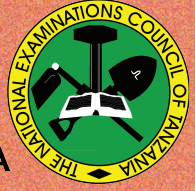




THE UNITED REPUBLIC OF TANZANIA
MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY
NATIONAL EXAMINATIONS COUNCIL OF TANZANIA



**STUDENTS' ITEM RESPONSE ANALYSIS REPORT
ON FORM TWO NATIONAL ASSESSMENT
(FTNA) 2024**

ARCHITECTURAL DRAUGHTING



THE UNITED REPUBLIC OF TANZANIA
MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY
NATIONAL EXAMINATIONS COUNCIL OF TANZANIA



STUDENTS' ITEM RESPONSE ANALYSIS REPORT
ON FORM TWO NATIONAL ASSESSMENT
(FTNA) 2024

072 ARCHITECTURAL DRAUGHTING

Published by:

National Examinations Council of Tanzania,
P.O. Box 2624,
Dar es Salaam, Tanzania.

© The National Examinations Council of Tanzania, 2025

All rights reserved.

TABLE OF CONTENTS

FOREWORD.....	iv
1.0 INTRODUCTION	1
2.0 THE ANALYSIS OF THE STUDENTS' RESPONSES IN EACH QUESTION	2
2.1 SECTION A: OBJECTIVE QUESTIONS	2
2.1.1 Question 1: Multiple Choice Items.....	3
2.1.2 Question 2: Matching Items.....	10
2.2 SECTION B: SHORT ANSWER QUESTIONS	12
2.2.1 Question 3: Auxiliary View.....	12
2.2.2 Question 4: Instrument Equipment and Materials	17
2.2.3 Question 5: Geometrical Figures	21
2.3 SECTION C: STRUCTURED QUESTIONS.....	25
2.3.1 Question 6: Orthographic Projection.....	25
2.3.2 Question 7: Pictorial Drawing	29
3.0 ANALYSIS OF THE STUDENTS' PERFORMANCE IN DIFFERENT TOPICS.....	35
4.0 CONCLUSION.....	35
5.0 RECOMMENDATIONS.....	36
APPENDIX.....	37

FOREWORD

The report presents the Students' Items Response Analysis (SIRA) on Form Two National Assessment in Architectural Draughting subject conducted in 2024. This report aims at providing feedback to all education stakeholders on the factors that contributed to students' performance in Architectural Draughting National Assessment.

The Form Two National Assessment (FTNA) is a formative evaluation that intends to monitor students' learning by providing feedback that teachers, students and other education stakeholders can use to improve teaching and learning processes. This analysis justifies the students' performance in the Architectural Draughting subject. It reveals that students had good performance in the topics of *Instrument, Equipment and Materials; Layout of the Drawing or Paper to Formatting; Geometrical Figures; Scales; Orthographic projection; Architectural Draughting and Occupation Information and Perspective Drawing and Pictorial Drawing*. However, in *Drawing Instruments* the students' performance was average. The factors that may have affected the students' responses include insufficient knowledge on particular concepts, failure to interpret the requirements of questions, poor command of English Language and lack of basic practices in technical drawing.

This report will help to identify students' strengths and weaknesses in order to improve learning before sitting for their Certificate of Secondary Education Examination (CSEE). It will help teachers to identify the challenging areas and act appropriately during the learning and teaching processes.

The National Examinations Council of Tanzania (NECTA) expects that the feedback provided in this report will enable the education stakeholders to take proper measures in improving the learning and teaching of the Architectural Draughting subject. Consequently, students will acquire knowledge, skills and competences indicated in the syllabus for better performance in future assessments and examinations. The Council appreciates the contribution of all those who participated in preparing this report.



Dr. Said A. Mohamed
EXECUTIVE SECRETARY

1.0 INTRODUCTION

This report provides a detailed analysis of the students' performance in Form Two National Assessment (FTNA) 2024 in the Architectural Draughting subject. The analysis shows that the assessment has adequately met the requirements of the Civil Engineering Syllabus for Technical Secondary School Education issued in 2019. In addition, the assessment was drawn in accordance to the Form Two National Assessment Format issued by NECTA in 2024.

The paper had seven (7) questions distributed in three sections namely A, B, and C. Section A comprised of two (2) objective questions: multiple-choice items and matching items. This section carried a total of 15 marks. Section B consisted of three short answer questions. Each question carried 15 marks to make a total of 45 marks. Section C had two (2) structured questions each weighing 20 marks. All question in each sections were compulsory.

A total of 416 students sat for Form Two National Assessment in Architectural Draughting. The number of students who sat for this paper in the previous year 2023 was 526, indicating a decrease of students by 20.91% in 2024. Generally, the performance was good since 317 (76.20%) students who sat for the assessment passed, whereas 99 (23.80%) students failed. The distribution of the scores and students' performance is shown in Table 1 and Figure 1.

Table 1: Students' Performance in Architectural Draughting Subject

Scores	Remarks	General Students' Performance	
		Number	Percentage (%)
0 – 29	Weak	99	23.80
30 – 64	Average	298	71.63
65 – 100	Good	19	4.57
Total		416	100

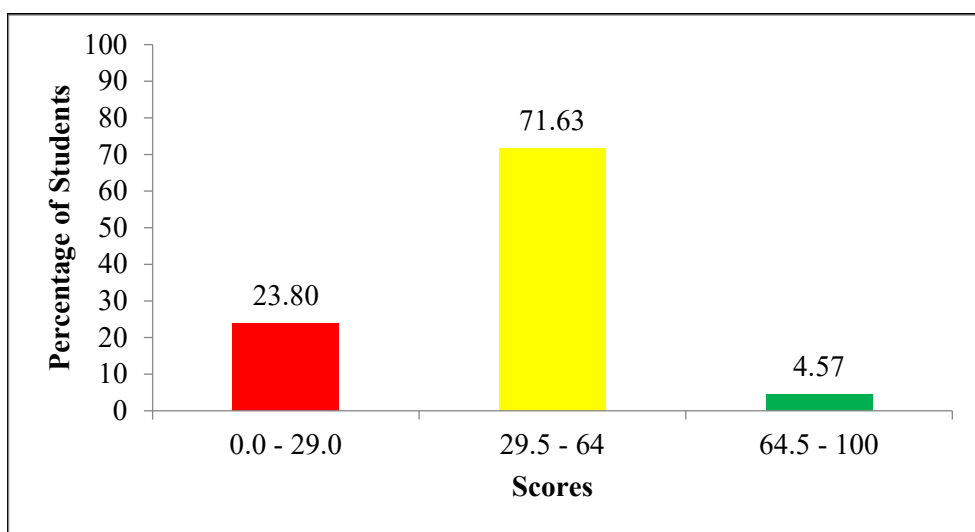


Figure 1: *Students' Performance in Architectural Draughting Subject*

This report analyses students' responses and their adherence to the requirements of the questions. In this analysis, a brief note is provided on what the students were required to do and the reasons for their performance. Samples of students' correct and incorrect responses are also inserted in form of extracts to illustrate the cases presented. Histograms, pie charts and tables are also used to summarize the students' performance in a particular question. The analysis categorizes the performance of the students into three groups namely good, average and weak, manifested by score ranges: 65–100, 30–64 and 0–29, respectively. green, yellow and red colours are used to represent the three categories of performance. Finally, the report gives the conclusion and recommendations for improvement.

2.0 THE ANALYSIS OF THE STUDENTS' RESPONSES IN EACH QUESTION

2.1 SECTION A: OBJECTIVE QUESTIONS

This section consisted of two questions that covered concepts from different topics. Question 1 consisted of 10 multiple-choice items, each carrying 1 mark, making a total of 10 marks. Question 2 consisted of 5 matching items, each carrying 1 mark, making a total of 5 marks. The score ranges used for

grading the students' performance in this section have been shown in each question.

2.1.1 Question 1: Multiple Choice Items

This question had ten (10) multiple-choice items from (i) to (x). The question required students to choose the correct answer from the given four (4) alternatives (A – D) and write its letter in the box provided. The items were set from seven (7) topics: *Architectural Draughting and Occupation Information, Instruments, Equipment and Materials, Layout of the Drawing or Paper to Formatting, Geometrical Figures, Orthographic projection, Perspective Drawing and Scales and Dimensions.*

A total of 416 students attempted the question, where 13 (3.13%) students scored from 0 to 2 marks, 193 (46.39%) scored from 3 to 6 marks and 210 (50.48%) scored from 7 to 10 marks. Figure 2 summarizes the students' performance in this question.

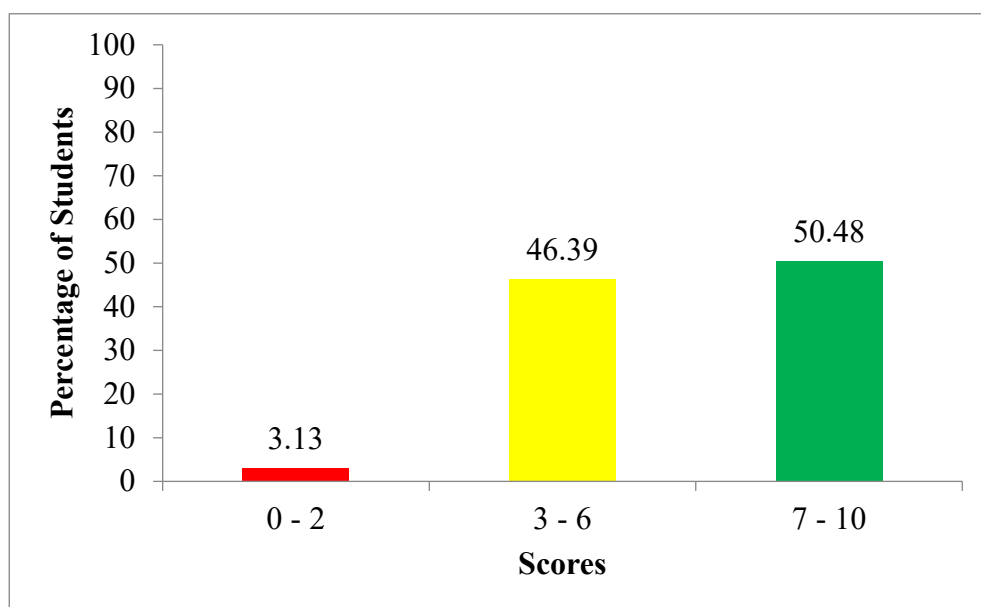


Figure 2: *The Students' Performance in Question 1*

Figure 2 shows that the students' performance in this question was good since 403 (96.87%) students scored pass mark and above. These students managed to choose the correct answers in many items. However, 13 (3.13%)

students performed poorly in the question because of insufficient knowledge related to the requirements of the question. The strengths and weaknesses of the students in choosing correct answers for individual items in the question are analysed as follows:

Item (i) was derived from the topic of *Architectural Draughting and Occupation Information*. The question aimed to assess students' knowledge of the duties of building team members in a construction project. Specifically, students were required to identify the team member responsible for financing construction projects. The question was:

Who is responsible for financing construction projects among the following building team members?

- | | | | |
|----------|---------------------|----------|--------------------------|
| <i>A</i> | <i>An architect</i> | <i>B</i> | <i>A general foreman</i> |
| <i>C</i> | <i>A contractor</i> | <i>D</i> | <i>A client</i> |

The correct answer was *D, A client*. Students who selected this alternative were able to distinguish the roles and responsibilities of various building team members. The other alternatives were incorrect. For instance, alternative *A, An architect* refers to a technical professional responsible for planning and designing buildings in consultation with the client. Therefore, an architect is not responsible for financing construction projects.

Similarly, alternative *B, A general foreman* was incorrect, as this role involves supervising all activities at the construction site rather than providing financial support. Furthermore, alternative *C: A contractor* was also incorrect. A contractor, whether an institution or a government agency, is primarily responsible for executing construction activities under a contractual agreement, not for financing the project.

Item (ii) was extracted from the topic *Instruments, Equipment, and Materials*. The question required students to identify an instrument used to draw a horizontal line on an A1 drawing board, assessing their knowledge of various drawing instruments. The question asked:

Which instrument will you use to draw a horizontal line when using A1 drawing board?

- | | | | |
|----------|-------------------|----------|-------------------|
| <i>A</i> | <i>Tee-square</i> | <i>B</i> | <i>Set square</i> |
| <i>C</i> | <i>Protractor</i> | <i>D</i> | <i>Compasses</i> |

The correct response was alternative *A*, *Tee-square*. Students who selected this option had enough knowledge of drawing instruments, their limitations, and their relationships. Alternative *B*, *Set Square* was an incorrect response. A set square is used for drawing straight lines, perpendicular lines, parallel lines, and angles of 90°, 60°, 45°, and 30° to the baseline; it cannot be used to draw horizontal lines on an A1 drawing board. Students who chose alternative *C*: *Protractor* were also incorrect, as a protractor is used for measuring angles, arcs, and circles. Similarly, alternative *D*: *Compasses* was not a correct response, as a compass is a technical drawing instrument used for drawing perfect circles or arcs.

Item (iii) was set from the topic *Layout of the Drawing or Paper to Formatting*. The question intended to assess student's knowledge on layout of a standard drawing paper. Students were required to locate the position of the title block on a drawing sheet. The question was:

An engineer is inspecting a floor plan drawing sheet for the site work. Which position should he locate the title block?

- A* *At the lower left corner of the sheet.*
- B* *At the lower right corner of the sheet.*
- C* *At the centre part of the sheet.*
- D* *At the upper right part of the sheet.*

The correct answer was *B*, *At the lower right corner of the sheet*. Students who chose this alternative were familiar with the layout of the drawing or paper to formatting. The title block is placed at the lower right corner of the drawing sheet. This placement allows for easy identification and compliance with standard conventions in technical drawing and architectural plans.

Students who chose either alternative *C*, *At the centre part of the sheet*, Alternative *A*, *At the lower left corner of the sheet*, or alternative *D*, *At the*

upper right part of the sheet were incorrect. These areas are reserved for placing various types of architectural drawings, in accordance with standard conventions in architectural drafting; they are not intended for the title block.

Item (iv) was set from the topic *Geometrical Figures*. It tested students' ability to identify the shape of the pavement block in quadrilateral shape in which all its side angles are equal. The question required students to choose the shape of a quadrilateral pavement block with all its sides and angles equal. The question was:

Supposed you are required to make a pavement block in quadrilateral shape in which all of its side's angles are equal. What is the shape of the pavement block?

- | | | | |
|----------|------------------|----------|------------------|
| <i>A</i> | <i>Trapezoid</i> | <i>B</i> | <i>Rhombus</i> |
| <i>C</i> | <i>Rhomboid</i> | <i>D</i> | <i>Trapezium</i> |

The correct response was alternative *B, Rhombus*, a rhombus is a geometrical figure with equal sides which are parallel to each other, their diagonals bisect each other perpendicularly with a sum of adjacent angles being 180^0 and all opposite angles are equal. Students who opted for this alternative were knowledgeable with the characteristics and differences of geometrical figures.

On the other hand, students who selected alternatives *A, Trapezoid, C, Rhomboid and D, Trapezium*, were all incorrect. these students were not aware that Trapezoid is a geometrical figure with two pairs of non-parallel sides, four unequal sides and angles. It is sometimes called irregular quadrilateral while trapezium is a geometrical figure with one pair of parallel sides. On the other hand, a rhomboid is a geometrical figure with two pairs of parallel sides, equal opposite angles but two pairs of its sides are not equal in length. Students who opted for these alternatives A, C and D demonstrated insufficient skills on geometrical figures.

Item (v) tested students' knowledge of the topic of *Geometrical Figures*. They were asked to identify an angle that cannot be constructed using a compass and a ruler. The question asked:

Supposed you are practising to draw geometrical figures with a compass and a ruler. Which angle is not possible to construct with the instruments you have?

A 60

B 45

C 40

D 120

The correct answer was *C*, 40° . Students who selected this response demonstrated sufficient knowledge and skills in using drawing instruments. The other options *A*, 60° , *B*, 45° , and *D*, 120° were incorrect, as all these angles can be accurately drawn with a compass and a ruler. A compass and a ruler are used to construct specific angles derived from the properties of equilateral and right-angled triangles such as 30° , 45° , 60° , 90° , and 120° . Angle 60° is constructed by drawing an equilateral triangle, while a 90° angle is obtained using perpendicular bisectors. The 45° angle results from bisecting a 90° angle and 120° is formed by extending a 60° angle. In contrast, an angle of 40° cannot be constructed using only these instruments because it is not derived from the fundamental geometric constructions based on these properties.

Item (vi) was derived from the topic of *Orthographic Projection*. It aimed to assess students' knowledge on type of projection. Students were required to identify the type of projections where the projectors are parallel to each other and perpendicular to the plane. The question asked:

The projection where the projectors are parallel to each other and also perpendicular to the plane is referred as

A Perspective

B Isometric

C Oblique

D Orthographic

The correct alternative was *D*, *Orthographic*. The students who opted for this option demonstrated adequate knowledge and skills in pictorial drawing and orthographic projections. On the contrary, students who opted for alternative *A*, *Perspective* were unable to select a correct response because a perspective view is a type of pictorial drawing where by the object being presented is projected by several projectors which are not parallel and they are expected to converge at one point.

Furthermore, alternative *B, Isometric*, was incorrect response, because its projectors are projected at the angle of 30^0 both sides from the horizontal. Their projectors are not parallel to each other and it is in three-dimension representation. On the other hand, alternative *D, Oblique*, was an incorrect response because oblique projectors are not parallel to each other. In oblique projection, one side of the object being presented remains purely horizontal while the other side of the object is inclined to either 30^0 , 45^0 or 60^0 .

Item (vii) was set from the topic *Perspective Drawing*. Students were required to identify the location of the projection lines at the point where it converges in a perspective view of an object. The question asked:

You are asked to draw a perspective view of an object. Where will the projection lines converge?

- | | | | |
|----------|-------------------------------|----------|---------------------------|
| <i>A</i> | <i>At the vanishing point</i> | <i>B</i> | <i>At the ground line</i> |
| <i>C</i> | <i>At the horizon line</i> | <i>D</i> | <i>At the eye point</i> |

The correct alternative was *A, At the vanishing point*, in which at this point the projectors in perspective drawing converge. On contrary, students who opted for alternative *B, At the ground line* were unable to choose correct response because the ground line refers to the line where the picture plane intersects the ground plane in perspective drawing.

Meanwhile, alternative *C, At the horizon line*, was incorrect response. The horizon line is the line where the horizon plane meets the picture plane in perspective drawing. It represents the viewer's eye level and is crucial in establishing the viewing angle. On the other hand, alternative *D, At the eye point*. The eye point refers to the position of the observer's eye in relation to the object being drawn. It helps define the viewpoint from which the drawing is made but it is not where the projectors converge.

Item (viii) tested the students' knowledge on the topic *Architectural Scales and Dimensions*. The question intended to test the student's ability to apply the knowledge of scales to identify correct shape of scale ruler. Students were required to identify which one among the given is a correct shape of architecture drawing scale ruler. The question was:

Which one is the shape of architectural drawing scale ruler?

- | | | | |
|----------|----------------------------|----------|---------------------------------|
| <i>A</i> | <i>Flat and hexagonal</i> | <i>B</i> | <i>Triangular and beveled</i> |
| <i>C</i> | <i>Triangular and flat</i> | <i>D</i> | <i>Triangular and hexagonal</i> |

The correct alternative was *C, Triangular and flat*. The triangular shape helps to accommodate multiple different scales on each side, and the flat design allows for easy use while drawing or measuring on architectural plans. On contrary, students who opted for *A, Flat and Hexagonal* had insufficient understanding since the hexagonal shape is not practical for precise measurements or easy handling while working on architectural plans. In addition, students who opted for *B, Triangular and beveled* and *D, Triangular and hexagonal* were unable to identify correct responses because beveled edges are not characteristic of standard architectural scale rulers, the beveled edges and hexagonal shape are unnecessary for the intended purpose.

Item (ix) was set from the topic *Architectural Scale and Dimensions*. The question required a student to apply knowledge of dimensioning to determine proper symbol for diameter. The students were required to represent a diameter of a circular soak away pit when dimensioning. The question was:

How would you represent a diameter of a circular soak away pit when dimensioning?

- | | | | | | | | |
|----------|----------|----------|------------|----------|----------|----------|----------|
| <i>A</i> | <i>D</i> | <i>B</i> | <i>Dia</i> | <i>C</i> | <i>Ø</i> | <i>D</i> | <i>d</i> |
|----------|----------|----------|------------|----------|----------|----------|----------|

The correct response in this question was *C*, because is the standard symbol used to represent the diameter of a circle in technical drawings, including architectural and engineering plans. This symbol is placed before the numerical value or dimension to indicate the diameter of a circular feature, such as a soak away pit. The students who opted for this alternative had sufficient knowledge and skills of dimensioning in architectural drawings

Other alternatives *A*, *B* and *D* were incorrect responses because they are not commonly accepted symbol for diameter. The students who opted for these alternatives demonstrated inadequate knowledge and skills in the topic of Dimensioning.

Item (x) was constructed from the topic *Architectural Scale and Dimensions*. This question assessed student's ability to apply scales. Students were required to identify the type of scale used by the draftsman which is neither enlarging nor reducing when drawing the plan of an object. The question was:

A draftsman must not use a scale which is either enlarging or reducing when drawing a plan of an object. Which scale a draftsman should use?

A 3:2 *B* 1:4 *C* 1:0.5 *D* 1:1

Students who correctly chose alternative *D*, 1:1 had adequate knowledge of full scale and were able to recognize that for architectural drawings or plans are meant to represent an object exactly as it is, therefore scale of 1:1 scale is used. Those who selected alternatives *A*, 3:2, or *C*, 1:0.5, are enlarging scale. whereby an the object is drawn larger than its actual size which is not suitable for representing a plan at full scale. Hence, this is not the correct response for the requirement in the question. On the other hand, alternative *B* (1:4) is incorrect because it is a reducing scale, which is used when an architect needs to draw large objects on a smaller sheet of paper.

2.1.2 Question 2: Matching Items

This question was derived from the topic *Geometrical Figures*. Students were required to match the description of an architectural draughting lines in List A with corresponding parts of a circle in List B by writing a letter of the correct response below the item number in the table provided. It stated that:

Match the description of an architectural draughting lines in List A with corresponding parts of a circle in List B by writing a letter of the correct response below the item number in the table provided.

List A	List B
(i) A straight line drawn through the center, meet at the circumference at both ends.	A. Chord
(ii) A straight line drawn from the center to the circumference.	B. Segment
(iii) A straight line drawn across the circle, meeting the circumference at both ends.	C. Tangent
(iv) A straight line, which touches the circumference.	D. Sector
(v) Any part of the circumference.	E. Arc
	F. Diameter
	G. Radius
	H. Normal

Statistics show that 416 students attempted this question. Out of those students, 43 (10.33%) scored from 0 to 1 mark. Students who scored from 2 to 3 marks were 146 (35.10%). Moreover, 227 (54.57%) students scored from 4 to 5 marks. Figure 3 summarizes the students' performance in this question.

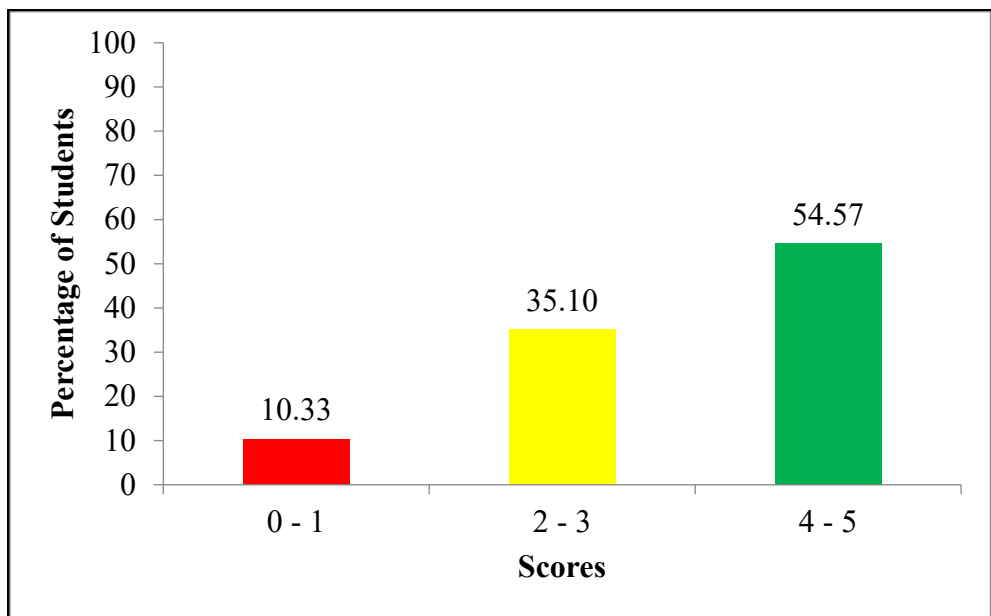


Figure 3: The Students' Performance in Question 2

Figure 3 indicates the students' performance in this question was good since 373 (89.67%) students scored pass mark and above. This indicates they have adequate knowledge in the topic of geometrical figures. Majority of these students showed competence in identifying and differentiating parts of a circle. For instance, students were able to identify a straight line drawn through the center meeting at the circumference at both ends as the *Diameter*. On the other hand, students identified *Radius* as a straight line drawn from the center of the circle to the circumference of the circle, while a straight line drawn across the circle meeting the circumference at both ends as the *Chord*. Students also correctly associated a straight line that touches the circumference with the *tangent*, and a part of the circumference with the *arc*.

In contrast, 43 (10.34%) students scored below 2 marks. These students had insufficient knowledge of the topic geometrical figures. Students in this group were unable to match correctly more than three items. Their poor performance were attributed with difficulty recalling key concepts, and failure to comprehend the principles of geometrical figures, specifically the various parts of a circle.

2.2 SECTION B: SHORT ANSWER QUESTIONS

2.2.1 Question 3: Auxiliary View

This question had three parts: (a), (b) and (c). Students were required to (a), explain the importance of adding auxiliary views on the orthographic projection, (b) analyses four steps to be followed in drawing an auxiliary view and (c) differentiate between secondary and partial auxiliary views. The question intended to test student's ability to analyze the procedures for drawing auxiliary views.

The question was attempted by 416 (100%) students, out of which 399 (95.91%) students scored from 0 to 4 marks, 12 (2.89%) students scored from 4.5 to 9.5 marks and 5 (1.20%) students scored from 10 to 15 marks. Figure 4 summarizes the students' performance in question 4.

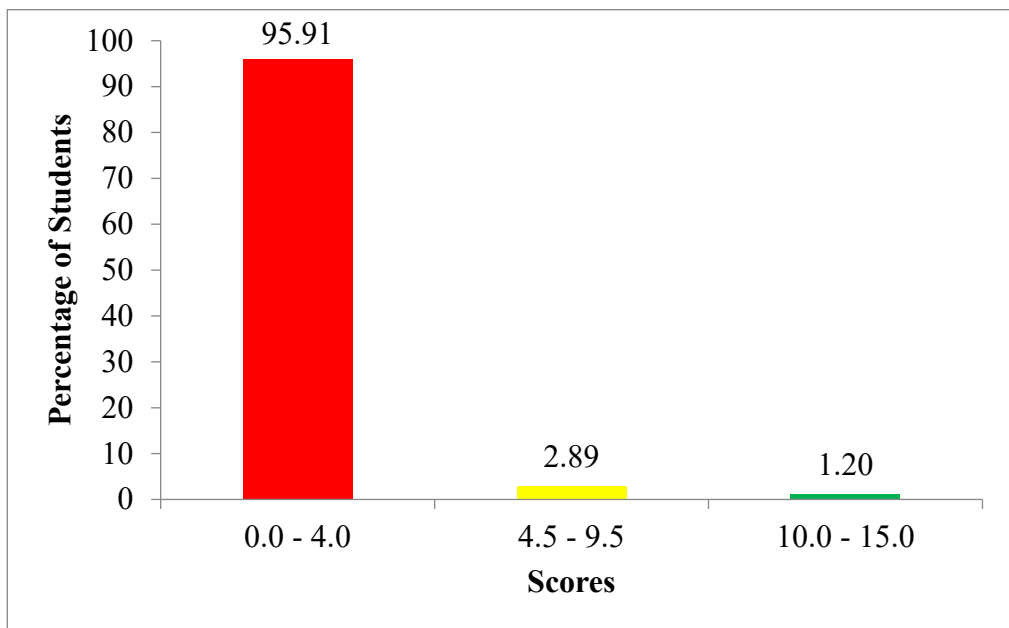


Figure 4: *The Students' Performance in Question 3*

Figure 4 illustrates that the general performance of the students in this question was poor, as 17 (4.08%) students scored from 4.5 to 15 marks. The majority of these students provided irrelevant responses. In part (a), they were unable to explain the importance of adding auxiliary views on the orthographic projections. Majority of students wrote meaningless statements while other failed to distinguish between auxiliary and orthographic as they described auxiliary view as a method of projecting orthographic views. This poor performance was due to a lack of knowledge and drawing skills related to auxiliary views.

However, in part (b), most students in this group failed to describe steps for drawing auxiliary views from the given orthographic views. Instead, they provided procedures for projecting orthographic views or gave irrelevant responses, such as meaningless phrases with no connection to the question's requirements. For example, one student wrote: *Step one, draw a straight line forming an angle of 90° , step two, measure an angle of 30° from the midpoint of an angle, step three, take a bisector and bisect by the measurement given, and step four, join the dimension you have got.*

Additionally, a few students misunderstood the question's demand as they provided procedures for preparing instruments, equipment, and materials for a technical drawing activity. Moreover, some students skipped all of part (b) entirely. In part (c), students failed to distinguish between partial auxiliary views and secondary auxiliary views. Their responses shows misinterpretation of the question and insufficient knowledge and skills regarding the different types of auxiliary views. Extract 3.1 is a sample response from a student with poor performance in question 3.

3. (a) Why it is important to add auxiliary views on the orthographic projection?

border to know the ^{side} plan view, front view and Top view
in the figure or diagram of the orthographic

(b) Analyse four steps to be followed in drawing an auxiliary view.

(i) look your diagram self as border to know how
will you start to draw the auxiliary view

(ii) Find the other which always used to identify
the front view in the diagram

(iii) Identify of front view, Top view, side view of the diagram
border to know how will you start to draw the
diagram or auxiliary view

(iv) Start to draw the Top view, side view, front view
of the auxiliary view by follow the steps

(c) Differentiate between secondary and partial auxiliary view.

primary this is the first angle projection which
used to show as the side view, front view, Top view
in the first angle

Extract 3.1: A sample of incorrect responses to Question 3

Extract 3.1 is a sample of an incorrect response. In part (a), the student explains the use of the auxiliary view to obtain the top, side, and front views. In part (b), instead of describing the steps for drawing auxiliary views, the student outlines the steps for drawing the top, side, and front views.

Furthermore, in part (c), the student explains how to draw the top, side, and front views using first angle projection.

Further analysis indicates that 17 (4.08%) students scored average and above, with marks ranging from 4.5 to 15. In part (a), majority of the students successfully explained the importance of auxiliary views in orthographic projection. These views are essential for determining the true size of inclined surfaces and accurately capturing the shape of objects with sloping features.

In part (b), students had knowledge of the steps required to develop auxiliary views. They explained the procedures, which included labelling key points of the auxiliary view from the inclined surface, constructing a reference line that also serves as the edge view of the reference plane in the right-side view, and drawing light projection lines at 90° from the inclined surface at a convenient distance. Additionally, they measured the distance from each point on the right-side view to the reference line. The distances from the inclined surface in the front view should also be projected at 90° , and all object outlines in the primary view should be darkened. Finally, all projections and reference lines should be erased.

On the other hand, in part (c), students were able to distinguish between secondary auxiliary views and partial auxiliary views. They understood that a secondary auxiliary view is projected from a primary auxiliary view to provide a more complete illustration of the object, while a partial auxiliary view eliminates one or more regular views, making the drawing easier to read. Overall, students performed well in this question across all parts (a), (b), and (c), demonstrating a sufficient knowledge of auxiliary views and strong drawing skills. Extract 3.2 presents a sample of correct responses.

3. (a) Why it is important to add auxiliary views on the orthographic projection?
- (i) Because both of them shows the side view of an object
 - (ii) Because both of them show the Front view but in auxiliary view shows slanted part.
- (b) Analyse four steps to be followed in drawing an auxiliary view.
- (i) Draw the required drawing which should be represented in auxiliary. This is the starting point of drawing auxiliary view.
 - (ii) Draw the line with 45° which start from the ^{each} edge of slanted part of the required drawing until reach at a required point.
 - (iii) At that required point that the drawing is drawn measure 90° by using a protractor so as to draw you slanted part.
 - (iv) Draw the slanted part by wing 90° at the point where the drawing you should fix and the dimensioning it.
- (c) Differentiate between secondary and partial auxiliary view.
- Secondary auxiliary view is the type of auxiliary view in which show other edges of the figure with slanted part
- WHILE
- Partial auxiliary view - is the type of auxiliary in which shows ~~the~~ only the slanted part of the object.

Extract 3.2: A sample of correct responses to Question 3

Extract 3.2 presents a sample of correct responses. In part (a), the student explained how the auxiliary view is used to obtain accurate slanted dimensions from the orthographic view. In part (b), the student outlines the steps involved in drawing auxiliary views and in part (c), the student described secondary and partial auxiliary views, explaining how they help in obtaining the true slanted size in orthographic projections.

2.2.2 Question 4: Instrument Equipment and Materials

The question consisted of three parts: (a), (b), and (c). In part (a), students were required to identify five factors that should be considered when selecting the appropriate pencil for a particular drawing. In part (b), they were asked to explain the use of hard pencil lead, medium pencil lead, and soft pencil lead in architectural draughting. In part (c), with the aid of sketches, they were to describe the uses of two types of pencil lead points produced during sharpening. The question assessed students' ability to apply skills in determining factors for pencil preparation and selection.

A total of 416 students attempted the question. The analysis of the students' performance shows that 222 (53.37%) students scored from 0 to 4 marks, 189 (45.43%) students scored from 4.5 to 9.5 marks, whereas 05 (1.20%) students scored from 10 to 15 marks. Figure 5 summarizes the students' performance in this question.

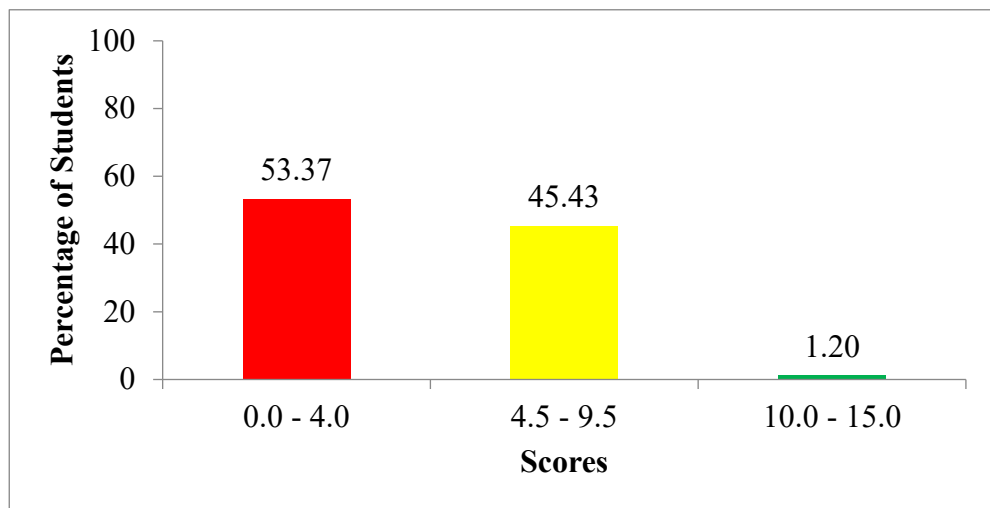


Figure 5: *The Students' Performance in Question 4*

Figure 5 shows that 194 (46.63%) students scored from 4.5 marks and above, indicating that the overall performance on this question was average. This outcome shows that majority of students had a clear understanding of the question's requirements and had sufficient knowledge and skills in the subject matter. Specifically, in part (a), students were able to identify key factors in selecting appropriate pencils for use. These factors include the

draftsman hand pressure, the nature of the drawing task, the texture of the paper, atmospheric conditions, the required level of accuracy, and the degree of opaqueness needed for reproduction.

In part (b), the majority of students successfully identified the use of hard, medium, and soft pencil leads in architectural draughting. Hard pencil leads are used to create precise, fine, and light lines, making them suitable for tasks that require high accuracy in architectural drawing. Medium pencils strike a balance between hardness and softness, making them ideal for general drawing and lettering tasks. Soft pencil leads, on the other hand, are primarily used for shading, hatching, and adding depth to drawings.

In part (c), students were able to describe, with the help of sketches, the uses of two types of pencil lead points produced during sharpening. The conical pencil lead point is particularly suited for tasks requiring precision and fine detail, such as lettering, drawing long lines, and sketching. In contrast, the chisel pencil lead point is used for drawing long, thin lines of uniform thickness. Extract 4.1 presents a good response from one of the students who answered the question.

4. (a) Which factors should be considered in selecting proper pencil to be used for a particular drawing? Give five factors.

(i) Types of the drawing you need to draw.

(ii) Size or style of drawing you need to draw

(iii) Hidden details or information of the drawing you need to draw.

(iv) Features of the drawing contain inside and outside.

(v) Physical appearance of the drawing to be drawn.

(b) Identify the use of the following grade of pencil in architectural draughting.

(i) Hard pencil lead

Is the type of pencil which is used in produced or drawing frame of the drawing

(ii) Medium pencil lead

Is the type of pencil which is used in drawing process.

Extract 4.1: A sample of correct responses to Question 4

Extract 4.1 is a sample of responses from a script of the student who in part (a), mentioned factors to be considered in selecting proper pencil to be used for a particular drawing. In part (b), identified the use of the hard, medium and soft pencils and in part (c), described the uses of two types of pencil lead points produced during sharpening.

Despite the average performance of students on this question, 222 (53%) students performed poorly. The majority of those who scored low marks either partially or completely failed to understand the requirements of the question. Further analysis of the responses reveals that students who scored zero provided irrelevant answers in both parts (a) and (b). The poor

performance in part (c) can be attributed to difficulties in the previous parts, which may be linked to insufficient knowledge and practical skills in technical drawing, particularly in the use of pencils. Extract 3.2 illustrates a poor response from one of the students who attempted the question.

4. (a) Which factors should be considered in selecting proper pencil to be used for particular drawing? Give five factors.

- (i) The lead of the pencil should be considered.
- (ii) Types of pencil should be considered.
- (iii) The factor which cause the pencil should be damaged, like water.
- (iv) Good writing of pencil
- (v) stability of pencil

(b) Identify the use of the following grade of pencil in architectural draughting.

- (i) Hard pencil lead
it is hard pencil which used in making black margin ^{line} like boundaries of drawings in making drawings
- (ii) Medium pencil lead
it is middle pencil so it is used to draw middle lines which is not ^{very} black or very thin. in middle.

Extract 4.2: A sample of incorrect responses to Question 4

Extract 4.2 is a sample of responses from a student's script where, in part (a), the student gave inconsistent responses, such as factors that damage pencils. In part (b), the student provided irrelevant responses, stating that middle pencils are used for drawing middle lines.

2.2.3 Question 5: Geometrical Figures

This question had two parts: (a) and (b). The question intended to test student's ability to create an ellipse using the knowledge and skills acquired from the topic *Geometrical Figures*. The students were required to: In part (a) describe the shape of pavement blocks to be produced, in part (b) draw an ellipse by using an auxiliary method given that the major and minor axes is 100 mm and 50 mm respectively.

A total of 416 (100%) students attempted the question and, out of them, 232 (55.77%) students scored from 0 to 4 marks, 100 (24.04%) students scored from 4.5 to 9.5 marks and 84 (20.19%) students scored from 10 to 15 marks. Figure 6 summarizes the overall performance of the students to the question.

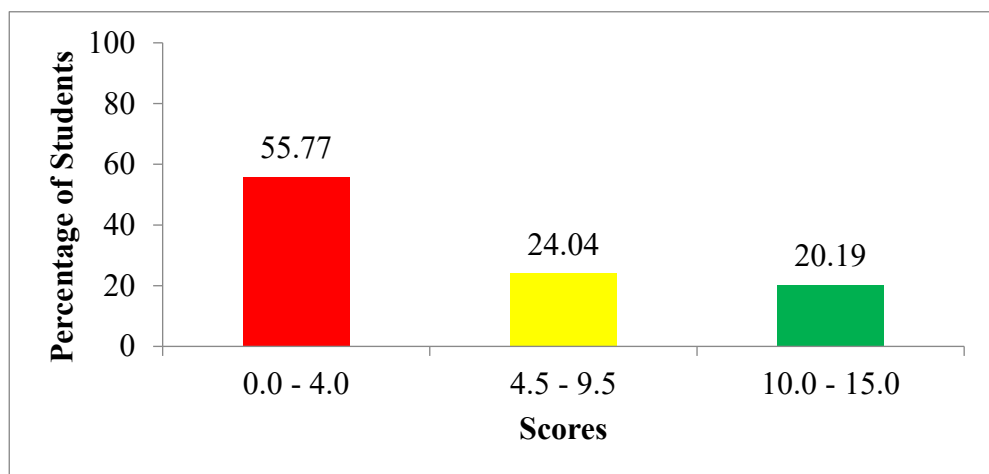


Figure 6: *The Students' Performance in Question 5*

Figure 6 shows that the overall performance of students on this question was average, with 184 (44.23%) students scoring 4.5 marks and above. This performance can be attributed by their adequate knowledge and ability to apply technical drawing skills to create geometric figures. In part (a), these students identified an ellipse as a plane figure bounded by a curved line with the longest and shortest axes bisecting each other at right angle at the center.

In part (b), they effectively used their drawing skills to construct an ellipse using the auxiliary method. The process involve drawing two concentric circles, one with a minor axis of 50 mm and the other with a major axis of 100 mm. These two circles share a common centre, point O. Four additional

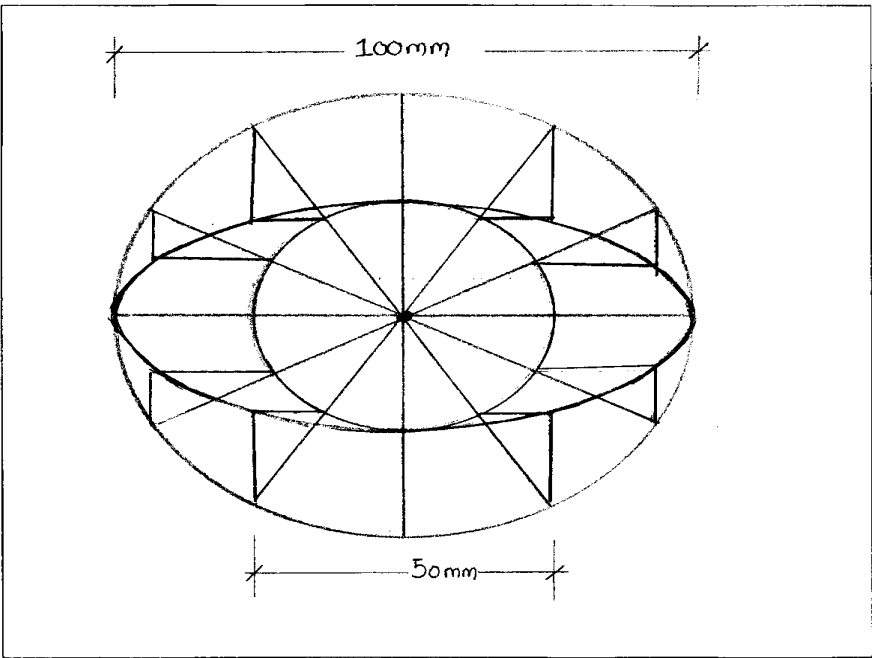
major axes are drawn from the larger circle, all passing through the centre O. At each point where the major axes intersect the circumference of the larger circle, vertical projections are drawn down to the smaller circle. Similarly, horizontal projections are drawn from the points where the major axes intersect the smaller circle. These projections form perpendicular lines. Finally, by freehand connecting of points where the projections meet form an ellipse. The overall accuracy of the construction was supported by a clear presentation of construction lines, visible object lines, neatness, the use of a scale, and the correct dimensions. Extract 5.1 is a sample of correct responses in question 5.

5. A welder is required to choose among various drawing of the polygons in order to produce formwork for pavement blocks. If an ellipse is chosen;

(a) Briefly describe the shape of pavement blocks to be produced.

The shape of pavement blocks will have two axis or diameter which are large diameter (major axis) and small diameter (minor axis).

(b) Draw an ellipse by using an auxiliary method given that the major and minor axes as 100 mm and 50 mm respectively.



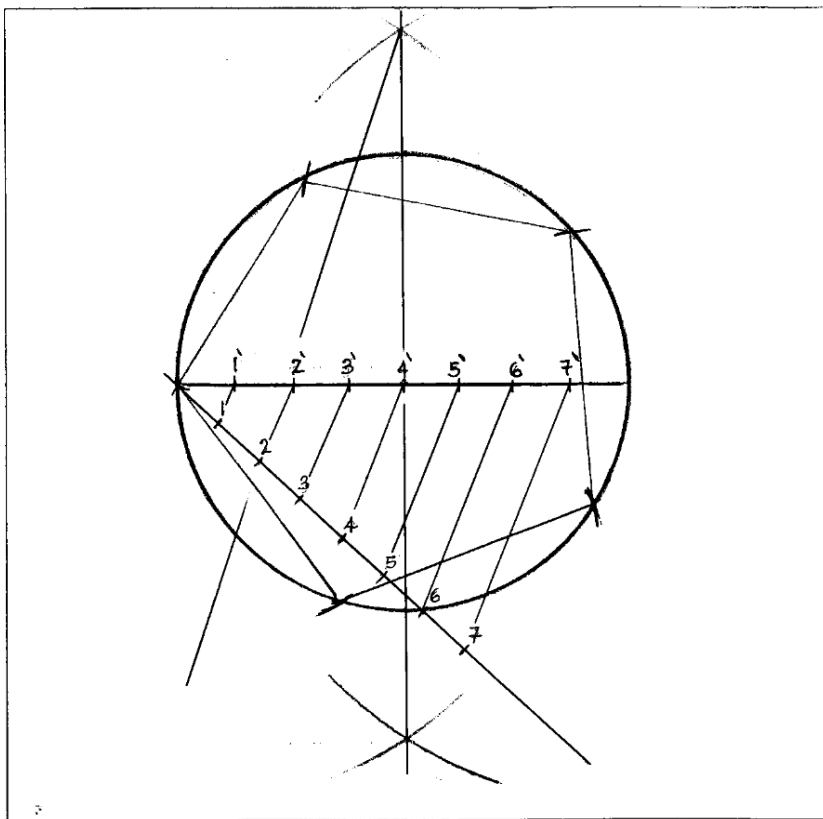
Extract 5.1: A sample of correct responses to Question 5

Extract 5.1 is a sample of responses from a student's script whereby the student, in part (a), provided relevant responses by giving correct definition of an ellipse and in part (b), sketched a drawing of an ellipse by using auxiliary method.

On the contrary, 232 (55.77%) students scored poor marks in the question. These students lacked knowledge of geometrical figures. In part (a), most students were unable to define the term *ellipse*. Some students misunderstood the question's requirements and ended up describing unrelated geometric shapes like polygons, pentagons, and hexagons as pavement blocks, simply because they were familiar with them in their real surroundings. Additionally, some students provided incomplete or irrelevant explanations, such as claiming that '*a trapezoid is a quadrilateral polygon with all sides equal*'. Others skipped this entire part.

In part (b), these students either failed or partially drew an ellipse by using the auxiliary method, due to a lack of both the necessary knowledge and technical drawing skills. For instance, some students drew other geometric shapes, such as a pentagon, hexagon and heptagon, while others skipped the entire part of the question. Additionally, they failed to demonstrate competence in using construction lines, object lines, visibility, neatness, scale, accurate views, and dimensions, as well as in including two circles. Extract 4.2 provides an example of a incorrect response from one of the students who attempted this question.

5. (b) Draw an ellipse by using an auxiliary method given that the major and minor axes as 100 mm and 50 mm respectively.



Extract 5.2: A sample of incorrect responses to Question 5

Extract 5.2 is a sample of incorrect responses from a student's script where, in part (b), the student provided irrelevant responses by drawing pentagon instead of ellipse due failure to abide to the question's demand.

2.3 SECTION C: STRUCTURED QUESTIONS

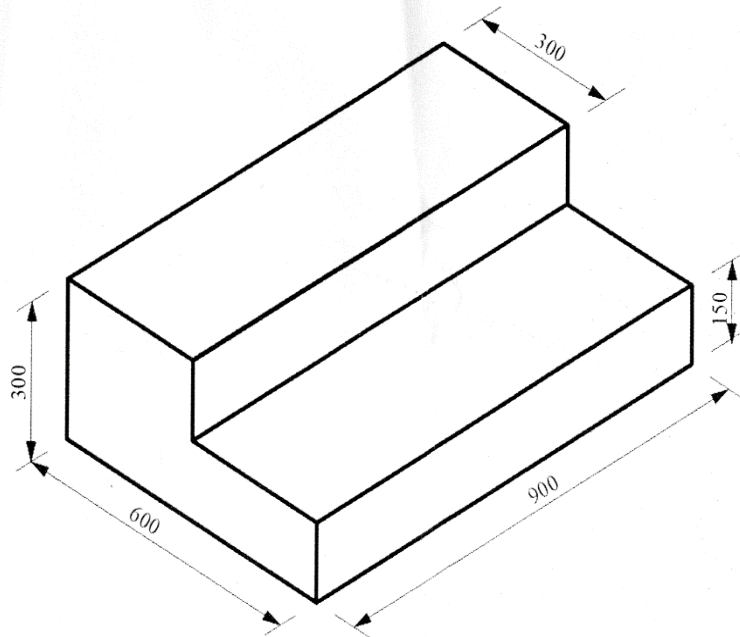
2.3.1 Question 6: Orthographic Projection

This question had two parts: (a) and (b). In this question, students were required to use a scale of 1:10 to draw, they were required to draw (a) the plan and front elevation of a step in first angle projection. In part (b) the cavalier oblique projections when given an oblique angle 45° . The question intended to assess student's understanding and ability to apply the concepts of orthographic projection. The question stated that:

The figure below is a sketch of a residential house step. By using a scale of 1:10, draw

(a) the plan and front elevation of a step in first angle projection.

(b) the cavalier oblique projections when given an oblique angle 45°



A total of 416 (100%) students attempted the question, out of which 64 (15.38%) students scored from 0 to 5.5 marks. Students who scored from 6 to 12.5 marks were 142 (34.14%), whereas 210 (50.48%) students scored from 13 to 20 marks. Figure 7 summarizes the overall performance of the students to the question.

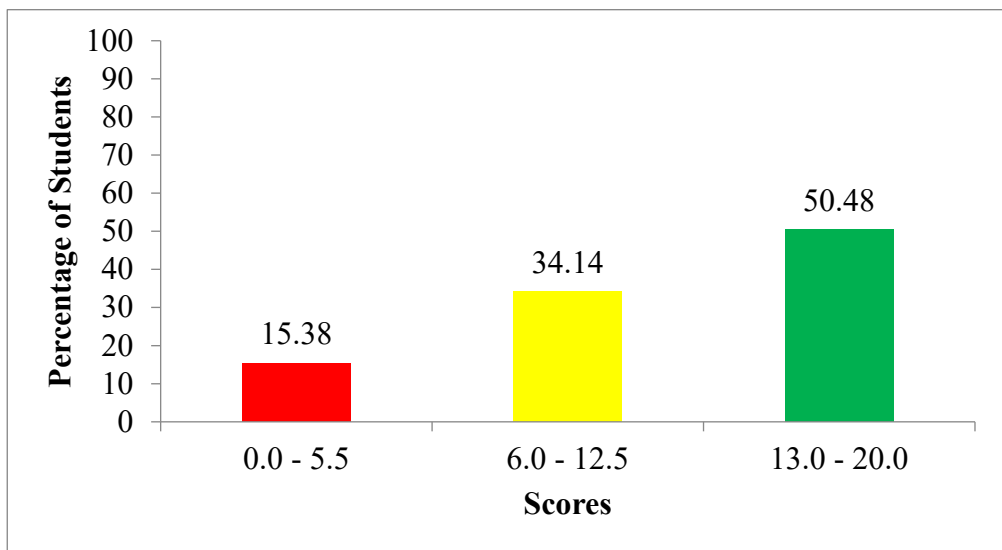
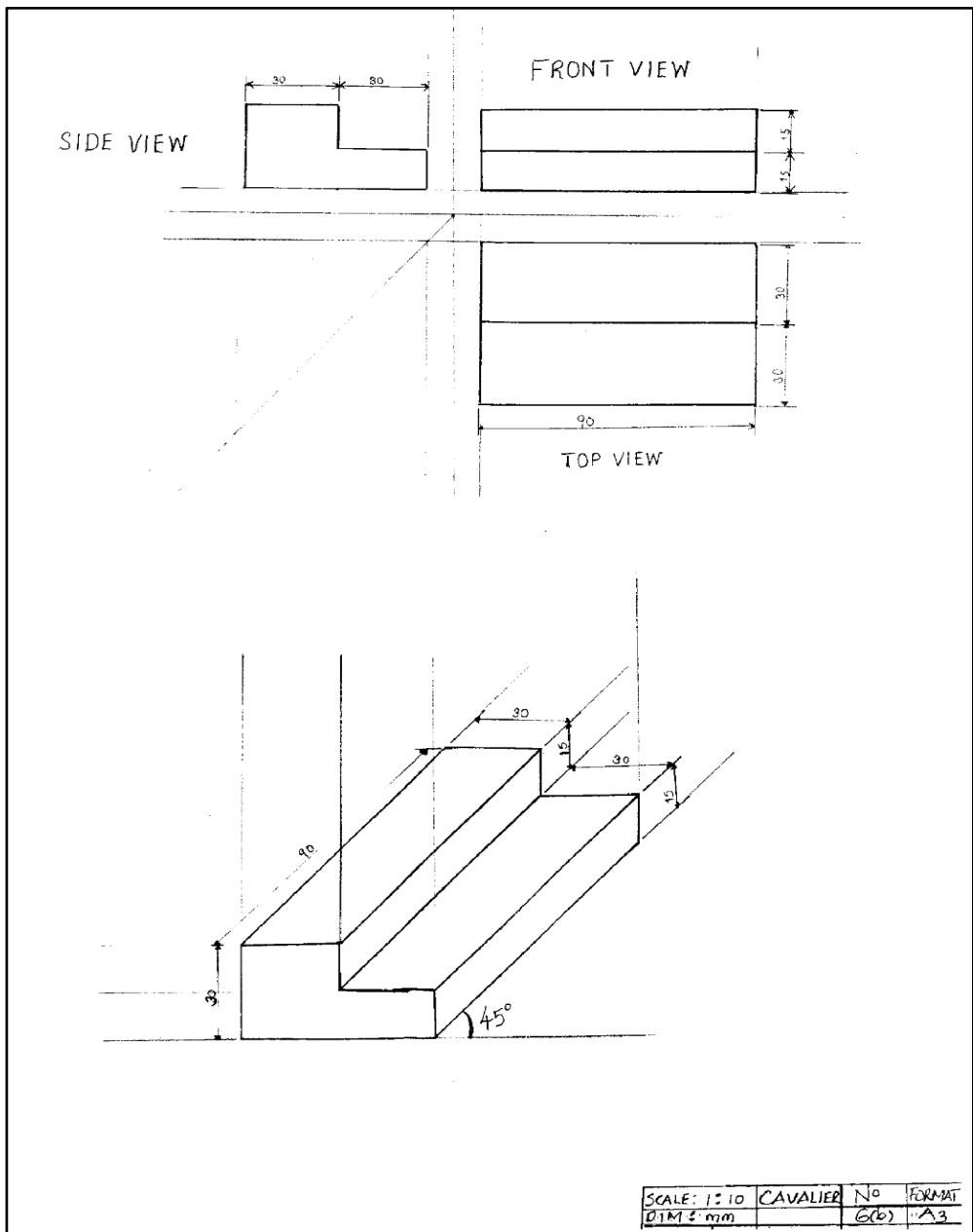


Figure 7: *The Students' Performance in Question 6*

Figure 7 shows that the performance of students on this question was good, with 352 (84.61%) students scoring 6 marks and above. In part (a), the majority of these students followed the correct steps to develop a plan and front elevation of a step in first-angle projection. In this projection method, the final drawing views are placed in standard positions, with the front view in the center, the top view below, and the side view to the left.

However, in part (b), the students who scored average and above marks had adequate knowledge in pictorial drawing, specifically in converting the given pictorial figure to cavalier oblique projection. These students accurately drew a pictorial residential house in cavalier oblique projection with its front face directly facing the viewer, while the sides are tilted at an angle of 45° from the horizontal. The variation on marks of students in this question was attributed to accurate dimensions, neatness, proper positioning of the title block and borderlines, labelling, use of construction lines and scale, and the correctness of the views. Extract 6.1 provides a sample of the students' correct responses to this question.

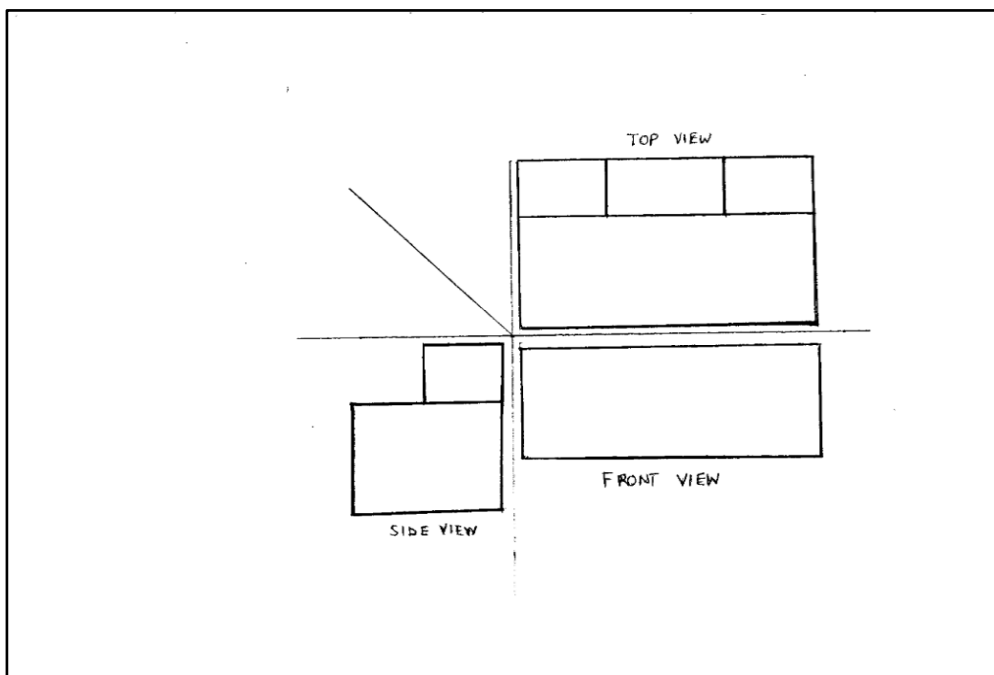


Extract 6.1: A sample of correct responses to Question 6

Extract 6.1 is a sample script of a student's response who managed to draw in part (a), the front elevation, end elevation and plan elevation using first angle projection and in part (b), projected the cavalier oblique projection of the residential house step correctly.

Despite good performance by most of students, 64 (15.38%) students scored 5.5 marks and below. The analysis shows that majority of these students lacked sufficient knowledge and skills in first-angle orthographic and cavalier oblique projection. Poor performance was attributed to several factors. In part (a), students failed to correctly position the top, side, and front views in first-angle projection, often confusing it with third-angle projection. In part (b), their poor performance was due to a misunderstanding of the question's requirements and lack of knowledge and practical skills in cavalier oblique projection, and inability to conceptualize the necessary projection angle.

Furthermore, in both parts of the question, students failed to use the appropriate scale. They also incorrectly positioned the borderline and title block, and made errors or omitted labelling and dimensioning. While they used the object lines and outlines incorrectly, their drawings generally lacked neatness. Extract 6.2 provides a sample of the students' incorrect responses to this question.



Extract 6.2: A sample of incorrect responses to Question 6

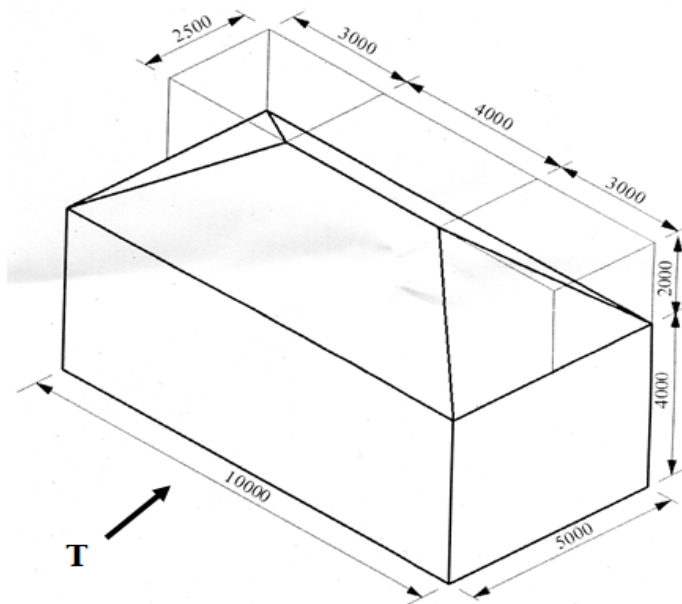
Extract 6.2 shows a sample of incorrect responses from a student who did not adhere to the principles of first angle orthographic projections, provided incorrect positioning of the views, inexactness of the object and neglected the use of projection lines and title block.

2.3.2 Question 7: Pictorial Drawing

This question had two parts: (a) and (b), where students were required to use a scale of 1:100 to; in part (a), draw front elevation as indicated by the arrow T, right side elevation and plan in third angle projection. In part (b), draw an isometric projection of a pictorial model sketch of a house with missing elevation. The question stated that:

The figure below is a pictorial model sketch of a house with missing elevation. By using a scale of 1:100, draw;

- (a) the front elevation indicated by arrow T, right side elevation and plan in third angle projection.*
- (b) the isometric projection.*



This question was attempted by 416 (100%) students. Out of those students, 82 (19.71%) students scored from 0 to 5.5 marks. The number of students who scored from 6 to 12.5 marks were 166 (39.90%) and 168 (40.39%)

students scored from 13 to 20 marks. Figure 8 summarizes the students' performance in this question.

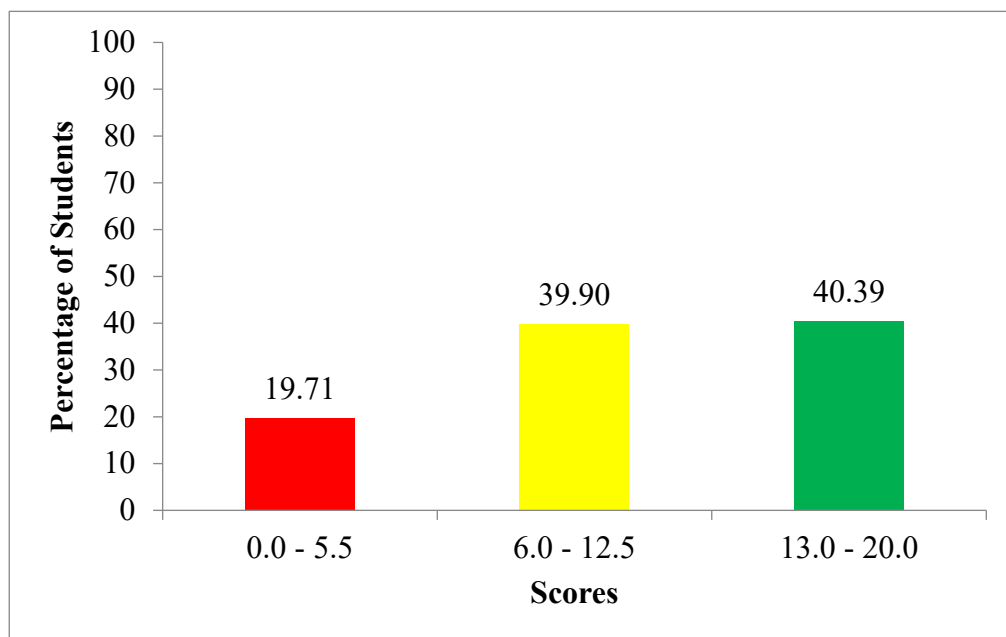


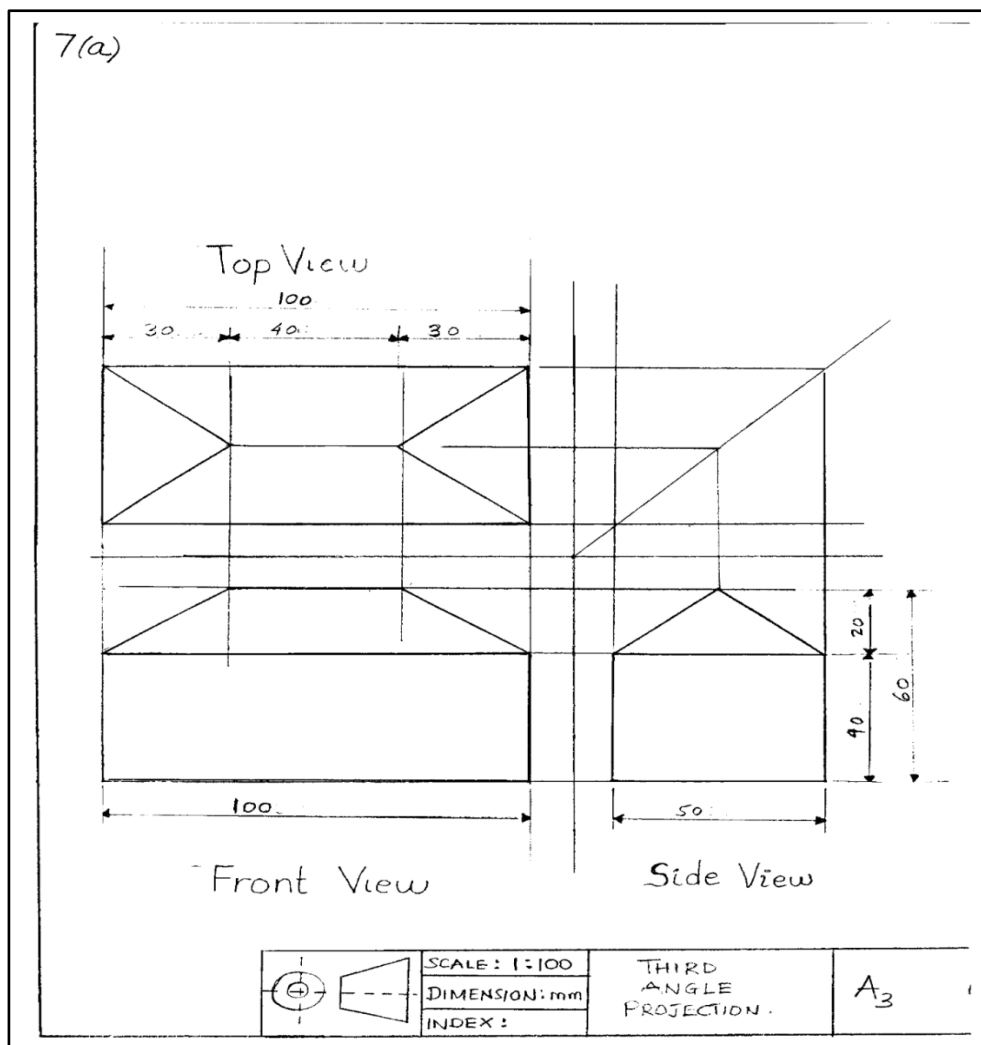
Figure 8: *The Students' Performance in Question 7*

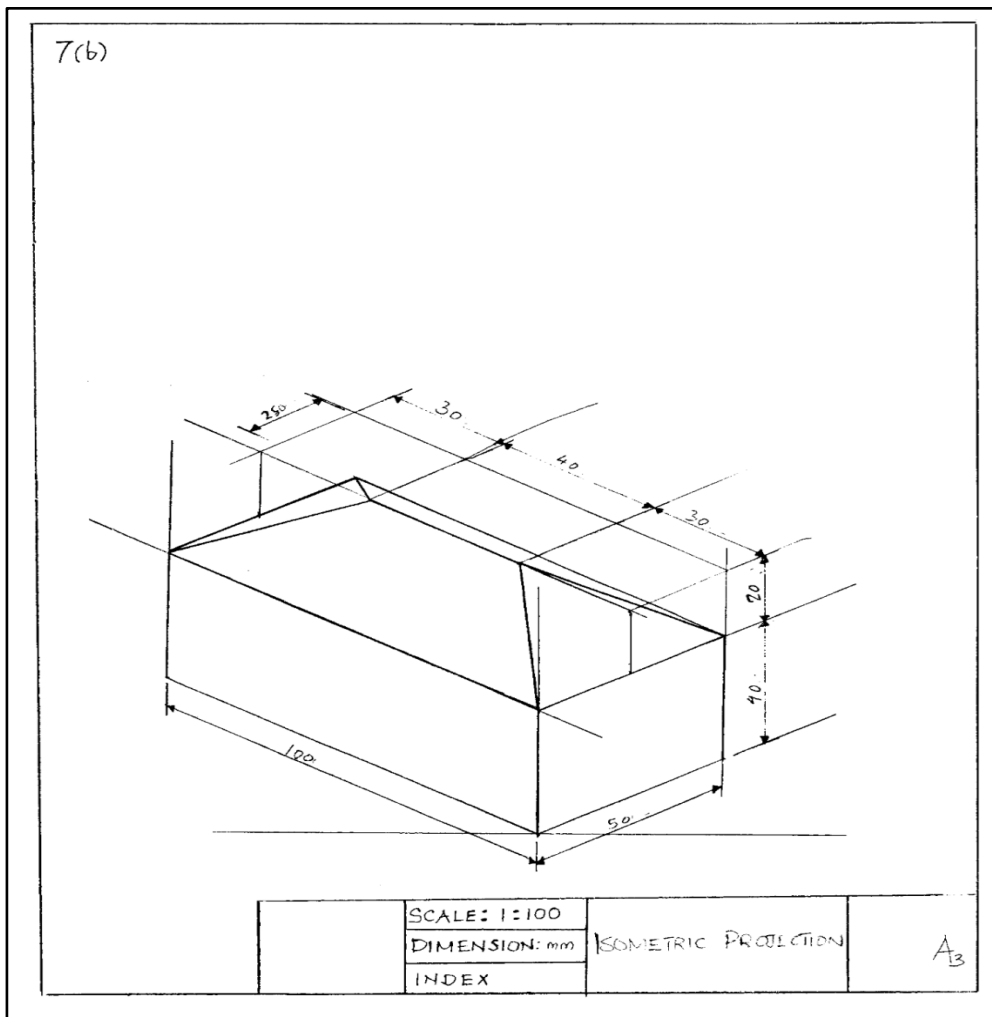
Figure 8 illustrates that the students' performance on this question was generally good, with 334 (80.29%) scoring between 6 and 20 marks. Further analysis reveals that students who performed well were able to create both orthographic and isometric views. The majority of the students, in part (a), successfully drew orthographic views of a model house, showing construction lines projected onto the front, plan, and end elevations. Factors such as the neatness of views, accurate dimensions, correct and clear labelling of views, proper use of construction lines, visibility of object lines, appropriate scale, and correct positioning of elevations contributed to their good performance. These students demonstrated a solid understanding of orthographic projections as outlined in the syllabus.

On the other hand, in part (b) students performed well due to their familiarity with isometric projection. Isometric projection represents objects with equal angles of 120° between the axes, creating a visually uniform scaling along all three axes. Students' good performance was attributed by following the correct procedure for using the box method. This procedure included drawing

horizontal construction lines on an A3 sheet and identifying a reference point to indicate the size of the model house sketch. It also involved drawing lines at a 30° angle to the horizontal from the central on both sides and then drawing parallel lines to complete the model house sketch.

Additionally, these students provided drawings with key elements such as a title block, correct dimensions, neatness, proper labelling, visible object lines, and an accurate scale (1:100). Extract 7.1 shows the correct responses from a student who attempted the question.





Extract 7.1: A sample of correct responses to Question 7

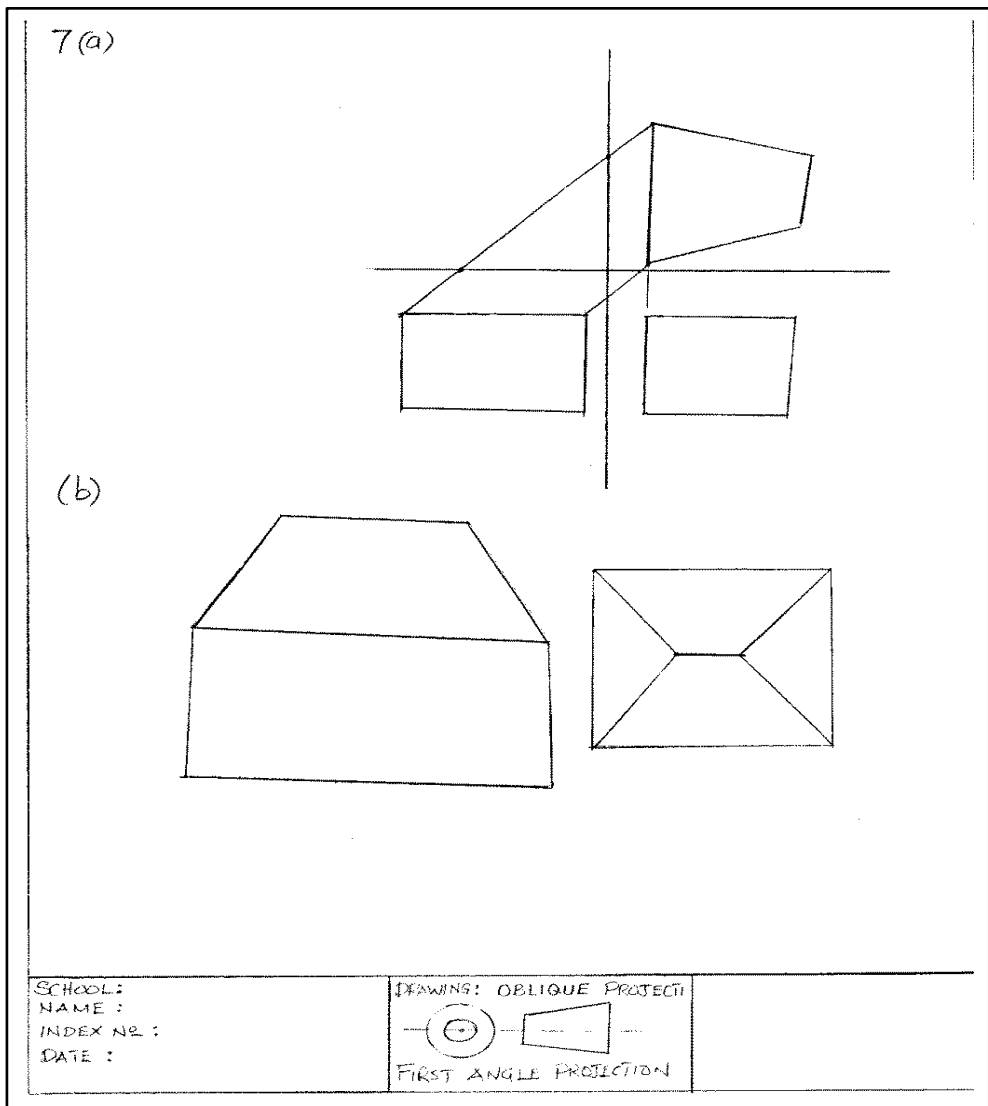
Extract 7.1 shows that the student managed to draw orthographic views of a model sketch of a house in part (a) using third angle projection and in part (b), drew isometric projection of the given model sketch of a house.

Despite the good performance of most of the students, 82 (19.71%) students performed poorly. Most of the students who scored low marks demonstrated insufficient skills in drawing views in orthographic and isometric projection.

Students in part (a), failed to demonstrate drawing skills by understanding of orthographic projection in the case of position and number of views. Some

students drew two views instead of the three, which were required. They also failed to distinguish or mix up the positions of top, front and side views between the first and third angle orthographic projections, which causes them to score low marks.

Students' poor performance in part (b), was due to inability to understand fully the demand of the question. For instance, some students could draw a model sketch of a house in isometric projection but failed to use the correct scale. They also failed to indicate the dimension as well as the angle of projection. On the other hand, some students failed to recall that the isometric projection drawing is drawn at an angle axis of 30^0 in both directions with the horizontal or baseline. Additionally, other students skipped some procedures in the process of attempting the question. The majority of students who scored zero lacked basic knowledge of the concepts assessed. Extract 7.2 below provides a sample of incorrect responses from one of the students.



Extract 7.2: A sample of incorrect responses to Question 7

Extract 7.2 is an incorrect response, from a student who wrongly interpreted the figure of a model sketch of a house and drew a third angle orthographic projection with incorrect views, wrong positioning of the views, wrong title block, lack of construction lines and was unable to draw isometric projections.

3.0 ANALYSIS OF THE STUDENTS' PERFORMANCE IN DIFFERENT TOPICS

The Form Two National Assessment on Architectural Draughting paper had seven (7) questions set from 9 topics as per Form I and Form II syllabus. The analysis of the performance shows that question 1, 2, 6 and 7 had good performance since the percentage of the students who passed were 96.87%, 89.66%, 84.62% and 80.29% respectively. The items in question 1 was set from the following topics: *Architectural Draughting and Occupation Information; Instruments Equipment and Materials; Layout of the Drawing or Paper to Formatting; Geometrical Figures; Orthographic Projection; Perspective Drawing; Architectural Scales and Dimensions* while Question 2, 6 and 7 were set from *Geometrical Figures, Orthographic Projection and Pictorial Drawing*.

The good performance in these topics is associated with students' ability to understand the requirements of the questions and the application of knowledge and skills acquired from different topics enabled them to identify the correct responses from the given options.

The topics in which the students performed averagely were *Instrument, Equipment and Materials* (47% and *Geometrical Figures* (46%) tested in questions 4 and 5 respectively. The average performance shows that the students had insufficient drawing skills that would have enabled them to perform above average in the topics concerned. On the other hand, one topic *Auxiliary Views* (4%) assessed from question 3 was the only topic, which was poorly performed. This is an indication that students had insufficient knowledge and skills on the concept of auxiliary views.

4.0 CONCLUSION

The analysis of the students' performance was done in all questions assessed in the Architectural Draughting assesment paper in 2024. Generally, the performance of the students in Architectural Draughting was good, since 76.20% of the students scored pass mark and above.

The good performance of the students was attributed to their correct interpretation of the questions requirements, adherence to drawing

procedures, and the adequate knowledge and skills acquired in the tested topics, including competence in practical drawing skills in *Geometrical Figures, Pictorial Drawing* and *Orthographic Projections*.

The analysis concludes that, drawing equipment, instruments, materials and more involvement in drawing practices works are required in improving the students' perspective performance. This will help them acquire logical and technical understanding of the subject matter.

5.0 RECOMMENDATIONS

Based on the shortcomings observed in the analysis, it is recommended that:

- (a) School administrators and subject teachers should provide enough practice by ensuring availability of learning and teaching facilities. The practice will foster the acquisition of knowledge and competence to students. As a result, their performance will improve at both school and national levels.
- (b) Regular exercises and tests should be given to students and immediate feedback provided on key issues including, how to identify the demand of the questions and appropriately responding to the questions.
- (c) Students should be provided with various drawing practices and access to various sources of drawing techniques to enhance their competence. This can be made possible by ensuring access to the internet, drawing programmes relevant books and study tours.
- (d) Students ought to be exposed to various ongoing projects in order to relate knowledge in the area of study into practices.
- (e) Students should be encouraged to read carefully the instructions on the question papers so that they can attempt questions in accordance to specific requirements.
- (f) Teachers should ensure that students thoroughly understand pictorial drawings, orthographic and auxiliary views, including types, uses, and drawing techniques, while providing intense practical learning opportunities to reinforce understanding.
- (g) Teachers should offer sufficient practice, regular feedback, and guidance to help students improve their drawing skills, while using demonstrations and discussions to simplify concepts and track progress in mastering pictorial, orthographic and auxiliary views.

Analysis of the Students' Performance in Different Topics

S/N	Topic	Question Number	Percentage of Students who Scored 30% or Above	Remarks
1	Drawing Instrument; Layout of the Drawing or Paper to Formatting; Geometrical Figures; Scales; Orthographic projection; Architectural draughting and Occupation information and Perspective Drawing.	1 (Multiple Choice Items)	96.87	Good
2	Orthographic projection	6	84.62	Good
3	Pictorial Drawing	7	80.29	Good
4	Geometrical Figures;	2 (Matching Items) and 5	66.95	Good
5	Instruments, Equipment and Materials	4	46.63	Average
6	Auxiliary Views	3	4.09	Weak

