD</b>							
<b>NAME AND SIGNATURE OF INTERNAL MODERATOR</b>							
<b>NAME AND SIGNATURE OF EXTERNAL MODERATOR</b>							

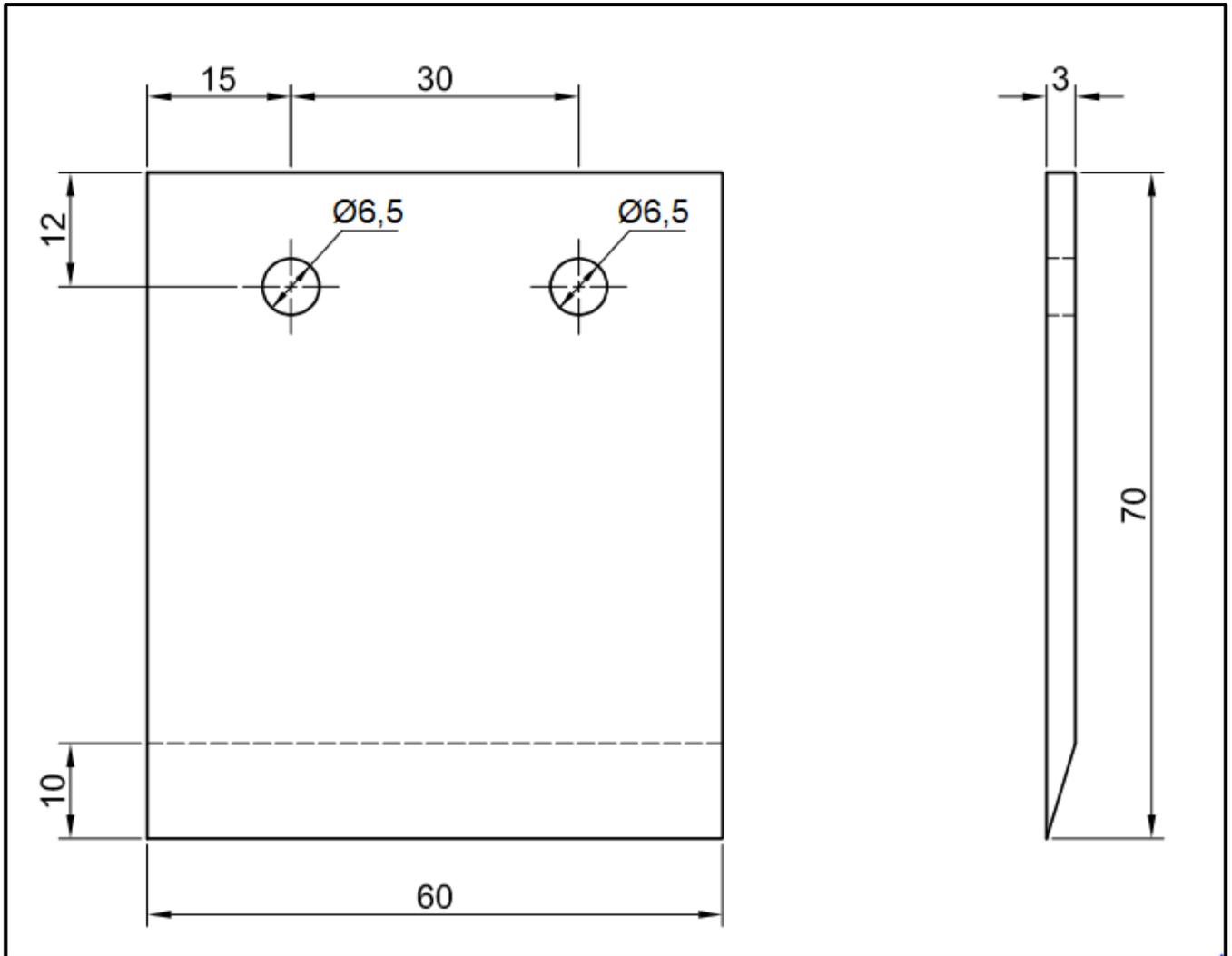
**PHASE 2: SIDE PLATES**  
April–June 2024



**FIGURE 8: SIDE PLATES**

MECHANICAL TECHNOLOGY							
FITTING AND MACHINING							
MARK SHEET – SIDE PLATES – PHASE 2							
GRADE	12	DATE					
PROJECT	BILTONG CUTTER						
CANDIDATE NAME							
FACETS	MARKS	Candidate – Self-assessment	Teacher Assessment	Internal Moderation	Provincial Moderation	External Moderation	TEACHER COMMENTS
		1	2	3	4	5	
Measure and cutting/machining the sizes of the two side plates (100 mm x 40)	20						
Drill the Ø6,5 mm holes according to the correct measurements on both of the side plates.	10						
Milling the 45° angles (assess the 20 mm)	10						
Drill the 4 x Ø5 mm bottom holes according to the correct measurements for tapping purposes.	20						
Tap the four holes to M6.	20						
Finishing	5						
<b>Subtotal:</b>	<b>85</b>						
<b>PHASE 2 TOTAL:</b>	<b>50</b>						
<b>MODERATOR COMMENTS:</b>							
<b>NAME AND SIGNATURE OF CANDIDATE</b>							
<b>NAME AND SIGNATURE OF TEACHER</b>							
<b>NAME AND SIGNATURE OF TECHNICAL DEPARTMENTAL HEAD</b>							
<b>NAME AND SIGNATURE OF INTERNAL MODERATOR</b>							
<b>NAME AND SIGNATURE OF EXTERNAL MODERATOR</b>							

**PHASE 3: (a) BLADE AND (b) CUTTING BLOCK**  
July–August 2024



**FIGURE 9: 3(a) BLADE**

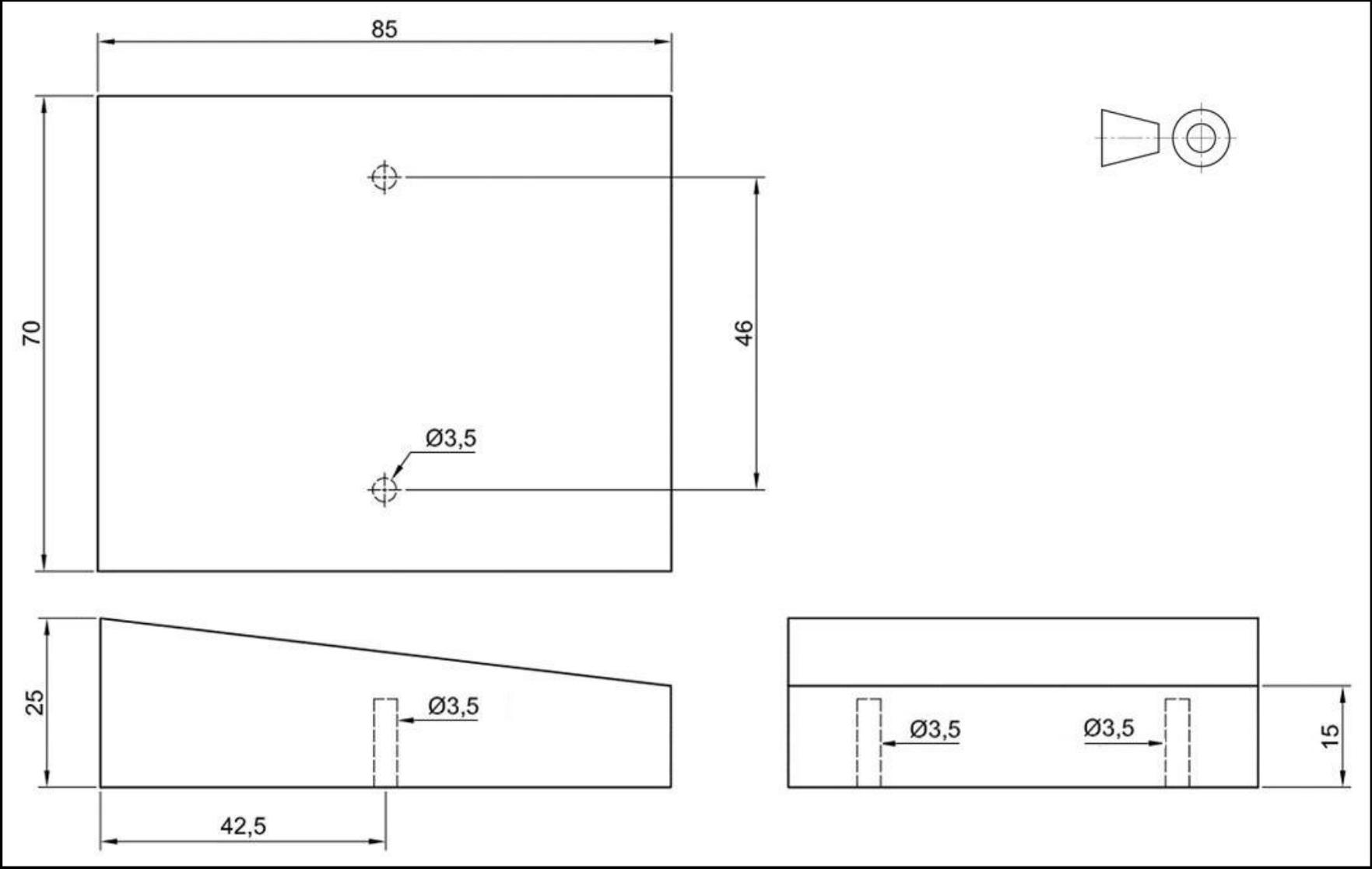


FIGURE 10: 3(b) CUTTING BLOCK

MECHANICAL TECHNOLOGY							
FITTING AND MACHINING							
MARK SHEET – BLADE AND CUTTING BLOCK – PHASE 3							
GRADE	12	DATE					
PROJECT	BILTONG CUTTER						
CANDIDATE NAME							
FACETS	MARKS	Candidate – Self-assessment	Teacher Assessment	Internal Moderation	Provincial Moderation	External Moderation	TEACHER COMMENTS
		1	2	3	4	5	
Measure and cutting/machining the sizes of the blade (1 x 70 mm x 60 mm)	10						
Drill the 2 x Ø6,5 mm holes on the blade according to the correct measurements.	10						
Grinding the cutting edge of the blade according to size (10 mm)	5						
Measure and cutting/machining the sizes of the cutting block (1 x 85 mm x 70 mm)	10						
Measure and cutting/machining the angle of the cutting block (front 15 mm and back 25 mm)	10						
Finishing	5						
<b>PHASE 3 TOTAL:</b>	<b>50</b>						
<b>MODERATOR COMMENTS:</b>							
<b>NAME AND SIGNATURE OF CANDIDATE</b>							
<b>NAME AND SIGNATURE OF TEACHER</b>							
<b>NAME AND SIGNATURE OF TECHNICAL DEPARTMENTAL HEAD</b>							
<b>NAME AND SIGNATURE OF INTERNAL MODERATOR</b>							
<b>NAME AND SIGNATURE OF EXTERNAL MODERATOR</b>							





MECHANICAL TECHNOLOGY							
FITTING AND MACHINING							
MARK SHEET – HANDLE – PHASE 4							
GRADE	12	DATE					
PROJECT	BILTONG CUTTER						
CANDIDATE NAME							
FACETS	MARKS	Candidate – Self-assessment	Teacher Assessment	Internal Moderation	Provincial Moderation	External Moderation	TEACHER COMMENTS
		1	2	3	4	5	
Cutting/Machining 250 mm length	5						
Cutting/Machining Ø24 mm thickness	5						
Cutting 45° angle of handle (Ø18 mm) (Part 1)	5						
Assess cutting depth of 7 mm x 2 (Part 2).	10						
Measure and cutting/machining depth 7 mm (Part 4)	5						
Cutting/Machining of 3 x parallel keyways 120° apart and 3 mm deep (Part 5)	15						
Cutting/Machining the Ø21 mm (Part 7)	5						
Calculate the setting of the compound slide (Calculation 1).	5						
Cutting/Machining the taper (Part 8)	5						
Drilling the 2 x Ø5 mm holes according to the correct measurements (Part 4)	10						
Tap the two Ø5 mm holes to M6.	10						
Drilling the Ø6 mm hole on Part 2 according to the correct measurements	5						
Calculation of the depth of the M24 x 2,5 screw thread (Calculation 2)	5						
Cutting the M24 x 2,5 screw thread on the lathe (crest diameter 24 mm) (Part 3)	5						
Assess the depth of the screw thread by using a thread pitch gauge.	5						
Assess the screw thread pitch by using a thread pitch gauge.	5						

Assess the quality of the screw thread.	5						
Knurling (Part 6)	5						
Finishing	5						
<b>Subtotal:</b>	<b>120</b>						
<b>PHASE 4 TOTAL:</b>	<b>100</b>						
<b>MODERATOR COMMENTS:</b>							
<b>NAME AND SIGNATURE OF CANDIDATE</b>							
<b>NAME AND SIGNATURE OF TEACHER</b>							
<b>NAME AND SIGNATURE OF TECHNICAL DEPARTMENTAL HEAD</b>							
<b>NAME AND SIGNATURE OF INTERNAL MODERATOR</b>							
<b>NAME AND SIGNATURE OF EXTERNAL MODERATOR</b>							

<b>MECHANICAL TECHNOLOGY</b>											
<b>FITTING AND MACHINING</b>											
<b>COMPOSITE MARK SHEET – TOTALS</b>											
<b>GRADE</b>		<b>12</b>		<b>DATE</b>							
<b>PROJECT</b>		<b>BILTONG CUTTER</b>									
		<b>CANDIDATES</b>									
<b>PHASES</b>	<b>MARKS</b>										
		<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>
<b>PHASE 1</b>	50										
<b>PHASE 2</b>	50										
<b>PHASE 3</b>	50										
<b>PHASE 4</b>	100										
<b>TOTAL:</b>	<b>250</b>										
<b>TOTAL PAT MARK:</b>	<b>100</b>										
<b>NAME AND SIGNATURE OF TEACHER</b>											
<b>NAME AND SIGNATURE OF TECHNICAL DEPARTMENTAL HEAD</b>											
<b>NAME AND SIGNATURE OF PRINCIPAL</b>											
<b>NAME AND SIGNATURE OF INTERNAL MODERATOR</b>											
<b>NAME AND SIGNATURE OF EXTERNAL MODERATOR</b>											

SCHOOL STAMP

## 5. CONCLUSION

On completion of the practical assessment task candidates 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 the candidate's life skills and provides opportunities for candidates to engage in their own learning.