

**EXAMINATIONS AND ASSESSMENT CHIEF DIRECTORATE**

Home of Examinations and Assessment, Zone 6, Zwelitsha, 5600

REPUBLIC OF SOUTH AFRICA, Website: [www.ecdoe.gov.za](http://www.ecdoe.gov.za)

## **2019 NSC CHIEF MARKER'S REPORT**

SUBJECT:	ENGINEERING GRAPHICS AND DESIGN
PAPER:	1
DURATION OF PAPER:	3
DATES OF MARKING:	1 – 14 DECEMBER 2019

**SECTION 1: (General overview of Learner Performance in the question paper as a whole)**

The overall performance of learners during this exam varied from very poor to excellent across all districts. Most of the learners attempted all the given questions with very few learners leaving out whole questions. The quality of the responses in the various questions differed as learners find certain sections more difficult than others or spend too much time on a particular question at the expense of other questions. The attention to correct time management cannot be over emphasised in EGD as this together with planning the sequence of answering the questions is crucial in determining whether the learner will finish the paper on time. Approximately 90 % of the marking guideline consist of half marks awarded for each line drawn. This means the learner must draw approximately 180 lines in the allotted 3 hrs. Without proper planning and being 'drawing fit', the learner will not finish the drawing on time. Below is an overview of the learner's challenges in the various questions as observed during marking.

**Question 1 (Analytical)**

Calculations of area and perimeter. Although this part of Q1 is always asked, there does not seem to be much improvement in the overall performance in this section. This is strange because all EGD learners do some form of maths in other subjects.

The freehand civil symbol tested in Q 1.20 was also not very well answered.

**Question 2 ( Interpenetration and development )**

Inability of learners to redraw the given information which is worth 10% of the mark allocation of this question.

It is evident that this part of the work is not adequately covered in the classroom.

The C.O.I.P in the front view and development was left out completely on many scripts.



*Ikamva eliqaqambileyo!*

**Question 3 ( Perspective )**

The construction of the roof was challenging to even the stronger learners. A lot of time was possibly wasted by learners struggling with this part of the perspective.

Learner often changed the position of the SP, GL, and PP to suit what they are familiar with.

This results in a 2 mark penalty per item and up to 6 marks could be lost by doing this.

Construction of the LVP and RVP should elementary for a gr 12 learner, yet many of them fail to do even this.

**Question 4 ( Civil drawing)**

Most learners underperform in this question because they do not read the instructions.

Attached to this question is a detailed information sheet on what exactly is required by the examiner

Often learners do not take the time to read through the question and marking off the salient points. This results in many mistakes such as, incorrect scales, orientation, placement and alignment issues which all incur a 2 mark penalty.

**Section 2** below contains a comprehensive report per question as well as suggestions of remedial actions to be taken in the classroom, to strive to improve the results of EGD P1.

## SECTION 2:

Comment on candidates' performance in individual questions

(It is expected that a comment will be provided for each question on a separate sheet).

<b>QUESTION 1</b>
<b>(a) General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?</b>
All candidates attempted the question. The lower order questions Q1 – Q6 were answered well. The middle order questions Q7 – Q 13 were answered satisfactorily. The higher order questions Q14 – Q20 were answered poorly

<b>(b) Why the question was poorly answered? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.</b>
<p>QUESTION 1: ANALYTICAL</p> <p>PRINT the answers neatly in capital letters to make them legible.</p> <p>Candidates do not understand the English language, as they cannot interpret and analyse the given information on the site plan.</p> <p>Question 1.1- 6; 1.8; 1.14; 1.17 required the candidate to read information from the site plan and title block. Any errors on these question may be due to the fact that not enough exercises are done.</p> <p>Question 1.7 required the candidate to convert the given dimension 6000 to m i.e. 6 or 6 m. The distance MUST NOT be measured and calculated. The drawing is not to scale.</p> <p>Question 1.9 BROWN is used on the sewage plan.</p> <p>Question 1.10 BIC = BUILT IN CUPBOARD; IGK = INGEBOUDE KAS.</p> <p>Questions 1.11 Broken lines on a site plan indicate STRUCTURES TO BE DEMOLISHED</p> <p>Question 1.12; 1.16 are applications of knowledge of using the NORTH SYMBOL and determining the directions referred to, candidates cannot apply compass directions to determine the information. Candidates use the term "view" instead of the correct term i.e. "elevation".</p> <p>Question 1.18 is a simple addition calculation of data in the surveyors report. Common mistake made was that the perimeter of the building was calculated. Care must be taken with the adding of decimals and it is suggested to calculate to two decimals.</p> <p>Question 20 Candidates do not use FAOP. Also they add additional features not shown in SANSS 10143.</p>

<b>(c) Provide suggestions for improvement in relation to Teaching and Learning</b>
<p>QUESTON 1 : ANALYTICAL</p> <p>Use the approved textbooks for examples of analytical questions. The website <a href="http://www.ecexams.co.za">www.ecexams.co.za</a> has papers for 2007 to 2019 for both September and November with memoranda. Use these resources to teach your learners. Teachers must make use of the SANS and DBE approved textbooks to obtain the correct terminology and graphical symbols for the subject. The relevant SANS document and extracts from the Building Regulation can be obtained from the Subject Advisors.</p> <p>The analytical question is an exercise in reading a drawing. Most of the answers are on the drawing. Teachers must make use of old examination papers to guide the learners in how to answer the analytical question. Exercises in the reading of drawings must be done to improve</p>

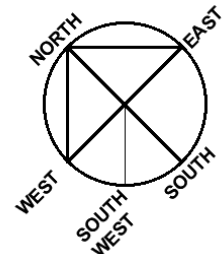
the learners ability to find information and dimensions

Q 9 the colour of new sewage lines in the question refers to the building regulation and should be in BROWN. Many candidates answered RED which refers to the building regulation for new work on the SITE PLAN.

c	Drainage installation contemplated in regulation A2(1)(d)	Colour
i	Drains and soil pipes	Brown
ii	Waste pipes	Green

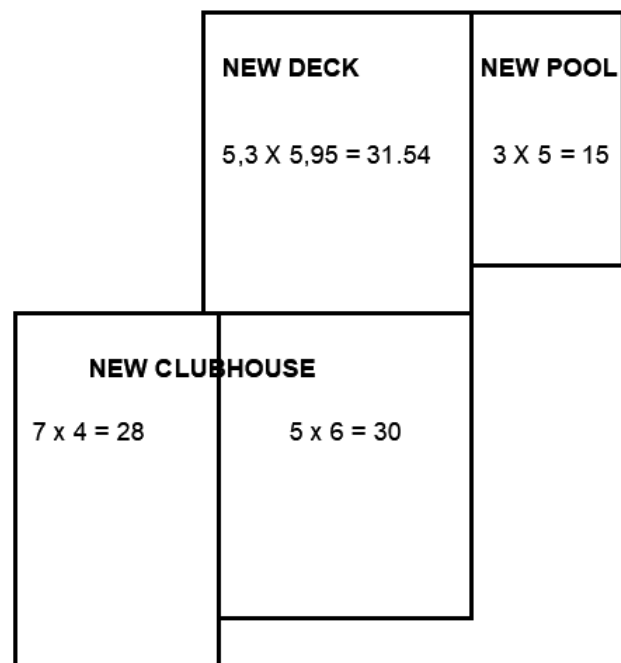
Q 15 The final two items at the end of the sewage system on the site plan are the Septic tank and the French drain *Septiese Tenk en Stapelriool*

Q 12 and 16 Determining direction based on the NORTH SYMBOL is confusing to learners with answers from every compass direction. The candidates must enter the directions as shown to resolve the question.

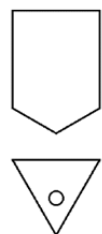


The calculations in Q18 and Q19 are asked in all the papers since 2007. Perimeter is simple addition. The most basic formula is Perimeter = S+S+S+S. PLEASE NOTE, marks are allocated for calculation, correct answer and conversion to the required unit of measurement (m).

Area is multiplication and in the case of Q19 addition as well. Teachers must teach their learners how to write dimensions, mm or m or m<sup>2</sup> When calculations are required write down the values and clearly show the calculations. The writing down of the appropriate formula will aid the learner. The basic formula is Area = L x B. PLEASE NOTE, marks are allocated for calculation, correct answer and conversion to the required unit of measurement, as well as writing the unit of measurement correctly (m<sup>2</sup>).



Question 1.20 The wall mounted urinal must be drawn in freehand and first angle orthographic projection Learners must answer questions correctly, e.g. if the question states that the symbol must be drawn in freehand, then it means freehand, and it will in future be marked as a drawing method, which means no instrument drawing will then be accepted. The graphical symbol MUST be exactly correct for marks to be allocated. The correct placement (FAOP) of the views is very important.

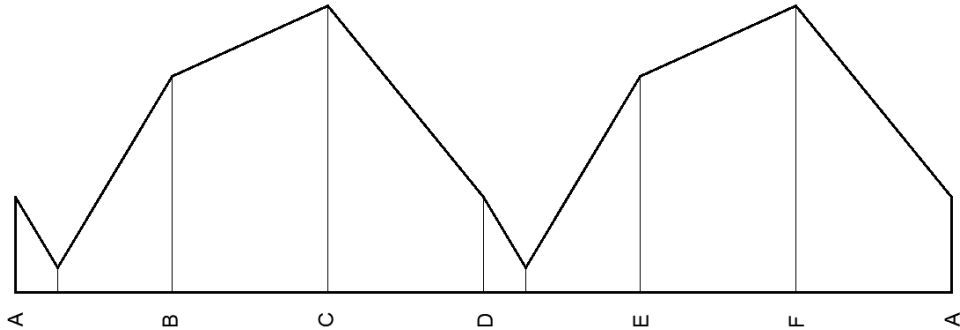




number the corners of the hexagon in all views. Hidden detail lines can be marked by using brackets.

Projection lines are critical in the drawing of these views. When the markers are unsure of a point the projection lines can be followed to find the relative points.

When doing the development it is important that the intervals are numbered that the correct dimensions are carried over from the views to the development. The correct line types must be used. Fold line are type B and outlines are type A.



### QUESTION 3

(a) General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?

All candidates attempted the question. In general the question was answered very poorly.

(b) Why the question was poorly answered? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.

#### QUESTION 3: PERSPECTIVE

Candidates cannot determine the VP's.

Candidates move the given detail such as: SP, HL, PP, GL

Candidates change the human eye view drawing to the birds eye view

(c) Provide suggestions for improvement in relation to Teaching and Learning

#### QUESTION 3: PERSPECTIVE

Although line quality is not assessed in the examination, the quality of line work is critical for the reading of the question, if a candidate has type A lines that are part of the answer and there are type B lines that are supposed to be part of the answer it is considered as incorrect because the drawing is confusing. In perspective drawings line quality is critical to the reading of the answer. Projection lines must be traceable to find the intersection points.

Do not change the given GL, HL or PP.

The vanishing point can be in a given view

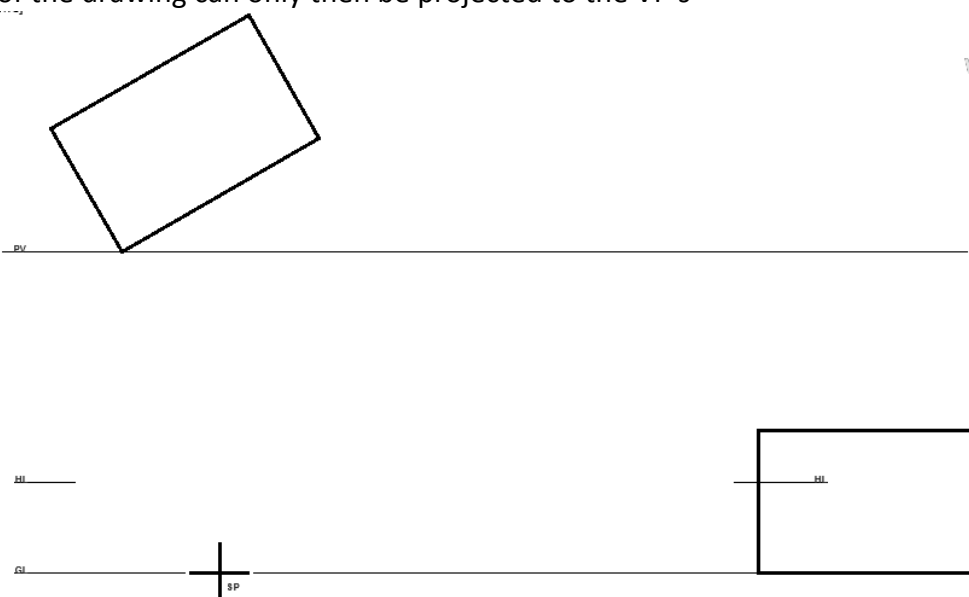
The candidates must follow the basic steps of starting a 2P perspective drawing

Determining the 2 VP's and labelling them LVP and RVP

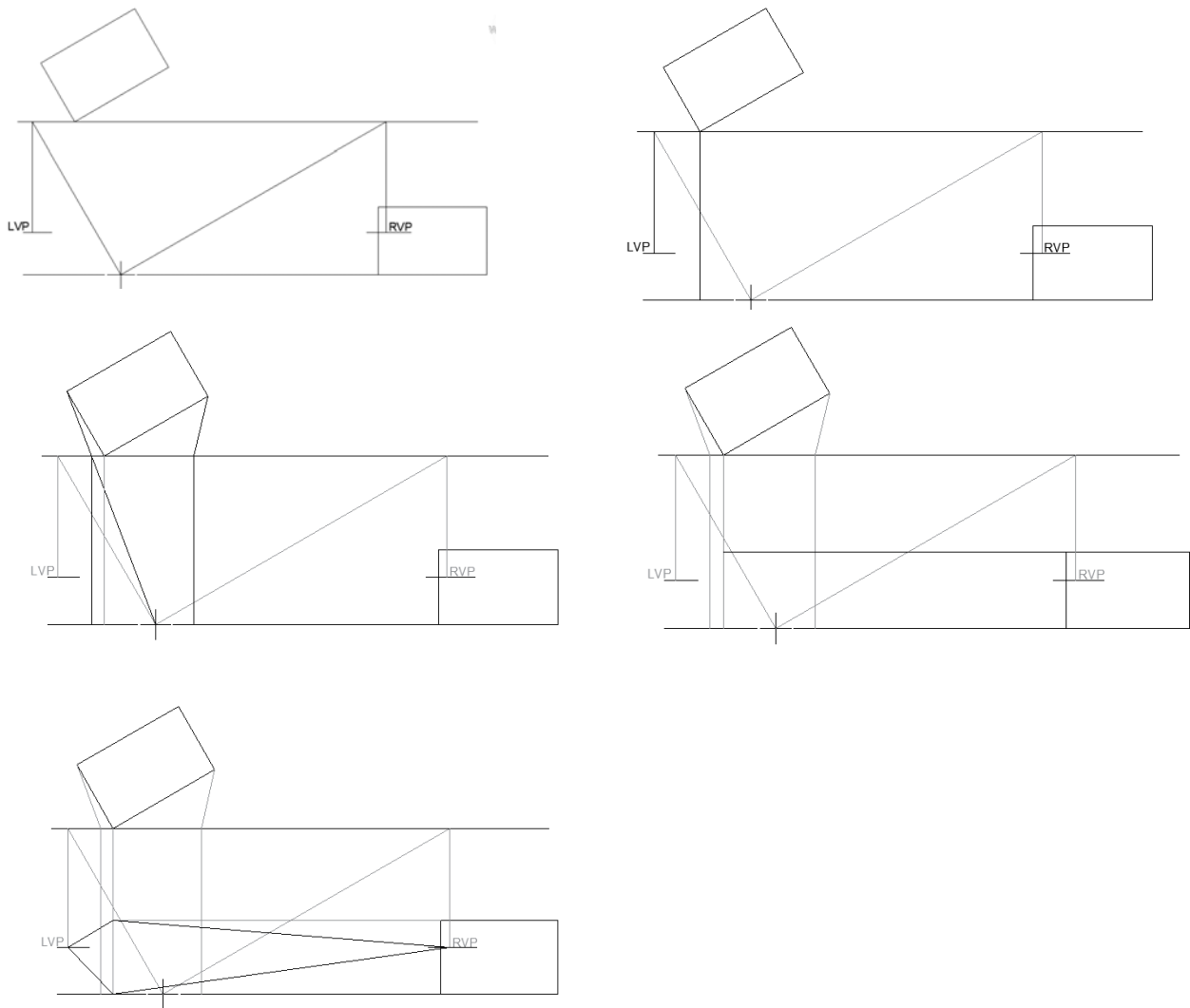
Determining the starting points or height lines of the drawing These are the points that touch the PP on the top view They must be projected perpendicular to the GL The height are projected from the elevation to these height lines

The true height of the drawing can only then be projected to the VP's

The corners of the top view must be projected to the SP the line must stop at the PP and from the PP perpendicular to the GL.



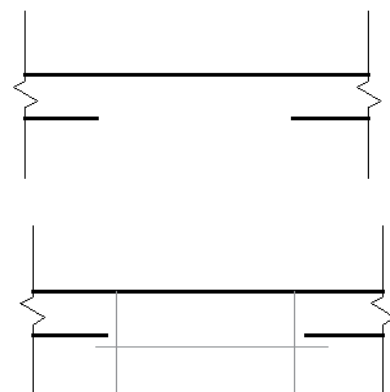
In above example the SP is **NOT BELOW** the corner of the top view. The following drawing explain the steps mentioned in the previous paragraph.



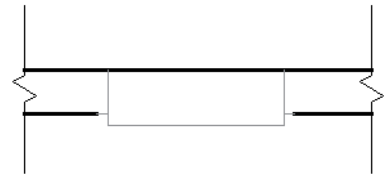
<b>QUESTION 4</b>
<b>(a) General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?</b>
All candidates attempted the question, the floor plan was acceptably answered, however the north elevation and the detailed section were poorly answered

<b>(b) Why the question was poorly answered? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.</b>
<p><b>QUESTION 4: CIVIL</b></p> <p>The detailed drawing of the sanitary fixtures are ignored and candidates copy the fixtures to the floor plan – symbols must be used to the dimensions given. Candidates simply fill the gap for windows and do not use dimensions given.</p> <p>The dimensions of features such as doors and windows are ignored.</p> <p>Candidates do not apply the rules of projection from the floor plan to the north elevation.</p> <p>The given information for the roof ridge or the roof cap is not adhered to.</p> <p>The projection from floor plan rooflines to the north elevation are not followed.</p> <p>Printing is not in CAPITAL letters and the lettering is not either horizontal or vertical.</p> <p>The dimensions given for the detailed section are not used. Learners draw substructure with instruments – waste time. Windows do not use given dimensions for parts of the window. Roof: many do not use the given dimensions for trusses, wall plate etc. also they do not put gutter fascia board and bracing, they also don't draw the roof sheet. Angle of roof truss size of roof truss. Purlin and spacing and bracing and spacing are not as given Purlins not square on truss. Use the information to draw the roofcap incorrectly. The candidates draw only part of the roof and the cutting plane shows the roof cap is included. Use wrong symbol for bath or do not use the graphical symbol.</p> <p>Labels: Very few learners label the DPC, GL</p>

<b>(c) Provide suggestions for improvement in relation to Teaching and Learning</b>
<p><b>QUESTION 4: CIVIL</b></p> <p>Although line quality is not assessed in the examination, the quality of line work is critical for the reading of the question, if a candidate has type A lines that are part of the answer and there are type B lines that are supposed to be part of the answer it is considered as incorrect because the drawing is confusing.</p> <p><u>Floor plan</u></p> <p>The dimensions for the windows and the positions for the different windows are given in data sheet. In the answer sheet the opening for the windows is larger than the window size. The given dimension must be scaled to draw the sides of the window. The window frame must be in the middle of the wall. The windowsill must protrude over the wall. Process for drawing a window</p> <p>The given opening is larger than the window</p> <p>Find the middle of the opening and draw lines that show the sides of the window</p> <p>Determine the width of the window sill and draw the line</p>



Erase the extended construction lines and fill in the opening from the wall to the window.



Determine the middle of the wall and place the window frame

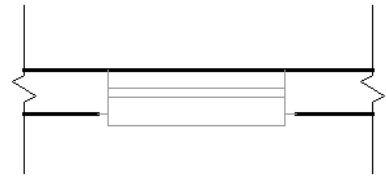
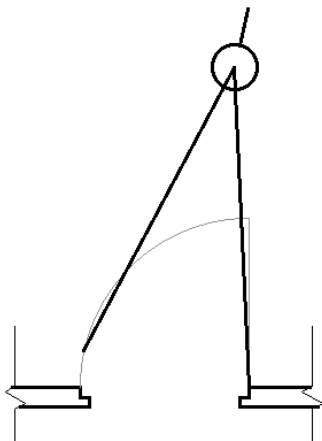
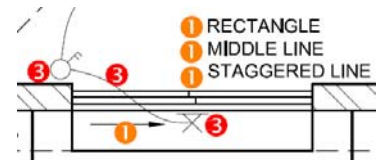


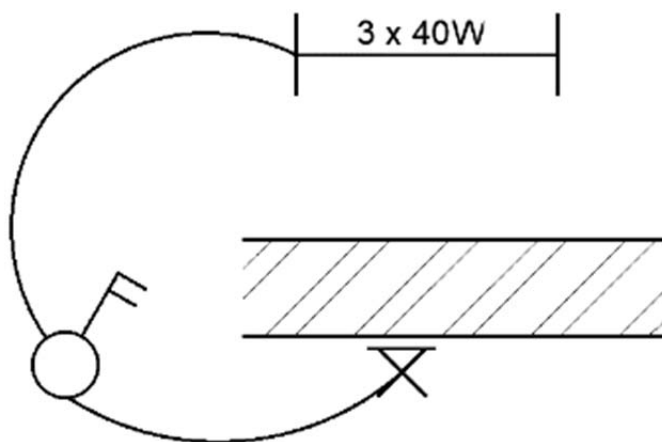
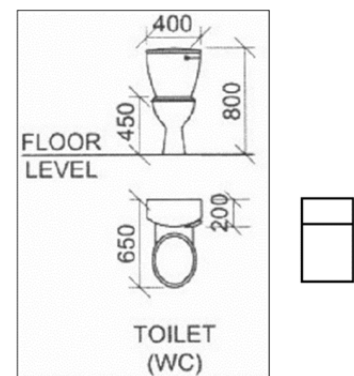
Diagram explaining the drawing of a door in a door frame. Set the compass to the widest part of the doorframe. Draw the arc for  $90^\circ$ . Draw a line perpendicular to the wall to complete the door. The arc radius should be 18 mm in a scale of 1 : 50 drawing. When using a circle stencil use the  $\varnothing 36$  to draw the arc



Note the detail and marks (1) for the sliding door. The door is in the middle of the wall. There is a step in line with the wall



Sanitary fixtures must not be copied front the data sheet. Use the dimensions from the datasheet to draw the symbols. Any extra lines are penalised.



Electrical fittings can be drawn in neat freehand, the given symbols in the datasheet must be used and placed where the numbers are in the datasheet diagram. The connections between switches and light fittings must be a freehand arc. See the figure take note of where the wire connects to the switch and the light fitting. Take note that the wall mounted light fitting must be drawn

away from the wall. When drawing electrical fittings the exact symbol given in the datasheet must be used.

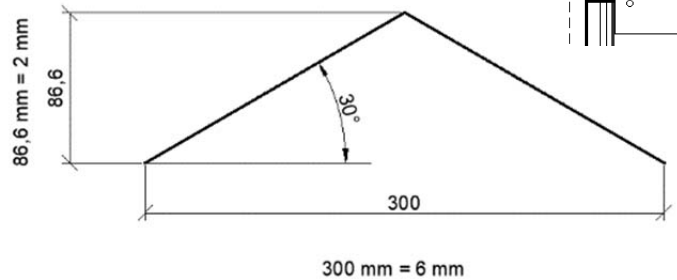
Hatching must be done with instruments as shown in the above diagram. All the walls i.e. loadbearing and non - loadbearing must be hatched in the same pattern, direction and size.

All labels must be in CAPITAL LETTERS and written horizontally or vertically.

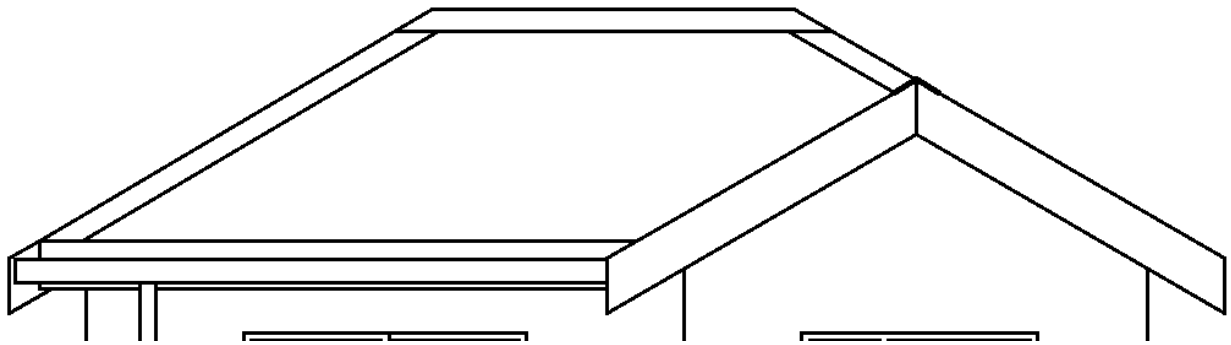
### North elevation

This elevation must be projected from the floor plan. The walls, windows and doors that are in floor plan must be projected. The roof detail is projected from the rooflines. REMEMBER the rooflines represent the edge of the roof where the trusses end. The fascia and bargeboard must be added to draw the elevation.

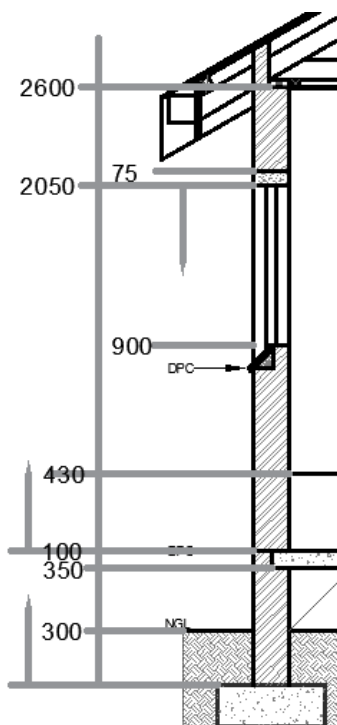
Use the dimensions in datasheet to determine the roof ridge. The vertical height of the roof ridge is shown in the diagram. Draw the roof ridge to scale then determine the height, transfer the height to the relevant places with dividers.



The COMPLETED North elevation roof and detail implies that no breaklines must be redrawn on the answer sheet and the complete roof detail must be drawn. No marks are awarded when breaklines are used.



Draw the full details WITHOUT any breaklines.



The finished floor level (FFL) is a chain line from outer wall to outer wall.

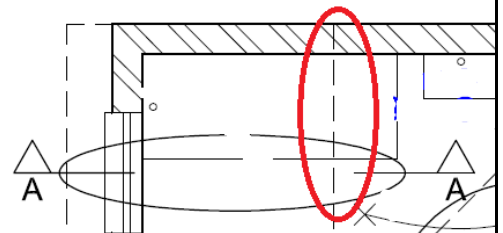
Windows and doors can be drawn as single lines. The detail within the window that opens can be chain or hidden detail lines, the reason is that you can see through the glass. Opaque glass is drawn in continuous lines.

### **Detailed section**

The scale to be used is 1 : 20

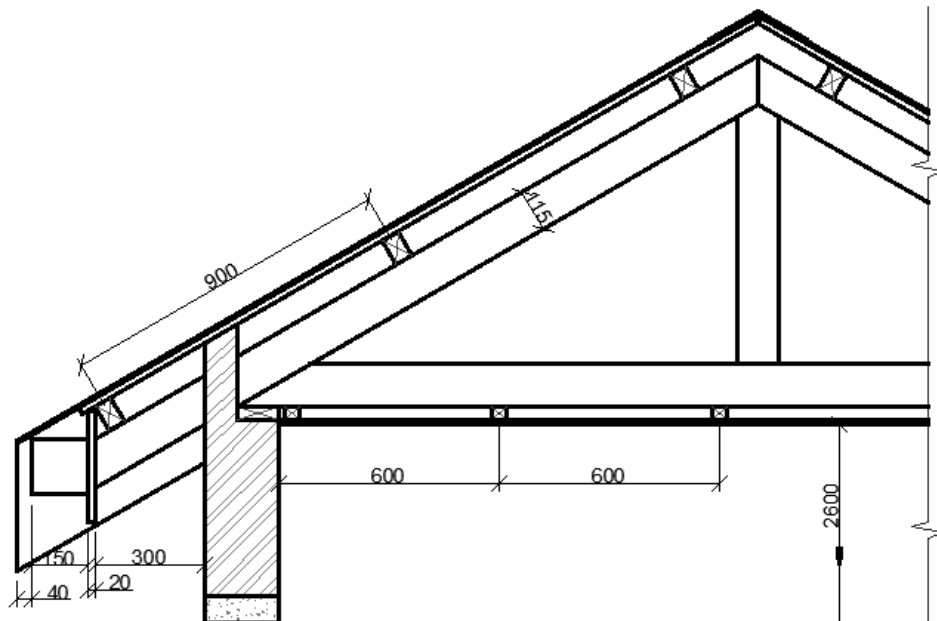
The cutting plane intersects with the ridgeline of the roof, the whole bath is visible, the window, as well as the faciaboard and the gutter.

Use the assessment criteria to determine which elements must be drawn.

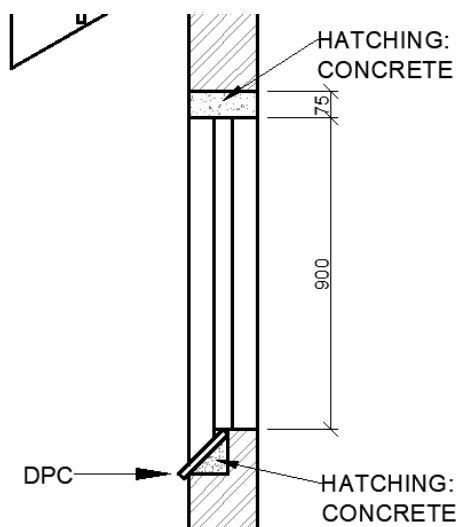


The height measurements are used to determine the different elements of the detailed section. Use the diagrams and detail drawing in the data sheet. Use construction lines and draw a ruler and mark of the dimensions of the elements.

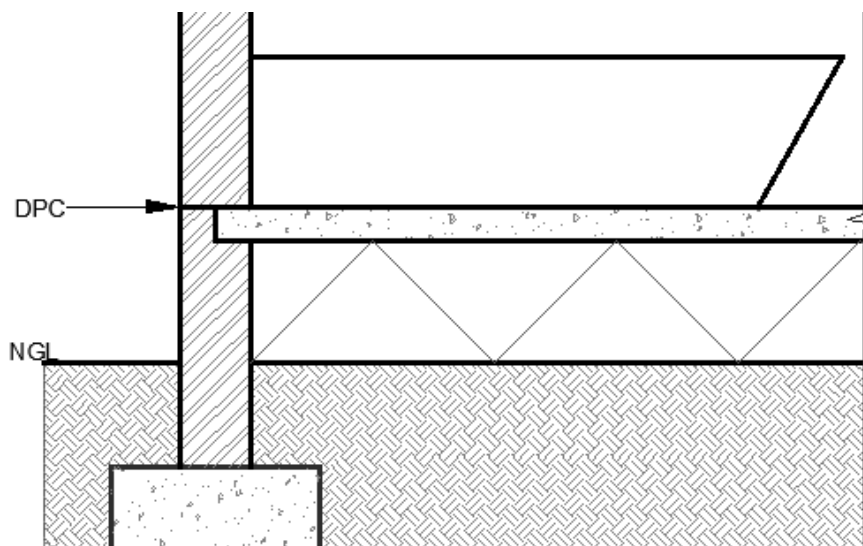
When the wall is placed in the middle of the foundation the dimensions to the breakline will be correct and all the roof elements (king post and roof cap as well as roof ridge line) will be visible. The wall plate is on the top of the wall and is 38 mm (2 mm) thick. The roof angle is drawn in



the corner between the top of the wall plate and the beam fill. The diagram below shows the important measurements for the completion of the roof.



The window opening has a single lintel above and a window sill. The lintel is of concrete and there is concrete fill under the window sill. The window frame is in the middle of the reveal. There is DPC under the concrete at the window sill.



The floor and the substructure is lower level work see the diagram for the detail.

Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.

- Candidates must enter their exam numbers NEATLY in the space provided on the front page as well as each page of the script.
- Although line quality is not assessed, the reading of drawings is easier when good quality line work is used.
- All labels must be in CAPITAL LETTERS and written horizontally or vertically.
- Drawing must be done accurately according to the given dimensions and scales.
- Read the instructions on the cover page and DO what is asked. Penalties are awarded if instructions are not adhered to.
- Staple the pages in the correct order in the area that is shown with the staple symbol in the top left hand corner.
- Do not draw on the back of the pages.
- Plan your time at 1.1 marks per minute.
- Plan your drawing before starting to draw.
- Draw the given detail neatly.
- If you cannot continue with question, do not dwell on the problem, continue with a question that you can answer.