

EXAMINATIONS AND ASSESSMENT CHIEF DIRECTORATE

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

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2019 NSC CHIEF MARKER'S REPORT

SUBJECT:	ENGINEERING GRAPHICS & DESIGN
PAPER:	2
DURATION OF PAPER:	3 HRS
DATES OF MARKING:	1 – 14 DECEMBER 2019

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

In general the learners performed poorly. The failure rate for EGD P2 is a testimony of the poor performance of the learners. There is a general appearance that learners are attempting more questions, but the accuracy and basic knowledge is lacking in the majority of the scripts that we assessed. Work from Grade 10 and 11 could not be done by the learners. There is of course the exception to the rule, were learners did very well in the paper or certain sections of the paper, which indicates that teachers are trying to increase the learners overall understanding of the work.

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).

QUESTION 1

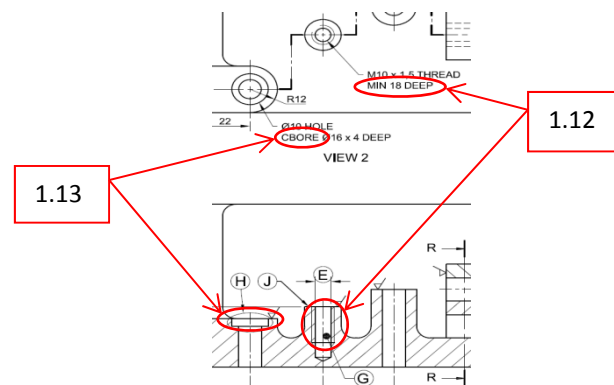
(a) General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?

- Sections of the question were well answered by the majority of the candidates, but overall this question was poorly answered.
- The majority of the candidates could at least answer 9 of the lower order questions. These questions are normal "find the answer on the paper" questions.

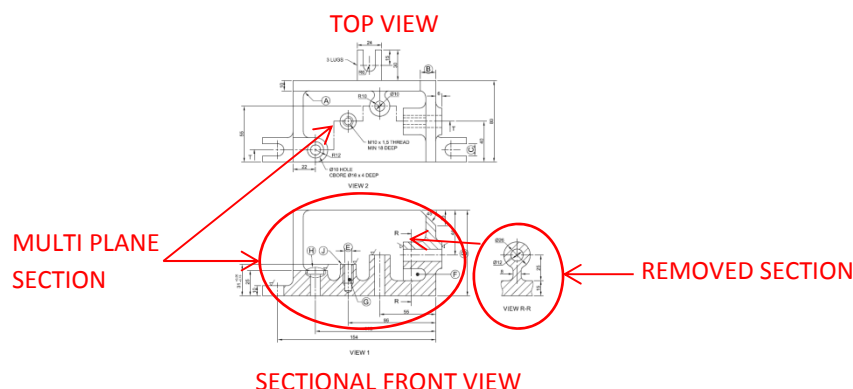
(b) Why the question was poorly answered? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.

- Question 1.1 - 1.5, 1.12 – 1.13: These questions were lower order cognitive questions and had to be read off the given drawing or title block. Learners do not understand the terminology that is used in the Mechanical world. This, in some cases, can be attributed to language barrier.

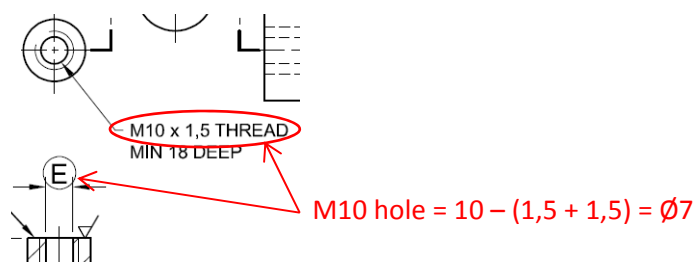
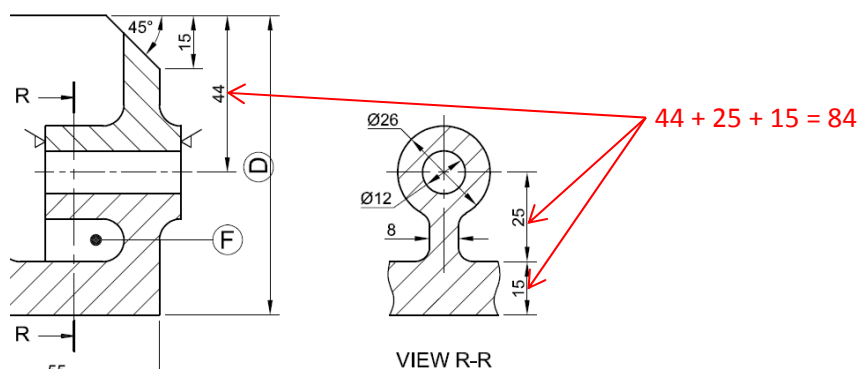
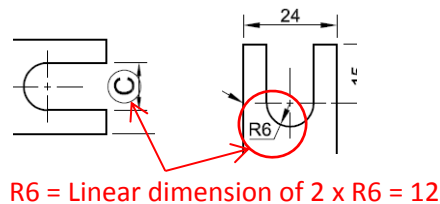
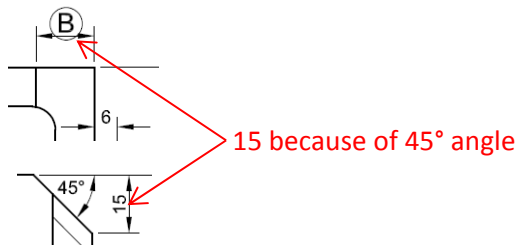
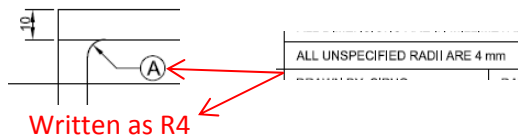
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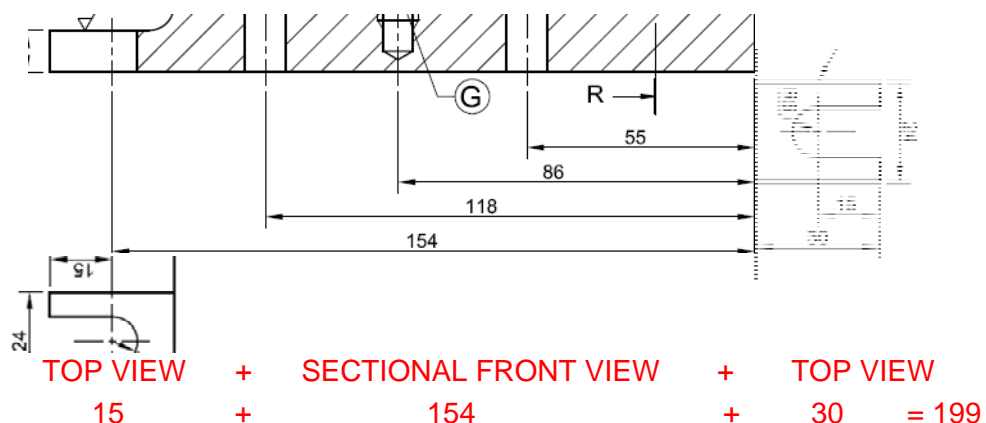
- Question 1.6 – 1.8: These three questions were all related to different types of sectioning that a candidate had to identify. Very few learners could get this right.



- Question 1.9: Many candidates could not get the correct answers for the dimensions asked. Some candidates measured the distance on the drawing that was not drawn to scale. Some answers were simple addition exercises. Candidates still do not know how to write down a dimension (R4 & Ø7).



- Question 1.10: Very few candidates could determine the length of the object, because they struggle to “read” the two views.



- Question 1.11: Candidates do not know the terminology and symbols used in mechanical drawing (web or rib).

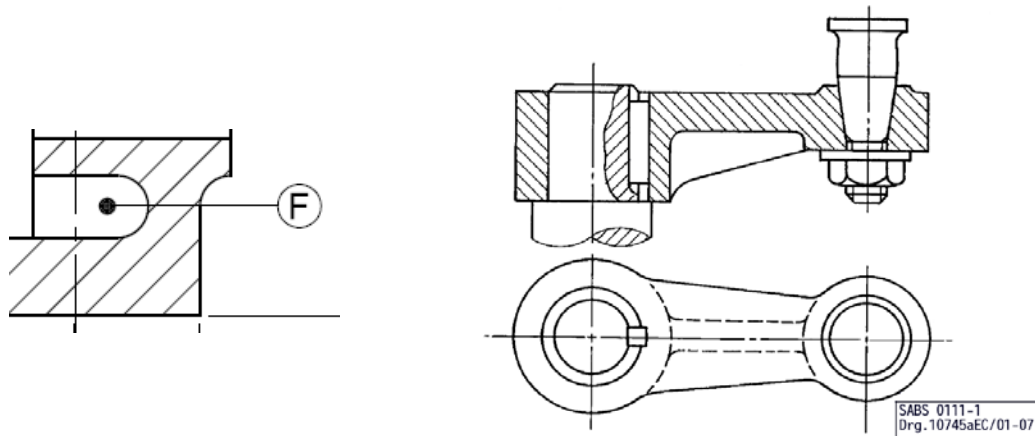
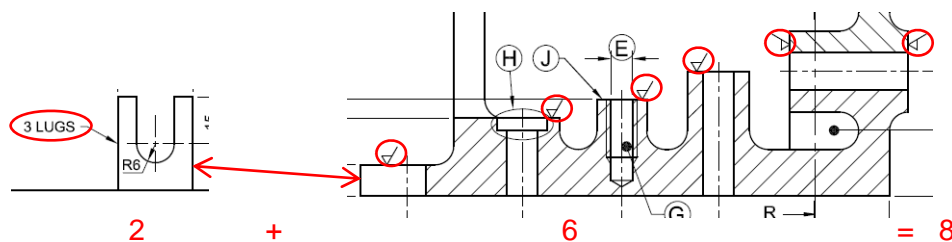
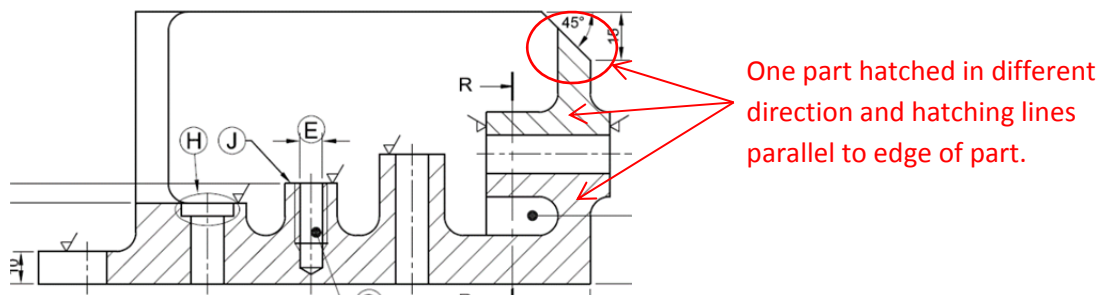


Figure 28 — Rib, shaft, key, crank pin, nut and washer, not sectioned

- Question 1.12 – 1.13: Candidates could not find the answers from the views that were given. The fact that candidates do not know the terminology and symbols used in mechanical drawing also made these answers difficult for them to find.
- Question 1.14: Candidates could not get the correct number of surface that had to be machined (8).



- Question 1.15: Candidates do not know the rules of sectioning and could not figure out what the mistake was made on the sectioned view.



- Question 1.16: Although this question has been asked in previous papers, very few candidates knew how to calculate the lower tolerance for the dimension given.

$$31 - 0,15 = 30,85$$

- Question 1.17: Very few candidates could get this question right. They had to label the different parts of a machining symbol.

10.2.5 Position of the specifications of surface texture in the symbol

The specifications of surface texture should be placed relative to the symbol, as shown in figure 107.

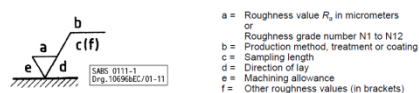
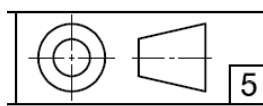


Figure 107 — Position of the specifications of surface texture in the symbol

- Question 1.18: This question asked for a freehand drawing of the projection symbol. The candidates still get this wrong, although it has been asked in nearly every examination. Some candidates also do not draw in freehand.



Answer is given in the paper on page 5.

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

- Teachers must make use of the SANS and DBE approved textbooks to obtain the correct terminology for the subject. Make use of old papers that are available on the internet to learn the different terminologies that the pupils need to understand.
- Exercises in the reading of drawings must be done to improve the candidate's ability to find and calculate dimensions.
- Teachers must make use of old examination papers to guide the candidates in how to answer the analytical question.
- Candidates must answer questions correctly, e.g. if the question states that the symbol must be drawn in freehand, then it must be freehand. The opposite is also true; if instruments are required then freehand drawings will not be accepted.
- Time management is essential to complete all the questions. Learners need to work under strict time frames as to improve their drawing speed.
- Make use of old mechanical parts that teachers can get from their local automotive repair shops, and use them as examples for their learners to understand the different components and their workings. Disassemble the parts and put them back together so that the learners can see how parts fit together.
- This is the type of question that you should give to your pupils and they take it home and research the answers. Let the class then decide which answer is the correct one and why.
- To get candidates to learn where the different views must be placed in third angle orthographic projection, let them print the names of the views on the drawings that they do for CASS.

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

- It seems to be that candidates leave question 1 for the end of the session which means that they sometimes run out of time and have to rush through the questions and then make mistakes. Time management is very important when completing the question paper.
- The responses from candidates indicate that many of them do not understand the terminology and language that is used in the paper. The answers would reflect that they did not understand what was asked, e.g. dimensions become names of parts, etc. The lack of knowledge of technical terminology was a big factor in the inability of the candidates to answer questions.
- This type of question should be asked in grade 10 to start developing their skills in reading drawings.
- With the exception of a few questions the majority of questions have been asked in previous papers. This shows that teachers do not consult previous papers when planning their lessons.
- Learners are not interested in learning the basics that is taught from Grade 10.

QUESTION 2	
(a)	General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?
	<ul style="list-style-type: none"> Many candidates attempted this question with relatively moderate results, but there are still some centres where the candidates do not know what to do.
(b)	Why the question was poorly answered? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.
	<ul style="list-style-type: none"> Candidates did not copy the given information correctly. They changed the position of the 0° as well as the position of the follower. Candidates do not insert the centrelines correctly. Candidates did not obtain the correct length for the X-axis of the graph ($8 \times 12 = 96$). Candidates did not divide the X-axis into 12 equal parts. Candidates did not know the construction for the acceleration and retardation movement. Candidates did not obtain the correct height of the graph. Some candidates could do the simple harmonic movement, but used the wrong size for the construction of the semi-circle. Candidates did not label the graph. Most of the candidates that attempted the construction of the profile did so with some success
(c)	Provide suggestions for improvement in relation to Teaching and Learning
	<ul style="list-style-type: none"> Teachers must teach according to the CAPS document. Work that was done in Grade 10 & 11 must be revised in Grade 12. Dividing lines into equal parts must be practised more extensively. The different variations of movement must be practised, Retardation and Acceleration & Simple Harmonic. Teachers must emphasise the importance of drawing the correct line types. CAMS are not drawings that take a long time to do and can easily be practiced in class time.
(d)	Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.
	<ul style="list-style-type: none"> Candidates must read the questions carefully to avoid drawing the wrong movements. Candidates must not change the given views to look like something that they have done before.

QUESTION 3	
(a)	General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?
	<ul style="list-style-type: none"> • Some centres answered the isometric drawing well. • There are many centres where there is a lack of understanding the concept of converting from 2D to 3D and learner responses were very poor.
(b)	Why the question was poorly answered? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.
	<ul style="list-style-type: none"> • Many candidates still have a problem mastering the following: <ul style="list-style-type: none"> ➢ Constructing auxiliary views. Most learners ignored the 60° angle. ➢ Drawing the isometric circle was very poorly done and even in well answered questions the learners left out the centre line. • The accuracy of the measurements was poorly done. • Many learners still cannot convert a 2D drawing into a 3D drawing.
(c)	Provide suggestions for improvement in relation to Teaching and Learning
	<ul style="list-style-type: none"> • Learners need to practice how to convert from 2D to 3D. Make use of models that you can make out of modelling clay, polystyrene, wood, cardboard or even use a 3d printer if you have access to one. When a learner can “see” what he needs to draw then it will make it easier for him to practice the “reading” of the object. • More attention should be given to the following aspects: <ul style="list-style-type: none"> ➢ Visibility of the lines (line quality is poor) ➢ Auxiliary view construction (60°) mostly not drawn. ➢ Candidates are battling to master the method of constructing a circle. Compass work is poor. • Centre lines must be practised.
(d)	Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.
	<ul style="list-style-type: none"> • Most learners fail to apply the correct line type, visible outlines compared to construction lines. • Educators should guide candidates on how to draw precise 90- and 30-degree lines of isometric drawings, using correct scale and given dimensions. Proper instruments should be used and checked regularly. • Emphasis to all grades.

QUESTION 4

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

- The majority of learners attempted the question. The question was not answered well.

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

- Planning of the placement of views is critical (3rd angle).
- Learners did not measure properly and drew inaccurately.
- Improper or incorrect placement of parts of the assembly.
- Some learners did not use proper instruments.
- Centre lines were very poorly drawn or omitted.
- Very few learners were able to construct the nut properly.
- Very few learners inserted the symmetry symbol in the Top view. Many learners did not use the knowledge of what symmetry entails and ended up drawing a complete Top view and did not have enough space to draw the Half Sectioned Front view.
- Candidates used civil hatching, hatched at the wrong angle and did not differentiate between parts (spacing & direction).
- Many learners did not hatch the view or hatched the whole Front view instead of only the left side.
- Parts of the assembly were drawn as unassembled.

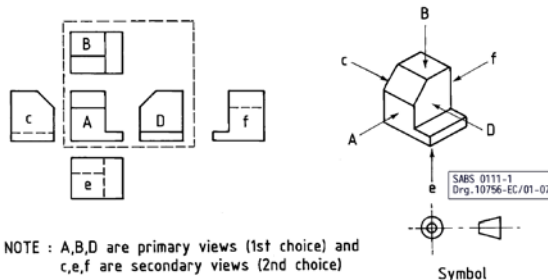
- (c) Provide suggestions for improvement in relation to Teaching and Learning

- Pay attention to drawing in Third Angle Orthographic projection.

6.2.2 Third angle projection

In third angle projection, with reference to the front view, A, the other views should be arranged as follows (see figure 12):

- top view, B, is placed above;
- left view, c, is placed on the left;
- right view, D, is placed on the right;
- bottom view, e, is placed below; and
- rear view, f, is placed on either the left or the right, as convenient.



- Although line quality is not evaluated neat drawings are easier to read and clarify the drawing. Learners must practice drawing neatly, because only correctly used line work is marked, e.g. outlines must stand out above construction lines and hidden detail lines. Centre lines and hidden detail lines must be correctly drawn and applied.

Table 3 — Types of lines

1	2	3
Line	Description	General applications
A	Continuous thick	A1 Visible outlines A2 Visible edges
B	Continuous thin (straight or curved)	B1 Imaginary lines of intersection B2 Dimensions lines B3 Projection lines B4 Leader lines B5 Hatching B6 Outlines of revolved sections in place B7 Short centre lines B8 Bending lines
C	Continuous thin freehand	C1 Limits of partial or interrupted views and sections, if the limit is not a chain thin
D*	Continuous thin (straight) with zigzags	D1 Break line
E	Dashed thick*	E1 Hidden outlines E2 Hidden edges
F	Dashed thin	F1 Hidden outlines F2 Hidden edges
G	Chain thin	G1 Centre lines G2 Lines of symmetry G3 Trajectories

- Pay attention to basic knowledge such as the manual construction of nuts and bolts.
- The part section on the pin was left out.

7.3.2 Part section

A view may be drawn in part section to show detail that would otherwise be hidden (see figure 23).

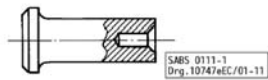
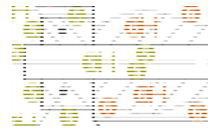


Figure 23 — Part section



- Same as with question 1 teachers must make use of old mechanical parts that they can get from their local automotive repair shops, and use them as examples for their learners to understand the different components and their workings. Disassemble the parts and put them back together so that the learners can see how parts fit together.
- Learners do not know the rules of sectioning.

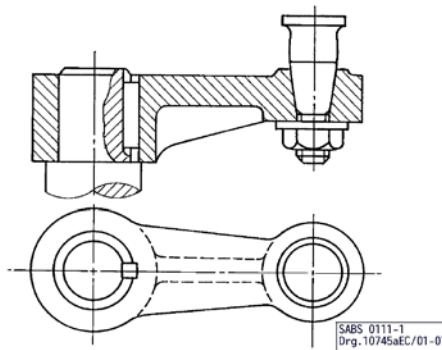


Figure 28 — Rib, shaft, key, crank pin, nut and washer, not sectioned

- PARTS MUST BE ASSEMBLED.

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

- Planning of time per question is critical. 1.1 marks should be completed per minute. Roughly 85 minutes should be spent on 93 marks.
- Planning of drawing layout needs attention.
- Line quality must improve.
- Learners do not practice the assembly drawings enough.
- While preparing learners, to answer assemblies, special attention must be given to hatching of different components and hatching rules.
- Also revise construction of nuts, washers and bolts again.
- Line types and their use must be stressed.
- Take note of use of centre lines and cutting planes.