



**basic education**

---

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

# **ENGINEERING GRAPHICS AND DESIGN**

## **GUIDELINES FOR PRACTICAL ASSESSMENT TASKS**

**GRADE 12**

**2023**

**These guidelines consist of 28 pages.**

**TABLE OF CONTENTS**

<b>1. INTRODUCTION</b>	<b>3</b>
<b>SECTION A (TEACHER GUIDELINES)</b>	<b>4</b>
<b>2. STRUCTURE OF THE EGD PAT</b>	<b>4</b>
<b>3. INSTRUCTIONS FOR THE ADMINISTRATION OF THE PAT</b>	<b>5</b>
<b>4. ASSESSMENT AND MODERATION OF THE PAT</b>	<b>6</b>
4.1 Assessment	6
4.2 Moderation	8
<b>5. CONCLUSION</b>	<b>8</b>
<b>SECTION B (LEARNER TASKS)</b>	<b>9</b>
<b>6. PRACTICAL ASSESSMENT TASK 1 (PAT 1)</b>	<b>10</b>
A civil design project	10
<b>7. PRACTICAL ASSESSMENT TASK 2 (PAT 2)</b>	<b>18</b>
A mechanical design project	18
<b>8. ANNEXURE A: ASSESSMENT RUBRIC</b>	<b>25</b>
<b>9. SIMPLIFIED RUBRIC FOR ALLOCATION AND VERIFICATION OF MARKS</b>	<b>26</b>
<b>10. PAT 2023: SUMMATIVE ASSESSMENT SHEET</b>	<b>27</b>
<b>11. DECLARATION OF AUTHENTICITY</b>	<b>28</b>

## 1. INTRODUCTION

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

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

A practical assessment task (PAT) 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 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. test or examination. 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.

## SECTION A (TEACHER GUIDELINES)

### 2. STRUCTURE OF THE PAT

The Engineering Graphics and Design (EGD) **PAT** is a **compulsory national formal assessment task** that contributes 100 marks (25%) towards a learner's final NSC mark. It is therefore regarded as a **third NSC examination paper**.

The purpose of the PAT is to assess topics, content and concepts, which are contained in the CAPS, but not assessed in tests or examinations. These are:

- The design process
- The application of the design process
- The quality and neatness of freehand, instrument and CAD drawings

With the inclusion of the research component as part of the design process, content and concepts that are not included in the CAPS may be included in the PAT. The PAT is therefore designed to develop a learner's ability to integrate and apply knowledge that is taught and self-acquired, and to demonstrate attained levels of skills and competency.

The PAT gives the learner an opportunity to apply knowledge in a creative way through the design process. The learner is also given an opportunity to complete the PAT in an environment which is more conducive to the creative processes. This environment should therefore provide the learner with easier access to, and a wider variety of, resource material than would otherwise be available in a formal test or examination.

The PAT is divided into THREE PHASES:

- PHASE 1: The design process
- PHASE 2: Preparing working and pictorial drawings
- PHASE 3: Creating the PAT file/portfolio

The three PHASES require that the learner demonstrates a clear understanding of, and is able to apply, the design process. As part of the design process, the learner must be able to do the following:

- Analyse the given scenario and formulate a design brief, that includes a list of specifications, constraints and a management plan
- Conduct relevant and usable research
- Use the research in developing ideas/concepts/solutions, analytically and graphically, using freehand drawings
- Select a final solution that demonstrates a clear understanding of the design brief
- Present the final solution as a set of working drawings and a pictorial (3D) drawing
- Provide clear evidence of continuous self-evaluation during the development of the PAT
- Create a PAT file/portfolio

PHASE 1 and PHASE 2 of the PAT have been designed to give the learner the opportunity to demonstrate a level of competency and skill that has been attained in the following drawing methods:

- **Freehand drawings**, prepared using a pencil and grid/graph paper only
- **Instrument drawings**, prepared in pencil and using drawing instruments
- **CAD drawings**, prepared using a CAD program

TWO practical assessment tasks (PATs) are included in this document:

- PAT 1 is a task in the context of civil technology, with an electrical component
- PAT 2 is a task in the context of mechanical technology

**With the guidance of the teacher**, each learner must select and complete **ONE PAT only**.

**Elements that make up the PAT mark for Engineering Graphics and Design**

<b>ELEMENTS OF THE MARK FOR THE PRACTICAL ASSESSMENT TASK</b>	
The <b>design process</b>	25%
The <b>correctness</b> of the <b>working and pictorial drawings</b>	50%
The <b>drawing methods</b> (freehand, instrument and CAD)	25%
<b>TOTAL</b>	<b>100%</b>

**3. INSTRUCTIONS FOR THE ADMINISTRATION OF THE PAT**

The teacher must **provide a copy of** and **mediate** the **entire SECTION B** (pages 9 to 28) of **this 2023 PAT document** to every Grade 12 learner **no later than Week 7 of Term 1**.

Each phase must be completed and assessed prior to commencement of phase moderation in Terms 2 and 3, and provincial moderation in Terms 3 and 4.

The phases of the PAT must therefore be completed within the following timeframes:

- PHASE 1: Design process (completed **before** the commencement of **Term 2**)
- PHASE 2: Presentation drawings (completed **before** the commencement of **Term 3**)
- PHASE 3: Completion of ALL presentation tasks and creation of file/portfolio (completed **in Term 3 before** the commencement of the **final provincial moderation**, or **at the latest, before** the commencement of the **preparatory examinations**).

Although the PHASES could be completed either **cyclically** or during **block times**, as indicated in the *CAPS*, it is recommended that **one entire day per term** be allocated for each PHASE.

**Teaching time** allocated for the preparation and completion of all three PHASES of the PAT may not exceed **16 hours**. However, **additional non-teaching time may be allocated** for the completion of the PAT at the school, but the **total time** allocated for the completion of **ALL** the PHASES of the PAT should **NOT exceed 20 hours**.

To ensure that the PAT is completed within the stipulated timeframes, it is essential that the teacher prepares and communicates a management plan/pacesetter with target dates. This will help learners monitor their own progress, and for the teacher to implement intervention programmes.

**NOTE:**

To **ensure the integrity** of the PAT as a '**third NSC examination paper**', the following additional instructions **must be adhered to**. **Non-compliance to any of these, and aforementioned instructions, will be deemed a serious examination irregularity.**

- It is the **responsibility** of the **teacher** to ensure that each learner's PAT is of an **appropriate Grade 12 level and complexity**.
- **ALL presentation requirements** of the selected PAT **must be strictly adhered to**.
- Except for the required research component, **ALL the presentation requirements** of the PAT **must be completed at school under the supervision of the teacher**.
- **Explanatory examples**, such as graphical illustrations, best practices from previous years' PATs, etc. **may ONLY be presented** to the learners **during the initial mediation** of the PAT. As these examples may not be given to the learners or left for them to view after the initial mediation, learners must be encouraged to take notes during the mediation, but **may NOT take any photographs or videos**.
- Although the sharing of knowledge and ideas between learners is permissible, no presentation may be shared or copied as **the entire PAT must be completed individually**. **ALL the presentations**, including the front page, table of contents, management plan, etc. **must be each learner's own original work**.

- Except for clean A4 and A3 drawing sheets and grid/graph paper, **NO templates, pre-prepared pages/drawing sheets, redrawn examples of the site plan, etc. may be given to the learners** in any form or format.
- **NO examples of possible or suggested solutions** of any component of the PAT **may be provided to, or procured for, the learners in any form or format.** This includes, but is not limited to, **examples developed** by any **individual, group, department, institution, organisation or business.**
- ALL learners must be encouraged to **work on their own**, with **minimal intervention.** **Developmental feedback** and **guidance** may **ONLY** be given **on presentations or a PHASE** that **has already been attempted/prepared/completed**, or when the learner requests it.
- When **learners prepare drawings in CAD**, the following **must be adhered to:**
  - The school **must provide** the **facilities**, including the CAD program(s) and computers. The **school must hold the licenses of ALL the CAD programs used by the learners**, and **NO other programs may be used** by any of the learners.
  - **ALL CAD drawings** must be prepared **at school under the supervision of the teacher.**
  - The opportunity to be trained using a CAD program must be made **available to ALL learners**, regardless of whether they use it or not.
  - As the teacher remains responsible for assessing both the competence displayed in using a CAD program and the layout and correctness of the drawing presentations, **he/she must have sufficient knowledge of and skills in the CAD program used.**
  - **Electronic and hard copy evidence** of the **history** of the **stage-by-stage development** of each learner's CAD drawings **must be** retained at the school for a period of time as stipulated by the Department of Basic Education (DBE).
  - During the moderation process learners may be called upon to explain the functions and principles of operating the CAD program, and to demonstrate drawing skills through performing capability tasks.
- The DECLARATION OF AUTHENTICITY, as set out on page 28 of this document, must be completed and signed by the learner and the teacher prior to the final assessment.
- The SUMMATIVE ASSESSMENT SHEET, as set out on page 27 of this document, must be completed in full for each learner following the final assessment of the PAT.
- The teacher must ensure that **ONLY** the completed SUMMATIVE ASSESSMENT SHEET, DECLARATION OF AUTHENTICITY and relevant CHECKLIST are included **after the table of contents** in each learner's completed PAT file/portfolio.

#### 4. ASSESSMENT AND MODERATION OF THE PAT

##### 4.1 Assessment

**Assessment of the PAT must be done according to the included and relevant 2023 ASSESSMENT CRITERIA AND CHECKLIST.**

Frequent developmental feedback is needed to determine and provide guidance and support to the learner, as well as to ensure that they are on the right track ('assessment for learning'). Both formal and informal assessment must therefore be conducted throughout the development of the PAT. **Informal assessment** may be conducted by either a peer or by the teacher.

The **teacher must conduct ALL formal assessment** and record the results on the official mark sheets. The marks of each learner **must also be indicated on** the official SUMMATIVE ASSESSMENT SHEET (see page 27), **which must be included in the learner's PAT file/portfolio**.

Where a school has **more than one Grade 12 EGD teacher**, the teachers must assist one another by conducting **PAT assessment as a team**. This will ensure a consistent standard of assessment across all the learners.

The **final formal assessment** must be completed **before** commencement of **final provincial moderation** or, **at the latest, before** the commencement of the **preparatory examinations** in Term 3.

Once the PATs have been assessed and moderated, the teacher/school **must retain ALL** the PATs for external moderation. **ALL the PATs must also be retained at the school** for a period of time as stipulated by the provincial departments of education.

**Clarification of level descriptors and the verification of marks:**

- **1-mark level descriptor:**  
This level descriptor is used for **elementary/basic presentation requirements and/or drawing features**, and must be applied as follows:
  - '0' (zero) must be allocated for the requirement not met, or if the presentation thereof is **incorrect**.
  - 1 mark may **only** be allocated if the requirement has been met fully and the presentation thereof is **correct**.
- **2-mark level descriptor:**
  - '0' (zero) must be allocated if the requirement **has not been included/shown**, or if the presentation of the requirement shows **less than 30%** evidence of knowledge, or when the requirement is **very poor**.
  - 1 mark may only be allocated if the presentation of the requirement shows at least **30% or more** evidence of knowledge, or the requirement is **NOT complete** or **NOT completely correct, NOT compliant and/or clear**, i.e. **average**.
  - 2 marks may only be allocated if the presentation of the requirement shows **at least 80% or more** evidence of knowledge, and the **requirement is more than 80% complete, correct/compliant and clear**, i.e. **very good**.
- **7-mark level descriptor**  
Refer to the 7-mark rubric on page 45 of the CAPS document for the level descriptors. This implies that a **'7' can only be allocated** if the presentation requirement(s) is **100% correct/compliant**, i.e. **outstanding** and **error-free**.
- **Verification of ALL final marks out of 10:**  
Each final mark out of 10 must be verified according to the descriptors contained in the rubric on page 25 of this document. This implies that a **'10' can only be allocated** if the presentation requirement(s) is **100% correct/compliant**, i.e. **perfect** and **error-free**.
- **Rounding-off of marks:**  
Each mark out of 10 must be rounded off **before being captured** on the SUMMATIVE ASSESSMENT SHEET (see page 27) and the recording/mark sheet. A mark of 9,5 must, however, remain a 9 as the 0,5 is an indication of a mistake. The final mark out of 25, 50 and 25 for each of the three complete sections of the PAT must also be rounded off after being calculated.

## 4.2 Moderation

**Moderation of the PAT must be conducted using the included 2023 ASSESSMENT CRITERIA AND CHECKLISTS, and according to the same level descriptors used for assessing the PATs.**

As monitoring and/or moderation of the PAT can take place **at any stage during the development of the PAT, ALL completed and unfinished presentations of ALL the PATs must always be available at the school.**

To facilitate intervention programmes and processes, the following school-based and cluster/district moderation must be done during Terms 2 and 3:

- Phase 1: Design process (beginning of Term 2 before the commencement of PHASE 2, or at the latest before the May/June Examinations)
- Phase 2: Presentation drawings (beginning of Term 3 before the commencement of PHASE 3)

Final provincial moderation must be concluded **before** the commencement of **DBE and/or Umalusi moderation**, or **at the latest** by the end of **Week 3 of Term 4**.

To assist the moderator with the moderation process, the teacher **must supply a complete set of updated mark sheets and merit lists.**

At the beginning of the moderation process, the moderator must **select 10%**, with a **minimum of THREE** and a **maximum of SIX PAT files/portfolios**. The selected PATs must be:

- No. 1 – a high/highest mark; ▪ No. 2 – an average/middle mark; ▪ No. 3 – a low mark;
- No. 4 – an average/middle mark; ▪ No. 5 – a high mark; ▪ No. 6 – a low mark

If the selected PATs do not provide a consistent result, **THREE** additional PATs, i.e. a high-, an average/middle- and a low-mark PAT must be selected and moderated to obtain more consistent results.

If a school has **more than ONE Grade 12 EGD teacher**, **THREE PATs**, i.e. a high-, an average/middle- and a low-mark PAT **must be selected from each teacher**.

The concept of '**benchmarking**' should be applied when moderating the PATs. This requires that **a PAT with a highest mark**, but preferably the PAT with the **highest mark, must be moderated first to establish a standard** against which all the other PATs of the school can be benchmarked.

### NOTE:

A **tolerance range of ONLY 5% is permissible** between the **average assessed mark** and the **average moderated mark** of the PATs selected for moderation. Only once moderation has been completed, must the more than 5% difference between the average marks of the moderated PATs be applied to the remainder of the PATs.

## 5. CONCLUSION

On completion of the practical assessment task, learners should be able to demonstrate their understanding of the design process, their enhanced 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 learners' life skills and provides opportunities for learners to engage in their own learning.



**SECTION B (LEARNER TASKS)****General information and instructions:**

- The EGD PAT is a **compulsory national formal assessment task** that contributes 100 marks (25%) towards your final National Senior Certificate (NSC) mark.
- This document contains the following TWO PAT scenarios:
  - PAT 1: A civil design task, with an electrical component
  - PAT 2: A mechanical design taskYou, the learner, with the guidance of your teacher, must select and complete **only ONE** of the PAT tasks contained in this document.
- ALL the presentation requirements of the selected PAT must be **strictly adhered to** and, with the exception of the research component, be **completed at school, under the supervision of your teacher**.
- Although the sharing of knowledge and ideas is permissible, no presentations may be shared or copied. The **entire PAT must be completed individually and ALL the presentations**, including the front page, table of contents, management plan, etc., **must be your own original work**.
- The PAT must be completed in phases and within the given time frames of your teacher's pacesetter/management plan.
- ALL freehand drawings and instrument drawings must be prepared in pencil.
- The PAT must be of an appropriate higher-order Grade 12 complexity.
- The PAT will be assessed according to the relevant ASSESSMENT CRITERIA AND CHECKLISTS, which are included in this PAT document.
- The relevant ASSESSMENT CRITERIA AND CHECKLIST for the PAT (i.e. either pages 16 and 17 or pages 23 and 24) **must be used** to provide clear evidence of **your own continuous self-evaluation** and the meeting of the deadlines during the development of the PAT.
- Just prior to the final submission of your complete PAT, you must complete and sign the DECLARATION OF AUTHENTICITY, as set out on page 28 of this document.
- ONLY the 2023 SUMMATIVE ASSESSMENT SHEET, your completed and signed DECLARATION OF AUTHENTICITY, the completed 2023 CHECKLIST and ALL your presentations must be included in the correct sequence in your PAT file/portfolio.
- You are not permitted to use any of the photographs/pictures and/or websites contained in this PAT document.
- Untidy and messy work, as well as the late submission of presentation requirements, will be penalised.

## 6. PRACTICAL ASSESSMENT TASK 1 (PAT 1)

### A civil design project

#### SCENARIO

Your client's appeal to the local municipality to revoke the subdivision of stand 71 from two stands, 71A and 71B, to a single stand, has been successful. The intention to build a **new conference centre** on stand 71 can now go ahead as planned as it would attract more business to the existing bed and breakfast facility on the stand. You have been tasked by your client to submit a suggested design solution for the **proposed new conference centre**.

The **proposed new conference centre** will simply be referred to as **the building** in the project from now on.

The building, which must have the capacity to cater for a maximum of 65 delegates at a time, must be a single-storey brick structure and must also cater for people with disabilities. To match the design of the existing bed and breakfast facility, the roof must be a Dutch gable design with an 'IBR' roof sheet finish, which also includes fascia boards, gutters and rainwater downpipes. The building must incorporate either an inner or outer curved wall as a prominent feature.

The main entrance must be north-facing and consist of a rotating door that has a single glass and aluminium swing door on either side. Directly outside and in front of the rotating door must be a covered drive-through that is wide enough to accommodate two motor vehicles side by side for the dropping off and collecting of delegates. The roof cover for the drive-through must be an extension of the Dutch gable roof design.

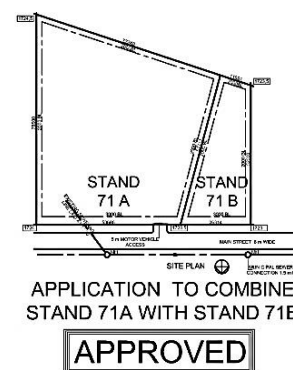
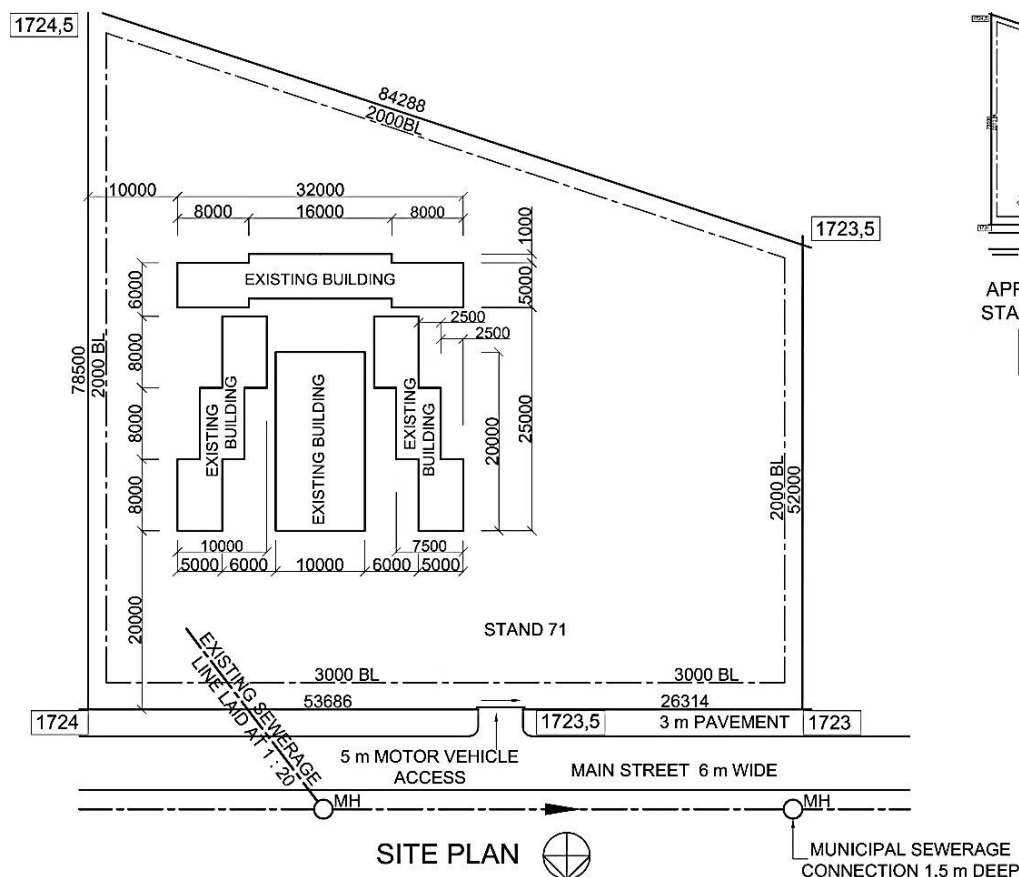
The main entrance must lead into a large open space/concourse within the building, with a floor area of no less than 110 m<sup>2</sup>. The concourse will be utilised for plenary sessions, entertainment and dining purposes, and must have a built-in reception desk near the main entrance.

Leading off the concourse must be a small kitchen of approximately 10 m<sup>2</sup> which will be used for catering purposes. The kitchen must have a single sink, built-in cupboards and sufficient work surfaces to prepare food, as well as space for a refrigerator and a stove. There must also be a built-in serving counter in the concourse, situated near the entrance to the kitchen.

Leading off the concourse must also be THREE similarly sized meeting rooms that can accommodate up to 15 delegates, each with a floor area no larger than 36 m<sup>2</sup>, as well as TWO similarly sized, but smaller, meeting rooms, each with a floor area of no larger than 24 m<sup>2</sup>. The two smaller rooms must be adjacent to each other with a retractable wall divider between them so that it can be opened to form a single, larger room that will be able to accommodate up to 20 delegates. Each of the rooms must have a door that isolates it from the concourse and an emergency exit door to the outside of the building.

There must be male and female toilet facilities, accessible from inside the building. The male toilet facility must have two separate toilets, three wall-mounted urinals and two hand wash basins. The female facility must have three separate toilets and three hand wash basins. There must also be a separate toilet facility with a toilet and a hand wash basin for disabled people. The building must have sufficient electrical lighting and switched socket outlets in all the rooms and areas, as well as large windows to let in sufficient natural light. All sewerage and waste-water from the building must be connected to the manhole on the municipal sewerage line.

Included in the design must be a parking area, with 12 standard parking bays and two parking bays for the disabled, situated close to the building. The **total area of the building**, excluding the drive-through, **may not exceed 320 m<sup>2</sup>**.



**Given:** The site plan of stand 71

## PHASE 1: PRESENTATION REQUIREMENTS

1. Analyse the given scenario and **formulate a design brief** in two paragraphs:
  - The **first paragraph** must, in your own words, give a brief background to the project, as well as a detailed description of what has to be designed.
  - The **second paragraph** must, in your own words, give a clear overview of your role in the project, as well as a **description** of the complete design process that you are going to implement to complete this project (PAT).

From the scenario and your teacher's management plan, **include the following as part of the design brief:**

- A list of 20 of the given specifications for the building
- A list of FIVE possible constraints. Note that the specifications that you have listed may not be repeated or reworded as possible constraints.
- Your own management plan that specifies target dates for the completion of each presentation requirement

2. **Conduct research on:**
  - Designs and floor-plan layouts of small conference centres
  - THREE examples of Dutch gable roof designs and THREE examples of covered drive-throughs
  - Designs and construction details of rotating doors with a swing door(s) on the side(s)

**NOTE:**

- The research must be relevant and should therefore be in the form of graphic material, i.e. pictures and illustrations.
- Evidence of at least FIVE different examples of each research topic must be included in the PAT file/portfolio.
- The research material must be aesthetically presented and may NOT exceed FOUR A4 or TWO A3 pages per topic.
- There must be clear evidence that the research has been used in your design solution.
- Include a list of ALL references used (Bibliography) directly after the research.

3. **Prepare neat detailed freehand drawings** of the floor-plan layout of TWO possible design solutions for the proposed new building, including the drive-through in front of the rotating door. Each freehand drawing must show the correct presentation of ALL the building features, the permanent fixtures, the roofline, as well as the primary dimensions and labels. The **calculation** for the **total area** of the **building** and the **floor area** of the **concourse** must be clearly shown in a table on the drawing sheet of each freehand drawing.

**NOTE:**

- **Grid/Graph paper must be used** to assist with the preparation of the freehand drawings so that ALL features and fixtures are drawn to proportion. The **grid/graph paper used must be included** in the PAT file/portfolio.
- **ALL aspects of the freehand drawing**, including dimensions, tables, labels and possible information blocks **must be prepared using a pencil ONLY**. The use of any other drawing instruments, e.g. a ruler or compass, will be penalised.
- Electrical fittings and the waste-water disposal systems are NOT required on the freehand drawings.
- The drawings may be prepared on either A4 or A3 drawing sheets.
- NO borders or title panels are required for the drawing sheets.
- ALL the freehand drawings must comply with the guidelines and graphical symbols contained in the *SANS 10143*.
- The drawings must provide clear evidence that a high level of competency has been attained in the **freehand** drawing method.

4. **Select the best solution** that demonstrates an in-depth understanding of the scenario within the context of the design brief.

On a separate page, compare and evaluate the TWO freehand solutions by:

- **Creating a table** with a minimum of **SIX relevant** and **descriptive criteria** that will facilitate measurable comparisons
- **Creating and applying a simple, self-explanatory rating scale** to score each solution **against each criterion**
- **Justifying each score** by describing the **positive and/or negative aspects** of each solution **against each criterion**

Complete the process by writing a comprehensive summary giving reasons for your selected freehand solution. The summary must include whether any late changes were made to the selected freehand solution, **or not**. If there were late changes, they must be clearly described.

**PHASE 2: PRESENTATION REQUIREMENTS**

5. Present the selected solution as a set of working drawings and a pictorial drawing (5.1, 5.2 and 5.3) that meet the following criteria:

- All the working drawings must be prepared on appropriately sized drawing sheets, set up with correct borders. **ONLY ONE** of the drawing sheets must be set up with a **complete civil title panel**.
- The drawings must provide clear evidence that a high level of competency has been attained in the following TWO drawing methods:
  - Instrument drawing
  - CAD (computer-aided drawing/design)

**NOTE:**

- ONE entire working drawing (i.e. 5.1.1, 5.1.2 and 5.1.3 **or** 5.2) must be prepared using a pencil and drawing instruments, and the other using a CAD program.
- The perspective drawing (5.3) may be prepared using either a pencil and drawing instruments or a CAD program.
- Schools that do not have CAD facilities must prepare all the required working drawings and pictorial drawing (i.e. 5.1, 5.2 and 5.3) using a pencil and drawing instruments.
- The title panel and ALL aspects of all drawings must comply with the guidelines, drawing symbols, graphical symbols and representations contained in the *SANS 10143*.

5.1 Draw **detailed LAYOUT DRAWINGS** of the selected freehand solution of the **complete building**, clearly showing all the required building features, including the drive-through.

**The layout drawings must show the following orthographic views:**

- 5.1.1 The complete **FLOOR PLAN**, drawn to a suitable scale, but **preferably** not smaller than scale 1 : 75.
- 5.1.2 **TWO ELEVATIONS**, drawn to the same scale as the floor plan, with one view that shows the front entrance to the building, and the other showing a side view. It is recommended to draw the elevations that would be required for the two-point perspective drawing.
- 5.1.3 A **DETAILED SECTION(S)**, drawn to scale 1 : 20, showing all the detail from the foundation to the roof, on a cutting plane that passes through the rotating door in the main entrance and a window.

**NOTE:**

Use break lines to divide the detailed section into TWO parts, with the one part wide enough to show the complete rotating door and a 1½ m section of the covered drive-through, and the other part wide enough to show the window and the end of the roof.

**Include the following on ALL relevant views:**

- ALL exterior features, including door and window detail
- **NOTE:** ALL window and doorframes must be shown in the TWO elevations.
- The roof detail, including all rainwater items and roof lines
- ALL permanent fixtures
- ALL electrical fittings and the wiring detail
- Waste-water disposal systems (sewerage)
- Titles, labels and notes
- Scales used
- Detailed dimensioning
- Cutting plane(s)
- All hatching detail
- North point

5.2 Draw, to a suitable scale, a complete detailed **SITE PLAN** of STAND 71.

**Include the following:**

- ALL given site details and features, including ALL existing buildings
- The proposed new building, parking area and driveways
- ALL sewerage detail, with labels and notes included
- Dimensions, including the reference dimensions and corner heights
- Scale
- North point

5.3 Draw a **detailed 'human eye view' TWO-POINT PERSPECTIVE DRAWING** that shows the main entrance and rotating door to the building. The horizon line (HL) must be  $\pm 1,5$  m above the ground line (GL).

**Evidence of the following must be included:**

- All views/drawings used to produce the perspective drawing
- The construction method used to produce the perspective drawing.

**NOTE:**

Use a copy of the perspective drawing, which may contain artistic features, as the picture for the cover page of your PAT file/portfolio.

### **PHASE 3: PRESENTATION REQUIREMENTS**

**Create a PAT file/portfolio containing the following in the given sequence:**

- A complete **cover page** that includes the school's name and centre number, your full name and surname, grade and class group, your teacher's initials and surname, and a copy of your own two-point perspective drawing for this task.
- A complete **table of contents**
- The **2023 SUMMATIVE ASSESSMENT SHEET** (see page 27)
- The completed **DECLARATION OF AUTHENTICITY** (see page 28)

**Include the following PHASE 1 and PHASE 2 presentation requirements in the PAT file/portfolio after the DECLARATION OF AUTHENTICITY:**

1. ALL the design brief requirements
2. Evidence of ALL the resource material used for the required research
3. The TWO freehand drawings of the possible design solutions
4. ALL the evidence of the selection of the best solution
5. ALL the required working drawings (5.1 and 5.2) and the perspective drawing (5.3)
6. The 'ASSESSMENT CRITERIA AND CHECKLIST FOR THE 2023 CIVIL PAT' (see pages 16 and 17), which must provide clear evidence of your own continuous self-evaluation and the meeting of the deadlines during the development of the PAT.

**NOTE:**

Include the following **on each page**:

- **Clear numbering** according to the numbers of the presentation requirements
- **Your** (the learner's) **name** and the **date of completion** and **submission**

**Assessment criteria and checklist for the 2023 Civil PAT**

- The SUMMATIVE ASSESSMENT SHEET on page 27 of the PAT document must be used to indicate the final totals out of 10 for each assessment criterion.
- The contribution of each aspect of the PAT is as follows:
  - The design process, i.e. presentation requirements numbers 1, 2, 3, 4, 6 and 7, will contribute 25 marks out of 100.
  - The working drawings and the pictorial drawing, i.e. presentation requirement number 5, will contribute 50 marks out of 100.
  - Drawing methods, drawing skills and presentation, which should be assessed according to ANNEXURE A, will contribute 25 marks out of 100.

ASSESSMENT CRITERIA AND CHECKLIST FOR THE 2023 CIVIL PAT								
1-mark level descriptive	0	Requirement not met or presented incorrectly				Checked	Maximum mark	Comments
	1	Requirement has been met and/or presented correctly						
2-mark level descriptive	0	Requirement not met, or <b>less than 30%</b> evidence of knowledge shown (very poor)						
	1	Requirement included and <b>at least 30%+</b> evidence of knowledge shown (avg.)						
	2	Presentation shows <b>at least 80% or more</b> evidence of knowledge (very good)						
1.	<b>Design Brief</b>							
	1.1	1 <sup>st</sup> paragraph: background and comprehensive description of what is to be designed					2	
	1.2	2 <sup>nd</sup> paragraph: your role and description of the design process you are going to follow					2	
	1.3	A list of 20 given specifications from the scenario					2	
	1.4	A list of FIVE possible constraints from the scenario					2	
	1.5	A management plan with possible target dates for ALL the presentation requirements					2	
						<b>TOTAL</b>	<b>10</b>	
2.	<b>Research</b> (This should be restricted to a <b>maximum</b> of FOUR A4 or TWO A3 pages per topic.)							
Relevant and usable research on:	2.1	Designs and floorplan layouts of small conference centres					2	
	2.2	THREE Dutch gable roof designs (1) + THREE covered drive-throughs (1)					2	
	2.3	Designs and construction detail of rotating door with side swing doors					2	
	Clear evidence that the research was used in design solutions					2		
	A list of ALL references used (Bibliography)					2		
						<b>TOTAL</b>	<b>10</b>	
3.	<b>Freehand drawings of TWO possible design solutions</b>					<b>Final mark for each solution</b>		
Assess each freehand solution as follows:	Building includes ALL required rooms/areas + is disability-friendly Prominent curved wall (1) + rotating door & drive-through (1) Correct presentation of building features (roofline, walls, doors, etc.) ALL fixtures included (WCs, sink, build-in reception desk, etc.) Correct presentation of all fixtures according to SANS 10143 The relative size + proportion of ALL features to each other Primary labels (1) + primary dimensions (1) 2 x calculations shown and within the specifications (2 + 2 = 4) Design, functionality + effective space utilisation	2	<b>Solution 1</b>	<b>10</b>				
		2						
		2						
		2						
		2						
		2	<b>Solution 2</b>	<b>10</b>				
		2						
		4						
		2						
		<b>Subtotal = 20 ÷ 2 = TOTAL</b>					<b>20</b>	
4.	<b>Selecting the best freehand solution</b> (This must be a separate presentation.)							
	A suitable table created for the selection process					2		
	A minimum of <b>SIX relevant and descriptive criteria</b> that will facilitate measurable comparisons					2		
	A simple rating scale created and used to score each solution against each criterion					2		
	Each score justified by describing the positive or negative aspects against each criterion					2		
	Comprehensive summary with reasons for selected solution (including possible late changes)					2		
						<b>TOTAL</b>	<b>10</b>	
5.	<b>Layout drawings and a pictorial drawing of selected solution</b>							
	<b>Drawing sheet preparation</b>							
	Appropriately sized drawing sheets					1		
	Borders on all the drawing sheets of all the working drawings					2		
	Complete SANS 10143 compliant CIVIL TITLE PANEL on ONE working drawing's drawing sheet					7		
<b>NOTE: Use the 7-mark simplified rubric on page 45 of the CAPS.</b>						<b>TOTAL</b>	<b>10</b>	
5.1	<b>Detailed layout drawings of the proposed new building and covered walkway</b>							
5.1.1	<b>FLOOR PLAN</b> showing:							
	Correlation with selected freehand solution and selection process summary					2		
	ALL internal and external walls and rooflines					2		
	ALL doors, including the rotating door, and windows					2		
	ALL permanent fixtures					2		
	ALL electrical fittings and the wiring detail					2		
	Waste-water disposal systems (sewerage)					2		
	Title, labels and notes					2		
	Detailed dimensioning					2		
	Hatching detail (1) + Cutting plane (1)				(1 + 1 = 2)	2		
	Suitable scale selected and correctly indicated (1) + North point (1)				(1 + 1 = 2)	2		
						<b>Subtotal = 20 ÷ 2 = TOTAL</b>	<b>10</b>	



ASSESSMENT CRITERIA AND CHECKLIST FOR THE 2023 CIVIL PAT				
5.1.2	<b>TWO ELEVATIONS</b> that show the front entrance and a side view of the building			
	Prescribed views shown (front entrance to building and a side view)		2	
	External walls and covered drive-through at main entrance		2	
	ALL door and window detail, including the door and window frames		2	
	Dutch gable roof detail, including rainwater items		2	
	Waste-water disposal system (sewerage)		1	
	Elevations drawn to the same scale as the floor plan		1	
<b>TOTAL</b>			<b>10</b>	
5.1.3	<b>DETAILED SECTION</b> in two parts			
	Both parts of the section correct according to the indicated cutting plane(s)		2	
	Foundation, slab and wall detail on both parts		2	
	Rotating door detail		2	
	Detail of 1½ m section of covered drive-through		2	
	Window detail		2	
	Roof detail, including relevant rainwater items, on both parts		2	
	Titles, labels and notes		2	
	Detailed dimensioning		2	
	ALL hatching detail		2	
	Scale 1 : 20 used and indicated correctly (1) + Break lines (1)	(1 + 1 = 2)	2	
<b>Subtotal = 20 ÷ 2 = TOTAL</b>			<b>10</b>	
5.2	<b>Detailed SITE PLAN</b>			
	Site plan correctly drawn, including ALL given site features and detail		2	
	The proposed new building with north-facing main entrance, parking area and driveways		2	
	ALL sewerage detail, with labels and notes included		2	
	Dimensions, including new building's reference dimensions and corner heights		2	
	Suitable scale indicated correctly		1	
	North point		1	
<b>TOTAL</b>			<b>10</b>	
5.3	<b>TWO-POINT PERSPECTIVE DRAWING</b> showing the entrance to conference centre			
	Evidence of the views and construction used to prepare the drawing		2	
	Correct orientation of the building with the HL at ±1,5 m above the ground line (GL)		1	
	Detail and correctness of the perspective drawing		7	
<b>TOTAL</b>			<b>10</b>	
6.	<b>Continuous self-evaluation and the meeting of deadlines</b>			
	Completed checklist as evidence of continuous self-evaluation	(mark out of 10 ÷ 2)	5	
	Meeting ALL the submission deadlines	(mark out of 10 ÷ 2)	5	
<b>TOTAL</b>			<b>10</b>	
7.	<b>Presentation of the complete PAT file/portfolio</b>			
	Complete cover page with a copy of the perspective drawing		1	
	Table of contents		1	
	Completed summative assessment sheet and declaration		1	
	Correct sequencing of ALL presentation requirements		1	
	Name and numbering on ALL the presentation requirements		1	
	General impression of file/portfolio, e.g. binding, appearance, etc.	(mark out of 10 ÷ 2)	5	
<b>TOTAL</b>			<b>10</b>	
<b>Assessment of drawing methods, drawing skills and presentation</b>				
a.	<b>Freehand drawings</b>			
	Freehand drawing methods and skills	(See ANNEXURE A on page 25)		
	<b>NOTE:</b> • No evidence of grid/graph paper used = max. 7 marks, even if drawn excellently • Not drawn in freehand = 0 marks, & some evidence of instruments used = max. 5 marks		10	
	Neatness (2) + correct line types used (2) + line consistency (2) + printing (2) + dimensioning (2)	(Also see ANNEXURE A on page 25)	10	
b.	<b>Instrument drawings</b>			
	Use of drawing instruments, drawing methods and skills	(See ANNEXURE A on page 25)	10	
	Neatness (2) + correct line types used (2) + line consistency (2) + printing (2) + dimensioning (2)	(Also see ANNEXURE A on page 25)	10	
c.	<b>CAD drawings</b>			
	Competence displayed in using a CAD program	(See ANNEXURE A on page 25)	10	
	Layout and correctness of the drawings presentation	(See ANNEXURE A on page 25)	10	

## 7. PRACTICAL ASSESSMENT TASK 2 (PAT 2)

### A mechanical design project

#### SCENARIO

A clamp or clamping device is designed to hold components firmly in place, either temporarily or permanently, and are therefore versatile tools that often have multiple applications.

You are employed by a mechanical design firm that specialises in improving the design and function of **complex CLAMPS** and **CLAMPING DEVICES**. The firm is currently working on design solutions to improve the functionality of existing clamps and clamping devices. Examples of some of these complex **clamps** and **clamping devices** are shown below.



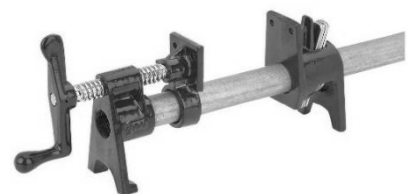
Trigger clamp  
[Source: [shopwl.com](http://shopwl.com)]



Wheel clamp  
[Source: [maypoleltd.com](http://maypoleltd.com)]



Pull clamp  
[Source: [m.indiamart.com](http://m.indiamart.com)]



Pipe clamp  
[Source: [leevalley.com](http://leevalley.com)]

As a design consultant for the firm, you have been tasked with investigating and analysing the design features of **complex** clamps and clamping devices and to then design an improvement(s) which could be, but is not limited to, one or more of the following:

- Improved efficiency
- To strengthen its design
- To modify its design

#### Your investigation, analysis and solution require the following stages:

- The **FIRST** stage involves finding a suitable **complex clamp** or **clamping device**. The clamp or clamping device must incorporate a mechanical mechanism, a screw mechanism and/or a mechanical locking device, and must consist of a **minimum of FOUR parts**. The **clamp or clamping device that you have selected** will simply be referred to as the **clamp** in the project from now on.

#### NOTE:

You are **NOT** required to purchase a clamp. The clamp you have selected should therefore be one that is readily available to you.

- The **SECOND** stage involves dismantling the clamp so that **ALL the individual parts** can be investigated, measured and photographed.
- The **THIRD** stage requires the identification of either the mechanical mechanism, the screw mechanism, the mechanical locking device, a complex (intricate) main part, or a combination of parts of the clamp, which could be improved, strengthened or modified in some way. This will necessitate the application of the design process, as stipulated below in the presentation requirements.

**Requirements and specifications for the clamp:**

- Each learner must have **his/her own clamp** for the PAT.
- Your clamp **must be submitted as part of your PAT presentation**.
- The clamp **must** incorporate a mechanical mechanism, screw mechanism and/or a mechanical locking device, with a **minimum of FOUR** parts.
- **Electrical, electronic or pneumatic** clamps or clamping devices **may NOT be used**.
- Your teacher must approve the clamp that you have selected. This is to ensure that it meets the requirements and that a PAT of an appropriate higher-order Grade 12 complexity can be produced.

**PHASE 1: PRESENTATION REQUIREMENTS**

1. Analyse the given scenario and **formulate a design brief** in two paragraphs:
  - The **first paragraph** must, in your own words, give a brief background to the project, as well as a detailed and comprehensive description of what has to be designed.
  - The **second paragraph** must, in your own words, give a clear overview of your role in the project, as well as a **description** of the complete design process that you are going to implement to complete this project (PAT).

From the given scenario and your teacher's management plan, **include the following as part of the design brief:**

- Your own list of ALL the specifications for your clamp
- Your own list of at least THREE constraints of your clamp
- Your own management plan, which specifies target dates for the completion of each presentation requirement

2. **Conduct research on:**

- The material used for each individual part of your clamp
- The specific design features and/or function/purpose of each individual part of your clamp
- The design and components of at least ONE other clamp or clamping device **that is similar to your clamp**

**NOTE:**

- The research must be relevant and should therefore be in the form of graphic material, i.e. pictures and illustrations.
- Evidence of ALL the required research material must be included in the PAT portfolio.
- The research material must be aesthetically presented and may NOT exceed FOUR A4 or TWO A3 pages per topic.
- The first two research requirements will primarily be hands-on investigative research, which must be presented using a comprehensive set of detailed photographs taken during the second stage. Include labels and/or notes indicating the material and the function (purpose) of each individual component.
- The evidence of the ONE other similar clamp may be in the form of a comprehensive set of pictures, illustrations and/or photographs, together with explanatory labels and notes.
- There must be clear evidence that the research was used in your design solution.
- Include a list of ALL references used (Bibliography) directly after the research.

3. **Prepare neat detailed freehand drawings** of TWO possible design solutions of the proposed improvement, strengthening or modification of the identified mechanical mechanism, screw mechanism, mechanical locking device, complex (intricate) main part, or combination of parts of your clamp.

Each set of freehand drawings must consist of relevant orthographic views and an isometric drawing(s). ALL freehand drawings must show the correct presentation of ALL the features and include dimensions, labels and explanatory notes. Include a short explanation of the possible improvement, strengthening or modification.

**NOTE:**

- **Grid/Graph paper** must be used to assist in preparing the freehand drawings so that ALL features are drawn to proportion. **The grid/graph paper used must be included** in the PAT file/portfolio as evidence.
- **ALL aspects of the freehand drawing**, including dimensions, labels, tables and possible information blocks **must be prepared using a pencil ONLY**. The use of any other drawing instruments, e.g. a ruler or compass, will be penalised.
- The drawings may be prepared on either A4 or A3 drawing sheets.
- NO borders or title blocks are required for the drawing sheets.
- ALL the freehand drawings must comply with the guidelines and conventional representations contained in the *SANS 10111*.
- These drawings must provide clear evidence that a high level of competency has been attained in the **freehand** drawing method.

4. **Select the best solution**, which demonstrates an in-depth understanding of the scenario within the context of the design brief.

On a separate page, compare and evaluate the TWO freehand solutions by:

- **Creating a table** with a minimum of **FOUR relevant** and **descriptive criteria** that will facilitate measurable comparisons
- **Creating and applying a simple, self-explanatory rating scale** to score each solution **against each criterion**
- **Justifying each score** by describing the **positive and/or negative aspects** of each solution **against each criterion**

Complete the process by writing a comprehensive summary giving reasons for your selected freehand solution. The summary must also include whether any late changes were made to the selected freehand solution, **or not**. If there were late changes, they must be clearly described.

**PHASE 2: PRESENTATION REQUIREMENTS**

5. Present your clamp and the selected improvement/strengthening/modification as a set of working drawings and a pictorial drawing (5.1, 5.2 and 5.3) that meet the following criteria:

- All the working drawings must be prepared on appropriately sized drawing sheets, set up with correct borders. **ONLY** the first drawing sheet (i.e. for 5.1) must be set up with a **complete mechanical title block, as presented in the EGD NSC Paper 2 analytical questions**.
- The drawings must provide clear evidence that a high level of competency has been attained in the following TWO drawing methods:
  - Instrument drawing
  - CAD (computer-aided drawing/design)

**NOTE:**

- ONE entire working drawing (i.e. 5.1 **or** 5.2) must be prepared using a pencil and drawing instruments, and the other using a CAD program.
- The isometric drawing (5.3) may be prepared using either a pencil and drawing instruments or a CAD program.

- Schools that do not have CAD facilities must prepare all the required working drawings and pictorial drawings (i.e. 5.1, 5.2 and 5.3) using a pencil and drawing instruments.
- ALL aspects of all drawings must comply with the guidelines and conventional representations contained in the *SANS 10111*.

5.1 Draw, to a suitable scale and in third-angle orthographic projection, an **ASSEMBLY DRAWING** of your **clamp**, clearly showing **ALL the parts before** any improvements, strengthening or modifications have been affected.

**NOTE:**

If your clamp has a long bed or frame, use relevant S-breaks or break lines to shorten the length/height of your clamp in the assembly drawings, so that a larger scale can be used.

**The assembly drawing must show the following FOUR views:**

5.1.1 The **FRONT VIEW**

5.1.2 A **second PRIMARY VIEW**

5.1.3 Any other **TWO SECONDARY VIEWS**

**NOTE:** TWO of the views must be sectioned or contain types of sections.

**Include the following:**

- Scale
- Detailed dimensions
- Title, labels and notes
- Cutting plane(s)
- ALL hatching detail
- Projection symbol

5.2 Draw, to a suitable scale and in third-angle orthographic projection, a **DETAILED DRAWING** of **only the identified mechanical mechanism, screw mechanism, mechanical locking device, complex main part, or combination of parts of your clamp**, clearly **showing the improvement/strengthening/modification**.

**The detailed drawing must show the following THREE views:**

5.2.1 The **FRONT VIEW**

5.2.2 Any other **TWO VIEWS**

**NOTE:** ONE of the views must be sectioned or contain a type of section.

**Include the following:**

- Title, as well as comprehensive explanatory labels and notes
- Relevant welding and/or machining symbols (if required)
- Relevant tolerances (if required)
- Scale(s)
- Detailed dimensioning
- Cutting plane(s)
- ALL hatching detail

- 5.3 Draw, to a suitable scale, a **detailed ISOMETRIC DRAWING** of your clamp, or of the improved, strengthened or modified part(s) that is of **an appropriate Grade 12 level of complexity**.

**NOTE:**

- Evidence of ALL auxiliary views and constructions used to produce the drawing must be clearly shown.
- Use a copy of the isometric drawing, which may contain artistic features, as the picture for the cover page of your PAT file/portfolio.

### **PHASE 3: PRESENTATION REQUIREMENTS**

**Create a PAT file/portfolio containing the following in the given sequence:**

- A complete **cover page**, that includes the school's name and centre number, your full name and surname, grade and class group, your teacher's initials and surname, and a copy of your own isometric drawing for this task
- A complete **table of contents**
- The **2023 SUMMATIVE ASSESSMENT SHEET** (see page 27)
- The completed **DECLARATION OF AUTHENTICITY** (see page 28)

**Include the following PHASE 1 and PHASE 2 presentation requirements in the PAT file/portfolio after the DECLARATION OF AUTHENTICITY:**

1. ALL the design brief requirements
2. Evidence of ALL the resource material used for the required research
3. The TWO freehand drawings of the possible design solutions
4. ALL the evidence of the selection of the best solution
5. ALL the required working drawings (5.1 and 5.2) and the isometric drawing (5.3)
6. The 'ASSESSMENT CRITERIA AND CHECKLIST FOR THE 2023 MECHANICAL PAT' (see pages 23 and 24), which must provide clear evidence of your own continuous self-evaluation and the meeting of the deadlines during the development of the PAT.

**NOTE:**

Include the following **on each page**:

- **Clear numbering** according to the numbers of the presentation requirements
- **Your** (the learner's) **name** and the **date of completion** and **submission**

### **Assessment criteria and checklist for the 2023 MECHANICAL PAT**

- The SUMMATIVE ASSESSMENT SHEET on page 27 of the PAT document must be used to indicate the final totals out of 10 for each assessment criterion.
- The contribution of each aspect of the PAT is as follows:
  - The design process, i.e. presentation requirements numbers 1, 2, 3, 4, 6 and 7, will contribute 25 marks out of 100.
  - The working drawings and the pictorial drawing, i.e. presentation requirement number 5, will contribute 50 marks out of 100.
  - Drawing methods, drawing skills and presentation, which should be assessed according to ANNEXURE A, will contribute 25 marks out of 100.

ASSESSMENT CRITERIA AND CHECKLIST FOR THE 2023 MECHANICAL PAT								
1-mark level descriptive	0	Requirements not met or presented incorrectly			Checked	Maximum mark	Comments	
	1	Requirements has been met and/or presented correctly						
2-mark level descriptive	0	Requirements not met, or <b>less than 30%</b> evidence of knowledge shown (very poor)						
	1	Requirements included and <b>at least 30%</b> evidence of knowledge shown (avg.)						
	2	Presentation shows at <b>least 80% or more</b> evidence of knowledge (very good)						
1.	<b>Design Brief</b>							
	1.1	1 <sup>st</sup> paragraph: background and comprehensive description of what is to be designed				2		
	1.2	2 <sup>nd</sup> paragraph: your role and description of the design process you are going to follow				2		
	1.3	A list of ALL the specifications of your clamp				2		
	1.4	A list of at least THREE constraints of your clamp				2		
	1.5	A management plan with target dates for ALL the presentation requirements				2		
	<b>TOTAL</b>					<b>10</b>		
2.	<b>Research</b> (This should be restricted to a maximum of THREE A4 or TWO A3 pages per research topic.)							
	<b>Relevant and usable research on:</b>	2.1	Materials used for each component of your clamp			2		
		2.2	Design features/function/purpose of each component of your clamp			2		
		2.3	The design, components, mechanisms, etc. of another similar clamp			2		
	Clear evidence that the research was used in your design solutions					2		
	A list of ALL references used (Bibliography)					2		
	<b>TOTAL</b>					<b>10</b>		
3.	<b>Freehand drawings of TWO possible design solutions</b>				<b>Final mark for each solution</b>			
	Assess each freehand solution as follows:	Third-angle orthographic views of the identified part(s)		2	<b>Solution 1</b>		<b>10</b>	
		Isometric drawing of the identified part(s)		2				
		Correct presentation of ALL the parts and features		1				
		Relative proportion of ALL parts and features to each other		2				
		Labels and explanatory notes		2	<b>Solution 2</b>		<b>10</b>	
		Dimensioning		2				
		Description of improvement/modification/re-design		2				
		Functionality of the improvement/strengthening/modification		2				
<b>Subtotal = 15 ÷ 1,5 = TOTAL</b>			<b>+15</b>					
(1 = 1; 2 = 1; 3 = 2; 4 = 3; 5 = 3; 6 = 4; 7 = 5; 8 = 5; 9 = 6; 10 = 7; 11 = 7; 12 = 8; 13 = 9; 14 = 9; 15 = 10)								
4.	<b>Selecting the best freehand solution</b> (This must be a separate presentation.)							
	An appropriate table created for the selection process					2		
	A minimum of FOUR relevant and descriptive criteria that will facilitate measurable comparisons					2		
	A simple rating scale created and used to score each solution against each criterion					2		
	Each score justified by describing the positive or negative aspects against each criterion					2		
	Comprehensive summary with reasons for selected solution (including possible late changes)					2		
	<b>TOTAL</b>					<b>10</b>		
5.	<b>Working drawings and a pictorial drawing of your selected clamp, and/or selected change(s)</b>							
	<b>Drawing sheet preparation</b>							
	Appropriately sized drawing sheets					1		
	Borders on all drawing sheets of all the working drawings					2		
	Complete EGD NSC P2 Q1 compliant MECHANICAL TITLE BLOCK on the drawing sheet of 5.1.					7		
	<b>NOTE:</b> Use the 7-mark simplified rubric on page 45 of the CAPS.				<b>TOTAL</b>	<b>10</b>		
	5.1	<b>ASSEMBLY DRAWING of your clamp, before any changes</b>						
	5.1.1	<b>FRONT VIEW</b> before any changes						
		ALL the parts included and drawn correctly according to the actual clamp				2		
		ALL hatching detail or, if not sectioned, ALL external features				2		
		ALL fasteners drawn correctly in ALL views				2		
		Labels and notes on ALL views				2		
		Projection symbol				1		
		Suitable scale selected for the assembly drawing, and indicated correctly				1		
	<b>TOTAL</b>					<b>10</b>		

ASSESSMENT CRITERIA AND CHECKLIST FOR THE 2023 MECHANICAL PAT					
5.1.2	<b>Second PRIMARY VIEW</b> before any changes				
	ALL the components included and drawn correctly according to the actual clamp		2		
	All hatching detail or, if not sectioned, external features		2		
	Dimensions on ALL views		2		
	ALL centre lines included on ALL views		2		
	ALL FOUR views drawn correctly in third-angle orthographic projection		2		
			<b>TOTAL</b>	<b>10</b>	
5.1.3	<b>Other TWO SECONDARY VIEWS</b> before any changes				
	Appropriate secondary views selected		2		
	ALL the parts included and drawn correctly according to the actual clamp		2		
	All hatching detail or, if not sectioned, external features		2		
	TWO views sectioned or contain types of sections		2		
	Correct cutting planes for the TWO sectional views and/or types of sections		2		
			<b>TOTAL</b>	<b>10</b>	
5.2	<b>DETAILED DRAWING</b> of the identified part(s), clearly showing the improvement/strengthening/modification				
	Appropriate view selected as the FRONT VIEW, and is drawn correctly		2		
	TWO other relevant VIEWS selected, and drawn correctly		2		
	Improvement/Strengthening/Modification correlates with selected freehand solution		2		
	Title, as well as comprehensive explanatory labels and notes		2		
	Detailed dimensions		2		
	ONE view sectioned, or contain types of sections, and drawn correctly		2		
	Cutting plane(s)		1		
	ALL hatching detail		2		
	Relevant welding symbols and/or machining symbols and/or tolerances		2		
	Projection symbol		1		
	Suitable scale selected and indicated correctly		1		
	Drawing in third-angle orthographic projection		1		
			<b>Subtotal = 20 ÷ 2 = TOTAL</b>	<b>10</b>	
5.3	<b>Detailed ISOMETRIC DRAWING</b>				
	Suitable <b>scale</b> selected and indicated correctly		1		
	Evidence of ALL auxiliary views and constructions used for the drawing		2		
	Detail and correctness of the isometric drawing		7		
	<b>NOTE: Use the 7-mark simplified rubric on page 45 of the CAPS.</b>		<b>TOTAL</b>	<b>10</b>	
6.	<b>Continuous self-evaluation and the meeting of deadlines</b>				
	Checklist completed as evidence of continuous self-evaluation	(mark out of 10 ÷ 2)	5		
	The meeting of ALL the submission deadlines	(mark out of 10 ÷ 2)	5		
			<b>TOTAL</b>	<b>10</b>	
7.	<b>Presentation of the complete PAT file/portfolio</b>				
	Complete cover page with a copy of the isometric drawing		1		
	Table of contents		1		
	Completed summative assessment sheet and declaration		1		
	Correct sequencing of ALL presentation requirements		1		
	Name and numbering on ALL the presentation requirements		1		
	General impression of file/portfolio, e.g. binding, appearance, etc.	(mark out of 10 ÷ 2)	5		
			<b>TOTAL</b>	<b>10</b>	
<b>Assessment of drawing methods, drawing skills and presentation</b>					
a.	<b>Freehand drawings</b>				
	Freehand drawing methods and skills	(See ANNEXURE A on page 25)	10		
	<b>NOTE: • No evidence of grid/graph paper used = max. 7 marks, even if drawn excellently</b>				
	<b>• Not drawn in freehand = 0 marks, &amp; some evidence of instruments used = max. 5 marks</b>				
	Neatness (2) + correct line types used (2) + line consistency (2) + printing (2) + dimensioning (2)	(Also see ANNEXURE A on page 25)	10		
b.	<b>Instrument drawings</b>				
	Use of drawing instruments, drawing methods and skills	(See ANNEXURE A on page 25)	10		
	Neatness (2) + correct line types used (2) + line consistency (2) + printing (2) + dimensioning (2)	(Also see ANNEXURE A on page 25)	10		
c.	<b>CAD drawings</b>				
	Competence displayed in using a CAD program	(See ANNEXURE A on page 25)	10		
	Layout and correctness of the drawings presentation	(See ANNEXURE A on page 25)	10		



## 8. ANNEXURE A: ASSESSMENT RUBRIC

## ASSESSING DRAWING METHODS, DRAWING SKILLS AND PRESENTATION

LEVELS OF PERFORMANCE													
MARK ALLOCATION			10	9	8	7	6	5	4	3	2	1	0
			100%	99%–90%	89%–80%	79%–70%	69%–60%	59%–50%	49%–40%	39%–30%	29%–20%	19%–1%	0%
Freehand drawing	METHODS AND SKILLS	The drawings display <b>correct freehand drawing methods and skills</b> , as well as the method used to <b>ensure good proportion and size</b> .	<b>NOTE:</b> • <b>No evidence</b> of grid/graph paper used = max. <b>7 marks</b> , even if excellent drawing methods and skills are displayed! • <b>Not drawn in freehand</b> , i.e. completely drawn with instruments, = <b>0 marks</b> • <b>If instruments were used for, or to assist with, some aspect</b> = max. <b>5 marks</b> , even if excellent drawing methods and skills are displayed.						The drawings display <b>poor drawing methods and skills</b> and there is little to no evidence of the method used which resulted in <b>poor proportion and size</b> .		The drawings display very <b>poor drawing methods and skills</b> and <b>no method</b> was used to ensure <b>correct proportion</b> .		
			The drawings display <b>excellent drawing methods and skills</b> and the method used to ensure outstanding proportion and size.			The drawings display <b>satisfactory drawing methods and skills</b> and the method used to ensure satisfactory proportion and size.							
	Final drawing <b>presentation</b> is <b>neat</b> , and the <b>line types used, line consistency/quality, printing</b> and <b>dimensioning</b> is <b>correct</b> .		<b>Neatness (2) + correct line types used (2) + line quality/consistency (2) + compliant printing/writing (2) + compliant dimensioning (2)</b>										
			The drawings are <b>very neat</b> and all <b>line work/line quality, printing</b> and <b>dimensioning</b> are <b>outstanding</b> and <b>consistent</b> .			<b>Additional descriptors/guidelines:</b> The drawings are <b>neat</b> and <b>line work/line quality, printing</b> and <b>dimensioning</b> are <b>generally good</b> and <b>mostly consistent</b> .			The drawings are <b>untidy</b> with <b>inconsistent line work/line quality, printing</b> and <b>dimensioning</b> .		The line work/line quality, printing and dimensioning are unacceptable.		
Instrument drawing	METHODS AND SKILLS	The drawings display the <b>correct use of drawing instruments, drawing methods and skills</b> .	The drawings display the correct use of <b>drawing instruments</b> and an <b>outstanding</b> application of <b>drawing methods and skills</b> .			The drawings display the correct use of drawing <b>instruments</b> and a <b>satisfactory</b> and <b>mostly correct</b> application of <b>drawing methods and skills</b> .			The drawings display poor use of drawing <b>instruments</b> and a <b>poor</b> and <b>incorrect</b> application of <b>drawing methods and skills</b> .		The drawings display an incorrect use of drawing <b>instruments</b> with <b>incorrect</b> applications of <b>drawing methods and skills</b> .		
	Final drawing <b>presentation</b> is <b>neat</b> , and the <b>line types used, line constancy/quality, printing</b> and <b>dimensioning</b> is <b>correct</b> .		<b>Neatness (2) + correct line types used (2) + line quality/consistency (2) + compliant printing/writing (2) + compliant dimensioning (2)</b>										
			The drawings are <b>very neat</b> and all <b>line work/line quality, printing</b> and <b>dimensioning</b> are <b>outstanding</b> and <b>consistent</b> .			<b>Additional descriptors/guidelines:</b> The drawings are <b>neat</b> and the <b>line work/line quality, printing</b> and <b>dimensioning</b> are <b>generally good</b> and <b>mostly consistent</b> .			The drawings are <b>untidy</b> , and the <b>line work/line quality, printing</b> and <b>dimensioning</b> are <b>inconsistent</b> .		The <b>line work/line quality, printing</b> and <b>dimensioning</b> are <b>unacceptable</b> .		
CAD drawing	METHODS AND SKILLS	The level of <b>competence</b> displayed in <b>using a CAD program</b>	Displays a <b>high level</b> of skills, knowledge and ability in using a <b>CAD program</b>			Displays a <b>satisfactory level</b> of skills, knowledge and ability in using a <b>CAD program</b>			Displays a <b>poor level</b> of skills, knowledge and ability in using a <b>CAD program</b>		Shows <b>little to no skills</b> , knowledge or ability in using a <b>CAD program</b>		
	Layout of the final drawing is <b>correct</b> and the <b>line work, printing</b> and <b>dimensioning</b> are <b>compliant</b> and <b>consistent</b> .		The <b>layout</b> of the drawings is <b>correct</b> and the <b>line work, printing</b> and <b>dimensioning</b> are <b>compliant</b> and <b>consistent</b> .			The <b>layout</b> of the drawings is <b>acceptable</b> and the <b>line work, printing</b> and <b>dimensioning</b> are <b>mostly compliant</b> and <b>consistent</b> .			The <b>layout</b> of the drawings is <b>very poor</b> and the <b>line work, printing</b> and <b>dimensioning</b> are <b>not compliant</b> and <b>inconsistent</b> .		The <b>layout, line work, printing</b> and <b>dimensioning</b> are <b>unacceptable</b> .		

**9. SIMPLIFIED RUBRIC FOR ALLOCATION AND VERIFICATION OF MARKS****NOTE:**

- **The final mark out of 10 of each assessment criterion, i.e. the overall level of achievement according to the presentation requirement, must be verified according to this rubric.**
- This rubric must also be used to allocate marks for all aspects of the assessment criteria which require a mark out of 10.

<b>VERIFICATION AND MARK ALLOCATION</b>			
<b>DESCRIPTION FOR MARK</b>	<b>GENERAL INDICATOR</b>	<b>± %</b>	<b>MARK</b>
<b>ALL/MORE than ALL</b> the REQUIREMENTS are met. <b>- PERFECT -</b>	<b>Error-free</b>	<b>100%</b>	<b>10</b>
<b>ALL (ALMOST ALL)</b> the REQUIREMENTS are met. <b>- OUTSTANDING -</b>	<b>Very few errors</b>	<b>90% +</b>	<b>9</b>
<b>ALMOST ALL (MOST OF)</b> the REQUIREMENTS are met. <b>- VERY GOOD -</b>	<b>Few errors</b>	<b>80% +</b>	<b>8</b>
The REQUIREMENTS are met <b>SUBSTANTIALY.</b> <b>- GOOD -</b>	<b>Some errors</b>	<b>70% +</b>	<b>7</b>
The REQUIREMENTS are met <b>ADEQUATELY.</b> <b>- SATISFACTORY -</b>		<b>60% +</b>	<b>6</b>
The REQUIREMENTS are met <b>MODERATELY.</b> <b>- ACCEPTABLE -</b>	<b>Many errors</b>	<b>50% +</b>	<b>5</b>
<b>ONLY SOME</b> of the REQUIREMENTS are met. <b>- UNACCEPTABLE -</b>		<b>40% +</b>	<b>4</b>
<b>VERY FEW</b> of the REQUIREMENTS are met. <b>- NOT ACHIEVED -</b>	<b>Mostly wrong</b>	<b>30% +</b> Only a few correct features	<b>3</b>
The REQUIREMENTS are <b>NOT</b> met. <b>- VERY POOR -</b>	<b>Completely wrong</b>	<b>29% and LESS</b>	<b>2</b>
		Something done incorrectly/ poorly	<b>1</b>
<b>NOT DONE</b>	<b>No work handed in!</b>	<b>Nothing to mark!</b>	<b>0</b>

## 10. PAT 2023: SUMMATIVE ASSESSMENT SHEET

PAT 2023  
SUMMATIVE ASSESSMENT SHEET

NAME OF SCHOOL: ..... DISTRICT: .....

NAME OF LEARNER: ..... (NAME AND SURNAME)

NAME OF TEACHER: ..... (NAME AND SURNAME)

NAME OF MODERATOR: ..... (NAME AND SURNAME) DATE: .....

PART A: Design Process			PART B: Working and pictorial drawings			Drawing competency and skill				
CRITERIA		MARK	CRITERIA		MARK	CRITERIA		MARK		
1	A design brief demonstrating a clear understanding of the scenario and the specifications, constraints and a management plan		All drawing sheets are appropriately set up with a border and an appropriate title block/panel.			Freehand drawing: ANNEXURE A	METHOD	The drawings display correct freehand drawing methods and skills and the method used to ensure proportion and size.		
2	Evidence of relevant and usable research with the inclusion of a bibliography		Orthographic drawings Assess each view's accuracy and correctness according to the selected solution/device, the stipulated requirements and drawing principals	5.1.1	View 1 PAT 1: Plan PAT 2: Front view					
3	TWO detailed freehand drawings of possible solutions  1st Solution  2nd Solution			5.1.2	View 2 PAT 1: Elevations (x2) PAT 2: 2nd main view			The final drawing presentation is neat and there is consistency of line work/line quality, printing and dimensioning.		
				5.1.3	View 3 PAT 1: Detailed section(s) PAT 2: Secondary views (x2)					
4	Selecting the best solution which demonstrates a clear understanding of the design brief			5.2	PAT 1: Site plan PAT 2: Detailed drawing		Instrument drawing: ANNEXURE A	METHOD	The drawings display the correct use of drawing instruments, drawing methods and skills.	
6	Clear evidence of evaluation and the meeting of deadlines of all the requirements		Pictorial Drawing	5.3	The correct drawing method and presentation of the pictorial drawing. PAT 1: Perspective PAT 2: Isometric		CAD drawing: ANNEXURE A	METHOD	The level of competence is displayed in using a CAD program.	
									The layout of the final drawing is correct and the line work, printing and dimensioning is compliant and consistent.	
7	The presentation of the complete PAT portfolio					NO CAD drawings		/ 40		
		With CAD drawings				/ 60				
SUBTOTAL		/ 70	SUBTOTAL		/ 60	CALCULATION without CAD		X 0.63		
CALCULATION		X 0.36	CALCULATION		X 0.84	CALCULATION with CAD		X 0.42		
Teacher's TOTAL			Teacher's TOTAL			Teacher's TOTAL				
TOTAL: A		/ 25	TOTAL: B		/ 50	TOTAL: C		/ 25		
Moderated TOTAL			Moderated TOTAL			Moderated TOTAL				
TOTAL: A		/ 25	TOTAL: B		/ 50	TOTAL: C		/ 25		
TEACHER'S TOTAL: A + B + C =			/ 100			TEACHER: Initial		MODERATOR: Initial		
MODERATED TOTAL: A + B + C =			/ 100							

**11. DECLARATION OF AUTHENTICITY****DECLARATION OF AUTHENTICITY**

To be submitted with each learner's practical assessment task portfolio

NAME OF THE SCHOOL: .....

NAME OF LEARNER: .....  
(SURNAME AND INITIALS)

**I hereby declare that all the contents of the practical assessment task (PAT) submitted by myself for assessment is my own original work and has not been plagiarised, copied from someone else or previously submitted for assessment.**

\_\_\_\_\_  
**SIGNATURE OF LEARNER**

\_\_\_\_/\_\_\_\_/2023  
**DATE** (DD/MM/YYYY)

NAME OF TEACHER: .....  
(SURNAME AND INITIALS)

**As far as I know, the above declaration by the candidate is true and I accept that the PAT submitted is his/her own work.**

\_\_\_\_\_  
**SIGNATURE OF TEACHER**

\_\_\_\_/\_\_\_\_/2023  
**DATE** (DD/MM/YYYY)

**SCHOOL STAMP**