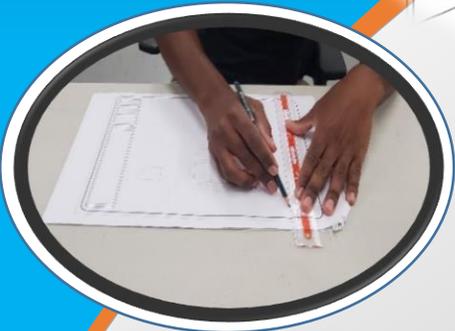
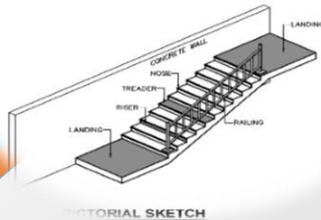
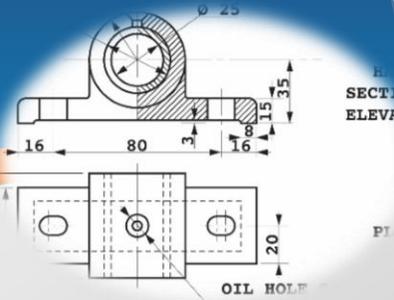




CARIBBEAN EXAMINATIONS COUNCIL

TECHNICAL DRAWING



**Subject Report
with
Exemplars**

June/July 2022

CARIBBEAN EXAMINATIONS COUNCIL

**REPORT ON CANDIDATES' WORK IN THE
CARIBBEAN SECONDARY EDUCATION CERTIFICATE[®]
EXAMINATION**

JUNE/JULY 2022

TECHNICAL DRAWING

TECHNICAL PROFICIENCY

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INTRODUCTION

This guide has been compiled using candidates' responses to the 2022 June/July examination in CSEC Technical Drawing.

In 2022, Covid-19 continued to be the source of various challenges for candidates writing the examination. A lack of readiness for online classes within some territories and the unique economic situation of each territory determined the extent to which candidates' preparedness for the exam was impacted.

To mitigate the pressures experienced by candidates, guidelines on most areas of the examination, including the format of the presentation of solutions, were provided by CXC.

Over the past five years, the CSEC Technical Drawing Examination Team has observed that sharing guidelines for the presentation of solutions has led to very little improvement in candidates' responses, especially when they use the CAD option. Thus, it is important that stakeholders pay greater attention to the instructions and information provided in order to prepare candidates to perform optimally in their examinations.

Entries for the 2022 examination increased from 8012 in 2021 to 8421 in 2022. Overall, 75.5 per cent of candidates achieved Grades I–III, a decline from 80.11 per cent in 2021 and 83.94 per cent in 2020.

The performance of candidates on Paper 01 was satisfactory. Out of a maximum score of 60, the mean was 34.9.

The performance of candidates on Paper 020 and Paper 022 was below average. Out of a maximum score of 120, the mean was 35.24 for Paper 021 and 39.69 for Paper 022.

Candidates' performance on Paper 03 remained good. Out of a maximum score of 120, the mean was 91.52.

PAPER 01 — MULTIPLE CHOICE

Paper 01 consisted of 60 multiple-choice items. The mean score, 34.9, was consistent with candidates' performance for the previous three years.

Section I — Working Drawing

Question 1

Candidates were presented with the outline of a line drawing of a floor plan for an art studio single story building. They were required to draw a cross-section at a specific cutting plane, A–A, using the given specifications.

Candidates were required to draw the cross-section at a scale of 1:50 and label the following components.

- Foundation footing and foundation wall
- Concrete slab on hardcore
- Floor and walls
- Patio floor joist with pillar and handrail
- Windows and doors
- Rafter, lath/ purlin and roofing material
- Ceiling
- Overhang and fascia.

Candidates were also required to include a suitable title and draw/print using the relevant scale.

This question was mandatory. It was attempted by approximately 84 per cent of candidates registered for the Building Option. Generally, candidates were able to generate a cross-sectional drawing from the information given, using either the traditional or CAD methods. This suggests that students had a knowledge of drawing a cross-section and were able to apply that knowledge.

Candidates' representations of the following were well done.

- Strip foundation footing and foundation walls
- Concrete slab on hardcore
- Conventional representation of foundation materials
- The roof as a gable at the given cutting plane
- Exterior load bearing walls
- Doors and windows in section and elevation

On the other hand, candidates experienced difficulty

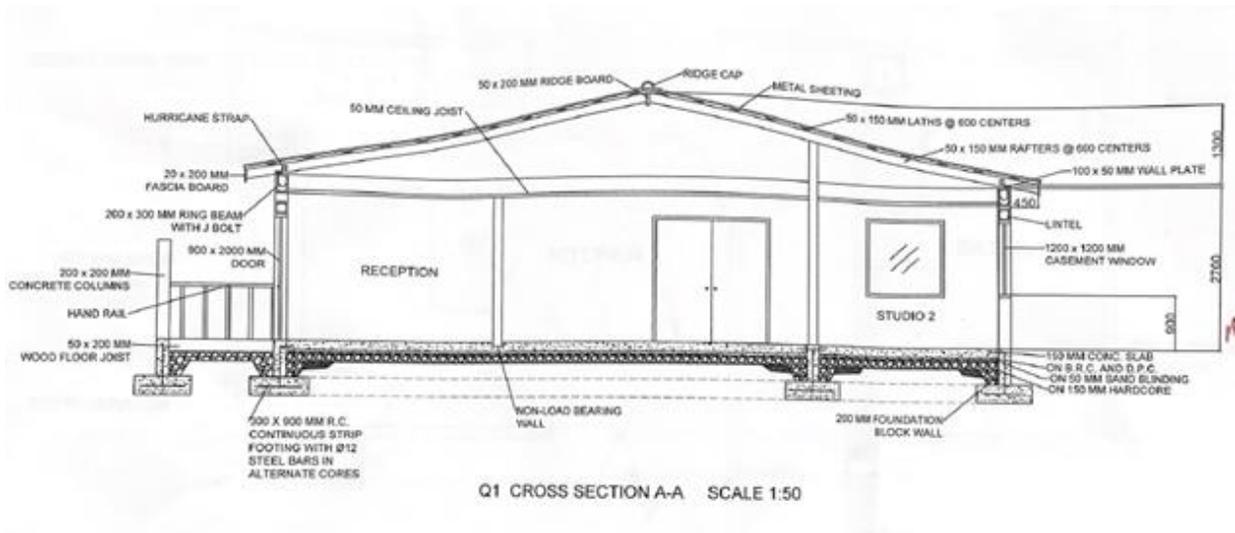
- interpreting the requirements of the question
- drawing the wood floor joist correctly
- representing the foundations for interior non-load bearing walls
- using conventional representation for materials in section

- accurately representing roof structural features
- correctly indicating floor to wall plate or floor to ceiling dimensions
- scaling.

Many candidates were able to interpret the question and display knowledge of generating a cross-section and placing labels as given. In general, it was clear that candidates' knowledge and application of the cross-section were acceptable; however, candidates need to improve their practical ability and neatness. While many candidates appeared to have difficulty scaling the drawing, especially when using the CAD option, others were able to successfully replace the scale with a smaller scale and achieve accurate measurements. These candidates were rewarded for their ability to utilize scales successfully.

A large proportion of candidates who used CAD had difficulty printing their responses to the correct scale and using the appropriate CAD linetype for differing requirements. This resulted in drawings that were either too small, too dark or too light. Candidates need to be taught how to print accurately when using CAD.

Candidate's Response to Question 1 — Sample 1



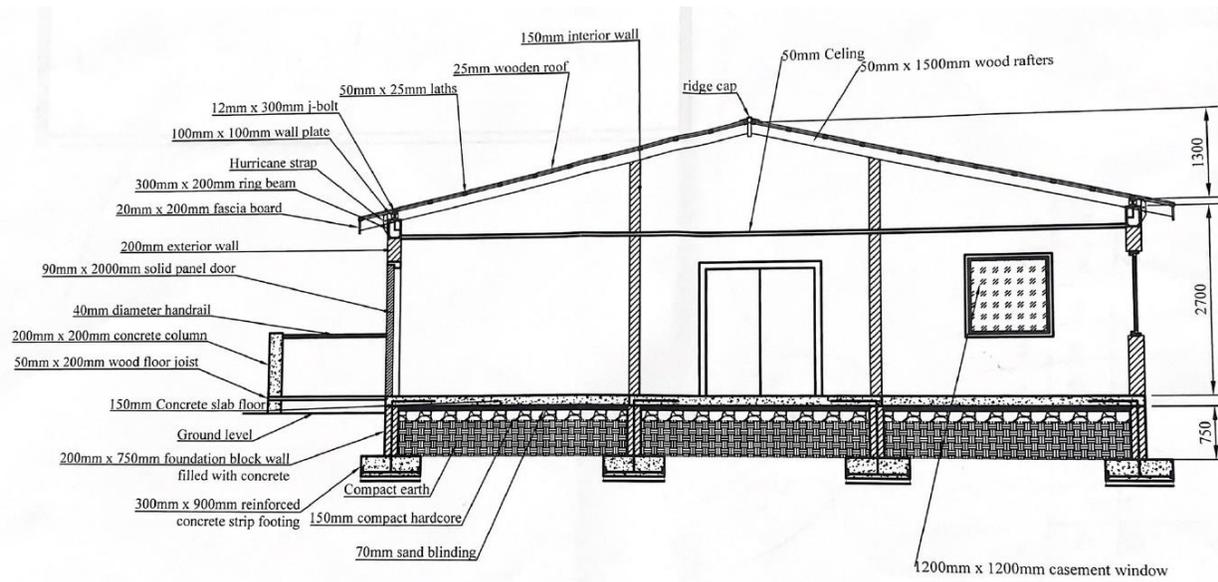
Examiner's Comment

The candidate demonstrated an excellent understanding of how to produce a cross-section at a specified cutting plane from a line diagram. The candidate also demonstrated a clear understanding of how to produce foundation footings and foundation walls, concrete floors on hardcore, exterior load bearing walls, windows and doors in section and elevation, ceiling and ring beam locations, overhang and fascia configurations, and roof structure integrated with roofing finishes. Additionally, the candidate exhibited an excellent knowledge of labelling and dimensioning techniques. The correct linetypes and lineweights were also applied by the candidate and so the components on the section could be identified.

On the other hand, the candidate incorrectly placed the wood floor joist of the patio floor on hardcore. The candidate should have indicated that it was suspended rather than showing a footing or slab thickening for an interior non-load bearing wall.

Despite these weaknesses, the candidate's response was well-executed.

Candidate's Response to Question 1 — Sample 2



Examiner's Comment

The candidate demonstrated an excellent understanding of how to produce a cross-section at a specified cutting plane from a line diagram. The candidate also demonstrated an excellent understanding of how to produce foundation footings and foundation walls, concrete floors on hardcore, suspended wood floors, load bearing and non-loading bearing walls, windows and doors in section and elevation, ceiling and ring beam locations, overhang and fascia configurations, and roof structure integrated with roofing finishes.

Additionally, the candidate demonstrated an excellent knowledge of labelling and dimensioning techniques. The correct linetypes and lineweights were applied by the candidate and so the different components on the section could be clearly identified.

Overall, this was a well-executed CAD response.

Recommendations

- Candidates are reminded that this is the Working Drawing section of the examination. Therefore, they should use standard practices and conventions for completing working drawings.
- Teachers should emphasize to students the importance of using the appropriate line thickness for what is being drawn, drawing correct symbols on the relevant drawings, using the correct dimensioning techniques when producing extension and dimension lines, and using the correct placement and size of the dimension.

Section II — Sketch and Design

Question 2

Candidates were required to make a neat, well-proportioned sketch, which showed the wall thickness of a bathroom and kitchen layout from a given part-plan line diagram.

The given components were

Kitchen

- stove and refrigerator
- island/table
- countertop
- double bowl sink
- upper cabinets

Bathroom

- shower
- toilet
- sink
- lower cabinet/ cupboard.

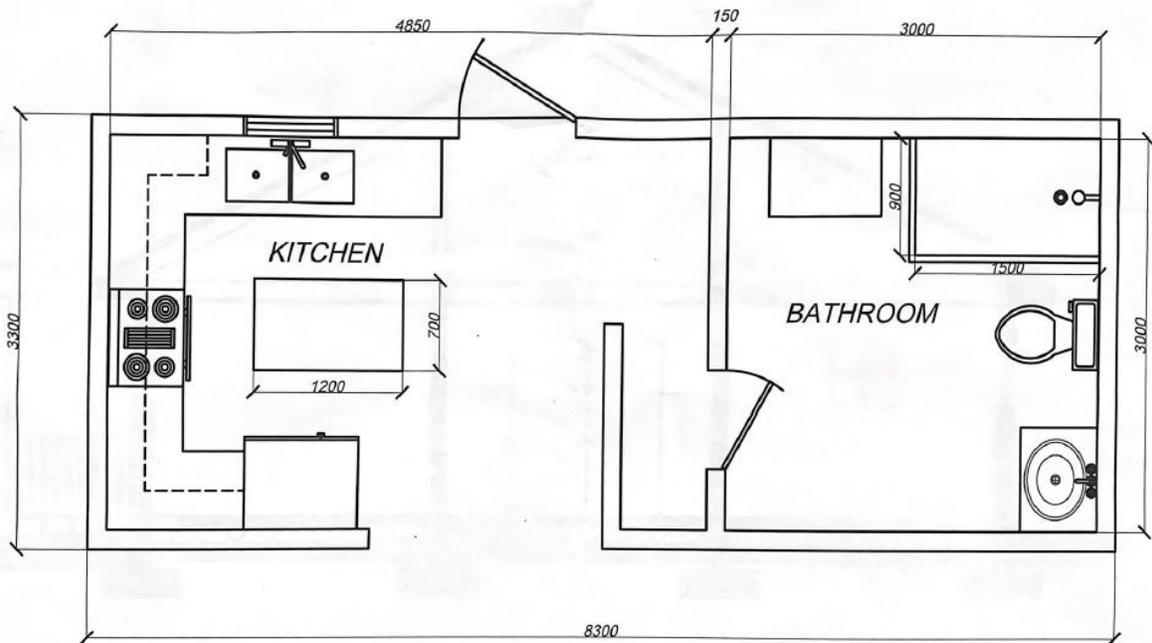
Approximately 69 per cent candidates responded to this question. Overall, candidates demonstrated

- an understanding of bathroom and kitchen layouts
- knowledge of labelling
- knowledge of the drawing convention symbols for kitchen and bathrooms.

On the other hand, some candidates were unable to

- draw a line diagram for the building
- use Figure 2 appropriately
- draw proportionally
- indicate the continuation of the building
- lay out the kitchen and bathroom components properly
- demonstrate knowledge of conventions for kitchens and bathrooms
- print CAD drawings to scale
- exhibit proper labelling techniques (text and leader lines with arrows).

Candidate's Response to Question 2 — Sample 1



*DRAWING SHOWING KITCHEN AND BATHROOM
SCALE 1:50*

Examiner's Comment

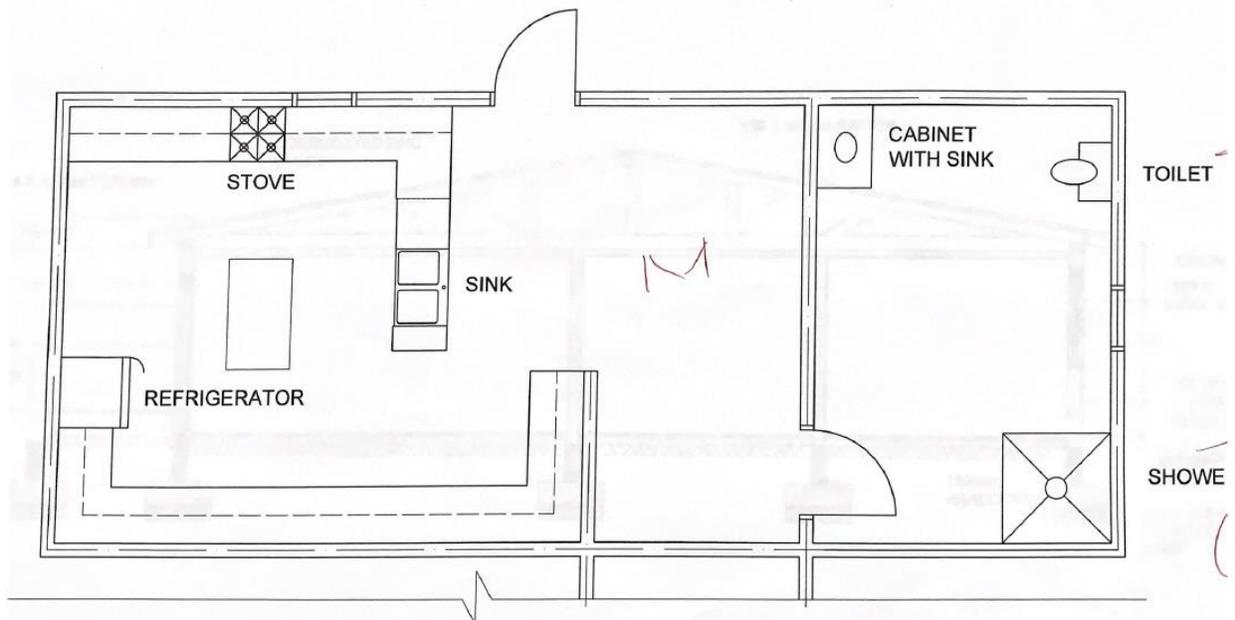
The candidate demonstrated a very good understanding of how to sketch a well-proportioned kitchen and bathroom floor plan from a given line diagram, showing wall thickness. The candidate represented all the doors, the patio and the wall separating the kitchen from the bathroom in the correct locations.

However, the candidate did not include a cut line to indicate that even though a window was placed along the wall the building continued. The candidate drew the standard conventional symbols for kitchen and bathroom elements correctly but did not label them. The size and location of the table/island in the middle of the work triangle minimized circulation and obstructed access to the appliances.

On the other hand, the candidate conveniently positioned the main kitchen elements to form an excellent kitchen work triangle. Circulation in the bathroom was also excellently incorporated by the candidate, who also ensured that the proportion of the bathroom elements to the size of the room was well maintained. Correct linetypes and lineweights were applied to identify different components on the sketch.

Overall, this was a well-executed CAD response.

Candidate's Response to Question 2 — Sample 2



Examiner's Comment

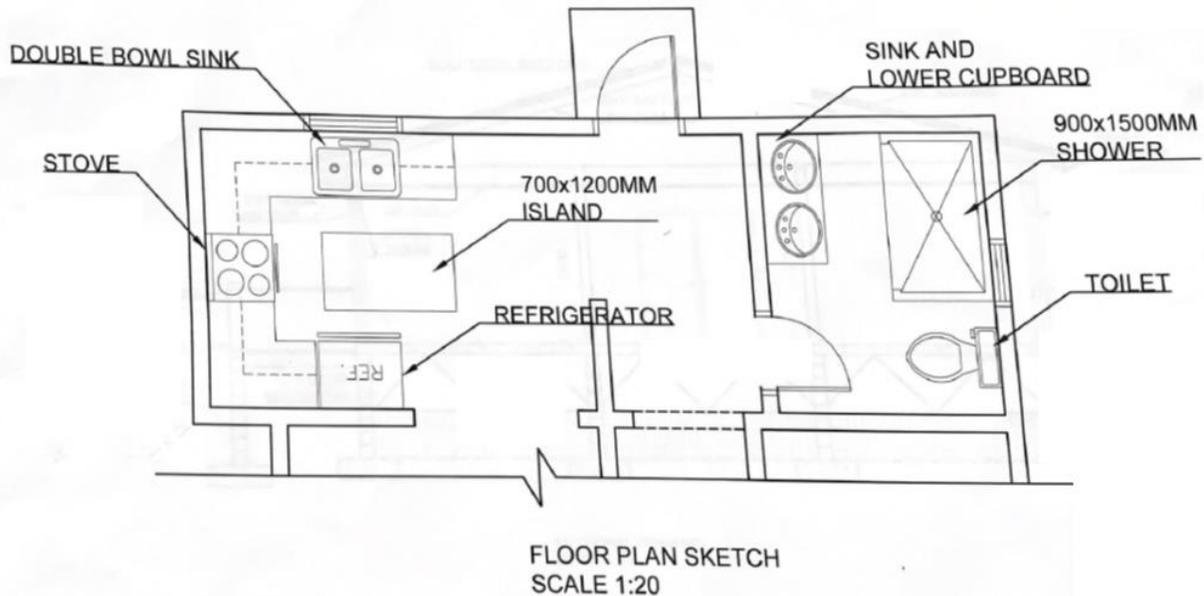
The candidate exhibited a very good understanding of how to sketch a well-proportioned kitchen and bathroom floor plan from a given line diagram, showing wall thickness. The candidate produced all the doors and windows, the patio, the wall separating the kitchen from the bathroom, and the cut line which indicated that the building continued, in the correct locations.

In addition, the standard conventional symbols for kitchen and bathroom elements were correctly drawn and labelled by the candidate. The candidate also positioned the kitchen elements conveniently so that there would be good circulation. Circulation in the bathroom was also adequate.

The candidate also applied the correct linetypes and lineweights in order to identify different components on the sketch. However, the candidate represented the upper cabinets incorrectly by using a continuous line instead of a hidden (dashed) line.

Overall, this was a well-executed CAD response.

Candidate's Response to Question 2 — Sample 3



Examiner's Comment

The candidate demonstrated an excellent understanding of how to sketch a well-proportioned kitchen and bathroom floor plan from a given line diagram, while showing the wall thickness. The candidate produced all the doors and windows, the patio, the wall separating the kitchen from the bathroom, and the cut line which indicated that the building continued. These elements were placed in the correct locations. The standard conventional symbols for kitchen and bathroom elements were correctly drawn and labelled by the candidate. The candidate also conveniently positioned the bathroom elements so that there would be good circulation.

Circulation in the kitchen was adequate; however, the size and location of the table/ island in the middle of the work triangle minimized circulation and obstructed access to the appliances.

Except for the incorrect representation of the upper cabinets with a continuous line instead of a hidden (dashed) line, the candidate applied the correct linetypes and lineweights. This meant that the various components on the sketch could be easily identified.

Overall, this was a well-executed CAD response.

Section I — Assembly Drawing

Question 1

Candidates were presented with enclosed sheets which contained orthographic details and an exploded view of parts, which made up a knuckle joint assembly.

For Part (a), candidates were required to draw full size, in either first-angle or third-angle orthographic projection, the following views of the knuckle joint assembly when fully assembled.

- A plan of the assembled knuckle joint showing all hidden details
- A sectional front elevation of the assembled knuckle joint taken on cutting plane A–A

For Part (b), candidates were required to show a parts list and six main dimensions, including a length, a diameter, a radius and a metric screw thread specification.

For Part (c), candidates were required to print the title — Knuckle Joint Assembly, the scale used and the projection method used by symbol.

This question, which was worth a total of 90 marks, was attempted by approximately 82 per cent of candidates. Moreover, approximately 60 per cent of these candidates demonstrated competency in assembling the given parts of the knuckle joint assembly to maximize its intended functionality.

Approximately 25 per cent of candidates demonstrated limited knowledge of assembly and sectional drawings. This was evidenced by candidates redrawing the parts sheet and exploded views given.

Furthermore, a large number of candidates (approximately 50 per cent) had difficulty in manipulating crosshatching lines to differentiate multiple parts of the assembly. An additional 63 per cent of candidates did not accurately produce two details of the plan related to the fork (1).

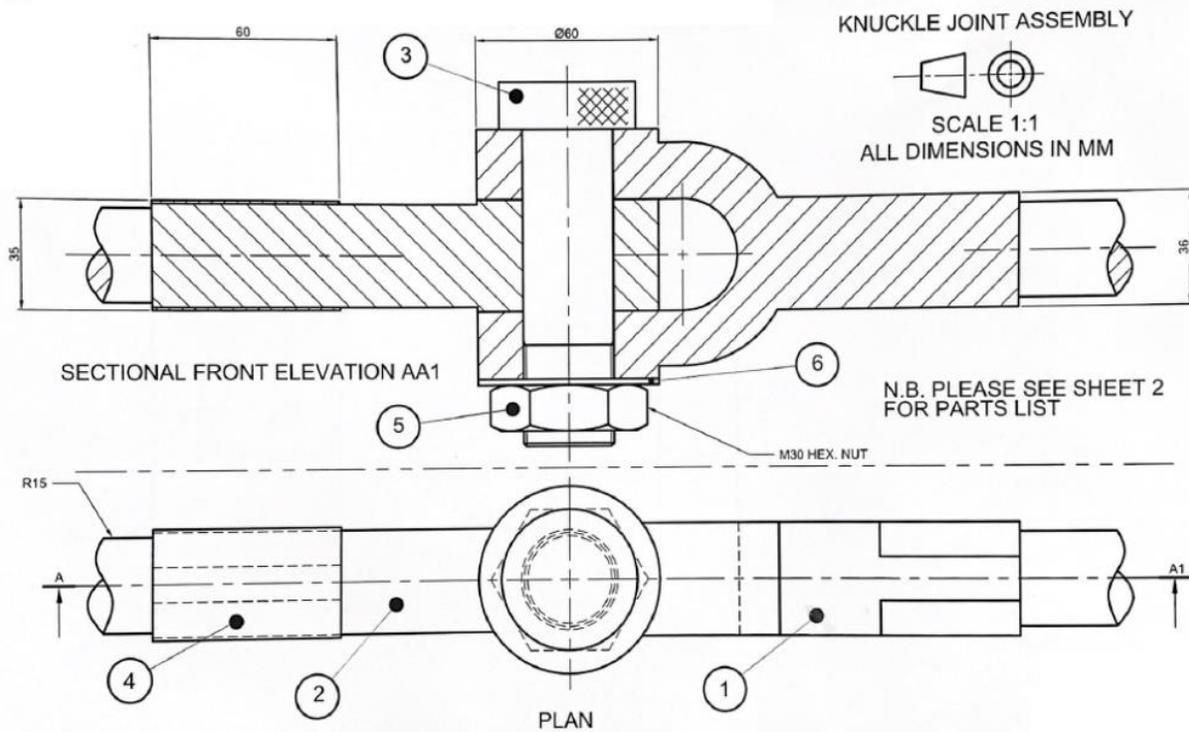
Approximately 95 per cent of candidates who responded to the Mechanical Engineering option utilized CAD to produce the final product. However, approximately 70 per cent of those responses were printed smaller than the scale given. This was possibly due to inaccurate scaling before printing.

Approximately ten per cent of candidates had limited knowledge of the layout of a parts list and so most of them redrew the parts from the parts sheet as a response. Approximately 15 per cent of candidates did not include the given cutting plane, A–A, which was needed to indicate where the section was obtained.

Candidates need to improve how they read and interpret the requirements of questions. They should also focus on the simple details such as ensuring that they print the title and that they use the correct scale and projection symbol. Finally, some candidates seem to be unaware of the correct printing process which is to be used for the CAD option. These candidates need to become aware of the correct printing process so that they can produce accurate representations of their drawings. Candidates' lack of knowledge in this area has negatively impacted the scores they receive for the marking of scales, line weights, line types, hatches and dimensions.

Candidate's Response to Question 1 — Sample 1

PARTS LIST			
ITEM NO.	DESCRIPTION	MATERIAL	QUANTITY
1	FORK	FS	1
2	EYE END	FS	1
3	BOLT	MS	1
4	SOCKET END	MS	1
5	HEX. NUT	MS	1
6	WASHER	MS	1



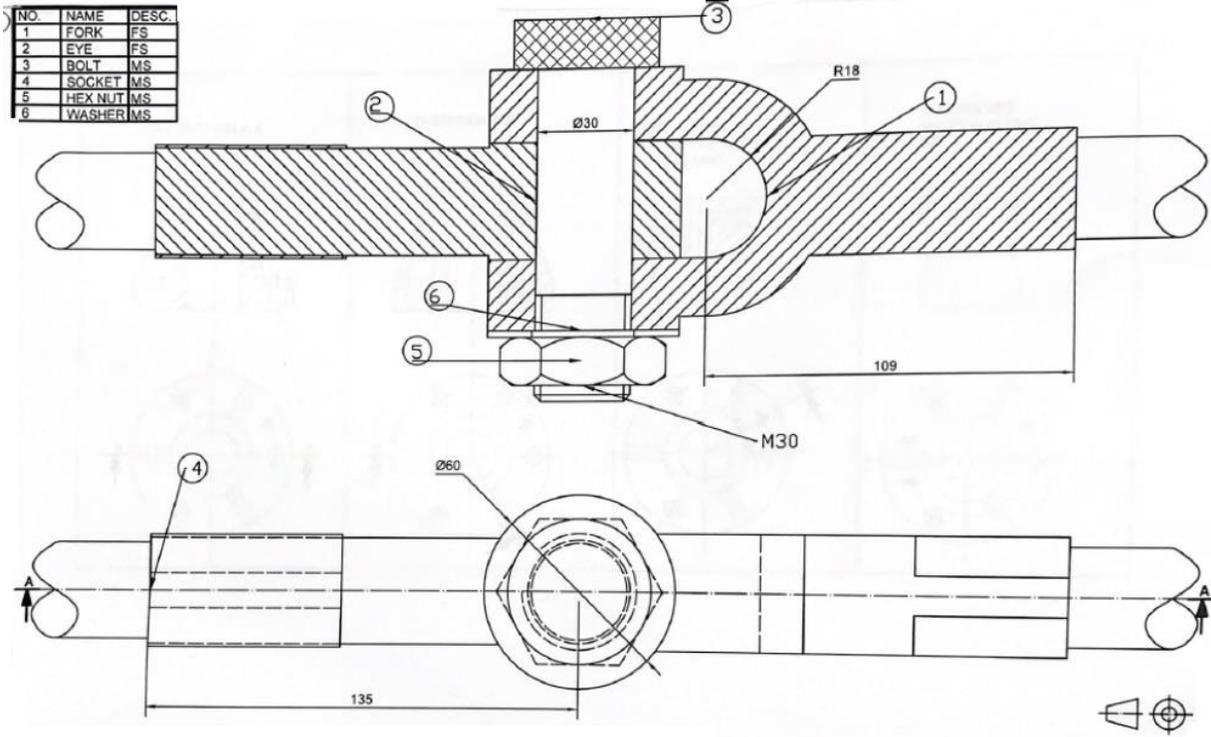
Examiner's Comment

The candidate produced an excellent interpretation of the assembly drawing, including the correct scale. The candidate demonstrated an excellent grasp of assembly of parts and so produced an accurate response. The orthographic projection and alignment of views were well depicted by the candidate. It was clear that the candidate had a good understanding of sectioning using hatch lines to identify different parts. A parts list, six main dimensions, printing of the title and projection symbol were included in the drawing.

The candidate was able to apply linetypes, line weights and line scales correctly. The drawing was printed clearly, using the correct scale. Line types and line weights were adequately done by the candidate. The parts list was correctly done, as the standard format was followed.

Overall, this was an excellent CAD response.

Candidate's Response to Question 1 — Sample 2



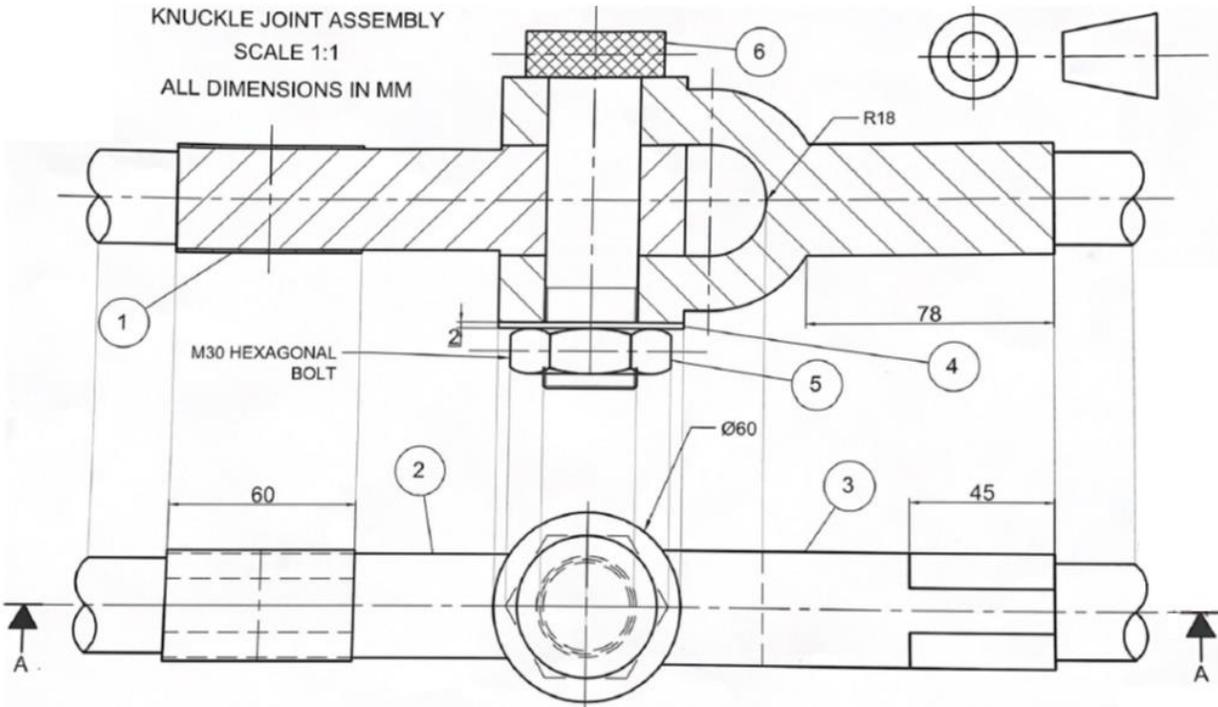
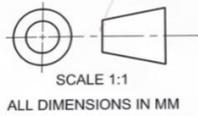
Examiner's Comment

The candidate produced a very good interpretation of the assembly drawing, inclusive of the correct scale. The candidate also had an excellent knowledge of assembly of parts and so produced an accurate response. The orthographic projection and alignment of views were well depicted. The candidate demonstrated a clear understanding of sectioning using hatch lines to identify different parts. A parts list, six main dimensions, the title and projection symbol were included in the drawing.

The candidate was able to apply linetypes, line weights and line scales correctly. The drawing was printed clearly using the correct scale. However, while the line types and line weights were adequately addressed, the candidate neglected to use the proper convention for centre lines in the plan and so did not depict any centre lines in the sectional elevation. The parts list which was created by the candidate showed all the parts and their descriptions but it did not include the quantity of each part.

Candidate's Response to Question 1 — Sample 3

ITEM NO.	ITEM NAME
1	SOCKET END
2	EYE END
3	WASHER
4	M30 HEXAGONAL BOLT
5	M30 BOLT



Examiner's Comment

The candidate produced a very good interpretation of the assembly drawing. The candidate also had excellent knowledge of assembly of parts and so produced an accurate response. The orthographic projection and alignment of views were well depicted. It was clear that the candidate understood how to section using hatch lines to identify different parts. A parts list, six main dimensions and the title were included in the drawing.

The candidate was able to apply linetypes, line weights and line scales correctly. The drawing was printed clearly using the correct scale. Even though the candidate created a parts list which showed all the parts and descriptions, the quantity of each part and the material used was not included. Additionally, an incorrect projection symbol was drawn.

Overall, the response was a very good CAD response.

Recommendations

- Candidates are reminded that this is the Working Drawing section of the examination. Therefore, they should use standard practices and conventions for completing working drawings.
- Candidates should place emphasis on
 - placement and alignment of views based on orthographic projection
 - conventions such as cutting planes, and cutting metric threads and screw fasteners
 - line conventions and thickness
 - drawing/printing to scale
 - dimensioning techniques.
- Candidates should place emphasis on including the details required for sectional drawings and the treatment of hatching lines to show the different components assembled.
- Teachers are reminded that if candidates will be using CAD in the examination, they must be taught to
 - utilize the correct processes for printing drawings to scale
 - select the correct of line weights, linetypes and hatches in working drawings.

Section II — Sketch and Design

Question 2

This question was worth a total of 30 marks. It tested candidates' ability to make freehand proportional orthographic sketches to illustrate specified methods of sectioning in each of the following.

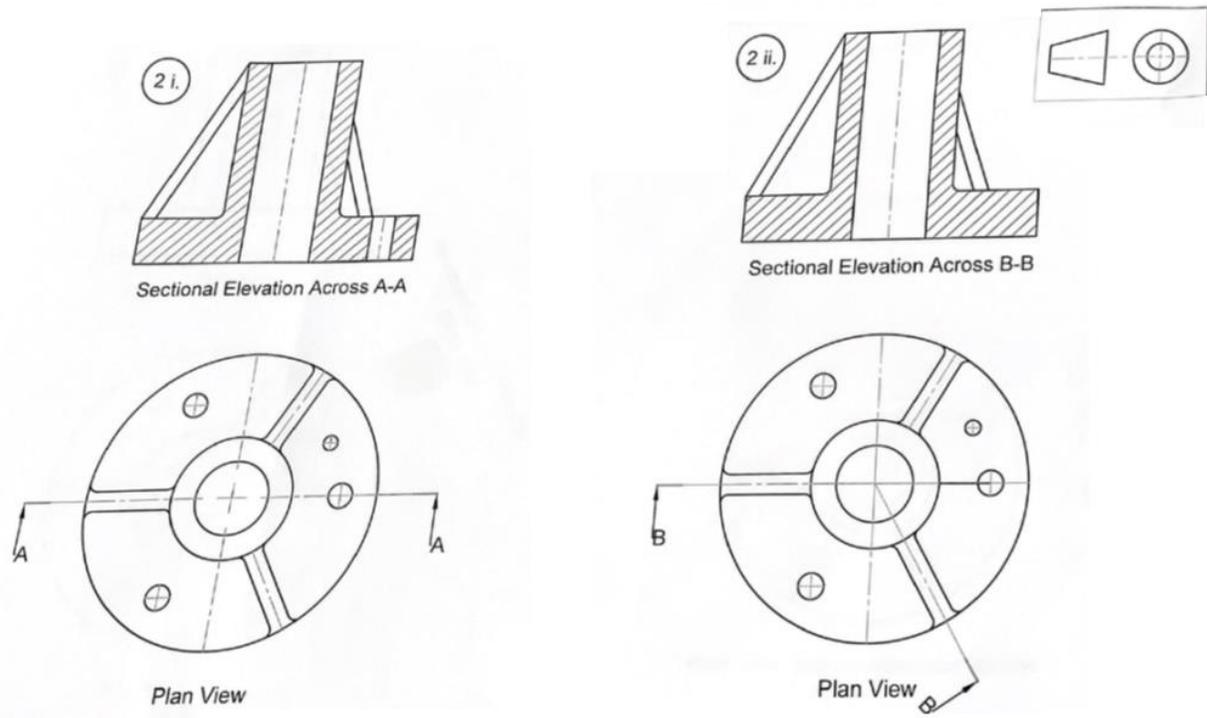
- A section along cutting plane A–A
- A section along cutting plane B–B
- A removed section of the blind hole along cutting plane C–C
- A revolved section along cutting plane D–D

Approximately 37 per cent of candidates attempted this question. Twenty per cent of candidates reproduced the given views. Approximately 45 per cent of candidates showed a general lack of knowledge and understanding of different types of sectioning, while 55 per cent of candidates demonstrated knowledge of the freehand proportional orthographic sketches used to illustrate specified methods of sectioning.

Approximately 70 per cent of candidates who demonstrated knowledge of freehand proportional orthographic sketches were able to demonstrate full sectioning correctly. However, it was evident that most candidates could not accurately demonstrate aligned, removed and revolved sectioning.

It must also be noted that 90 per cent of candidates used CAD.

Candidate's Response to Question 2 — Sample 1



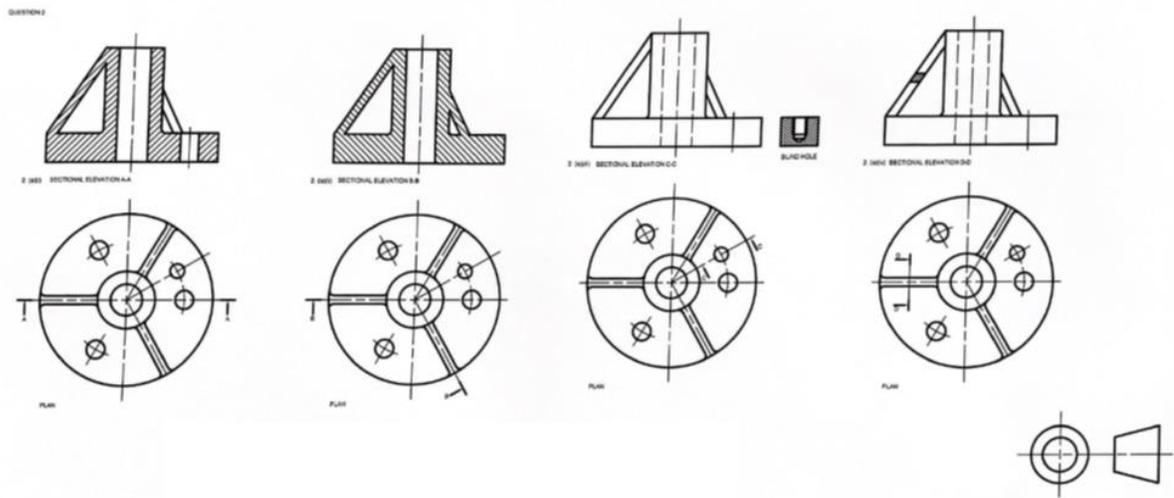
Examiner's Comment

The candidate demonstrated a very good understanding and interpretation of the given orthographic views of the hub. The candidate was required to sketch four different types of sectioning. Marks were also awarded for labelling the sketches and proportional sketching.

The candidate produced an excellent CAD rendition of the sections; however, some errors in the candidate's sectioning techniques for webs and aligned sections were evident. The labelling and proportional sketching were done excellently by the candidate.

Overall, this was a very good CAD response.

Candidate's Response to Question 2 — Sample 2



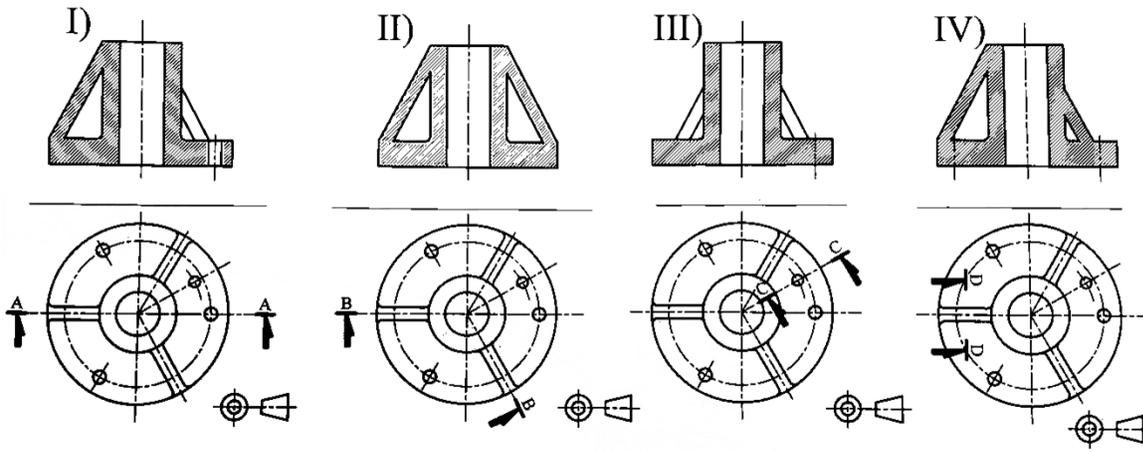
Examiner's Comment

The candidate demonstrated a very good understanding of the given orthographic views of the hub. The candidate was required to sketch four different types of sectioning. Marks were also awarded for labelling the sketches and proportional sketching.

The candidate produced an excellent CAD rendition of the sections; however, errors in the candidate's sectioning techniques for the aligned cutting plane and the blind hole were evident. However, the candidate demonstrated good labelling and proportional sketching skills.

Overall, this was a very good CAD response.

Candidate's Response to Question 2 — Sample 3



Examiner's Comment

The candidate demonstrated an excellent understanding of the given orthographic views of the hub. The candidate was required to sketch four different types of sectioning. Marks were also awarded for labelling the sketches and proportional sketching.

The candidate produced an excellent CAD rendition of the sections; however, some errors in the candidate's sectioning techniques for full and aligned sections were evident. The candidate demonstrated good labelling and proportional sketching skills.

Overall, this was a very good CAD response.

Recommendations

When delivering the curriculum, teachers should incorporate more visits to workshops (field trips to mechanical workshops/garages) to expose students to the more practical aspects of the content in the mechanical syllabus.

Moreover, candidates may benefit from additional classroom exercises/assignments that

- emphasize the reading of instructions given in questions to elicit the required information prior to formulating solutions
- encourage students to sketch solutions prior to attempting to produce the final solution
- emphasize the specifics required for sectional details
- enable more candidates to attempt Question 2 as it is worth 30 marks. When a candidate does not gain these marks he or she could possibly fail the exam.

GENERAL RECOMMENDATIONS

All information regarding Technical Drawing is placed on the CXC website. Teachers are urged to check the CXC website regularly for updated information.