



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

**CIVIL TECHNOLOGY
FEBRUARY/MARCH 2014**

MARKS: 200

TIME: 3 hours

This question paper consists of 13 pages, 9 answer sheets and a formula sheet.



REQUIREMENTS:

1. Drawing instruments
2. A non-programmable pocket calculator
3. ANSWER BOOK

INSTRUCTIONS AND INFORMATION

1. This question paper consists of SIX questions.
2. Answer ALL the questions.
3. Answer each question as a whole; do NOT separate subquestions.
4. Start the answer to EACH question on a NEW page.
5. Do NOT write in the margins of the ANSWER BOOK.
6. Sketches may be used to illustrate your answers.
7. ALL calculations and written answers must be done in the ANSWER BOOK or on the attached ANSWER SHEETS.
8. Use the mark allocation as a guide to the length of your answers.
9. Drawings and sketches must be done in pencil, fully dimensioned and neatly finished off with descriptive titles and notes to conform to the *SANS/SABS Code of Practice for Building Drawings*.
10. For the purpose of this question paper, the size of a brick should be taken as 220 mm x 110 mm x 75 mm.
11. Use your discretion where dimensions and/or details have been omitted.
12. Answer QUESTIONS 1.3, 2.4, 2.7, 3.2, 4.2, 5.2.1, 5.4, 6.1 and 6.2 on the attached ANSWER SHEETS using drawing instruments where necessary.
13. Write your CENTRE NUMBER and EXAMINATION NUMBER on every ANSWER SHEET and hand them in with your ANSWER BOOK, whether you have used them or not.
14. Drawings in the question paper are NOT to scale due to electronic transfer.



QUESTION 1: CONSTRUCTION PROCESSES

- 1.1 Choose a description from COLUMN B that matches an item in COLUMN A. Write only the letter (A–L) next to the question number (1.1.1–1.1.10), for example 1.1.11 M.

COLUMN A		COLUMN B	
1.1.1	Flammable material	A	resistance to wear
1.1.2	Tensile strength	B	this type of material must be stored close to a fire extinguisher
1.1.3	Durable	C	vertical member of a roof truss
1.1.4	Queen post	D	type of roof covering
1.1.5	Chipboard	E	accessory used with a dumpy level
1.1.6	Copper	F	material that measures 38 mm x 76 mm
1.1.7	Batten	G	protective material that is used to prolong the lifespan of materials
1.1.8	Paint	H	the collapse of structures
1.1.9	Telescopic staff	I	material that measures 38 mm x 38 mm
1.1.10	IBR sheeting	J	type of metal that will not rust
		K	material made of wood particles held together with adhesives
		L	the resistance of a material to break under tension

(10)

- 1.2 An arch is to be built inside a house.

- 1.2.1 What type of arch would you recommend? (1)
- 1.2.2 Justify (Motivate) the use of a rough arch in a plastered wall. (1)



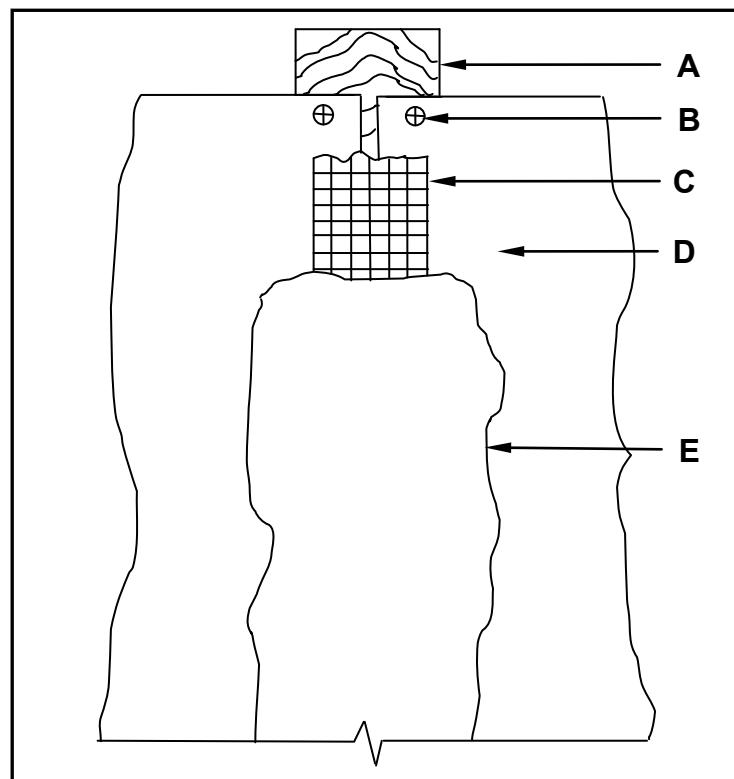
- 1.3 The sketch on ANSWER SHEET 1.3 (attached) shows a plan course (top view) of a wall built in English bond.
- 1.3.1 Use ANSWER SHEET 1.3 (attached) to project and draw, from the given view, a front elevation of the wall, THREE courses high in good proportion. (4)
- 1.3.2 Print a title for the drawing. (1)
- 1.3.3 Indicate the following labels on your drawing:
- A header brick (1)
 - A stretcher brick (1)
 - A queen closer (1)
- 1.4 Explain in THREE steps what you would do if a colleague swallowed a poisonous chemical on site. (3)
- 1.5 Draw a neat freehand isometric sketch showing the tenon of a mortice and tenon joint. (4)
- 1.6 Give ONE reason why beam filling is done on a building. (1)
- 1.7 Would you use beam filling in your own house if closed eaves were going to be used? Motivate your answer. (2)
- [30]**



QUESTION 2: ADVANCED CONSTRUCTION PROCESSES

(ANSWER THIS QUESTION ON A NEW PAGE.)

- 2.1 Indicate whether the following statements are TRUE or FALSE. Write only 'true' or 'false' next to the question number (2.1.1–2.1.5) in the ANSWER BOOK.
- 2.1.1 A lintel is a temporary support for bricks while an arch is being built. (1)
- 2.1.2 Castors can be used on ladders to make them safe to use. (1)
- 2.1.3 Form oil is used on formwork to prevent concrete from sticking to the shutter material. (1)
- 2.1.4 Gypsum board is the only material used on concealed eaves. (1)
- 2.1.5 Bolts and nuts can be used to join adjacent members of a timber roof truss. (1)
- 2.2 FIGURE 2.2 below illustrates the front elevation of a joint between two gypsum boards of a dry wall and the method used to conceal the joint. Study the drawing and answer the questions that follow.

**FIGURE 2.2**

- 2.2.1 Name parts **A** to **E**. (5)
- 2.2.2 Name another fastener that can be used at **B**. (1)
- 2.2.3 Explain the purpose of **C**. (1)



- 2.3 Describe TWO advantages of using steel shuttering (formwork) instead of timber shuttering (formwork). (2)
- 2.4 FIGURE 2.4 on ANSWER SHEET 2.4 (attached) shows a dumpy level in two different positions. The incomplete level-book page (collimation table) is given.
- 2.4.1 Use the information in the table and calculate the difference in height from **C** to **D** and from **D** to **E**. (2)
- 2.4.2 Calculate the differences and show the results of your answers in the table. (4)
- 2.5 Show, by means of neat freehand sketches, the difference between the vertical section of a *short-bored pile foundation* and a *strip foundation*. (4)
- 2.6 Explain THREE advantages of using an oil-based paint on building material that will be exposed to weather conditions. (3)
- 2.7 FIGURE 2.7 on ANSWER SHEET 2.7 (attached) shows an incomplete vertical sectional drawing of the formwork through the centre of a concrete beam. Study the drawing and draw the following on ANSWER SHEET 2.7 to complete the sectional view:
- 2.7.1 Two main bars (2)
- 2.7.2 ONE shear bar (1)
- 2.7.3 TWO anchor bars (2)
- 2.7.4 Stirrup (Binder) (1)
- 2.7.5 The symbol for concrete (1)
- 2.7.6 Two spacers that are used to maintain the cover depth of concrete at the bottom (2)
- 2.7.7 Any THREE labels (3)
- 2.7.8 Correctness of sketch (1)
- [40]**



QUESTION 3: CIVIL SERVICES

(ANSWER THIS QUESTION ON A NEW PAGE.)

- 3.1 FIGURE 3A and FIGURE 3B below show alternative methods of generating electricity. Study the photographs and answer the questions that follow.

**FIGURE 3A****FIGURE 3B**

- 3.1.1 Identify the primary source for generating electricity in FIGURE 3A. (1)
- 3.1.2 Identify the primary source for generating electricity in FIGURE 3B. (1)
- 3.1.3 Name TWO other sources that can be used to generate electricity. (2)
- 3.1.4 Explain TWO advantages of generating electricity as shown in FIGURE 3A. (2)
- 3.2 FIGURE 3.2 on ANSWER SHEET 3.2 (attached) shows a line diagram of the floor plan of an L-shaped office that is to be erected on a vacant stand.
- 3.2.1 Write the abbreviations for the sanitary fittings indicated by numbers 1 to 4 next to the numbers on ANSWER SHEET 3.2. (4)
- 3.2.2 On ANSWER SHEET 3.2, design a sewerage system and draw the sewerage plan for the building. All regulations and design principles of a good sewerage system must be considered. Indicate the following on your drawing:
- A manhole near the connection to the conservancy tank
 - A gully at 1
 - A vent pipe at 3
 - A rodding eye at the highest point of the sewerage system and another one where there is a change in direction
 - Inspection eyes where branch and main pipes meet
 - Indicate all sewerage abbreviations where applicable (11)
- 3.2.3 On the drawing, indicate the diameter of the pipe, type of pipe and the slope of the main sewer line. (3)



3.2.4 Draw the electrical symbols indicated by **A** to **F** on ANSWER SHEET 3.2 next to the letter:

- A – One-way switch, double pole
- B – Electrical meter
- C – Distribution box
- D – Fluorescent light (single tube)
- E – Socket outlet (power point with a switch)
- F – Light (ceiling-mounted)

(6)
[30]

QUESTION 4: MATERIALS AND QUANTITIES

(ANSWER THIS QUESTION ON A NEW PAGE.)

4.1 You are provided with the following equipment and material:

- Three steel moulds of 150 mm x 150 mm x 150 mm
- 25 mm diameter x 575 mm long steel rod
- Form oil (Release oil)
- Water tank
- Fresh concrete

- 4.1.1 You are expected to conduct a test using the equipment and material above. Name the test that you will conduct. (1)
- 4.1.2 What is the purpose of the test? (1)
- 4.1.3 Draw THREE front views showing the different stages of filling the moulds with concrete. (3)
- 4.1.4 How many times should each layer be compacted? (1)
- 4.1.5 How should the specimen be stored after it has set properly? (1)
- 4.1.6 At what temperature must the specimens be stored? (1)
- 4.1.7 Describe TWO details that must appear on the label of the specimens. (2)



- 4.2 FIGURE 4.2 below shows the elevation of a gable wall of a building. The wall is 220 mm thick. Use ANSWER SHEET 4.2 (attached) to calculate the following:

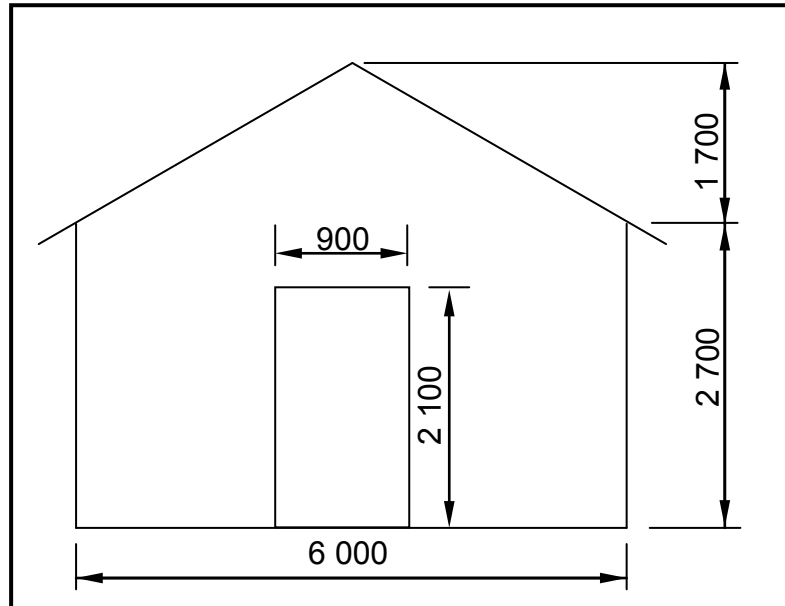


FIGURE 4.2

- 4.2.1 The number of bricks required to build the wall if 110 bricks are used to build one square metre of a 220 mm thick wall. (15)
- 4.2.2 5% for breakages and cutting of bricks (2)
- 4.3 You have to make a cabinet for a kitchen for a client. You recommend using melamine board for the construction of the cabinet. Give ONE reason why you recommend melamine board. (1)
- 4.4 Cast-iron and PVC pipes can be used in sewerage systems. Describe TWO characteristics of PVC pipes which will make it the better option to use in sewerage systems. (2)

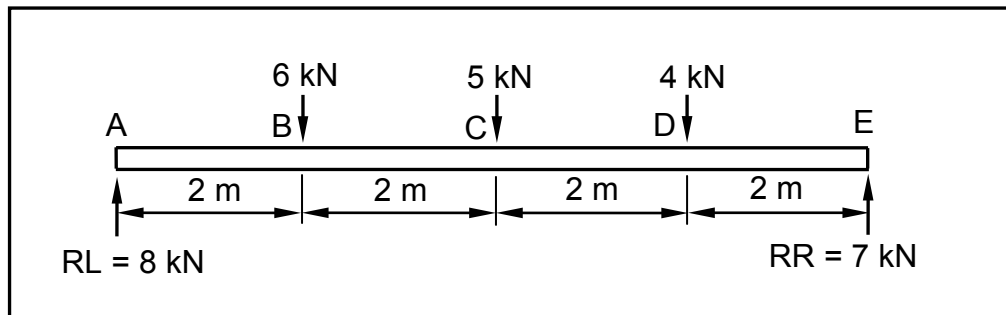
[30]



QUESTION 5: APPLIED MECHANICS

(ANSWER THIS QUESTION ON A NEW PAGE.)

- 5.1 A beam with a length of 8 m is subjected to three point loads as shown in the space diagram in FIGURE 5.1 below.

**FIGURE 5.1**

- 5.1.1 Prove, by means of calculation, that the shear force at A (SF_A) = 8 kN. (1)
- 5.1.2 Prove, by means of calculation, that the shear force at B (SF_B) = 2 kN. (1)
- 5.1.3 Prove, by means of calculation, that the shear force at C (SF_C) = -3 kN. (1)
- 5.1.4 Prove, by means of calculation, that the shear force at D (SF_D) = -7 kN. (1)
- 5.1.5 Prove, by means of calculation, that the shear force at E (SF_E) = 0 kN. (1)
- 5.2 Use the information in QUESTION 5.1 and draw the following on ANSWER SHEET 5.2.1 (attached):
- 5.2.1 The space diagram to scale 10 mm = 1 m (1)
- 5.2.2 The shear force diagram to scale 5 mm = 1 kN (5)



- 5.3 FIGURE 5.3 below shows a lamina of a triangle with a rectangular hole in it. Prove, by means of calculation, that the position of the centroid of the lamina from A–A is 50 mm. Show ALL steps of the calculation.

HINT: Use the formula on the attached FORMULA SHEET.

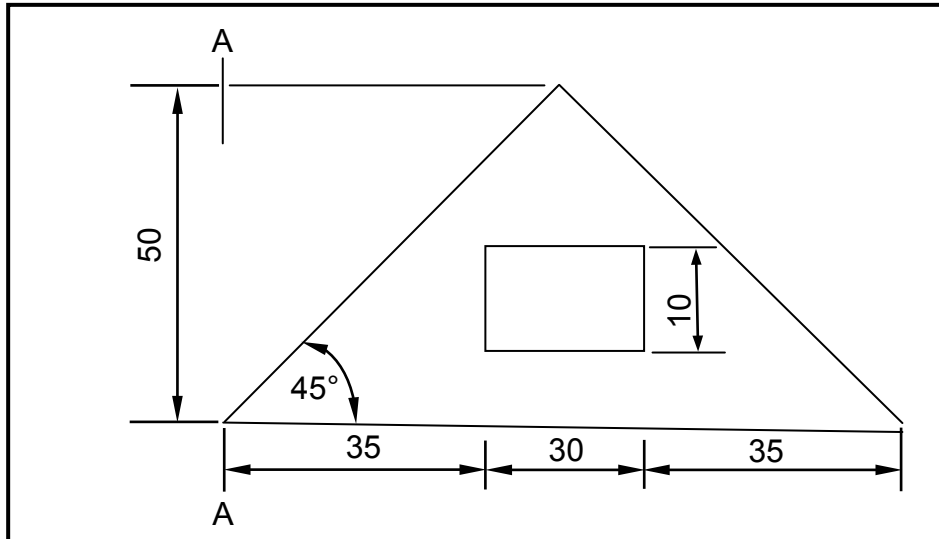


FIGURE 5.3

(8)

- 5.4 FIGURE 5.4 below shows the space diagram of a roof truss with a span of 8 metres and two point loads of 30 N and 90 N.

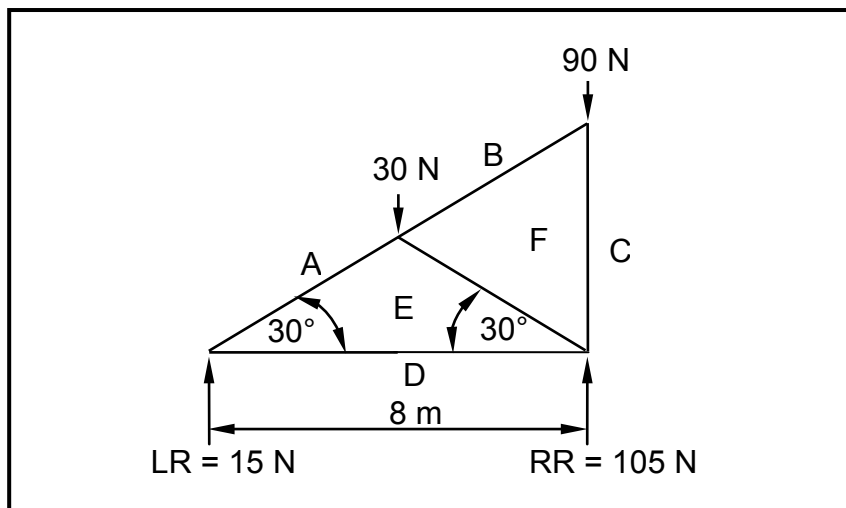


FIGURE 5.4

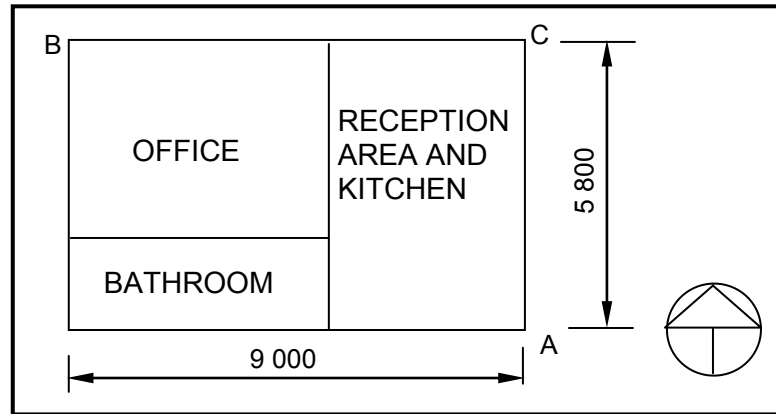
- 5.4.1 On ANSWER SHEET 5.4 (attached) develop and draw a vector diagram to graphically determine the magnitude and nature of the forces in each member (part) of the truss. Use scale 1 mm = 1 N. (5)

- 5.4.2 Use the information from the space and vector diagrams and complete the table on ANSWER SHEET 5.4. (6)
[30]



QUESTION 6: GRAPHIC COMMUNICATION

- 6.1 6.1.1 FIGURE 6.1 below shows a line diagram of a plan of a home office. The external measurements of the building are shown. On ANSWER SHEET 6.1 (attached) develop and draw, to scale 1 : 50, the floor plan for the home office. Use the specifications given below.

**FIGURE 6.1**

Specifications:

- External walls are 220 mm thick.
- Internal walls are 110 mm thick.
- All door openings are 900 mm wide.
- The internal measurements of the rooms are:
 - Reception area and kitchen: 4 450 mm x 5 360 mm
 - Office: 4 450 mm x 3 000 mm
 - Bathroom: 4 000 mm x 2 250 mm

Show the following in your drawing:

ON THE NORTHERN SIDE OF THE BUILDING

- An entrance door to the reception area and kitchen, 500 mm from point **C**
- A window 1 800 mm wide in the office placed 1 500 mm from point **B**

ON THE SOUTHERN SIDE

- A window 1 200 mm wide placed in the centre of the reception area and kitchen wall
- A window 1 200 mm wide placed in the centre of the bathroom wall

ON THE EASTERN SIDE

- A window 2 400 mm wide in the reception area and kitchen wall placed 1 000 mm from point **A**

IN THE RECEPTION AREA AND KITCHEN

- A door that leads from the reception area and kitchen into the office
- A door that leads from the office into the bathroom



IN THE RECEPTION AREA AND KITCHEN

- A single kitchen sink under the smaller window

IN THE BATHROOM

- A water closet
- A shower of 1 000 mm x 1 000 mm
- A wash basin of 500 mm x 350 mm (21)

6.1.2 Indicate the dimensions of the overall length and width of the building. (2)

6.1.3 Print the title and scale below the drawing. (2)

6.2 The drawing on ANSWER SHEET 6.2 (attached) shows the east elevation of a building. Use ANSWER SHEET 6.2 and answer the questions that follow.

6.2.1 Complete the table to indicate the description of members **A** to **H** and **J** and **K**. (10)

6.2.2 What is the function of the dashed lines shown on the windows? (1)

6.2.3 Recommend THREE types of exterior finishes for the wall. (3)

6.2.4 What type of roof structure is used on the elevation on ANSWER SHEET 6.2? (1)
[40]

TOTAL: 200



CENTRE NUMBER:									
-----------------------	--	--	--	--	--	--	--	--	--

EXAMINATION NUMBER:													
----------------------------	--	--	--	--	--	--	--	--	--	--	--	--	--

QUESTION 1.3

ANSWER SHEET 1.3

Assessment criteria	Marks	L M
1st course correctly drawn	1	
2nd course correctly drawn	1	
3rd course correctly drawn	1	
Proportion	1	
Header	1	
Stretcher	1	
Queen closer	1	
Title	1	
Total	8	

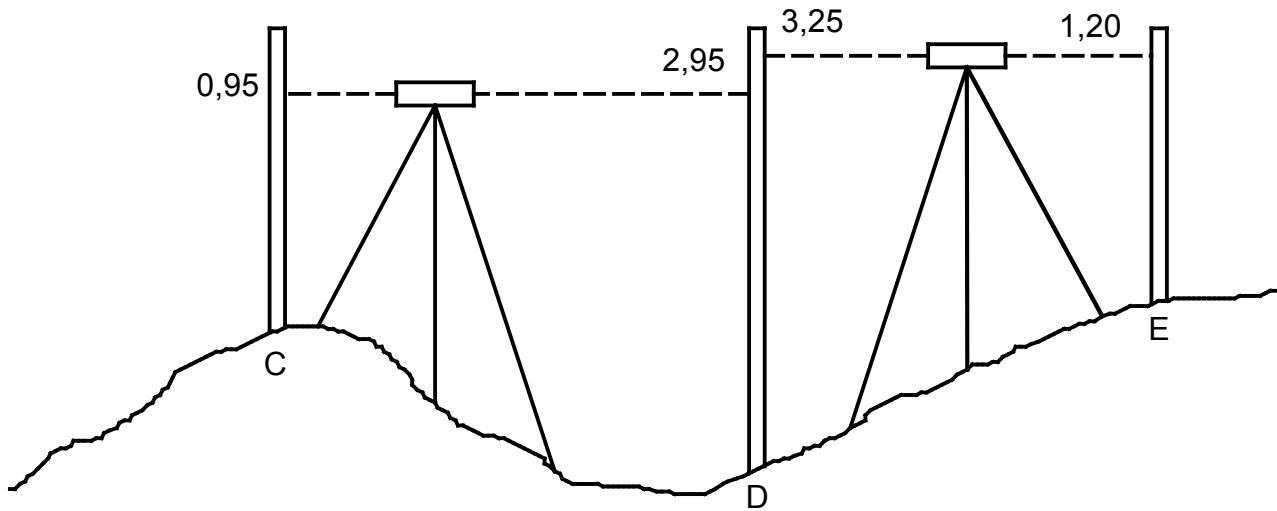


CENTRE NUMBER:

EXAMINATION NUMBER:

QUESTION 2.4

ANSWER SHEET 2.4



BS	FS	RISE	FALL	REMARK
0,95				Peg C
	2,95		C-D	Peg D
3,25				Peg D
	1,20	D-E		Peg E
				TOTAL
				DIFFERENCE
				RESULT

COLLOMATION TABLE

(6)



CENTRE NUMBER:

EXAMINATION NUMBER:

QUESTION 2.7

ANSWER SHEET 2.7

Assessment criteria	Marks	L M
Two main bars	2	
One shear bar	1	
Two anchor bars	2	
Stirrup (binder)	1	
Symbol for concrete	1	
Two spacers	2	
Any three labels	3	
Correctness of sketch	1	
Total	13	

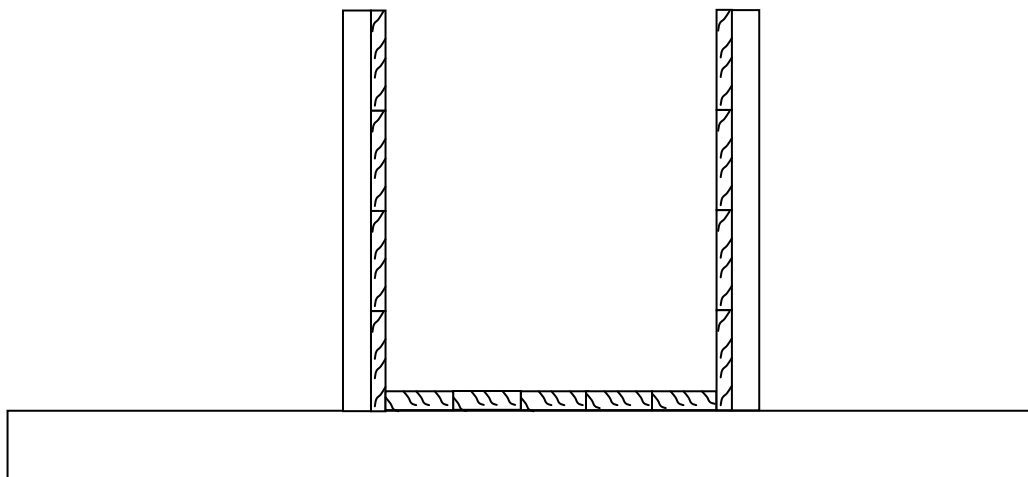


FIGURE 2.7

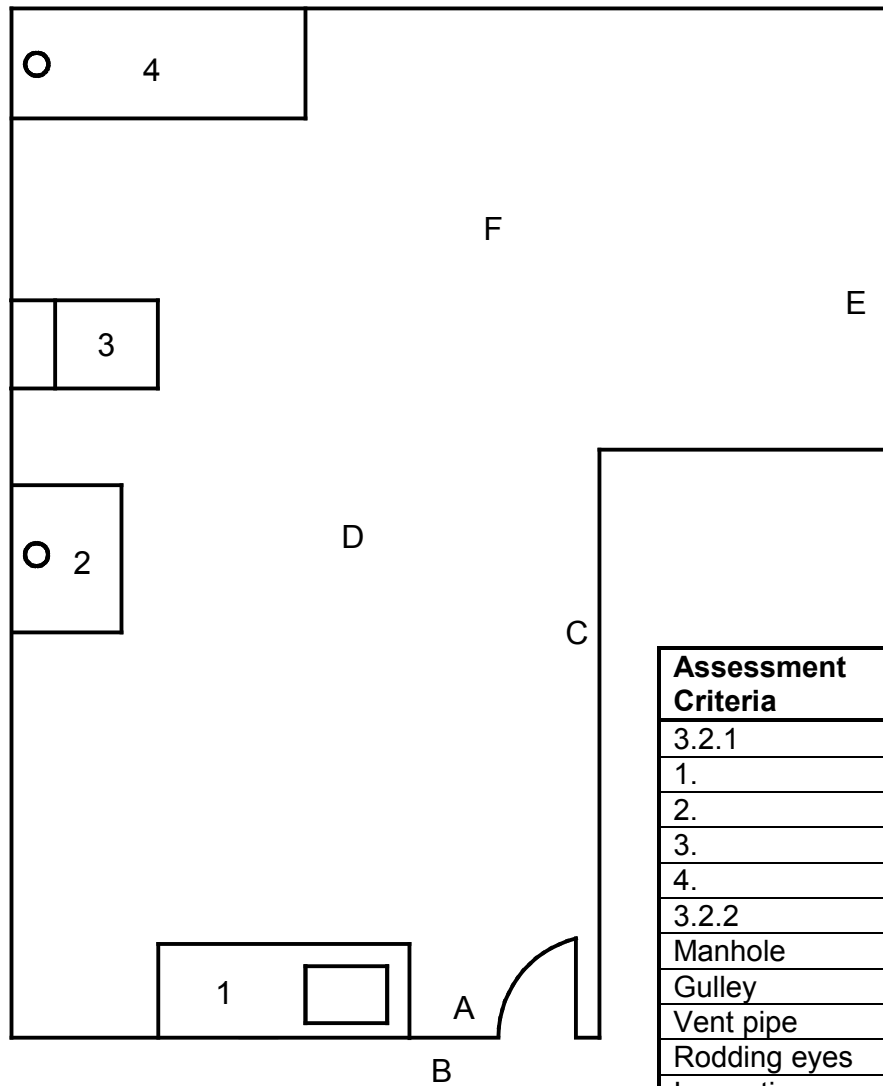


CENTRE NUMBER:

EXAMINATION NUMBER:

QUESTION 3.2

ANSWER SHEET 3.2



Assessment Criteria	Marks	L	M
3.2.1			
1.	1		
2.	1		
3.	1		
4.	1		
3.2.2			
Manhole	1		
Gulley	1		
Vent pipe	1		
Rodding eyes	2		
Inspection eyes	2		
Correct layout	4		
3.2.3			
Description of pipe	3		
3.2.4	6		
Total	24		



CONNECTION POINT



CENTRE NUMBER:

--	--	--	--	--	--	--	--	--	--

EXAMINATION NUMBER:

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

QUESTION 4.2

ANSWER SHEET 4.2

4.2

A	B	C	D
1/			Area of rectangular wall up to wall plate level. (Door included.)
1/			Area of gable (triangular) part of wall
			Total area of wall including the door opening
1/			Area of door
			Area of wall with door opening deducted
1/			Number of bricks 110 bricks per m ² for a 220 mm wall
			5% for breakages and cutting of bricks

(15)

(2)



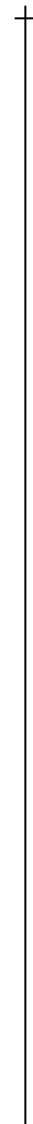
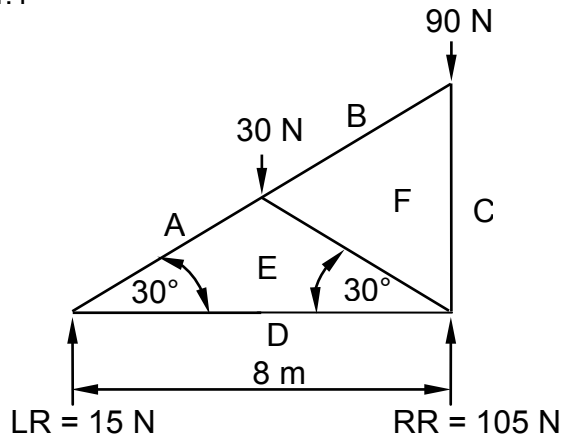
CENTRE NUMBER:

EXAMINATION NUMBER:

QUESTION 5.4

ANSWER SHEET 5.4

5.4.1



(5)

5.4.2

MEMBER	MAGNITUDE	NATURE
AE		
BF	0 N	-
DE		
EF		
FC	90 N	Strut

(6)



CENTRE NUMBER:

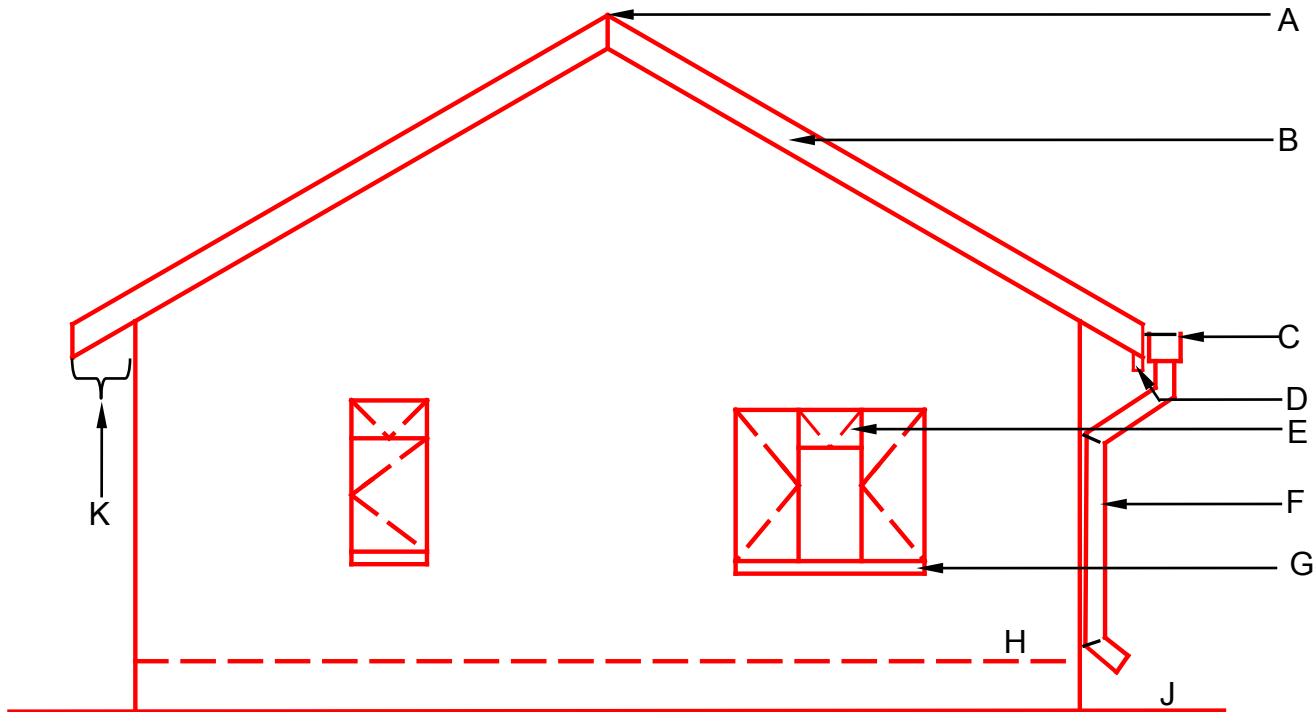
EXAMINATION NUMBER:

ANSWER SHEET 6.2

QUESTION 6.2

No.	Answer	Marks	L M
6.2.2		1	
6.2.3		1	
		1	
		1	
6.2.4		1	

6.2.1	Description	Marks	L M
A		1	
B		1	
C		1	
D		1	
E		1	
F		1	
G		1	
H		1	
J		1	
K		1	



EAST ELEVATION

SCALE 1 : 100



FORMULA SHEET

IMPORTANT SYMBOLS

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
g	Centre of gravity	h	Height	d	Diameter
c	Centroid	b	Breadth/Width	r	Radius
l	Length	s	Side	A	Area
π	Pi = $\frac{22}{7} = 3,142$	\emptyset	Diameter	V	Volume

FORMULAE

AREA OF	FORMULA (in words)	FORMULA (in symbols)	FORMULA FOR THE POSITION OF CENTROIDS	
			X-axis	Y-axis
Square	side x side	s x s	$\frac{s}{2}$	$\frac{s}{2}$
Rectangle	length x breadth	l x b	$\frac{l}{2}$	$\frac{b}{2}$
Right-angled triangle	$\frac{1}{2}$ x base x height	$\frac{1}{2}b \times h$	$\frac{b}{3}$	$\frac{h}{3}$
Equilateral triangle/ Pyramid	$\frac{1}{2}$ x base x height	$\frac{1}{2}b \times h$	$\frac{b}{2}$	$\frac{h}{3}$
Circle	π x radius x radius	πr^2	Centroid is in the centre	
Circle	π x diameter x diameter divided by 4	$\frac{\pi d^2}{4}$		
Semi-circle	π x radius x radius divided by 2	$\frac{\pi r^2}{2}$	Centroid is 0,424r on the centre line	

$$\text{Position of centroid} = \frac{(A1 \times d) \pm (A2 \times d)}{\text{Total area}}$$

OR

$$X = \frac{\Sigma Ax}{\Sigma A} \quad \text{OR} \quad Y = \frac{\Sigma Ay}{\Sigma A}$$





$$X = \frac{\sum Ax}{\sum A} \quad \text{OF} \quad Y = \frac{\sum Ay}{\sum A}$$

OF

$$\text{Posisie van sentroed} = \frac{(A1 \times d) \pm (A2 \times d)}{\text{Totale oppervlakte}}$$

OPPERVLAKTE VAN		FORMULE (in woorde)	FORMULE (in simbole)	FORMULE VIR DIE POSISIE VAN SENTROÏEDE	
				X-as	Y-as
Vierkant		sy x sy	s x s	$\frac{s}{2}$	$\frac{s}{2}$
Reghoek		lengte x breedte	l x b	$\frac{l}{2}$	$\frac{b}{2}$
Reghoekige driehoek		$\frac{1}{2}$ x basis x hoogte	$\frac{1}{2}$ b x h	$\frac{b}{3}$	$\frac{h}{3}$
Gelyksydige driehoek/ Piramide		$\frac{1}{2}$ x basis x hoogte	$\frac{1}{2}$ b x h	$\frac{b}{2}$	$\frac{h}{3}$
Sirkel		π x radius x radius	πr^2	Sentroïed is in die middel	
Sirkel		π x diameter x diameter gedeel deur 4	$\frac{\pi d^2}{4}$		
Semisirkel		π x radius x radius gedeel deur 2	$\frac{\pi r^2}{2}$	Sentroïed is 0,424r op die middellyn	

FORMULES

SIMBOOL	BESKRYWING	SIMBOOL	BESKRYWING	SIMBOOL	BESKRYWING	SIMBOOL	BESKRYWING
g	Swaartepunt	h	Hoogte	d	Diameter		
c	Sentroïed	b	Breedte/Wydte	r	Radius		
l	Lengte	s	Sy	A	Oppervlakte		
π	$\pi = \frac{22}{7} = 3,142$	\emptyset	Diameter	V	Volume		

BELANGRIKE SIMBOLE

FORMULEBLAD

Assesseringskriteria	Punte	L P
Vensters	4	
Deure	3	
Teken van die simbole	4	
Buitemure	4	
Binnemure	2	
Afmetings	2	
Titel en skaal	2	
Toepassing van skaal	2	
Netheid	2	
Totaal	25	

SENTRUMNUMMER:

EKSAMENNUMMER:

VRAAG 6.1

ANTWOORBLAD 6.1



EASTERN CAPE



5.4.2

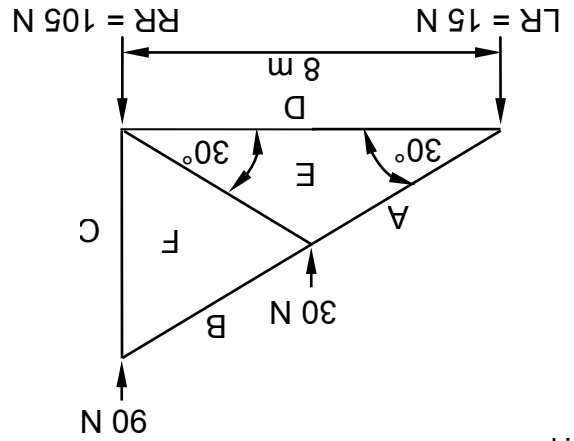
ONDERDEEL	GROOTTE	AARD
AE		
BF	0 N	-
DE		
EF		
FC	90 N	Stut

(6)

(5)



5.4.1



ANTWOORBLAD 5.4

VRAAG 5.4

EKSAMENNUMMER:

SENTRUMNUMMER:



A	B	C	D
1/			Oppervlakte van reghoekige muur tot muurplaathoogte. Deur ingesluit.
			Oppervlakte van gewel (driehoekige) deel van muur
			Totale oppervlakte van muur, deuropening ingesluit
1/			Oppervlakte van deur
			Oppervlakte van muur met deuropening afgetrek
1/			Getal stene
			110 stene per m ² vir 'n 220 mm-muur
			5% breek en sny van stene

4.2

ANTWOORDBLAD 4.2

VRAAG 4.2

EKSAMENNUMMER:

SENTRUMNUMMER:

(2)

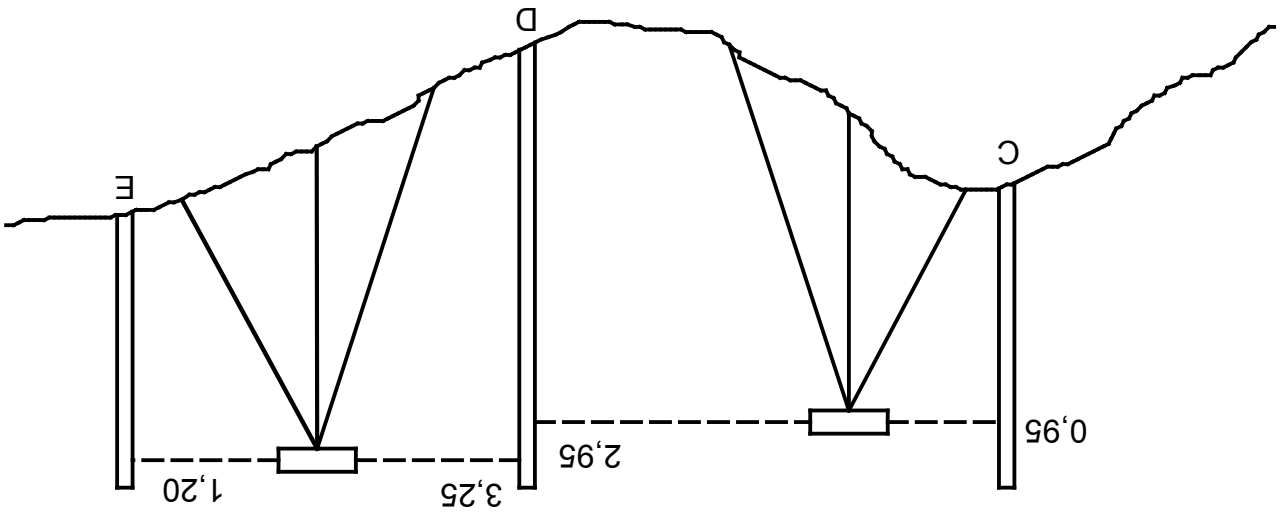
(15)



(6)

KOLLOMASIETABEL

BS/PT/L	FSP/NL	RISE/STYG	FALL/VAL	OPMERKING
0,95				Pen C
	2,95		C-D	Pen D
3,25				Pen D
	1,20	D-E		Pen E
				TOTAAL
				VERSKIL
				RESULTAAT (TOETS)



ANTWOORDBLAD 2.4

VRAAG 2.4

EKSAMENNUMMER:

SENTRUMNUMMER:



(8)

Assesseringskriteria	Punte	L P
1ste laag korrek geteken	1	
2de laag korrek geteken	1	
3de laag korrek geteken	1	
Verhouding	1	
Koplaag	1	
Stryklaag	1	
Sluitsteen/Vroueslutter	1	
Titel	1	
Totaal	8	

ANTWOORDBLAD 1.3

VRAAG 1.3

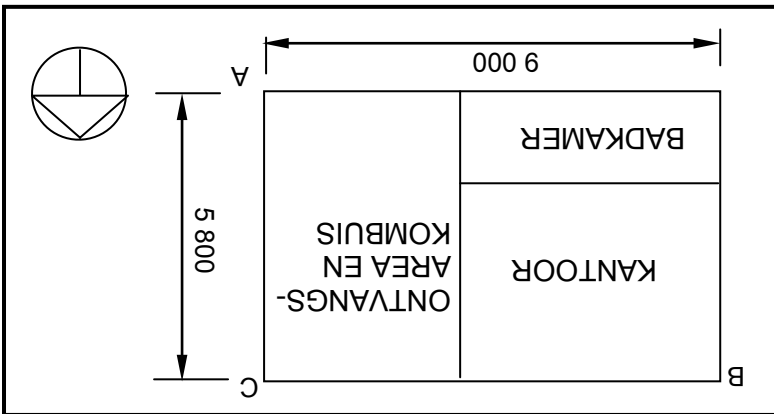
EKSAMENNUMMER:

SENTRUMNUMMER:

VRAAG 6: GRAFIESE KOMMUNIKASIE

6.1 6.1.1

FIGUR 6.1 hieronder toon 'n lynndiagram van 'n plan van 'n tuiskantoor. Die buitemate van die gebou word aangedui. Op ANTWOORBLAD 6.1 (aangeheg) ontwikkel en teken, volgens skaal 1 : 50, die vloerplan van die tuiskantoor. Gebruik die spesifikasies wat hieronder gegee word.



Spesifikasies:

- Butemure is 220 mm dik.
- Binnemure is 110 mm dik.
- Alle deuropeninge is 900 mm wyd.
- Die interne afmetings van die kamers is:
 - Ontvangsarea en kombuis: 4 450 mm x 5 360 mm
 - Kantoor: 4 450 mm x 3 000 mm
 - Badkamer: 4 000 mm x 2 250 mm

Toon die volgende in jou tekening:

AAN DIE NOORDEKANT VAN DIE GEBOU

- 'n Ingangsdur na die ontvangsarea en kombuis, 500 mm vanaf punt **C**
- 'n Venster 1 800 mm wyd in die kantoor wat 1 500 mm vanaf punt **B** geplaas is

AAN DIE SUIDEKANT

- 'n Venster 1 200 mm wyd wat in die middel van die ontvangsarea en kombuisruimte geplaas is
- 'n Venster 1 200 mm wyd wat in die middel van die badkamermuur geplaas is

AAN DIE OOSTEKANT

- 'n Venster 2 400 mm wyd in die ontvangsarea en kombuisruimte wat 1 000 mm vanaf punt **A** geplaas is

IN DIE ONTVANGSAREA EN KOMBUS

- 'n Dur wat vanaf die ontvangsarea en kombuis na die kantoor lei
- 'n Dur wat vanaf die kantoor na die badkamer lei

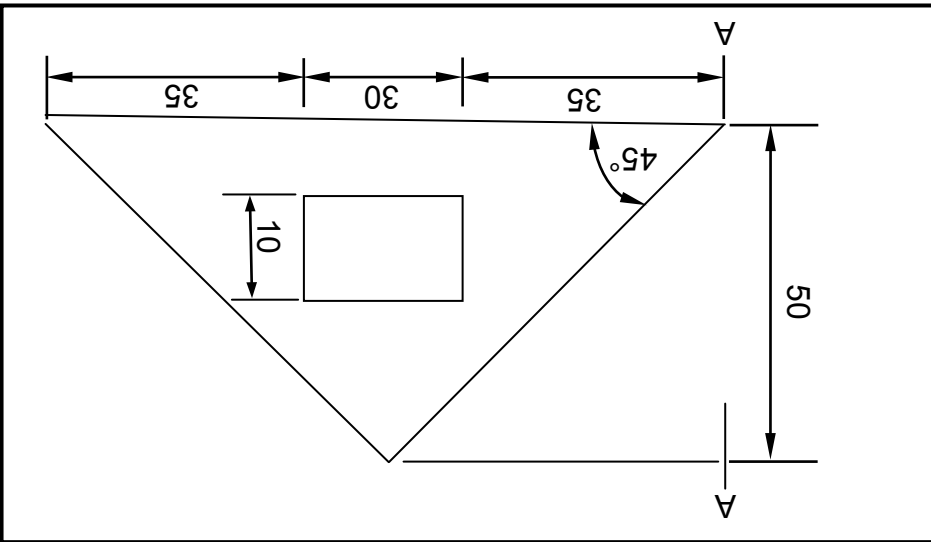




5.3

FIGUR 5.3 hieronder toon 'n lamel van 'n driehoek met 'n reghoekige gat daarin. Bewys, met behulp van berekeninge, dat die posisie van die sentroed van die lamel 50 mm vanaf A-A is. Toon ALLE stappe van die berekening.

WENK: Gebruik die formule op die aangehegte FORMULEBLAD.

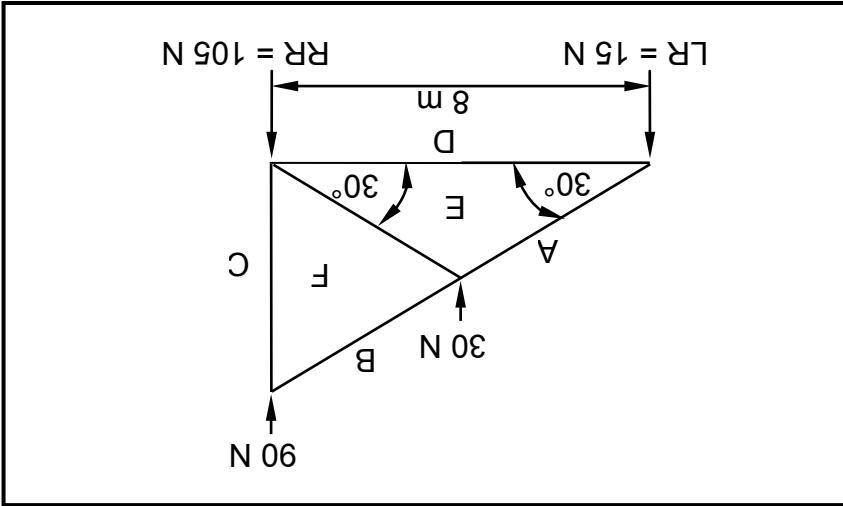


FIGUR 5.3

(8)

5.4

FIGUR 5.4 hieronder toon die ruimtediagram van 'n dakkap met 'n span van 8 meter en twee puntbelastinge van 30 N en 90 N.



FIGUR 5.4

5.4.1

Op ANTWOORBLAD 5.4 (aangeheg) ontwikkel en teken 'n vektordiagram om die grootte en aard van die kragte in elke onderdeel van die dakap grafies te bepaal. Gebruik skaal 1 mm = 1 N.

5.4.2

Gebruik die inligting in die ruimte- en vektordiagram en voltooi die tabel op ANTWOORBLAD 5.4.

(5)

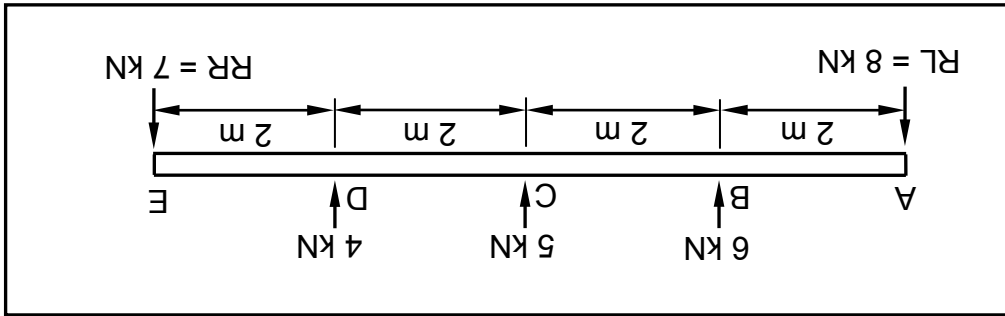
(6)

[30]



- 5.2 Gebruik die inligting in VRAAG 5.1 en teken die volgende op ANTWOORBLAD 5.2:1 (aangeheg):
- 5.2.1 Die ruimtediagram volgens skaal 10 mm = 1 m (1)
 - 5.2.2 Die skuifkragediagram volgens skaal 5 mm = 1 kN (5)
- 5.1.1 Bewys, met behulp van berekeninge, dat die skuifkrag by A (S_{ka}) = 8 kN. (1)
- 5.1.2 Bewys, met behulp van berekeninge, dat die skuifkrag by B (S_{kb}) = 2 kN. (1)
- 5.1.3 Bewys, met behulp van berekeninge, dat die skuifkrag by C (S_{kc}) = -3 kN. (1)
- 5.1.4 Bewys, met behulp van berekeninge, dat die skuifkrag by D (S_{kd}) = -7 kN. (1)
- 5.1.5 Bewys, met behulp van berekeninge, dat die skuifkrag by E (S_{ke}) = 0 kN. (1)

FIGUR 5.1



5.1 'n Balk met 'n lengte van 8 m word aan drie puntbelastings onderwerp, soos in die ruimtediagram in FIGUR 5.1 hieronder getoon.

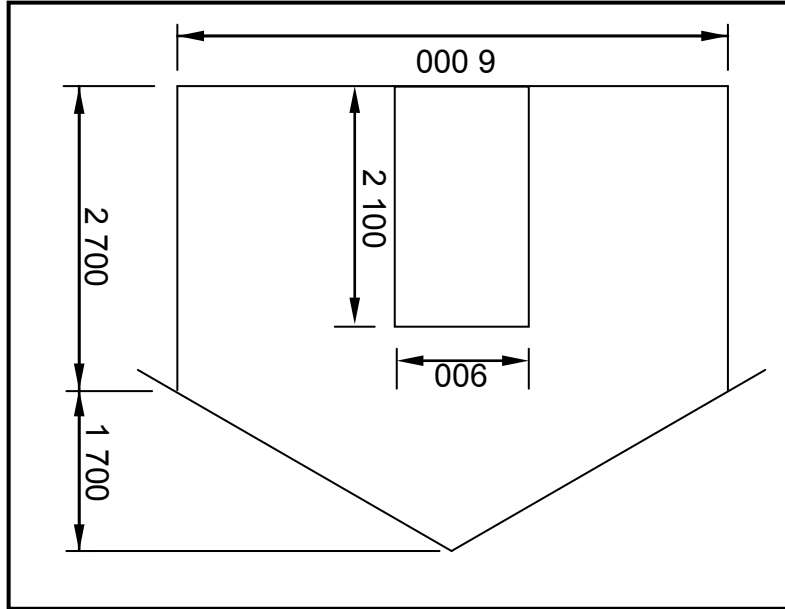
(BEANTWOORD HIERDIE VRAAG OP 'N NUWE BLADSY.)

VRAAG 5: TOEGEPASTE MEGANIKA



4.2

FIGUR 4.2 hieronder toon die aansig van 'n gebou met 'n gewelmuur. Die muur is 220 mm dik. Gebruik ANTWOORBLAD 4.2 (aangeheg) om die volgende te bereken:



FIGUR 4.2

4.2.1

Die getal stene wat benodig word om die muur te bou, as 110 stene vir een vierkante meter van die 220 mm dik muur gebruik word.

(15)

4.2.2

5% vir breek en sny van stene

(2)

4.3

Jy moet 'n kabinet vir 'n kombuis vir 'n kliënt maak. Vir die konstruksie van die kabinet beveel jy melamienbord aan. Gee EFN rede waarom jy melamienbord aanbeveel.

(1)

4.4

Gietyster- (Gegote yster) en PVC-pype kan in rioolstelsels gebruik word. Beskryf TWEE kenmerke van PVC-pyp wat dit 'n beter keuse maak vir gebruik in rioolstelsels.

(2)

[30]



- 4.1.1 Jy moet die toerusting en materiaal hierbo gebruik om 'n toets uit te voer. Noem die toets wat jy sal uitvoer. (1)
- 4.1.2 Wat is die doel van die toets? (1)
- 4.1.3 Tekn DRIE vooransigte wat die verskillende stadia toon om die vorms met die beton te vul. (3)
- 4.1.4 Hoeveel keer moet elke laag gekompakteer word? (1)
- 4.1.5 Hoe moet die monster gestoor word nadat dit behoorlik verhard het? (1)
- 4.1.6 By watter temperatuur moet die monsters gestoor word? (1)
- 4.1.7 Beskryf TWEE besonderhede wat op die etiket van die monsters moet voorkom. (2)

4.1 Die volgende toerusting en materiaal word aan jou verskat:

- Drie staalvorms van 150 mm x 150 mm x 150 mm
- 25 mm diameter x 575 mm lang staalstaaf
- Bekistingsolie (vormolie)
- Waterenk
- Vars beton

(BEANTWOORD HIERDIE VRAAG OP 'N NUWE BLADSY.)

VRAAG 4: MATERIALE EN HOEVELHEDE

- 3.2.3 Toon op die tekening die diameter van die pyp, die tipe pyp en die val van die hooftlooilyn aan. (3)
- 3.2.4 Tekn die elektrise simbole wat deur **A** tot **F** op ANTWOORD-BLAD 3.2 aangedui word langs die letter: (6)
- A – Eerigtingskakelaar, dubbelpool
 B – Elektrise meter
 C – Verdeelbord
 D – Fluoorlig (Enkel buis)
 E – Kontak sok (kragprop met 'n skakelaar)
 F – Lig (plafonngemonteer)

[30]



VRAAG 3: SIVIELE DIENSTE

(BEANTWOORD HIERDIE VRAAG OP 'N NUWE BLADSY.)

3.1 FIGUR 3A en FIGUR 3B hieronder toon alternatiewe metodes om krag op te wek. Bestudeer die foto's en beantwoord die vrae wat volg.



FIGUR 3A



FIGUR 3B

3.1.1 Identifiseer die primêre bron van elektrisiteitsopwekking in FIGUR 3A. (1)

3.1.2 Identifiseer die primêre bron van elektrisiteitsopwekking in FIGUR 3B. (1)

3.1.3 Noem TWEE ander bronne wat gebruik kan word om elektrisiteit op te wek. (2)

3.1.4 Verduidelik TWEE voordele van die elektrisiteitsopwekking in FIGUR 3A. (2)

3.2 FIGUR 3.2 op ANTWOORDBLAD 3.2 (aangeheg) toon 'n lyndiagram van die vloerplan van 'n L-vormige kantoor wat op 'n oop erf opgerig moet word.

3.2.1 Skryf die afkortings vir die sanitêre toebehore wat deur nommers 1 tot 4 aangedui word langs die nommers op ANTWOORDBLAD 3.2. (4)

3.2.2 Op ANTWOORDBLAD 3.2, ontwerp 'n rioolstelsel en teken die rioolplan vir die gebou. Alle regulasies en ontwerpbeginsels van 'n goeie rioolstelsel moet in ag geneem word. Toon die volgende op jou tekening:

- 'n Mangat naby die aansluiting na die riooltenk
- 'n Rioolput by 1
- 'n Lugpyp by 3
- 'n Steekkoog by die hoogste punt van die rioolstelsel en nog een waar die stelsel van rigting verander
- Inspeksie- of waar takpype en hoofpype bymekaar aansluit
- Toon alle rioolafkortings, waar van toepassing

(11)

2.3	Beskryf TWEE voordele van die gebruik van staalbekisting in plaas van houtbekisting.	(2)
2.4	FIGUR 2.4 op ANTWOORDBLAD 2.4 (aangeheg) toon 'n bukswaterpas in twee verskillende posies. Die onvotooide hoogteboekbladsy (kollimasietabel) is gegee.	
2.4.1	Gebruik die inligting in die tabel en bereken die hoogteverskil van C na D en van D na E.	(2)
2.4.2	Bereken die verskille en toon die resultate van jou antwoorde in die tabel.	(4)
2.5	Toon, deur middel van netjiese vryhandsketse, die verskil tussen die vertikale deursnee van 'n kortboor-heipaalfondasie en 'n strookfondasie.	(4)
2.6	Verduidelik DRIE voordele van die gebruik van 'n oliebasisverf op boumateriaal wat aan weersomstandighede blootgestel gaan wees.	(3)
2.7	FIGUR 2.7 op ANTWOORDBLAD 2.7 (aangeheg) toon 'n onvotooide vertikale deursneetekening van die bekisting deur die middel van 'n betonbalk. Bestudeer die tekening en teken die volgende op ANTWOORDBLAD 2.7 om die deursneeaansig te voltooi:	
2.7.1	Twee hoofstawe	(2)
2.7.2	EEN skuifstaaf (gekruk)	(1)
2.7.3	TWEE ankerstawe	(2)
2.7.4	Beuel	(1)
2.7.5	Die simbool vir beton	(1)
2.7.6	TWEE spasieerders wat gebruik word om die dekdiepte van die beton aan die onderkant in stand te hou	(2)
2.7.7	Enige DRIE byskrifte	(3)
2.7.8	Korrektheid van skets	(1)

[40]

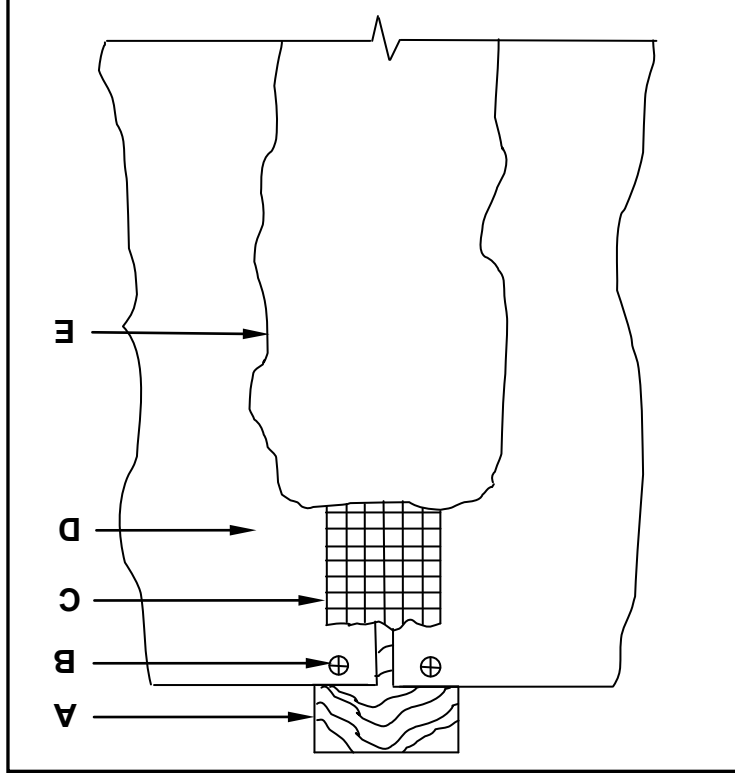


VRAAG 2: GEVORDERDE KONSTRUKSIEPROSESSE
(BEANTWOORD HIERDIE VRAAG OP 'N NUWE BLADSY.)

2.1 Dui aan of die volgende stellings WAAR of ONWAAR is. Skryf slegs 'waar' of 'onwaar' langs die vraagnummer (2.1.1–2.1.5) in die ANTWOORDEBOEK neer.

- 2.1.1 'n Latei is 'n tydelike stut vir stene terwyl 'n boog gebou word. (1)
- 2.1.2 Rolwiele kan op lere gebruik word om dit veilig vir gebruik te maak. (1)
- 2.1.3 Bekistingsolie word op bekisting gebruik om te voorkom dat beton aan die bekistingsmateriaal vassit. (1)
- 2.1.4 Gipsbord is die enigste materiaal wat by geslote/toe dakrande gebruik word. (1)
- 2.1.5 Boute en moere kan gebruik word om aangrensende dele van 'n houtdakkap te verbind. (1)

2.2 FIGUR 2.2 hieronder illustreer die vooraansig van 'n las tussen twee gipsborde van 'n stapelmuur (droë muur) en die metode wat gebruik is om die las te bedek. Bestudeer die tekening en beantwoord die vrae wat volg.



2.2.1 Benoem onderdeel A tot E. (5)

2.2.2 Noem 'n ander hegmiddel wat by B gebruik kan word. (1)

2.2.3 Verduidelik die doel van C. (1)





1.3	Die skets op ANTWOORDBLAD 1.3 (aangeheg) toon 'n planlaag (boaansig) van 'n muur wat in Engelse verband gebou is.	
1.3.1	Gebruik ANTWOORDBLAD 1.3 (aangeheg) om 'n vooraansig van die muur, DRIE steeniae hoog vanaf die gegewe aansig in goeie verhouding te projekteer en te teken.	(4)
1.3.2	Drukskrif 'n titel vir die tekening.	(1)
1.3.3	Toon die volgende byskritte op jou tekening:	
	<ul style="list-style-type: none"> • 'n Kopsteen • 'n Stryksteen • 'n Sluitsteen/Vrouesluis 	(1) (1) (1)
1.4	Verduidelik in DRIE stappe wat jy sal doen indien 'n kollega 'n giftige chemikalie op 'n bouperseel gesluk het.	(3)
1.5	Maak 'n netjiese vryhand isometriese skets wat die tap van 'n tap-en-gatvoeg toon.	(4)
1.6	Gee EEN rede waarom balkvuiling by 'n gebou gedoen word.	(1)
1.7	Sai jy balkvuiling in jou eie woonhuis gebruik indien geslote/toe dakrande gebruik gaan word? Motiveer jou antwoord.	(2)

[30]



VRAAG 1: KONSTRUKSIEPROSESSE

1.1 Kies 'n beskrywing uit KOLOM B wat by 'n item in KOLOM A pas. Skryf slegs die letter (A-L) langs die vraagnommer (1.1.1-1.1.10) in die ANTWOORDEBOEK neer, byvoorbeeld 1.1.11 M.

KOLOM A	KOLOM B
1.1.1 Vlambare materiaal	A slytweerstand
1.1.2 Treksterkte	B hierdie soort materiaal moet naby 'n brandlusser gebêre word
1.1.3 Duursam	C vertikale onderdeel van 'n dakkap
1.1.4 Hangstyl	D soort dakbedekking
1.1.5 Spaanderbord	E bykomstigheid wat saam met 'n bukswaterpas gebruik word
1.1.6 Koper	F materiaal met 'n mate van 38 mm x 76 mm
1.1.8 Verf	G beskermende materiaal wat gebruik word om die lewensduur van materiaal te verleng
1.1.9 Teleskopiese staf	H inmekartuimel van strukture
1.1.10 IBR-dakbedekking	I materiaal met 'n mate van 38 mm x 38 mm
	J tipe metaal wat nie sal roes nie
	K materiaal gemaak van houtdeeltjies wat met kleefmiddels aanmekaar gehou word
	L die weerstand van 'n materiaal om onder spanning te breek

(10)

1.2 'n Boog moet binne-in 'n huis gebou word.

1.2.1 Watter tipe boog sou jy aanbeveel? (1)

1.2.2 Regverdig (Motiveer) die gebruik van 'n ruhoog in 'n gepleisterde muur. (1)



1. Hierdie vraestel bestaan uit SES vrae.
2. Beantwoord AL die vrae.
3. Beantwoord elke vraag as 'n geheel; MOENIE onderafdelings van vrae skei nie.
4. Begin die antwoord op ELKE vraag op 'n NUWE bladsy.
5. MOENIE in die kantlyn van die ANTWOORDEBOEK skryf NIE.
6. Sketse mag gebruik word om jou antwoorde te illustreer.
7. ALLE berekeninge en geskrewe antwoorde moet in die ANTWOORDEBOEK of op die aangehegte ANTWOORDBLAIE gedoen word.
8. Gebruik die puntetoekenning as 'n riglyn vir die lengte van jou antwoorde.
9. Tekeninge en sketse moet met potlood gedoen word, volledig gemaatskryf en netjies met beskrywende opskrifte en aantekeninge afgerond word, in ooreenstemming met die SANS/SABS se *Aanbevole Gebruikskode vir Boutekenepraktik*.
10. Vir die doel van hierdie vraestel moet die grootte van 'n steen as 220 mm x 110 mm x 75 mm geneem word.
11. Gebruik jou eie oordeel waar afmetings en/of inligting ontbreek.
12. Beantwoord VRAAG 1.3, 2.4, 2.7, 3.2, 4.2, 5.2.1, 5.4, 6.1 en 6.2 op die aangehegte ANTWOORDBLAIE en gebruik tekengereedskap waar nodig.
13. Skryf jou SENTRUMNOMMER en EKSAMENNOMMER op elke ANTWOORDBLAD en lewer dit saam met jou ANTWOORDEBOEK in, selfs al het jy dit nie gebruik nie.
14. Tekeninge in die vraestel is as gevolg van elektroniese kopiering NIE volgens skaal NIE.

BENODIGDEDE:

1. Tekengereedskap

2. 'n Nieprogrammeerbare sakrekenaar

3. ANTWOORDEBOEK

INSTRUKSIES EN INLIGTING



* C V L T D M *



Hierdie vraestel bestaan uit 13 bladsye, 9 antwoordblaaie en 'n formuleblad.

TYD: 3 uur

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SIVIELE TEGNOLOGIE

GRAAD 12

NASIONALE
SENIOR SERTIFIKAAT



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