

CHAPTER 4

CIVIL TECHNOLOGY

4.1 CIVIL SERVICES

The following report should be read in conjunction with the Civil Services question paper of the November 2021 examinations.

4.1.1 PERFORMANCE TRENDS (2018–2021)

In 2021, 627 candidates sat for the Civil Services examination, 26 more candidates than in 2020.

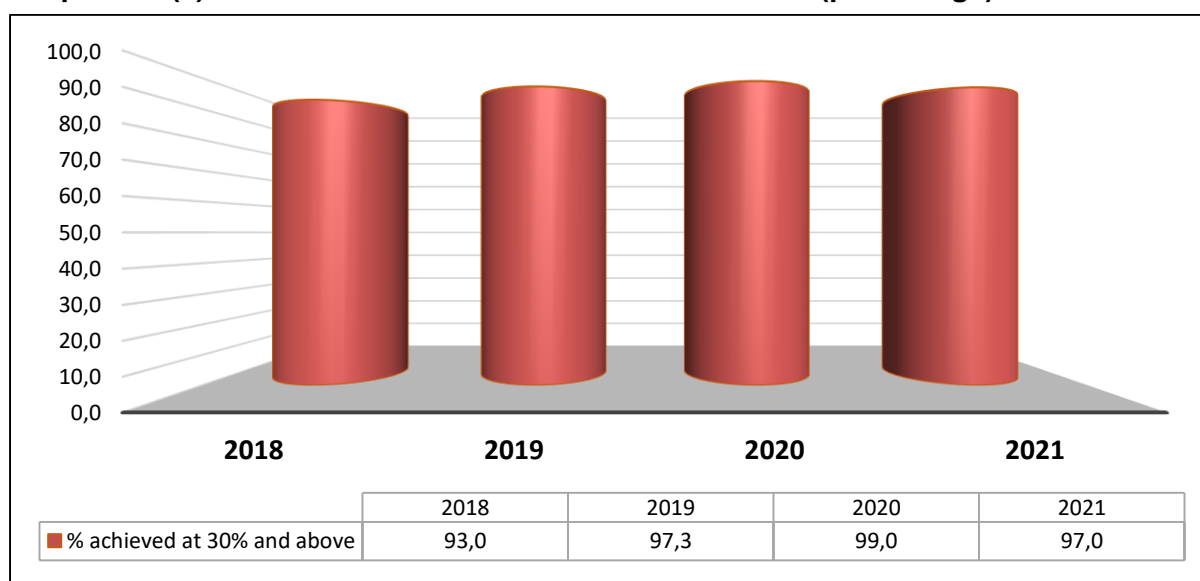
The performance of the candidates in 2021 shows a slight decline when compared to the performance in 2020. The pass percentage at 30% (Level 2) dropped from 99,0% in 2020 to 97,0% in 2021. It was disappointing that 61,3% of candidates achieved over 50% this year in comparison to 66,8% of candidates doing so in 2020.

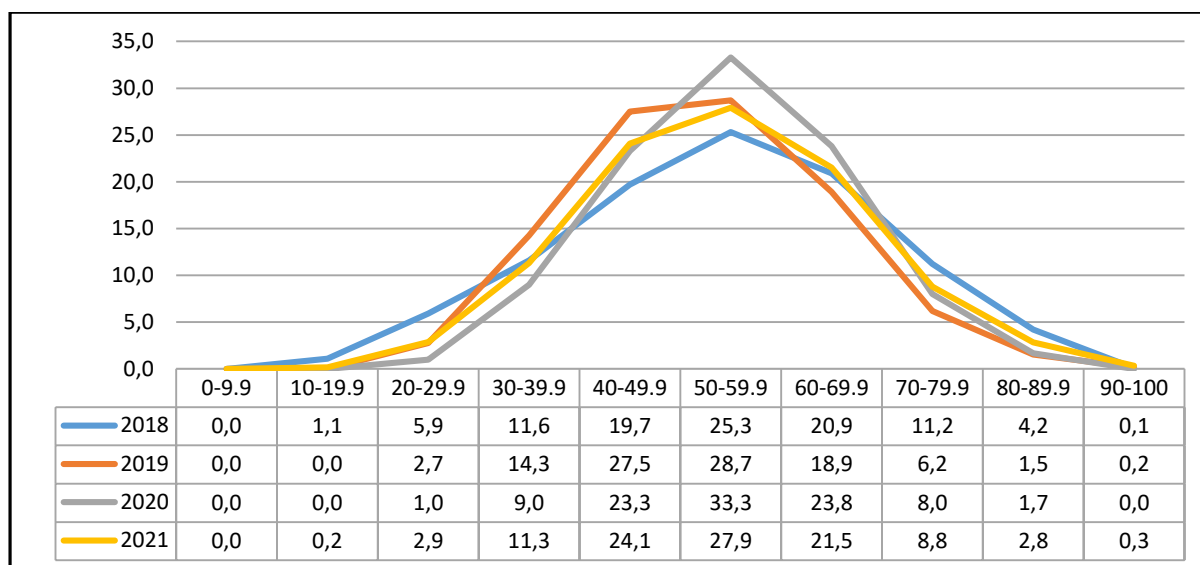
The percentage of distinctions (80%; Level 7) increased marginally from 1,7% in 2020 to 3,1% in 2021. This translates to an increase in the number of distinctions from 10 to 19.

Table 4.1.1 Overall achievement rates in Civil Services

Year	No. wrote	No. achieved at 30% and above	% achieved at 30% and above
2018	795	739	93,0
2019	582	566	97,3
2020	601	595	99,0
2021	627	608	97,0

Graph 4.1.1(a) Overall achievement rates in Civil Services (percentage)



Graph 4.1.1(b) Performance distribution curves in Civil Services (percentage)

4.1.2 OVERVIEW OF CANDIDATES' PERFORMANCE IN THE CIVIL SERVICES PAPER

General comments

- (a) It was noted that many candidates did not start each question on a new page as indicated in the instructions.
- (b) Many candidates experienced difficulty with subject-specific and academic terminology.
- (c) Poor drawing and interpretation skills were evident. There was poor distinction between line diagrams, sketches, pictorial views and scale drawings. Many scale drawings were not done using drawing equipment.
- (d) From the responses in the scripts, it is evident that the candidates lacked practical exposure and experience.
- (e) A significant number of candidates were not credited with marks because they failed to label their drawings.
- (f) Candidates experienced challenges to express themselves when responding to questions which required them to describe or explain.
- (g) Matching-items and multiple-choice questions were left unanswered by some candidates, and they were not credited as a result.
- (h) Many candidates found it difficult to explain practical applications theoretically.
- (i) In a question that counted 2 marks, a significant number of candidates provided only one response instead of two.
- (j) It was observed that the performance of the candidates was poorest in the topics indicated last on the ATP. A possible reason for the poor performance may be that at the end of the year, teachers are under pressure to complete the ATP and do not spend enough time on teaching these topics.

4.1.3 ANALYSIS OF CANDIDATES' PERFORMANCE IN EACH QUESTION IN CIVIL SERVICES

QUESTION 1: OHSA, MATERIALS, TOOLS, EQUIPMENT AND JOINING

Common errors and misconceptions

- (a) In Q1.1 (5 marks) candidates had difficulty in the *matching-items* question to link the appropriate descriptions with the items provided. A number of candidates were not able to respond in the required manner. They had to demonstrate deeper insight in the properties and principles applied in materials rather than the mere identification and use thereof. Many candidates were also not familiar with the correct subject terminology that was used in the question.
- (b) In Q1.2.1 and Q1.2.3 (4 marks) candidates were not able to respond well to the question relating to the specifications that scaffolding should adhere to before it is used and while working on scaffolding.
- (c) In Q1.4 (2 marks) candidates named the safety precautions for a worker working on a trestle scaffold and not the regulations regarding the safe use of trestle scaffolds.
- (d) In Q1.6 (3 marks) some candidates could not explain in logical steps how a bolt and nut can be used to join two metal plates.
- (e) In Q1.7 (2 marks) many candidates were not able to respond with the correct answer by completing the sentences given in the question. Instead, the candidates wrote general uses and aspects of how to care for the multi detector. They were not credited for this interpretation.

Suggestions for improvement

- (a) It is recommended that teachers ensure that learners fully understand the concepts related to materials instead of rote learning. It is important that learners work physically with materials to become familiar with them and acquire the knowledge of the properties and uses of different materials.
- (b) A glossary of academic terminology must be compiled and given to learners and must be used throughout the presentation of lessons. The meaning of each of these terms should be clearly explained to the learners.
- (c) It is imperative that labels be indicated on all drawings.
- (d) Learners must be taught to explain or describe concepts in a logical manner, e.g. *Explain how to use a bolt and nut to join two metal plates.*
- (e) Multiple-choice and matching-item questions must be attempted.
- (f) It is recommended that before learners start with scale drawings, they study them by doing the drawings freehand until they know all the parts and the sequence to be followed.
- (g) The mark allocation per question is indicative of the number of facts required in response to the question.

- (h) It is important that all topics be sufficiently covered before the preparatory examinations commence.
- (i) Teachers should not only rely on activities that are in the textbooks. Alternative questions that address the expected outcomes should be developed to cover all cognitive levels. These are listed in the CAPS for all the topics.
- (j) Learners must be aware that the relevant unit of measurement must be indicated in their answers.
- (k) It would be beneficial for learners if they were taught to read the question carefully and to isolate the exact aspect, within the topic, that should form the basis of their response. Learners recognise certain words and make their own conclusions without really taking cognisance of the question that is asked
- (l) If learners do not adhere to the instructions in the question, they may lose marks, e.g. if the question requires a line diagram and the candidate responds with a drawing, showing all details of the object, (s)he has not adhered to the instructions.
- (m) Learners must be aware that if they draw another drawing than the one asked in the question, no marks will be awarded for the incorrect drawing or part thereof.
- (n) It is recommended that if teachers complete the Grade 11 ATP in good time, they should start preparing learners for those topics that are placed last in the Grade 12 ATP.
- (o) Teachers and learners should take note that the assessment criteria in the answer sheets do not indicate all the aspects and mark allocations of the drawings required. The table on the left is an example of details that will appear in the question paper. The table on the right reflects details in the marking guideline. This implies that learners should know all the parts and dimensions of all required drawings.

ASSESSMENT CRITERIA	MARK	CM
Correctness of drawing	8	
One label with dimensions	2	
TOTAL:	10	

ASSESSMENT CRITERIA	MARK
Correctness of drawing:	
Rafters	2
King post	1
Tie beam	1
Queen posts	2
Struts	2
Wall plates	2
TOTAL:	10

- (p) More emphasis should be placed on the use of practical demonstrations of the application of different joining fixtures. Learners should be given the opportunity to practically use each of the prescribed joining fixtures during practical periods.

QUESTION 2: GRAPHICS AS METHOD OF COMMUNICATION

Common errors and misconceptions

- (a) Many candidates experienced challenges in reading and interpreting the floor plan and elevation and they were unable to identify, draw and interpret drawing symbols.
- (b) The use of the correct subject terminology seems to be a challenge for many candidates. When candidates are asked to identify features or objects from the drawings, they used layman's terminology or they gave explanations.

- (c) Candidates made use of symbols that are found in computer-aided drawings and not the SANS approved symbols that are required in the question paper. Candidates lost valuable marks because of this.
- (d) Poor performance by candidates was noted in Q2.2 (1 mark). The identification of the person who is responsible to verify levels and measurements on the site posed challenges to them.
- (e) In Q2.12 (1 mark) some candidates identified the municipal sewerage connection only as a manhole.
- (f) Many candidates did not indicate the unit next to the dimension in Q2.14 (1 mark), and were, therefore, not credited for the answer.
- (g) Poor performance by candidates was noted in Q2.15 (1 mark) and Q2.17 (1 mark). Candidates failed to identify the site numbers on a specific side of the site plan.
- (h) In Q2.18 (2 marks) most candidates correctly identified errors on the floor plan.
- (i) There was a noticeable decline in responses. Candidates could not correctly deduce dimensions from the site plan and calculate the omitted dimension in Q2.29 (6 marks).

Suggestions for improvement

- (a) Actual building plans should be used during teaching to familiarise learners with the interpretation of these items.
- (b) A lot of attention should be given to the correct subject terminology when explaining content to learners. Learners should always be corrected when they respond using the wrong terminology when interacting in the classroom.
- (c) Teachers should ensure that learners are aware of the fact that there are many symbols found in the construction field, but only SANS approved symbols are accepted in this subject.
- (d) More analytical questions and worksheets, similar to Q2, should be completed in class focusing on the correct terminology for each part on the drawings.
- (e) The correct use of subject terminology should be emphasised to ensure learners avoid the unnecessary loss of marks through the use of incorrect terms.
- (f) It is recommended that teachers emphasize the importance of indicating units next to any measurement and answers of calculations to ensure that learners do not lose any marks that are easy to score.
- (g) It is recommended that teachers differentiate between the elevations of a building and the views in orthographic drawings during teaching and also explain the correct use of the terminology in the correct context.
- (h) Teachers should not only teach learners what they see in the building plans, but also to identify/recognise all detail that should be indicated in a building plan as well as how to analyse and identify errors or omissions.
- (i) Learners should be exposed to more calculations involving area, perimeter and lengths of walls to ensure that they have mastered the mathematical concepts.

QUESTION 3: CONSTRUCTION ASSOCIATED WITH CIVIL SERVICES, OHSA AND QUANTITIES

Common errors and misconceptions

- (a) Q3.1 (2 marks) was poorly answered by most candidates. They were not familiar with the correct terminology and equipment *respirator* and wrote *mask* instead, for which they were not credited.
- (b) In Q3.2 (2 marks) most candidates were not able to describe two aspects that must be determined when setting out and excavating trenches for sewer pipes.
- (c) Many candidates had difficulty with identifying the concrete ring manhole and describing the process for installing the base of this manhole as required in Q3.4 (5 marks). It seems candidates had not been exposed to the specific practical aspects of the building of this item.
- (d) In Q3.7 (8 marks) the majority of candidates demonstrated a poor understanding of the basic concepts in the calculation of the quantity of bricks, and the correct use of the dimension sheet.
- (e) In Q3.8 (9 marks) many candidates were not familiar with the brick bond tested and were not able to correctly project and draw the second course of the given wall.

Suggestions for improvement

- (a) It is recommended that teachers emphasise the correct terminology related to equipment during teaching and informal assessment.
- (b) It is advised that aspects pertaining to the setting out and excavation of trenches for sewerage pipes be coupled with a practical demonstration in the L-shaped sand pit that should be available at all schools offering Civil Services. Pictures and video clips can be used to enhance understanding of the setting-out of trenches in a real-life context.
- (c) It will be beneficial to learners if they can be exposed to the practical installation of concrete ring manholes. If a physical demonstration is not possible, video clips and pictures can be used very effectively to demonstrate this procedure.
- (d) Subject advisors should conduct workshops on the calculation of quantities. It is recommended that teachers first explain the concept of the specific items for which the quantities should be calculated before explaining the actual calculation. It will be beneficial to learners if they were given more exercises on the calculation of quantities of each item than the one example in the textbook. These additional exercises should form part of the teacher's lesson preparation.
- (e) It will be beneficial to learners if they are exposed to the practical dry packing of the different brick bonds. Learners should also perform freehand drawings of the different brick bonds indicating the sizes of the different bricks used.

QUESTION 4: COLD AND HOT-WATER SUPPLY, TOOLS, EQUIPMENT AND MATERIALS

Common errors and misconceptions

- (a) In Q4.1 (8 marks) many candidates had difficulty with matching the correct description from the matching column question with the item listed in the opposite column. Candidates had to demonstrate deeper insight in the parts and working principles of valves, rather than the mere identification and use of valves. It is evident that they were not fully equipped to respond in the required manner.
- (b) The majority of candidates were not able to respond to the methods used to prevent electrolytic reaction in Q4.2.
- (c) In Q4.5 (2 marks) most candidates were not familiar with the principle on which an electronic water-saving shower head works and confused it with pre-set water providing devices.
- (d) Many candidates demonstrated a poor understanding of the symbols that are used in plumbing and were not able to correctly draw the symbols as required in Q4.6.
- (e) In Q4.8 most candidates had difficulty with explaining what an *Airlock* and *Water hammer* were.
- (f) Most candidates were not familiar with the correct name of the tool and the use of the different parts of the machine in Q4.11 (3 marks).

Suggestions for improvement

- (a) More emphasis should be placed on the practical disassembly, reassembly and installation of valves to enable learners to see the different parts of the valves and the purpose of each part.
- (b) It will be beneficial to learners if they could be shown the outcomes of electrolytic reaction. It is advised that teachers use small sections of different types of pipes to physically explain the concepts of *similar* and *dissimilar* pipes as used in the reference material.
- (c) It is recommended that teachers differentiate between the different water-saving devices using a table so that learners can clearly identify the differences between them.
- (d) Learners will benefit if informal assessment tasks are conducted on a regular basis during each term to test the identification and drawing of the symbols used in plumbing.
- (e) A practical demonstration will help to develop a better understanding of the different faults that may occur in hot and cold-water systems.
- (f) The challenge with terminology can be addressed by ensuring that correct subject terminology is used by the teacher while teaching and by learners when doing class and homework activities. Teaching in the language of teaching and learning is a critical factor in the ability of the learners to comprehend and correctly respond to questions.

QUESTION 5: GRAPHICS AS MEANS OF COMMUNICATION, ROOF WORK AND STORM WATER

Common errors and misconceptions

- (a) In Q5.2 (9 marks) most candidates were not able to draw the front elevation of a PVC gutter with all the required accessories on the given fascia board as expected.
- (b) Poor performance was evident in the drawing of the development of the cylindrical pipe elbow in Q5.3 (19 marks). Many candidates either developed the wrong section of pipe or did not attempt the question at all.
- (c) Many candidates did not project the development from the given view but instead drew the development in the open space available on the side of the answer sheet. If candidates did not project the development from the given view, as indicated in the instructions, they were not credited with the three marks for those projection lines. Candidates who developed the wrong pipe were only credited with the first three marks for dividing the circle into twelve equal parts and the upward projection lines.

Suggestions for improvement

- (a) It will benefit learners if a PVC gutter with gutter clips, gutter outlet, stop ends and a down pipe can be erected in the workshop so that learners can be exposed to this topic in a real-life context.
- (b) Workshops on the development of cones and pipes, conducted by subject specialists, will benefit teachers. Making paper or cardboard models of the developments listed in the CAPS will assist learners in their understanding of these concepts. The Grade 10 and 11 PAT can also be used to develop the skills of learners on this topic. A possible reason for the poor performance in this topic can be that Civil Technology teachers rely on the EGD teachers to teach this topic and do not teach and give enough examples to learners to draw in the Civil Technology class.
- (c) More emphasis should be placed on the adherence to instructions in the questions. Many candidates lost easy-to-score marks by not adhering to the instructions in the questions.

QUESTION 6: SEWERAGE, SANITARY FITTINGS AND JOINING

Common errors and misconceptions

- (a) In Q6.3 most candidates were not familiar with the correct name of the compression ring/ferrule in the compression T coupling and were not able to explain the function of the compression ring.
- (b) The majority of candidates were not familiar with the regulations pertaining to the laying of pipes for sanitary fittings in Q6.5.
- (c) In Q6.6 many candidates had difficulty with explaining the difference between the functions of chamber A and B of a septic tank.
- (d) Many candidates had difficulty with the drawing of the sewerage layout that was required in Q6.8 (13 marks). A possible reason may be that candidates were not exposed to the practical application of the design and layout of a sewerage system according to drainage principles and regulations. The correct flow direction of branch

pipes, the correct connection of two sewer lines and the positioning of the rodding eyes posed the biggest challenge to candidates in this question.

Suggestions for improvement

- (a) It will benefit learners to physically use the prescribed joints and to be exposed to a sectional view of the real joints. This will enhance their understanding of the different joints and develop their skills in the drawing of these items.
- (b) It is recommended that learners be given the opportunity in class to explain the regulations pertaining to the laying of pipes for sanitary fitments, in the language of teaching and learning, to develop their ability to express themselves in a logical manner.
- (c) It will benefit learners if teachers practically demonstrated the working principles and purpose of septic tanks.
- (d) Subject advisors should conduct workshops on the design and installation of a sewerage system by taking teachers on a site excursion around a school to show them the different parts of a sewerage system. This will assist teachers with understanding the function and position of each component before going into a classroom to demonstrate to their learners how to design and draw the layout of a sewerage system. Teachers might find that replicating the strategy of a real-life tour of the school will enhance learners' understanding of the details of this topic.

4.2 CONSTRUCTION

The following report should be read in conjunction with the Construction question paper of the November 2021 Examinations.

4.2.1 PERFORMANCE TRENDS (2018–2021)

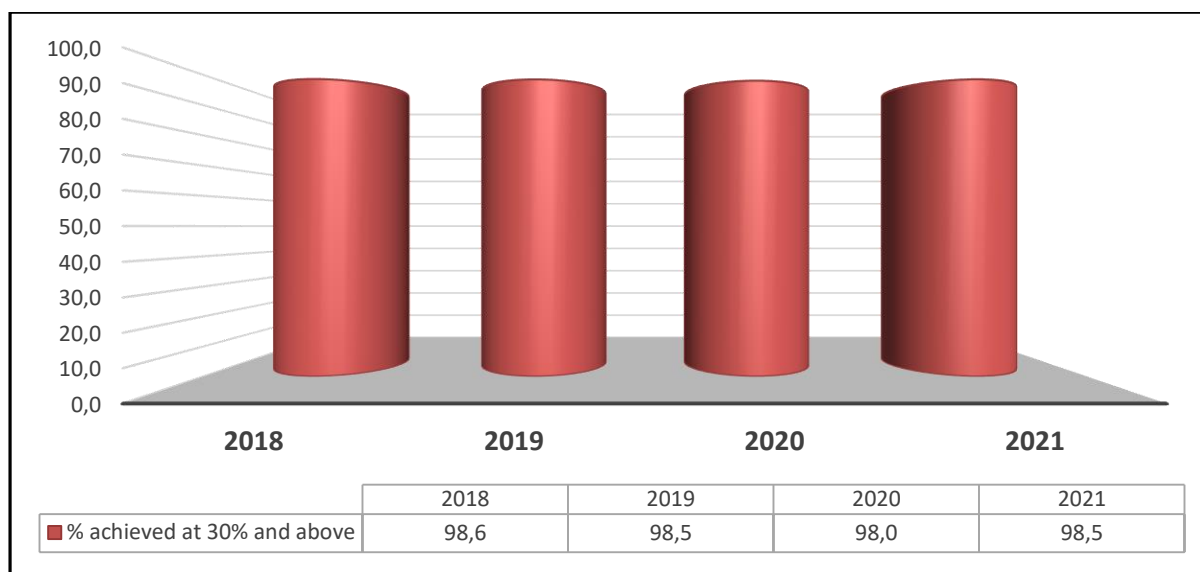
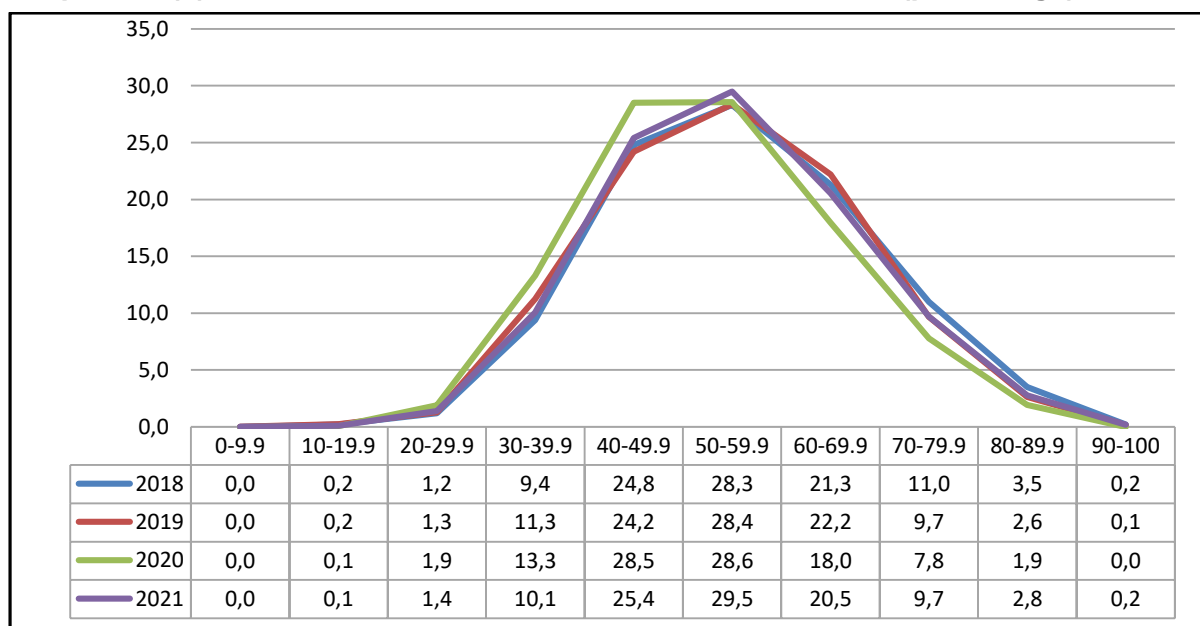
In 2021, 4 474 candidates sat for the Construction examination. The number of candidates increased by 892 in 2021.

The performance of the candidates in 2021 was close to the performance of learners in 2020. The pass percentage at 30% and above increased slightly from 98,0% in 2020 to 98,5% in 2021. It was encouraging that 62,7% of candidates achieved over 50% this year in comparison to 56,3% of candidates doing so in 2020.

The percentage of distinctions (80% and above) increased marginally from 1,9% in 2020 to 3,0% in 2021. This translates to an increase in the number of distinctions from 68 in 2020 to an impressive 134 in 2021.

Table 4.2.1 Overall achievement rates in Construction

Year	No. wrote	No. achieved at 30% and above	% achieved at 30% and above
2018	4 350	4 288	98,6
2019	3 492	3 438	98,5
2020	3 582	3 511	98,0
2021	4 474	4 406	98,5

Graph 4.2.1(a) Overall achievement rates in Construction (percentage)**Graph 4.2.1(b) Performance distribution curves in Construction (percentage)**

4.2.2 OVERVIEW OF CANDIDATES' PERFORMANCE IN THE CONSTRUCTION PAPER

General Comments

- (a) It was noted that many candidates did not start each question on a new page as indicated in the instructions.
- (b) A large number of candidates experienced difficulty with subject-specific and academic terminology.
- (c) Poor drawing and interpretation skills were evident. There was poor distinction between line diagrams, sketches, pictorial views and scale drawings. Many scale drawings were not done using drawing equipment.

- (d) From the responses in the scripts, it is evident that the candidates lacked practical exposure and experience.
- (e) A significant number of candidates were not credited with marks because they failed to label their drawings.
- (f) Candidates experienced challenges to express themselves when responding to questions which required them to describe or explain.
- (g) Matching-items and multiple-choice questions were left unanswered by some candidates, and they were not credited as a result.
- (h) Many candidates found it difficult to explain practical applications theoretically.
- (i) In a question that counted 2 marks, a significant number of candidates provided only one response instead of two.
- (j) It was observed that the performance of the candidates was poorest in the topics indicated last on the ATP. A possible reason for the poor performance may be that at the end of the year, teachers are under pressure to complete the ATP and do not spend enough time on teaching these topics.

4.2.3 ANALYSIS OF CANDIDATES' PERFORMANCE IN EACH QUESTION IN CONSTRUCTION

QUESTION 1: OHSA, MATERIALS, TOOLS, EQUIPMENT AND JOINING

Common errors and misconceptions

- (a) In Q1.1 (5 marks) candidates had difficulty in the *matching-items* question to link the appropriate descriptions with the items provided. A number of candidates were not able to respond in the required manner. They had to demonstrate deeper insight in the properties and principles applied in materials rather than the mere identification and use thereof. Many candidates were also not familiar with the correct subject terminology that was used in the question.
- (b) In Q1.2.1 and Q1.2.3 (4 marks) candidates were not able to respond well to the question relating to the specifications that scaffolding should adhere to before it is used and while working on scaffolding.
- (c) In Q1.4 (2 marks) candidates named the safety precautions for a worker working on a trestle scaffold and not the regulations regarding the safe use of trestle scaffolds.
- (d) In Q1.6 (3 marks) some candidates could not explain in logical steps how a bolt and nut can be used to join two metal plates.
- (e) In Q1.7 (2 marks) many candidates were not able to respond with the correct answer by completing the sentences given in the question. Instead, the candidates wrote general uses and aspects of how to care for the multi detector. They were not credited for this interpretation.

Suggestions for improvement

- (a) It is recommended that teachers ensure that learners fully understand the concepts related to materials instead of rote learning. It is important that learners work physically with materials to become familiar with them and acquire the knowledge of the properties and uses of different materials.
- (b) A glossary of academic terminology must be compiled and given to learners and must be used throughout the presentation of lessons. The meaning of each of these terms should be clearly explained to the learners.
- (c) It is imperative that labels be indicated on all drawings.
- (d) Learners must be taught to explain or describe concepts in a logical manner, e.g. *Explain how to use a bolt and nut to join two metal plates.*
- (e) Multiple-choice and matching-item questions must be attempted.
- (f) It is recommended that before learners start with scale drawings, they study them by doing the drawings freehand until they know all the parts and the sequence to be followed.
- (g) The mark allocation per question is indicative of the number of facts required in response to the question.
- (h) It is important that all topics be sufficiently covered before the preparatory examinations commence.
- (i) Teachers should not only rely on activities that are in the textbooks. Alternative questions that address the expected outcomes should be developed to cover all cognitive levels. These are listed in the CAPS for all the topics.
- (j) Learners must be aware that the relevant unit of measurement must be indicated in their answers.
- (k) It would be beneficial for learners if they were taught to read the question carefully and to isolate the exact aspect, within the topic, that should form the basis of their response. Learners recognise certain words and make their own conclusions without really taking cognisance of the question that is asked
- (l) If learners do not adhere to the instructions in the question, they may lose marks, e.g. if the question requires a line diagram and the candidate responds with a drawing, showing all details of the object, (s)he has not adhered to the instructions.
- (m) Learners must be aware that if they draw another drawing than the one asked in the question, no marks will be awarded for the incorrect drawing or part thereof.
- (n) It is recommended that if teachers complete the Grade 11 ATP in good time, they should start preparing learners for those topics that are placed last in the Grade 12 ATP.

- (o) Teachers and learners should take note that the assessment criteria in the answer sheets do not indicate all the aspects and mark allocations of the drawings required. The table on the left is an example of details that will appear in the question paper. The table on the right reflects details in the marking guideline. This implies that learners should know all the parts and dimensions of all required drawings.

ASSESSMENT CRITERIA	MARK	CM
Correctness of drawing	8	
One label with dimensions	2	
TOTAL:	10	

ASSESSMENT CRITERIA	MARK
Correctness of drawing:	
Rafters	2
King post	1
Tie beam	1
Queen posts	2
Struts	2
Wall plates	2
TOTAL:	10

- (p) More emphasis should be placed on the use of practical demonstrations of the application of different joining fixtures. Learners should be given the opportunity to practically use each of the prescribed joining fixtures during practical periods.

QUESTION 2: GRAPHICS AS METHOD OF COMMUNICATION

Common errors and misconceptions

- Many candidates experienced challenges in reading and interpreting the floor plan and elevation and they were unable to identify, draw and interpret drawing symbols.
- The use of the correct subject terminology seems to be a challenge for many candidates. When candidates are asked to identify features or objects from the drawings, they used layman's terminology or they gave explanations.
- Candidates made use of symbols that are found in computer-aided drawings and not the SANS approved symbols that are required in the question paper. Candidates lost valuable marks because of this.
- Poor performance by candidates was noted in Q2.2 (1 mark). The identification of the person who is responsible to verify levels and measurements on the site posed challenges to them.
- In Q2.12 (1 mark) some candidates identified the municipal sewerage connection only as a manhole.
- Many candidates did not indicate the unit next to the dimension in Q2.14 (1 mark), and were, therefore, not credited for the answer.
- Poor performance by candidates was noted in Q2.15 (1 mark) and Q2.17 (1 mark). Candidates failed to identify the site numbers on a specific side of the site plan.
- In Q2.18 (2 marks) most candidates correctly identified errors on the floor plan.
- There was a noticeable decline in responses. Candidates could not correctly deduce dimensions from the site plan and calculate the omitted dimension in Q2.29 (6 marks).

Suggestions for improvement

- (a) Actual building plans should be used during teaching to familiarise learners with the interpretation of these items.
- (b) A lot of attention should be given to the correct subject terminology when explaining content to learners. Learners should always be corrected when they respond using the wrong terminology when interacting in the classroom.
- (c) Teachers should ensure that learners are aware of the fact that there are many symbols found in the construction field, but only SANS approved symbols are accepted in this subject.
- (d) More analytical questions and worksheets, similar to Q2, should be completed in class focusing on the correct terminology for each part on the drawings.
- (e) The correct use of subject terminology should be emphasised to ensure learners avoid the unnecessary loss of marks through the use of incorrect terms.
- (f) It is recommended that teachers emphasize the importance of indicating units next to any measurement and answers of calculations to ensure that learners do not lose any marks that are easy to score.
- (g) It is recommended that teachers differentiate between the elevations of a building and the views in orthographic drawings during teaching and also explain the correct use of the terminology in the correct context.
- (h) Teachers should not only teach learners what they see in the building plans, but also to identify/recognise all detail that should be indicated in a building plan as well as how to analyse and identify errors or omissions.
- (i) Learners should be exposed to more calculations involving area, perimeter and lengths of walls to ensure that they have mastered the mathematical concepts.

QUESTION 3: ROOFS, STAIRCASES AND JOINING

Common errors and misconceptions

- (a) Question 3.1 (1 mark) was answered very poorly. Candidates were not familiar with the different balustrade patterns.
- (b) It was observed that most candidates did not answer Q 3.3 (1 mark) and could not recall the minimum distance between a pitch line and the handrail of a staircase.
- (c) Q3.7 (1 mark) appeared to be challenging for most candidates. Candidates could not name one type of cast-in anchor.
- (d) Candidates struggled to draw the components of a closed-couple roof truss to scale in Q3.14 (8 marks). Candidates did not adhere to or apply the prescribed scale. If the candidate drew the wrong roof truss, he or she was not awarded any marks.

Suggestions for Improvement

- (a) Samples of the different balustrade patterns could be displayed in the classroom so that learners could identify and name these different patterns on a few occasions,

especially during revision. Learners remember content better if they see it physically and not just in the textbook.

- (b) Simulation tasks work very well for learners to identify and know the different parts and specifications of staircases. If time allows, it will benefit the learners if they could build (even according to a smaller scale) their own staircase.
- (c) Because learners cover joining methods in Grade 10 and 11, they tend to get complacent and assume that they know the content. Teachers must make sure that they give these chapters the necessary attention in Grade 12.
- (d) It is recommended that teachers provide learners with more exercises on the drawing of roof trusses for learners to develop their drawing skills and in understanding the different types of roof trusses.

QUESTION 4: EXCAVATIONS, FORMWORK, TOOLS AND EQUIPMENT AND MATERIALS

Common errors and misconceptions

- (a) Q4.4.1 (2 marks) expected the candidate to name two members that were omitted in the figure and required the candidate to predict the likely consequence of omitting these members during excavations. Candidates answered the first part of this question well, but most candidates neglected to answer the second part of the question.
- (b) Many candidates drew the shuttering in Q4.4.2 (5 marks) oblique and not two-dimensional. Many candidates understood the concept but experienced challenges in drawing a two-dimensional drawing. It seems that the candidates did not understand what the different drawing methods are.
- (c) Candidates could not identify the type of formwork in Q4.6.1 (1 mark). Many candidates gave an explanation but could not use the correct terminology.
- (d) The word *respectively* in Q4.8 (2 marks) posed a challenge to many candidates. Candidates did not know what the different verbs or instructions meant, and although they knew the content, they could not respond accurately to some of the questions.
- (e) Q4.10 (2 marks) was not answered as well as expected. Candidates could not respond to the two categories of metals. Candidates listed types of metals that fall within both the categories of ferrous and non-ferrous metals instead of the two categories.

Suggestions for improvement

- (a) All formal and informal tasks should be set according to the same standard as the NSC question papers and according to the examination guidelines. Learners should be exposed to these types of questions on a regular basis.
- (b) The different drawing principles and methods should be explained to learners in the classroom, so that they are able to respond with the correct type of drawing during examinations. During formal or informal tasks, marks should not be awarded to learners for the incorrect drawings.
- (c) The correct terminology should be used during teaching and learning, so that learners can respond accurately to these types of questions.

- (d) All the different verbs and instructions that are used in the question papers should be explained to learners so that they can understand what the questions expect from them and how to respond.
- (e) Samples of the different metals can be used very effectively to practically demonstrate, not only the properties and uses of thereof, but also to divide them into the different categories for learners to be able to understand all the required aspects of these materials.

QUESTION 5: PLASTER AND SCREED, BRICKWORK AND GRAPHICS AS MEANS OF COMMUNICATION

Common Errors and Misconceptions

- (a) In Q5.1.3 (1 mark) many candidates were not familiar with different admixtures for the material.
- (b) Q5.2.1 to Q5.2.3 (3 marks) required the candidate to explain different terminology. Many candidates were not equipped to explain the terminology accurately.
- (c) Question 5.4.2 (1 mark) seemed to be challenging for many candidates. It appeared that candidates did not understand the verb *describe* and instead of *describing* where weep holes were positioned, they gave the functions of the weep holes.
- (d) Only a limited number of candidates were able to draw the horizontal section of a steel door frame in Q5.5 (4 marks). If the drawing was rotated, candidates were not awarded any marks.

Suggestions for Improvement

- (a) Materials is a topic that is covered in Grade 10 and 11, and it seems to be neglected in Grade 12. All topics should be covered as prescribed by the ATP for Grade 12.
- (b) Terminology should be high priority during teaching and learning. Learners need to know and be able to explain the different terminology before they can advance to the practical implementation of a certain topic.
- (c) It will be beneficial to learners if teachers ensure that learners understand the different types of questions and what the ideal responses would be to those questions.
- (d) More emphasis should be placed on the different orientations of sectional drawings for door frames.

QUESTION 6: REINFORCEMENT IN CONCRETE, FOUNDATIONS, CONCRETE FLOOR AND QUANTITIES

Common errors and misconceptions

- (a) Q 6.2, Q6.3 and Q6.8 (5 marks) seemed to be challenging for most candidates. The required responses were dimensions while candidates only focused on identifying parts and were not equipped to give more detail.
- (b) In Q6.5 (9 marks) candidates had difficulty with drawing a detailed drawing of the vertical sectional view through a rib and block floor.

- (c) Q 6.6.1 and 6.6.2 (1 mark each) were placed between two drawing questions. Many candidates neglected to answer these questions.
- (d) Q 6.6.3 required the candidates to draw the reinforcing of the circled part on an answer sheet. Many candidates experienced challenges with drawing the reinforcing in the indicated section.
- (e) Doing basic calculations posed a serious challenge to candidates. Many candidates could not calculate the correct area of the floor, the volume of concrete or the number of tiles needed in Q6.9.1 and Q6.9.2 (10 marks). Most candidates could not use the dimension paper, in the answer sheet for Q6.9, correctly.

Suggestions for improvement

- (a) Learners should be encouraged not to limit their studies to merely identifying parts, but to also be able to know the measurements or dimensions of these parts.
- (b) It is recommended that these types of drawings be done in class. Visits to construction sites would be an excellent way to demonstrate such installations since it would be difficult to demonstrate at school. If that is not possible, there are different videos available on the internet that can be used to demonstrate these installations.
- (c) Learners should make sure that they answer all the questions and number them according to the numbering system used in the question paper.
- (d) Reinforcing is covered in Grades 10, 11 and 12. Learners should be exposed to the different methods of asking questions on the same content and not only examples from previous NSC question papers.
- (e) More exercises on the calculation of quantities of materials for a building should be given to learners to develop a better understanding of the topic. These calculations should always be done on dimension paper so that learners become familiar with this process in preparing for examinations. Arrangements could be made with the mathematics teacher to also focus on the different formulae used in the technology subjects to ensure a concrete understanding of these concepts.

4.3 WOODWORKING

The following report should be read in conjunction with the Woodworking question paper of the November 2021 Examinations.

4.3.1 PERFORMANCE TRENDS (2018–2021)

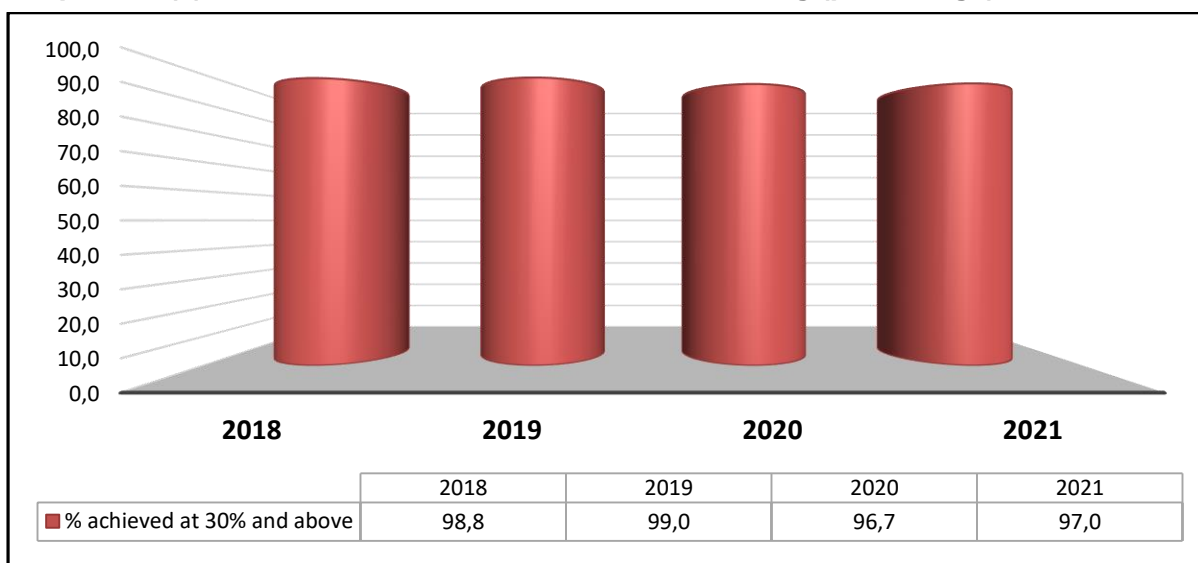
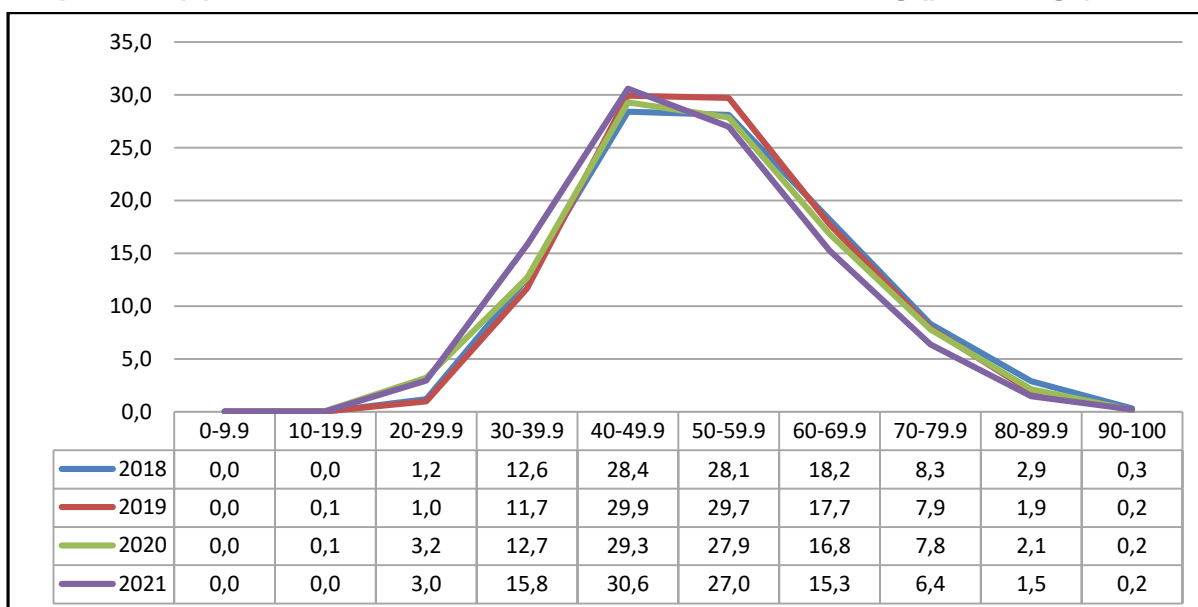
In 2021, 2 366 candidates sat for the Woodworking examination, i.e. the number of candidates increased by 529 in 2021.

The performance of the candidates in 2021 was almost similar to the performance of learners in 2020. The pass percentage at 30% and above increased slightly from 96,7% in 2020 to 97,0% in 2021. The percentage of candidates who obtained 50% and above stood at 50,4% for 2021. This was a decline from 54,8% in 2020.

The percentage of distinctions (80% and above) decreased marginally from 2,3% in 2020 to 1,7% in 2021. Given the bigger cohort, the number of distinctions decreased from 42 in 2020 to 40 in 2021.

Table 4.3.1 Overall achievement rates in Woodworking

Year	No. wrote	No. achieved at 30% and above	% achieved at 30% and above
2018	2 606	2 574	98,8
2019	1 946	1 926	99,0
2020	1 837	1 777	96,7
2021	2 366	2 294	97,0

Graph 4.3.1(a) Overall achievement rates in Woodworking (percentage)**Graph 4.3.1 (b) Performance distribution curves in Woodworking (percentage)**

4.3.2 OVERVIEW OF CANDIDATES' PERFORMANCE IN THE WOODWORKING PAPER

General Comments

- (a) It was noted that many candidates did not start each question on a new page as indicated in the instructions.
- (b) A large number of candidates experienced difficulty with subject-specific and academic terminology.
- (c) Poor drawing and interpretation skills were evident. There was poor distinction between line diagrams, sketches, pictorial views and scale drawings. Many scale drawings were not done using drawing equipment.
- (d) From the responses in the scripts, it is evident that the candidates lacked practical exposure and experience.
- (e) A significant number of candidates were not credited due to a failure to indicate labels.
- (f) Candidates experienced challenges to express themselves when responding to questions which required them to describe or explain.
- (g) Matching-items and multiple-choice questions were left unanswered by some candidates, and they were not credited as a result.
- (h) Many candidates found it difficult to explain practical applications theoretically.
- (i) In a question that counts 2 marks, a significant number of candidates provided only one response instead of two.
- (j) It was observed that the performance of the candidates was poorest in the topics indicated last on the ATP. A possible reason for the poor performance may be that at the end of the year, teachers are under pressure to complete the ATP and do not spend enough time on teaching these topics.

4.3.3 ANALYSIS OF CANDIDATES' PERFORMANCE IN EACH QUESTION IN WOODWORKING

QUESTION 1: OHSA, MATERIALS, TOOLS, EQUIPMENT AND JOINING

Common errors and misconceptions

- (a) In Q1.1 (5 marks) candidates had difficulty in the *matching-items* question to link the appropriate descriptions with the items provided. A number of candidates were not able to respond in the required manner. They had to demonstrate deeper insight in the properties and principles applied in materials rather than the mere identification and use thereof. Many candidates were also not familiar with the correct subject terminology that was used in the question.
- (b) In Q1.2.1 and Q1.2.3 (4 marks) candidates were not able to respond well to the question relating to the specifications that scaffolding should adhere to before it is used and while working on scaffolding.

- (c) In Q1.4 (2 marks) candidates named the safety precautions for a worker working on a trestle scaffold and not the regulations regarding the safe use of trestle scaffolds.
- (d) In Q1.6 (3 marks) some candidates could not explain in logical steps how a bolt and nut can be used to join two metal plates.
- (e) In Q1.7 (2 marks) many candidates were not able to respond with the correct answer by completing the sentences given in the question. Instead, the candidates wrote general uses and aspects of how to care for the multi detector. They were not credited for this interpretation.

Suggestions for improvement

- (a) It is recommended that teachers ensure that learners fully understand the concepts related to materials instead of rote learning. It is important that learners work physically with materials to become familiar with them and acquire the knowledge of the properties and uses of different materials.
- (b) A glossary of academic terminology must be compiled and given to learners and must be used throughout the presentation of lessons. The meaning of each of these terms should be clearly explained to the learners.
- (c) It is imperative that labels be indicated on all drawings.
- (d) Learners must be taught to explain or describe concepts in a logical manner, e.g. *Explain how to use a bolt and nut to join two metal plates.*
- (e) Multiple-choice and matching-item questions must be attempted.
- (f) It is recommended that before learners start with scale drawings, they study them by doing the drawings freehand until they know all the parts and the sequence to be followed.
- (g) The mark allocation per question is indicative of the number of facts required in response to the question.
- (h) It is important that all topics be sufficiently covered before the preparatory examinations commence.
- (i) Teachers should not only rely on activities that are in the textbooks. Alternative questions that address the expected outcomes should be developed to cover all cognitive levels. These are listed in the CAPS for all the topics.
- (j) Learners must be aware that the relevant unit of measurement must be indicated in their answers.
- (k) It would be beneficial for learners if they were taught to read the question carefully and to isolate the exact aspect, within the topic, that should form the basis of their response. Learners recognise certain words and make their own conclusions without really taking cognisance of the question that is asked
- (l) If learners do not adhere to the instructions in the question, they may lose marks, e.g. if the question requires a line diagram and the candidate responds with a drawing, showing all details of the object, (s)he has not adhered to the instructions.

- (m) Learners must be aware that if they draw another drawing than the one asked in the question, no marks will be awarded for the incorrect drawing or part thereof.
- (n) It is recommended that if teachers complete the Grade 11 ATP in good time, they should start preparing learners for those topics that are placed last in the Grade 12 ATP.
- (o) Teachers and learners should take note that the assessment criteria in the answer sheets do not indicate all the aspects and mark allocations of the drawings required. The table on the left is an example of details that will appear in the question paper. The table on the right reflects details in the marking guideline. This implies that learners should know all the parts and dimensions of all required drawings.

ASSESSMENT CRITERIA	MARK	CM
Correctness of drawing	8	
One label with dimensions	2	
TOTAL:	10	

ASSESSMENT CRITERIA	MARK
Correctness of drawing:	
Rafters	2
King post	1
Tie beam	1
Queen posts	2
Struts	2
Wall plates	2
TOTAL:	10

- (p) More emphasis should be placed on the use of practical demonstrations of the application of different joining fixtures. Learners should be given the opportunity to practically use each of the prescribed joining fixtures during practical periods.

QUESTION 2: GRAPHICS AS METHOD OF COMMUNICATION

Common errors and misconceptions

- (a) Many candidates experienced challenges in reading and interpreting the floor plan and elevation and they were unable to identify, draw and interpret drawing symbols.
- (b) The use of the correct subject terminology seems to be a challenge for many candidates. When candidates are asked to identify features or objects from the drawings, they used layman's terminology or they gave explanations.
- (c) Candidates made use of symbols that are found in computer-aided drawings and not the SANS approved symbols that are required in the question paper. Candidates lost valuable marks because of this.
- (d) Poor performance by candidates was noted in Q2.2 (1 mark). The identification of the person who is responsible to verify levels and measurements on the site posed challenges to them.
- (e) In Q2.12 (1 mark) some candidates identified the municipal sewerage connection only as a manhole.
- (f) Many candidates did not indicate the unit next to the dimension in Q2.14 (1 mark), and were, therefore, not credited for the answer.
- (g) Poor performance by candidates was noted in Q2.15 (1 mark) and Q2.17 (1 mark). Candidates failed to identify the site numbers on a specific side of the site plan.
- (h) In Q2.18 (2 marks) most candidates correctly identified errors on the floor plan.

- (i) There was a noticeable decline in responses. Candidates could not correctly deduce dimensions from the site plan and calculate the omitted dimension in Q2.29 (6 marks).

Suggestions for improvement

- (a) Actual building plans should be used during teaching to familiarise learners with the interpretation of these items.
- (b) A lot of attention should be given to the correct subject terminology when explaining content to learners. Learners should always be corrected when they respond using the wrong terminology when interacting in the classroom.
- (c) Teachers should ensure that learners are aware of the fact that there are many symbols found in the construction field, but only SANS approved symbols are accepted in this subject.
- (d) More analytical questions and worksheets, similar to Q2, should be completed in class focusing on the correct terminology for each part on the drawings.
- (e) The correct use of subject terminology should be emphasised to ensure learners avoid the unnecessary loss of marks through the use of incorrect terms.
- (f) It is recommended that teachers emphasize the importance of indicating units next to any measurement and answers of calculations to ensure that learners do not lose any marks that are easy to score.
- (g) It is recommended that teachers differentiate between the elevations of a building and the views in orthographic drawings during teaching and also explain the correct use of the terminology in the correct context.
- (h) Teachers should not only teach learners what they see in the building plans, but also to identify/recognise all detail that should be indicated in a building plan as well as how to analyse and identify errors or omissions.
- (i) Learners should be exposed to more calculations involving area, perimeter and lengths of walls to ensure that they have mastered the mathematical concepts.

QUESTION 3: CASEMENTS, CUPBOARDS, WALL-PANELLING AND QUANTITIES

Common errors and misconceptions

- (a) In Q3.1 (6 marks) many candidates had difficulty with identifying the parts of the casement, stating the purpose of the *drip groove* and explaining the term *fanlight*.
- (b) Most candidates were not equipped to correctly calculate the dimensions of the required parts and to correctly complete the cutting list for the cupboard in Q3.2.1 (7 marks).
- (c) In Q3.2.2 (11 marks) it was evident from the responses of many candidates that they were unable to draw the sectional view of the cupboard correctly and indicate the hatching of the sectioned parts correctly.
- (d) The majority of the candidates were not equipped to project and draw to the given scale the front view of the wall panelling in Q3.3 (6 marks).

Suggestions for improvement

- (a) It is recommended that an old casement with a fanlight, which is not being used, should be cut and the relevant sections shown to the learners in class. The learners should then make drawings of what they see in the model.
- (b) Subject advisors should conduct workshops on the calculation of quantities. More exercises on the calculation of quantities of materials should be given to learners. It is advisable that learners be taught to read and interpret drawings and to use the correct method to compile a cutting list.
- (c) It will be beneficial to learners to be exposed to more practical examples of cupboards with doors, shelves and drawers from which they can draw the cupboards. In this way, they can see and understand the composition of the structure of the cupboard.
- (d) It will be beneficial to candidates if teachers required learners to draw the front, top and side views of the wall panelling during class and homework activities to equip them with the necessary skills to respond to this type of question.

QUESTION 4: ROOFS, CEILINGS, TOOLS AND EQUIPMENT, AND MATERIALS

Common errors and misconceptions

- (a) In Q4.1 (8 marks) the majority of the candidates were not sufficiently equipped to select the correct description of the roof members to match the items listed in column A.
- (b) Most candidates had difficulty with explaining the safe handling of the tools in terms of the specified criteria in Q4.2 (2 marks), Q4.3 (2 marks) and Q4.4 (1 mark). Instead, candidates listed general aspects regarding the safe handling of the tools and were not credited as a result.
- (c) In Q4.5.1 (1 mark) many candidates were not able to identify the metal T strip and only indicated metal strip or cover strip.
- (d) The majority of candidates were not able to differentiate between the different roof members of the different types of roof trusses and the correct names and functions of these parts in Q4.6 to Q4.11 (9 marks).
- (e) In Q4.12 (6 marks) the majority of candidates were not able to rearrange the given steps to be followed to lay concrete roof tiles in the correct sequence.
- (f) Most candidates were not able to respond correctly to the types of varnish finishes and the effect that spilled water may have on a waxed surface in Q4.13 to Q4.15.

Suggestions for improvement

- (a) It will be beneficial to learners if they are exposed to more drawings of roofs and the members which comprise each type of roof.
- (b) Learners should be given more practical exposure to all the listed tools and equipment prescribed in the CAPS to familiarise themselves with the parts, proper use, care and safety of machines.

- (c) It will be beneficial to learners if they are taught to look critically at objects and parts of structures and to always use the correct subject terminology when responding to a question.
- (d) Candidates did not understand the different roof trusses and the members of each truss in relation to one another. It seems that learners were taught each truss in isolation and were, therefore, not equipped to respond well to the questions in the question paper. It would be beneficial to look at how a combination of roof trusses is used in the roof structure.
- (e) More emphasis should be placed on the correct procedures to be followed when installing roof covering.
- (f) A challenge could be that learners were not practically exposed to the different varnish finishes and the type of protection each type provides to wood.

QUESTION 5: CENTERING, FORMWORK, SHORING AND GRAPHICS AS MEANS OF COMMUNICATION

Common errors and misconceptions

- (a) Many candidates were not able to select the correct answer from the given options in the multiple-choice questions regarding the different types of shores and parts of the shores in Q5.1 (5 marks).
- (b) In Q5.2 (5 marks) some candidates were not able to respond correctly to the shapes of the arches and were not able to correctly calculate the rise of the arch from the given span.
- (c) Most candidates responded well to question Q5.3 (9 marks). However, some candidates drew the full drawing instead of a line diagram as the question required and lost 5 marks as a result.
- (d) In Q5.4 (11 marks) many candidates were not able to draw a vertical section through the formwork for a beam and attached floor correctly.

Suggestions for improvement

- (a) A challenge could be that candidates were not practically exposed to shoring and do not understand this concept.
- (b) It is advised that learners should be exposed to more drawings of the different arches and also be taught how to calculate the rise of an arch if the span is given.
- (c) It will benefit candidates if they read the instructions in the question carefully and follow the instructions to the letter to ensure that they can obtain maximum marks.
- (d) A model should be made in the workshop for all concrete structures requiring formwork that are listed in the CAPS. It must be explained to learners why each component of the formwork is placed at a particular point, its correct name and the purpose that the component serves.

QUESTION 6: SUSPENDED FLOORS, STAIRCASES, IRONMONGERY, DOORS AND JOINING

Common errors and misconceptions

- (a) In Q6.2 (8 marks) very few candidates were able to draw the haunched mortice and tenon joint correctly.
- (b) Most candidates were not able to draw the floor joist with the truss hanger secured to the wall in Q6.3 (3 marks) correctly. Instead, many candidates redrew the incomplete drawing that was provided in answer sheet 6.5.
- (c) In Q6.4 (5 marks) many candidates could not differentiate correctly by means of two-dimensional drawings, between a straight flight of stairs with a landing and a stairwell with half a landing. Candidates were not credited if they drew three dimensional drawings, as the question required two-dimensional drawings.
- (d) The majority of candidates were not able to draw the supporting structure of a suspended timber floor in Q6.5 (10 marks) correctly. A challenge could be that learners were not exposed to the practical construction of a suspended timber floor and may not have drawn scale drawings of this floor during teaching and learning during the year.
- (e) In Q6.6 (8 marks) the majority of candidates were not able to correctly draw the horizontal section through the frame stile and raised and fielded panel of a door with a sidelight. Most candidates drew a raised panel instead of a raised and fielded panel. The majority of candidates left this question unanswered.

Suggestions for improvement

- (a) A challenge could be that candidates did not read the question properly and misinterpreted the instructions that indicated that the drawing shows an incomplete view of a haunched mortice and tenon joint. It will be beneficial to candidates if they read the instructions in the question carefully and followed the instructions to the letter to ensure that they could obtain maximum marks.
- (b) Practical demonstrations can be used to enhance the understanding of learners on the different methods that can be used to secure floor joists for upper-level suspended floors to a wall.
- (c) The use of a model of a suspended timber floor showing all components, including the supporting piers, will assist learners in gaining a better understanding of a suspended timber floor.
- (d) A model of an entrance door with a side light and raised and fielded panels can be made in the workshop. Learners should draw horizontal and vertical sectional drawings of this door with raised panels as well as raised and fielded panels.