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2025 NSC CHIEF MARKER'S REPORT

SUBJECT	Engineering graphics and design		
QUESTION PAPER	1	2	3
DURATION OF QUESTION PAPER	3 hours		
PROVINCE	Eastern Cape		
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DATES OF MARKING	28 November – 11 December		
HEAD OF EXAMINATION:	E.M. Mabona		

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

Many learners performed poorly, although it the results seems to be the same as last year. The lower order of the paper was attempted by all learners. The middle and higher order questions were poorly answered or not attempted at all. The learners focus more on question 1 and 4, then question 3 and 2.

SECTION 2: Comment on candidates' performance in individual questions

QUESTION 1

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

Question 1 (Mechanical Analytical) – 30 marks (15%)

The candidates had difficulty with the more complex, analytical components of the questions, suggesting that many may not have been adequately prepared. Only a small number of candidates earned marks on the mid- to higher-order items. Many candidates struggle with the freehand conventions.

Question 2. (Locs Mechanism and Cam) - 41 marks (20%)

Many candidates did better than in previous years in this question, many candidates attempted the question they are only able to answer the lower order parts. The prepared candidates display sufficient knowledge in drawing the displacement graph.

Question 3 (Isometric) - 39 marks (20%)

Some candidates performed well on this question; however, many still struggled. There is a noticeable gap in understanding the process of converting 2D shapes into 3D representations. The understanding of third angle orthographic projection seems to be a particular problem and has an effect on the interpretation of the drawing in isometric form. The weak responses suggest that candidates have difficulty visualizing the transformation between 2D and 3D forms.

Question 4 (Mechanical Assembly) - 90 marks (45%)

The mechanical assembly question posed challenges for many candidates. This could indicate the question required specific knowledge and skills that were not fully grasped. The question was not well answered as a whole. Candidates lose unnecessary marks because of poor application of drawing standards. Only a small percentage of candidates produced a fully assemble accurate drawing that complied with SANS conventions. Many centres show no knowledge of assembly of how to assemble different parts; the parts are all drawn separately. Majority of candidates just redraw the orthographic views that are available on the data sheet of question 4.

QUESTION 2

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

Question 1

Questions 1.9 – 1.11:

These items required learners to recall and apply content that should have been learned beforehand. The responses suggest that learners had not practiced this material adequately prior to the examination.

Question 1.14 – 1.15:

This question required candidates to identify and calculate dimensions from a given drawing. Many struggled to interpret the drawing and understand what it represented.

Questions 1.18 – 1.20:

Conventions, which frequently appear as middle- to higher-order questions, remain a challenge. Learners often do not practice these conventions and symbols in class and therefore cannot recognize them during the examination.

Question 2

Mechanism

Candidates were able in most cases to replicate the given schematic of the mechanism. Many did not grasp the motion of the around point C. Many struggled to use C and A as a swivel point. Additionally, candidates struggled with basic calculations.

Cam

This question was generally attempted more successfully; however, many candidates still confused the motions of simple harmonic and acceleration/deceleration. Several were only able to perform the simple harmonic motion, then repeated it, resulting in lost marks. Candidates frequently did not divide the horizontal and vertical distances into six equal parts to represent movement on the graph, and in most cases, the graph was not properly labelled. Many candidates did not line up the base line of the displacement graph with the follower, this created challenges in transferring into cam profile.

Question 3

Many candidates continue to struggle with several aspects of this question:

- Constructing an auxiliary view and correctly using it in the drawing (e.g., for the non-isometric lines).
- Drawing the isometric circle, which remains problematic; many either do not attempt it or draw it freehand without proper construction, and centre lines are often omitted. Some draw the arcs of the circle correctly but then darken them using freehand and then forfeit these marks.
- Many marks are lost for extension of construction lines, where lines needed to be darkened to indicate distinction between lines.
- They are unable to use the given point P as a starting point of the isometric, they tend to create their own starting point, losing marks for starting position.

Candidates also often fail to draw neatly, resulting in lost marks due to the lack of distinction between construction lines and final outlines.

Overall, drawing accuracy remains a major concern as well as the application of third angle orthographic projection, learners lose many marks due to incorrect placing of the views when constructing the isometric.

Additionally, many candidates are still unable to convert 2D shapes into 3D representations, which significantly affects their ability to earn marks in isometric drawings.

Question 4

Proper planning of view placement is essential in third-angle orthographic projection. In this type of projection, views are arranged assuming the object is positioned in the first quadrant: the front view is placed at the centre, the top view above it, and the right-side view to the right.

This question tends to be very time consuming with many small parts and large amounts of detail, candidates that do not practice regularly will tend to run into problems when it comes to completing the assembly accurately.

Many candidates do not measure accurately, resulting in incorrect drawings. Maintaining proper scale and proportionality across all views is critical to ensure that the object's dimensions are accurately represented. Candidates lose unnecessary marks because of poor application of drawing standards. Only a small percentage of candidates produced a fully assemble accurate drawing that complied with SANS conventions.

Incorrect placement of parts in mechanical assembly drawings often causes confusion and inaccuracies. Parts may be shown in the wrong orientation or relative position, making it difficult to understand how they fit together.

Some candidates fail to use proper drawing instruments. Without the correct tools, lines may be uneven, measurements inaccurate, and the overall drawing unclear.

Centre lines remain a significant problem; most learners do not draw them accurately, meaning they fail to comply with SANS standards and cannot be awarded marks.

Very few candidates are able to construct nuts correctly in mechanical assembly drawings. Nuts, being threaded components, require careful construction, but their arcs are often drawn freehand.

Hatching is also frequently done incorrectly. Some candidates use civil hatching, hatch at the wrong angle, fail to change hatching direction to differentiate parts, or hatch through solid lines, all of which result in mark deductions.

Parts of assemblies are sometimes drawn as unassembled, indicating that candidates may not have fully understood the required knowledge and skills. Learners should use exploded isometric views and follow part numbering to guide the correct assembly sequence.

Part 1 the housing contained lots of complex detail and, even in isometric form which was difficult for candidates to interpret.

In Part 7 the flange coupling drawing there were extra hidden detail lines that did not exist. This could have been confusing to candidates.

QUESTION 3

Provide suggestions for improvement in relation to Teaching and Learning.

Question 1

Educators should make use of past examination papers available on the DBE website to help learners become familiar with the terminology and concepts they need to understand.

Regular practice in reading and interpreting drawings is vital for improving learners' ability to identify and calculate dimensions accurately. Such exercises also strengthen their understanding of the features used in technical drawings. A suggestion is that learners practice these analytical questions on a weekly basis in order to improve memory recall and similar questioning techniques.

Past exam papers are an effective resource for teaching learners how to approach analytical questions. They help candidates become familiar with question formats, understand marking criteria, recognize common mistakes, and build confidence.

When a question specifies that a symbol or response must be drawn freehand or according to a particular instruction, ensure that learners follow these guidelines carefully.

Effective time management is crucial for completing the entire exam. Learners should use the allocated reading time to review analytical questions and should practice working under timed conditions to improve their drawing speed.

Using old mechanical parts or models in the classroom can help learners understand different components and their corresponding working drawings. Handling these models—taking them apart and reassembling them—enhances their understanding of how the parts fit together.

Questions of this nature are ideal for take-home research tasks. Encourage learners to investigate the answers independently, then discuss their findings as a class to determine the most accurate response and the reasoning behind it.

To help learners understand where each view should be placed in third-angle orthographic projection, have them write the names of the views underneath each drawing they complete in class.

Question 2

Teachers must adhere to the guidelines outlined in the CAPS document. CAPS highlights the importance of building on learners' prior knowledge, meaning that concepts taught in Grades 10 and 11 should be revisited and reinforced in Grade 12.

Dividing circles into equal parts is a key skill for drawing loci, mechanisms, and cams, and should be reviewed regularly.

Teachers should clearly explain the terminology used in practice questions to describe mechanism movements, such as oscillates, slides, reciprocates, pivots, pin-jointed, crank, and swivel guide. Exposure to different mechanism questions and examples may boost learner performance and ability to interpretation of these questions.

Learners need consistent practice in dividing vertical and horizontal lines into equal parts. Teachers must emphasize that, when determining the movement UAR, rotational and displacement lines should be divided into at least six equal parts.

Learners also need access to proper drawing instruments to ensure accuracy in their work.

Question 3

Learners need regular practice in converting 2D shapes into 3D representations. Using physical models and digital tools can be highly effective in helping them understand this process. Begin with simple shapes and have learners practice sketching them in isometric form. Encourage them to rotate or reposition the shapes in 3D space to observe how the view changes. The key is to provide multiple opportunities for learners to interact with 3D objects and practice drawing them from different angles.

Additional focus should be given to the following aspects of isometric drawings:

Line visibility and quality: Clear, well-defined lines are essential for accurate and legible isometric representations.

Placement: Candidates need to assess what is given before simply starting the drawing and be sure to start on the given point on the isometric question paper. Marks are lost due to incorrect starting position.

Auxiliary view: More emphasis needs to be placed on the drawing of auxiliary views and how to apply them in isometric drawings.

Constructing circles in isometric: Many candidates struggle with this, particularly with compass use and drawing in angular space. Emphasize that mastering this technique requires consistent practice.

Centre lines: Learners must practice drawing centre lines correctly, as they often confuse hidden detail lines with centre lines. The quality of centre lines is frequently poor and does not follow any specific line type, indicating a lack of understanding.

Question 4

Greater attention should be given to drawing in third-angle orthographic projection. Teachers need to emphasize the exploded isometric view provided in assembly questions, as this guides learners in correctly assembling the drawing. A suggestion is that in Grade 10 while learners are focusing on simple casting in mechanical drawings, that they then attempt a few simple assembly drawing with between 3 to 4 parts to start to build a basic understanding of how to assemble parts.

Line quality is essential for producing clear, accurate, and easily understood representations of components and their relationships within the assembly. Consistent line weights and line types should be stressed, as they directly affect the readability and effectiveness of the drawing.

Poor line work—such as lines that are too thin, too thick, or inconsistent—can cause confusion and misinterpretation. Sharp, clean lines are necessary to accurately represent the shapes, edges, and boundaries of parts.

Centre lines are often unclear in learners' drawings, which can lead to significant issues in interpreting assembly drawings. When centre lines are not properly drawn, misalignments and errors in the assembly can occur.

QUESTION 4

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

Question 1

It appears that candidates often leave Question 1 until the end of the exam session, which results in them running out of time, rushing through the questions, and making unnecessary mistakes. Effective time management is therefore essential when completing this paper.

Candidate responses indicate a widespread lack of understanding of the terminology and language used in the questions. For example, when asked to provide dimensions, some candidates incorrectly respond with the names of parts of the assembly. This demonstrates that insufficient knowledge of technical terminology affects their ability to answer questions accurately.

Many of the questions in this section are repeated from previous exam papers, suggesting that teachers do not consistently consult past papers when planning lessons.

Additionally, learners often show little interest in mastering the basic skills introduced from Grade 10, which further affects their performance.

Question 2

When working with displacement graphs, it is essential to understand the context of the problem to ensure that movements are represented accurately. Misinterpreting the question can result in errors, such as plotting points in the wrong direction. Carefully reading the instructions and specifications helps ensure that the graph correctly reflects the described situation. The basics of graph and cam construction are sometimes not clear and this leads to many errors in the application of the motion in the given question.

Learners should practice freehand drawing of smooth, even curves through specified points. Points must be plotted clearly to maintain the accuracy of the curve. Regular practice is necessary to avoid sharp corners or abrupt changes in direction. Students can begin with simple curves and gradually progress to more complex graphs.

Question 3

Many candidates struggle with using the correct line types, particularly in distinguishing between visible outlines and construction lines. A common error is applying the same line weight to both, which can lead to confusion. Maintaining a consistent distinction between line types is essential for clarity in isometric drawings.

When guiding candidates on drawing 30-degree lines in isometric sketches, it is important to ensure they use the correct set squares along with a T-square.

Proper drawing instruments must be used and regularly checked. Isometric drawing should be practiced consistently across all grades to build proficiency.

Many candidates continue to struggle with correctly applying line types in their drawings, particularly in distinguishing between visible outlines and construction lines. A frequent mistake is using the same line weight for both, which reduces the clarity of the drawing and can confuse the marker. It is therefore crucial to emphasize to learners the importance of consistently differentiating line types: visible outlines should be drawn bold and clear, while construction lines should be light and fine. This practice not only improves readability but also reflects proper drafting standards.

When teaching candidates how to draw 30-degree lines in isometric drawings, it is important to ensure they are using the correct set squares along with a T-square. Guidance should include demonstrating the proper alignment and positioning of instruments to avoid inaccuracies, as even small deviations can affect the overall quality of the isometric drawing.

Additionally, proper drawing instruments must always be used and checked regularly for accuracy, including pencils of suitable hardness, compasses, rulers, and set squares. Teaching learners to maintain their instruments in good condition can significantly improve the precision of their work.

Finally, isometric drawing should be practiced consistently across all grades. Early and regular exposure allows learners to build confidence, develop spatial visualization skills, and improve accuracy over time. Incorporating incremental challenges, starting with simple shapes and progressing to complex 3D forms, will help learners master the essential skills required for isometric representation.

Question 4

Effective time management during exams is crucial. Candidates should aim for approximately 1.5 marks per minute. This question accounts for 45% of the total exam marks, so learners need to prioritize it when planning their time. Allocating roughly 81 minutes for the 90 marks will increase the likelihood of completing the question and achieving maximum scores.

Emphasize the importance of using different line types. Sharp, clean lines are essential for accurately representing the shapes, edges, and boundaries of parts.

Proper planning of view placement is critical in third-angle orthographic projection and should be given special attention during teaching.

When preparing learners for assembly questions, particular focus must be placed on the sectioning of components and the correct application of sectioning rules.

The use and understanding of line types must be consistently reinforced throughout teaching and practice.