Province of the
EASTERN CAPE
EDUCATION

NATIONAL SENIOR CERTIFICATE

GRADE 12

SEPTEMBER 2010

CIVIL TECHNOLOGY

MARKS: 200

TIME: 3 hours

* C V L T E A *

This question paper consists of 9 pages + a 3 page answer sheet.

REQUIREMENTS:

1. Drawing instruments
2. A non-programmable calculator

INSTRUCTIONS AND INFORMATION

1. This question paper consists of FIVE questions.
2. ALL questions are COMPULSORY.
3. Answer each question as a whole. DO NOT separate sub-questions.
4. Start each question on a NEW page.
5. Sketches may be used to illustrate your answers.
6. ALL calculations and written answers must be done in the answer book.
7. Drawings and sketches must be fully dimensioned and neatly finished off with titles and labels to conform to SANS (SABS) Recommended Practice for Building Drawings.
8. For the purpose of this examination, the size of a brick should be taken as 220 mm x 110 mm x 75 mm.
9. Use your discretion where dimensions and/or details have been omitted.
10. Non-programmable pocket calculators may be used.
11. Answer QUESTION 4.1, QUESTION 4.2, QUESTION 4.4 and QUESTION 5.2 on answer sheets A to C.

QUESTION 1

1.1 You are a carpenter and a client expect from you to make roof trusses for his house.

1.1.1 Draw on scale 1:50 a line diagram of a South African roof truss with a span width of 7 meter.
The truss has a pitch of 30º and overhang of 500 mm.
Name all the parts in the drawing. (12)

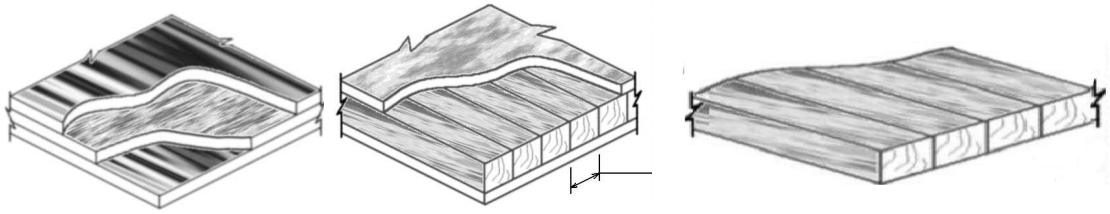
1.1.2 Name TWO methods which are used to fix roof truss parts to each other. (2)

1.1.3 Set up a quantity list for the manufacturing of the roof truss which you have drawn. All parts are manufactured of 114 mm x 38 mm pine wood. (10)

1.2 Which factor determines the spacing between roof trusses? (1)

1.3 Explain the difference between a stub mortise and tenon joint and the through mortise and tenon joint. (2)

1.4 Answer the following questions with regard to the board products in FIGURES 1.4.A to 1.4.C:



1.4.A **1.4.B** **1.4.C**

1.4.1 Identify the boards in FIGURES 1.4.A to 1.4.C; (3)

1.4.2 Name FIVE advantages of board 1.4.A. (5)

1.4.3 Name TWO of these boards which can be used as shuttering material. (2)

1.4.4 What is the thin layer wood on the outside of board 1.4.B called? (1)

1.4.5 Name TWO cutting methods to manufacture the thin layer wood on the outside of board 1.4.B. (2)

[40]

QUESTION 2

2.1 Name TWO responsibilities of the employer in the implementation of safety measures. (2)

2.2 Describe the purpose of the ordinance on construction work. (4)

2.3 Name FOUR safety measures with regard to the safe storage of materials. (4)

2.4 You are responsible for the safety in a workshop.
Briefly explain why cutting tools must be sharp. (2)

2.5 Identify FOUR of the following safety measures which are applicable to scaffolds.

2.5.1 It should not be moved while workers are still on the scaffold;

2.5.2 The scaffold may only be moved when the workers are secured with harnesses;

2.5.3 Scaffolds must be constructed on a level surface;

2.5.4 The tubes must be lengthened when scaffolds are constructed on a slant, to ensure a horizontal platform:

2.5.5 High scaffolds must be anchored to the ground with stay-wires;

2.5.6 Scaffolds must not be constructed higher than six storeys;

2.5.7 A guard rail must be added to the scaffold;

2.5.8 Scaffolds must be constructed upright. (4)

2.6 Identify the parts of the shoring in FIGURE 2.6. (3)

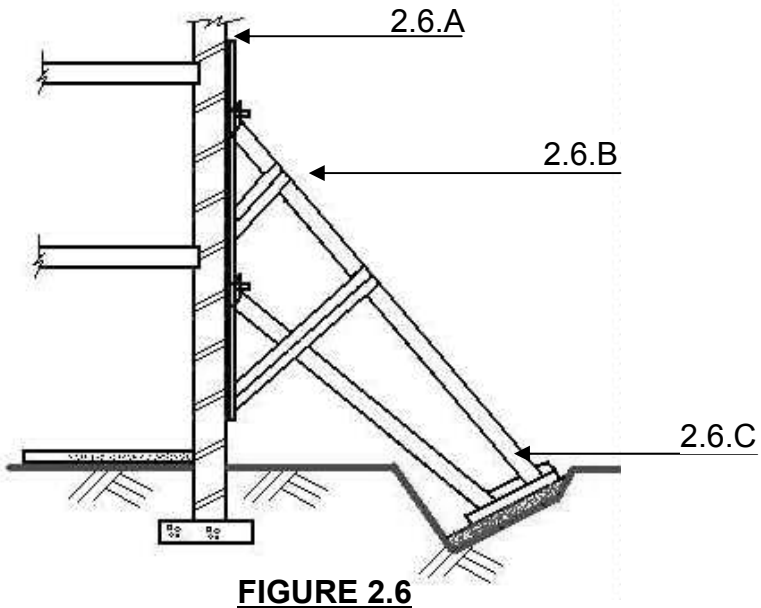


FIGURE 2.6

2.7 Name ONE use of each of the following hand tools:

2.7.1 Sliding bevel;

2.7.2 Marking gauge;

2.7.3 Trying plane;

2.7.4 Rip saw;

2.7.5 Mallet. (5)

2.8 Describe THREE safety measures which must be applied when crosscutting is done with a circular saw. (6)

2.9 What is the main use of a radial saw? (1)

2.10 FIGURE 2.10 shows a plank which is planed on a jointer.
Does the figure show the correct planning direction? Motivate your answer. (2)

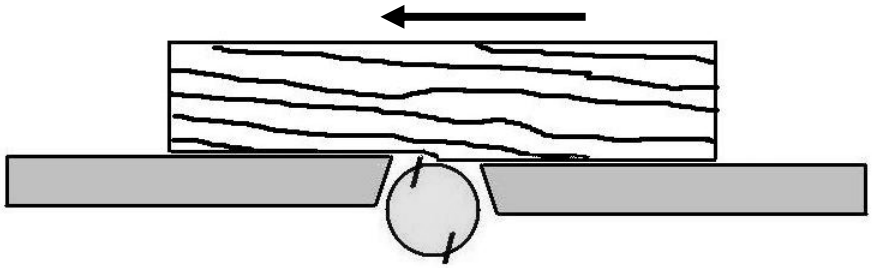


FIGURE 2.10

2.11 Answer the following questions with regard to the wood seasoning method in FIGURE 2.11.

2.11.1 What is the seasoning method called? (1)

2.11.2 Describe TWO advantages of this seasoning method. (4)

2.11.3 Name TWO reasons why wood must be seasoned. (2)

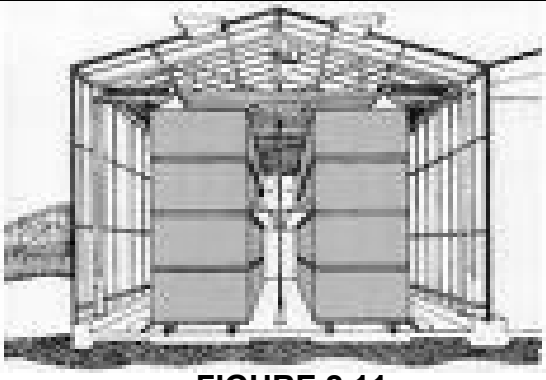


FIGURE 2.11

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QUESTION 3

3.1 Explain fully the meaning of the symbol on the wood in FIGURE 3.1. (3)

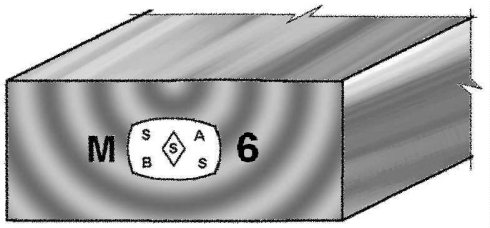


FIGURE 3.1

3.2 What are the standard length, width and thickness measurements of a clay brick? (3)

3.3 Identify the wall ends 3.3.1 and 3.3.2 in FIGURE 3.3. (2)

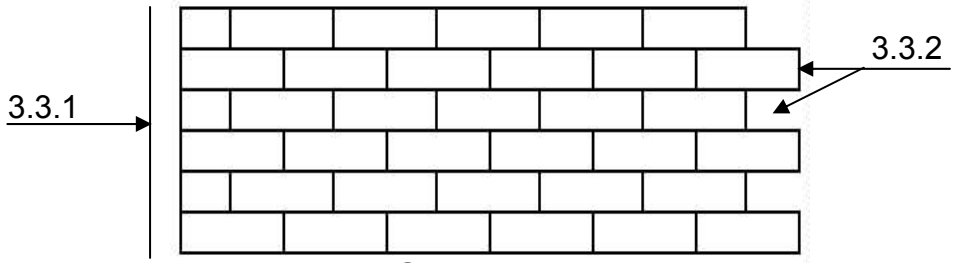


FIGURE 3.3

3.4 Name THREE factors which determine the maximum water temperature in a solar heating system. (3)

3.5 Complete the following description of a solar heating system with a storage tank:

Water circulates through ...3.5.1... -pipes and then flows to a storage tank. The tray is made of a ...3.5.2... material, like ...3.5.3... .The base is coated with an ...3.5.4... material, such as ...3.5.5..., on which the ...3.5.6... are mounted. The inside is painted with a matt ...3.5.7... paint. The lid consists of transparent ...3.5.8... glass, mounted in a frame. The glass ...3.5.9... the rays of the sun and prevents ...3.5.10... from covering the pipes. (10)

3.6 Name FOUR properties of PVC pipes for water supply. (4)

3.7 Briefly describe what a french drain is. (4)

3.8 Briefly describe the advantage of wind power generating above coal power generating. (2)

3.9 Why must electrical wiring be covered with a insulating material? (2)

3.10 Name the FOUR ingredients of a concrete mixture. (4)

3.11 What is the purpose of the compacting of concrete? (2)

3.12 Name ONE method used to compact concrete. (1)
[40]

QUESTION 4

4.1 FIGURE 4.1 shows a symmetrical body on axis XY.
Determine the centre of gravity of the body on the centre line from X.
(The table on Sheet A can be used for the calculations) (11)

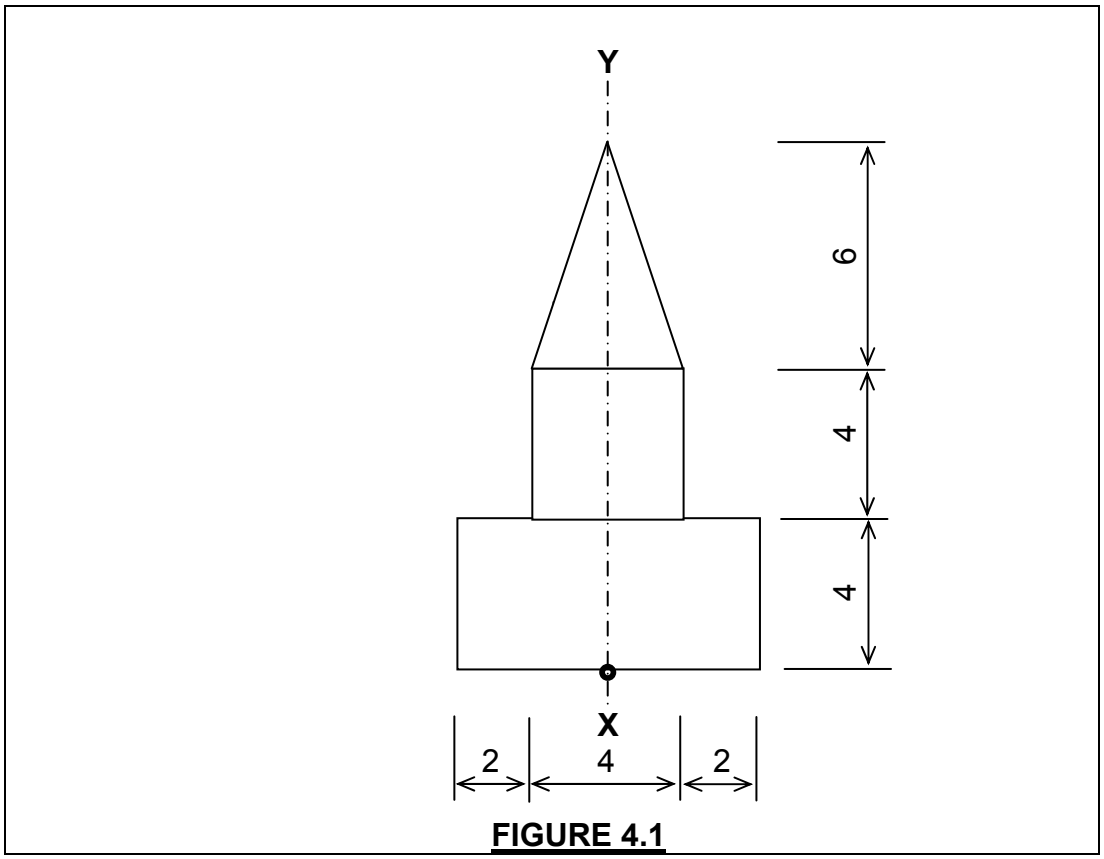


FIGURE 4.1

4.2 FIGURE 4.2 on Sheet A shows a space diagram of a roof truss.
Determine graphically on Sheet A the sizes and nature of the parts of the truss by completing the force diagram and the table. (9)

4.3 FIGURE 4.3 shows a beam with distributed and pointed loads.
Determine the reaction forces of supports A and B.

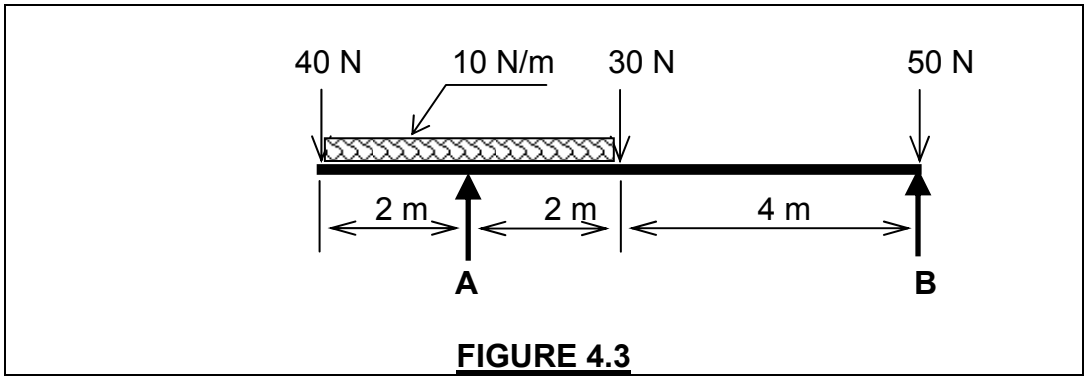


FIGURE 4.3

4.4 FIGURE 4.4 on Sheet B shows a diagrammatic representation of a beam with pointed loads. Determine on Sheet B the following:

4.4.1 The shear forces of points A to D, and (4)

4.4.2 Draw the shear force diagram to the given scale. (4)

4.5 A bar with a length of 2 meter and a radius of 3 mm, lengthens with 0,04 mm when it is subjected to a tensile force 500 N.
Determine: (Show all formulas and calculations) (5)

4.5.1 The stress,

4.5.2 strain and (3)

4.5.3 the elasticity. (4)
[40]

QUESTION 5

5.1 Answer the following questions with regard to the structure in FIGURE 5.1:

5.1.1 Identify parts 5.1.A to 5.1.K. (11)

5.1.2 What is the purpose of part 5.1.C? (1)

5.1.3 What is the purpose of part 5.1.D? (1)

5.1.4 What are the standard width and thickness measurements of part 5.1.A? (2)

5.1.5 What are the standard width and thickness measurements of part 5.1.E? (2)

5.1.6 Which type of material is part 5.1.F manufactured from? (1)

5.1.7 Which type of material is part 5.1.I manufactured from? (1)

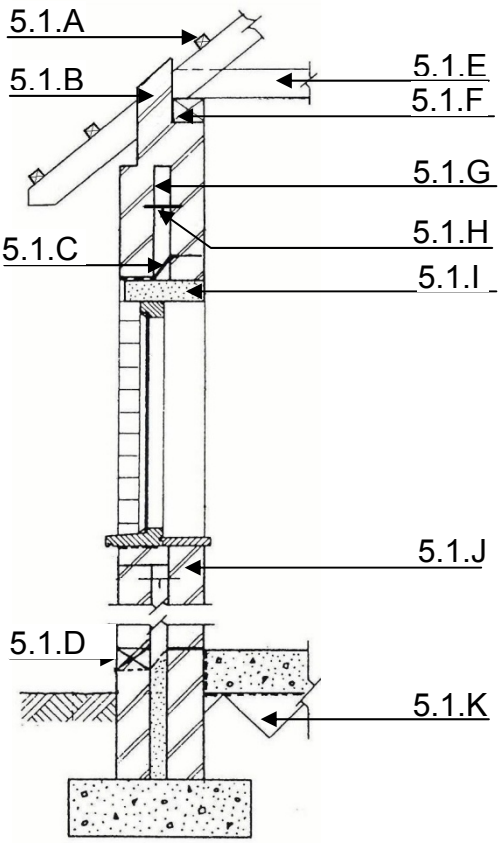


FIGURE 5.1

5.2 FIGURE 5.2 on Sheet C shows an uncompleted floor plan with drainage of a house.
The openings indicated by the ◇◇◇ symbol, does NOT show the correct drawing practice symbols. Complete the floor and drainage plan on Sheet C by drawing in the following symbols:

5.2.1 Window at opening W1; (4)

5.2.2 Outer door at opening D1; (3)

5.2.3 Inner door at opening D2; (2)

5.2.4 Concertina door at opening D3; (2)

5.2.5 Sliding door at opening D4; (4)

5.2.6 All drainage access openings which are required by regulations; (4)

5.2.7 Vent pipe; (1)

5.2.8 Gully. (1)

[40]

TOTAL: 200

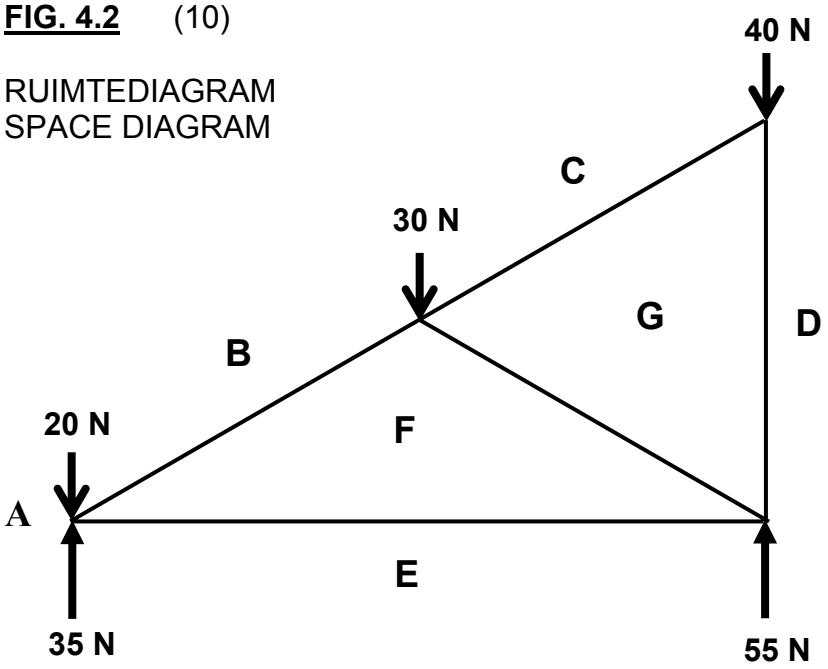
ANTWOORDBLAD ANSWER SHEET	**A**	SIVIELE TEGNOLOGIE CIVIL TECHNOLOGY	NAAM: NAME:

VRAAG / QUESTION 4.1 (11)

Vorm / Shape	Area	X	m X
1			
2			
3			
TOTAAL/TOTAL			
Swaartepunt / Centre of gravity = ……			

FIG. 4.2 (10)

RUIMTEDIAGRAM
SPACE DIAGRAM



KRAGTEDIAGRAM
FORCE DIAGRAM

SKAAL / SCALE: 1 mm = 1 N

DEEL PART	GROOTTE SIZE	STUT STRUT	STANG TIE
BF			
CG			
GF			
GD			
EF			

ANTWOORDBLAD **ANSWER SHEET**	**B**	**SIVIELE TEGNOLOGIE** **CIVIL TECHNOLOGY**	**NAAM:** **NAME:**

FIGURE. 4.4

4.4.1 Die skuifkragwaardes / The shear force values (6)

a = ……..

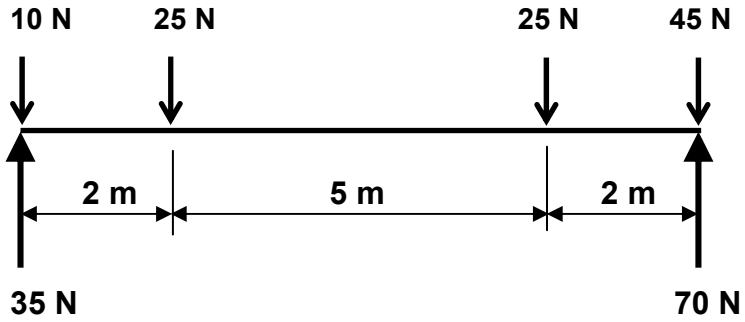
b = ……..

c = ……..

d = ……..

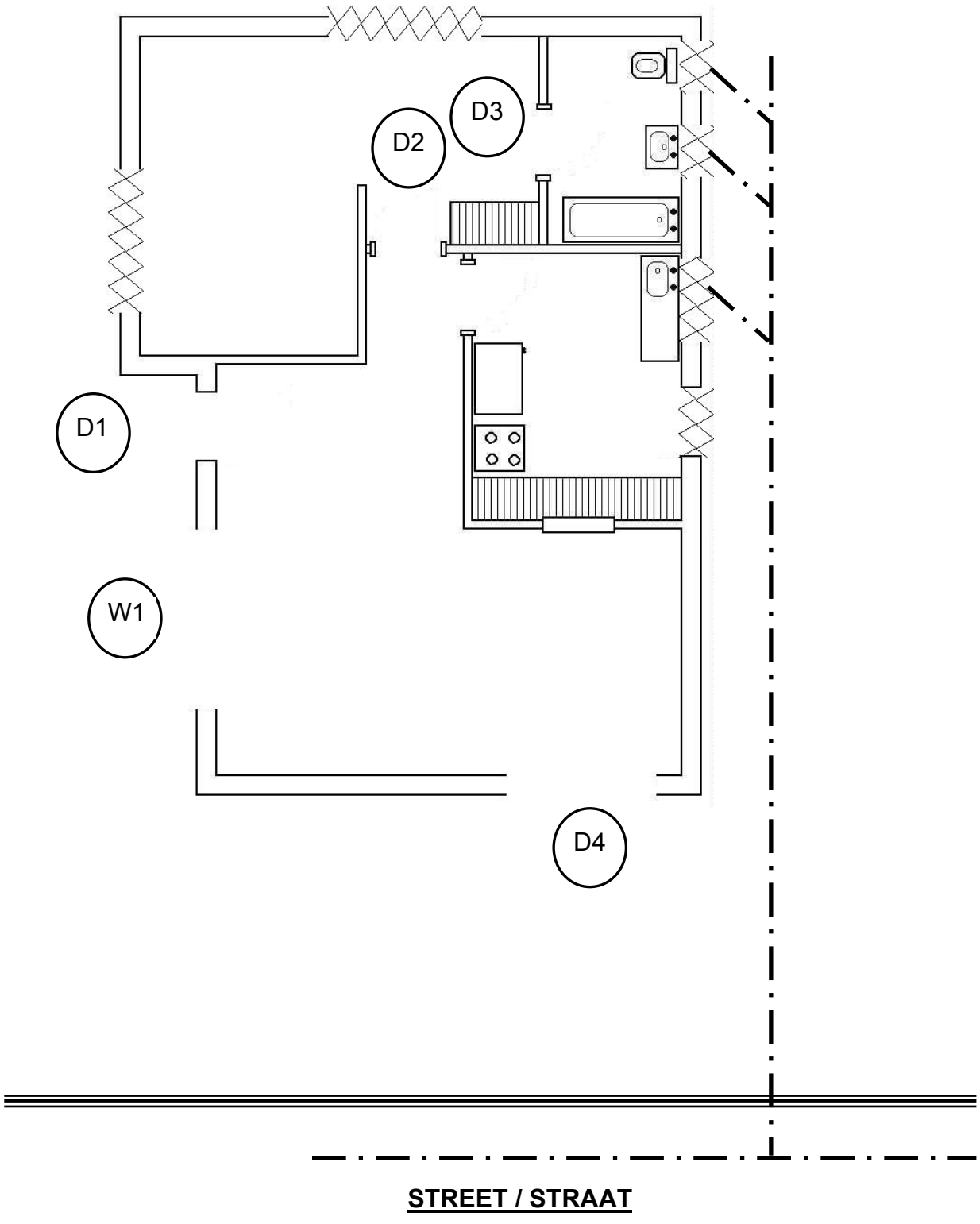
4.4.2 Die skuifkragdiagram / The shear force diagram (4)

SCALE/SKAAL: 2 mm = 1 N



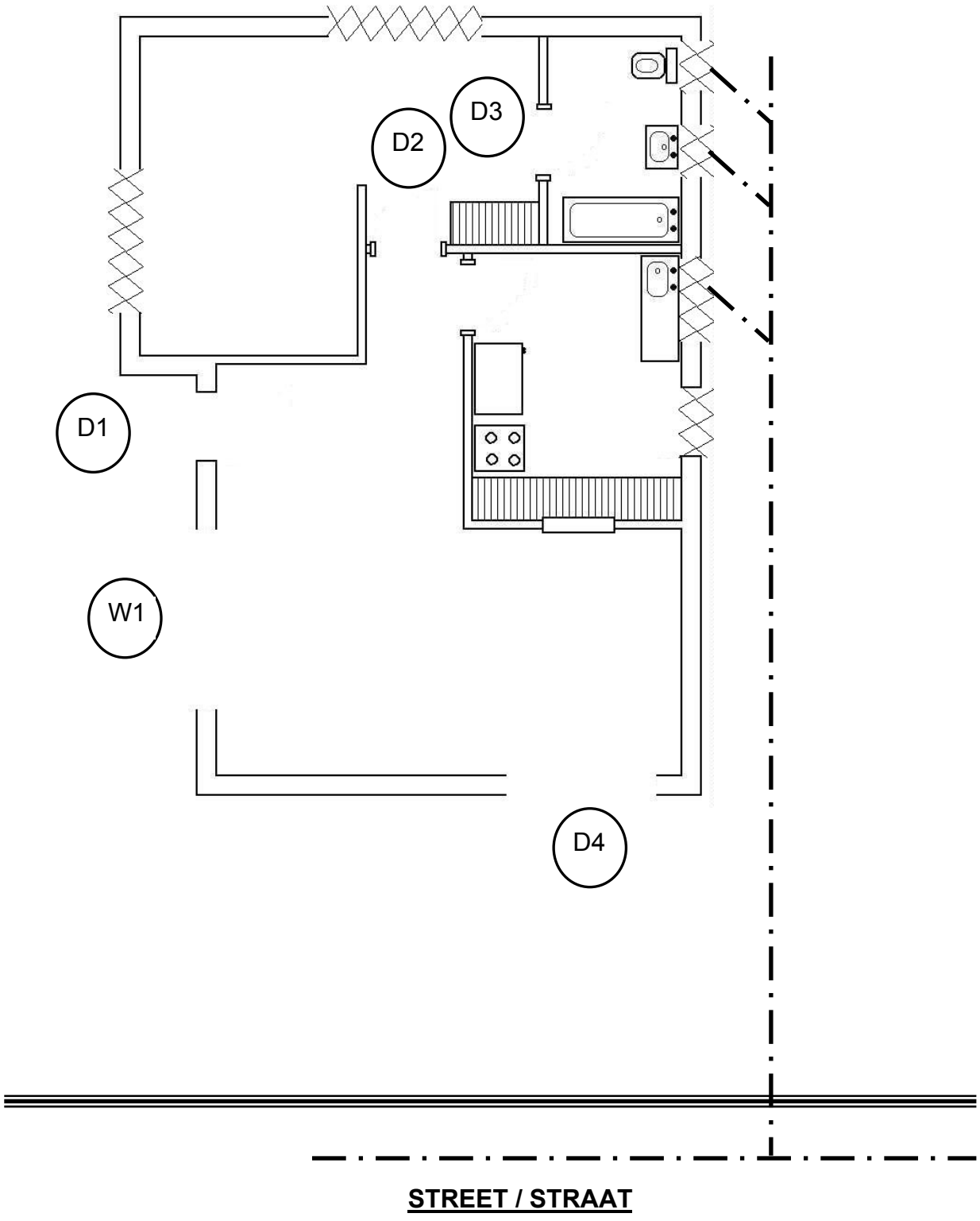
ANTWOORDBLAD ANSWER SHEET	C	SIVIELE TEGNOLOGIE CIVIL TECHNOLOGY	NAAM: NAME:

FIG. 5.2 (21)



ANTWOORDBLAD **ANSWER SHEET**	**C**	**SIVIELE TEGNOLOGIE** **CIVIL TECHNOLOGY**	**NAAM:** **NAME:**

FIG. 5.2 (21)



ANTWOORDBLAD ANSWER SHEET	B	SIVIELE TEGNOLOGIE CIVIL TECHNOLOGY	NAAM: NAME:

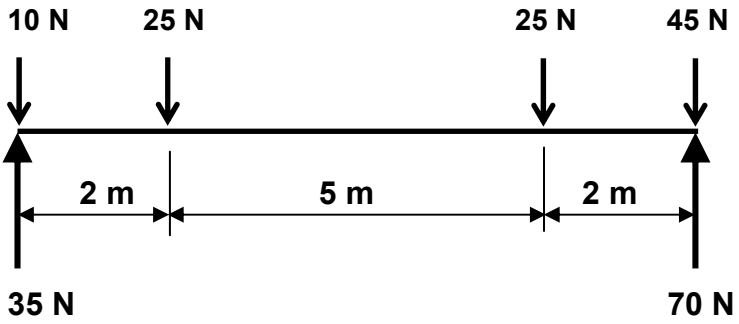
FIG. 4.4

4.4.1 Die skuifkragwaardes / The shear force values (6)

a = ……..
b = ……..
c = ……..
d = ……..

4.4.2 Die skuifkragdiagram / The shear force diagram (4)

SCALE/SKAAL: 2 mm = 1 N



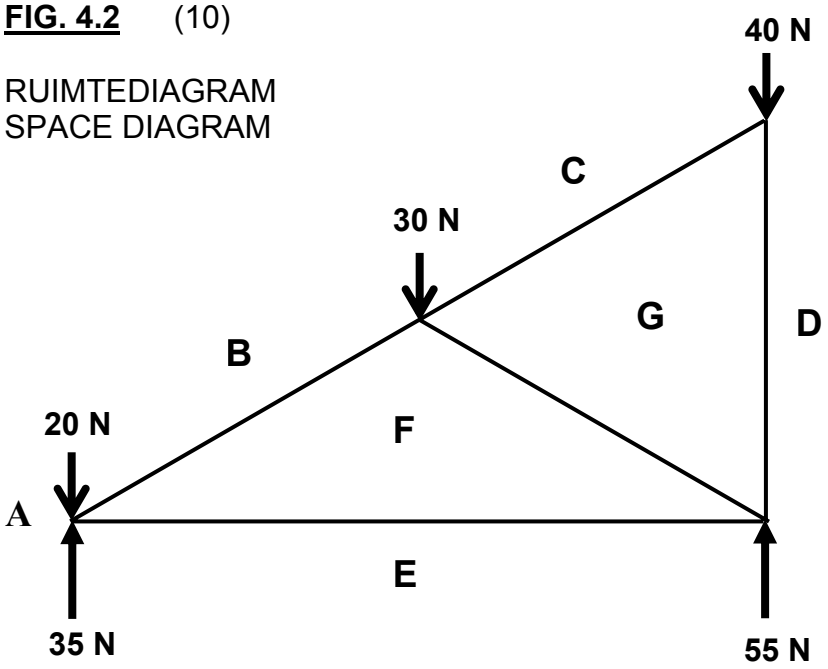
ANTWOORDBLAD ANSWER SHEET	A	SIVIELE TEGNOLOGIE CIVIL TECHNOLOGY	NAAM: NAME:

Vr. / Q. 4.1 (11)

Vorm / Shape	Area	X	m X
1			
2			
3			
TOTAAL/TOTAL			
Swaartepunt = ……			

FIG. 4.2 (10)

RUIMTEDIAGRAM
SPACE DIAGRAM



KRAGTEDIAGRAM
FORCE DIAGRAM

SKAAL / SCALE: 1 mm = 1 N

DEEL PART	GROOTTE SIZE	STUT STRUT	STANG TIE
BF			
CG			
GF			
GD			
EF			

VRAAG 5

5.1 Beantwoord die volgende vrae ten opsigte van die struktuur in FIGUUR 5.1:

5.1.1 Identifiseer dele 5.1.A tot 5.1.K. (11)

5.1.2 Wat is die doel van deel 5.1.C? (1)

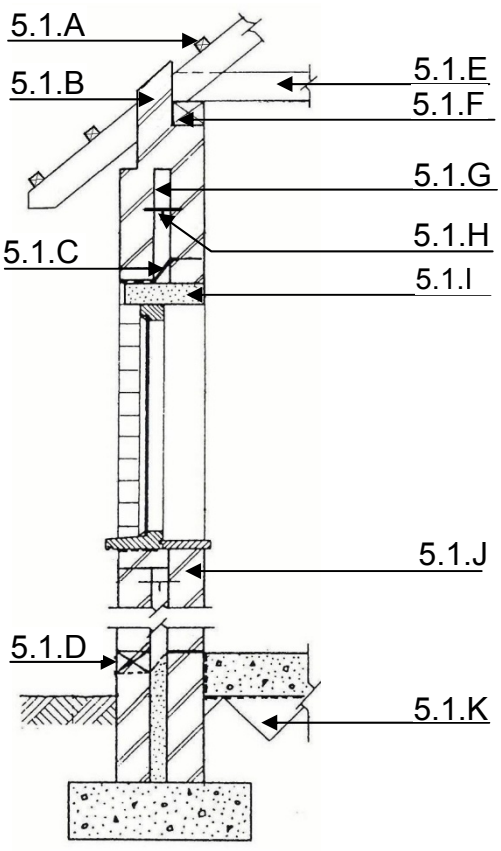
5.1.3 Wat is die doel van deel 5.1.D? (1)

5.1.4 Wat is die standaard breedte en dikte mates van deel 5.1.A? (2)

5.1.5 Wat is die standaard breedte en dikte mates van deel 5.1.E? (2)

5.1.6 Van watter tipe materiaal word deel 5.1.F vervaardig? (1)

5.1.7 Van watter tipe materiaal word deel 5.1.I vervaardig? (1)



FIGUUR 5.1

5.2 FIGUUR 5.2 op Vel C toon 'n onvolledige vloerplan met riolering van 'n huis.
Die openinge wat deur die simbool aangedui word, toon NIE korrekte boutekenpraktyk simbole NIE.
Voltooi die vloer- en rioleringsplan op Vel C deur die volgende simbole in te teken:

5.2.1 Venster by opening W1; (4)

5.2.2 Buitedeur by opening D1; (3)

5.2.3 Binnedeur by opening D2; (2)

5.2.4 Konsertinadeur by opening D3; (2)

5.2.5 Skuifdeur by opening D4; (4)

5.2.6 Alle riolering toegangsopeninge wat deur regulasies vereis word; (4)

5.2.7 Lugpyp; (1)

5.2.8 Rioolput. (1)

[40]

TOTAAL: 200

4.4 FIGUUR 4.4 op Vel B toon 'n diagrammatiese voorstelling van ’n balk met puntbelasting. Bereken op Vel B die volgende:

4.4.1 Die skuifkragwaardes op punte A tot D, en (4)

4.4.2 Teken die skuifkragdiagram volgens die gegewe skaal. (4)

4.5 ’n Staaf van 2 meter lank en met ’n radius van 3 mm, word 0,04 mm langer wanneer ’n trekkrag van 500 N daarop toegepas word. Bereken: (Toon alle formules en berekeninge)

4.5.1 Die spanning, (6)

4.5.2 vormverandering en (3)

4.5.3 die elastisiteit. (4)

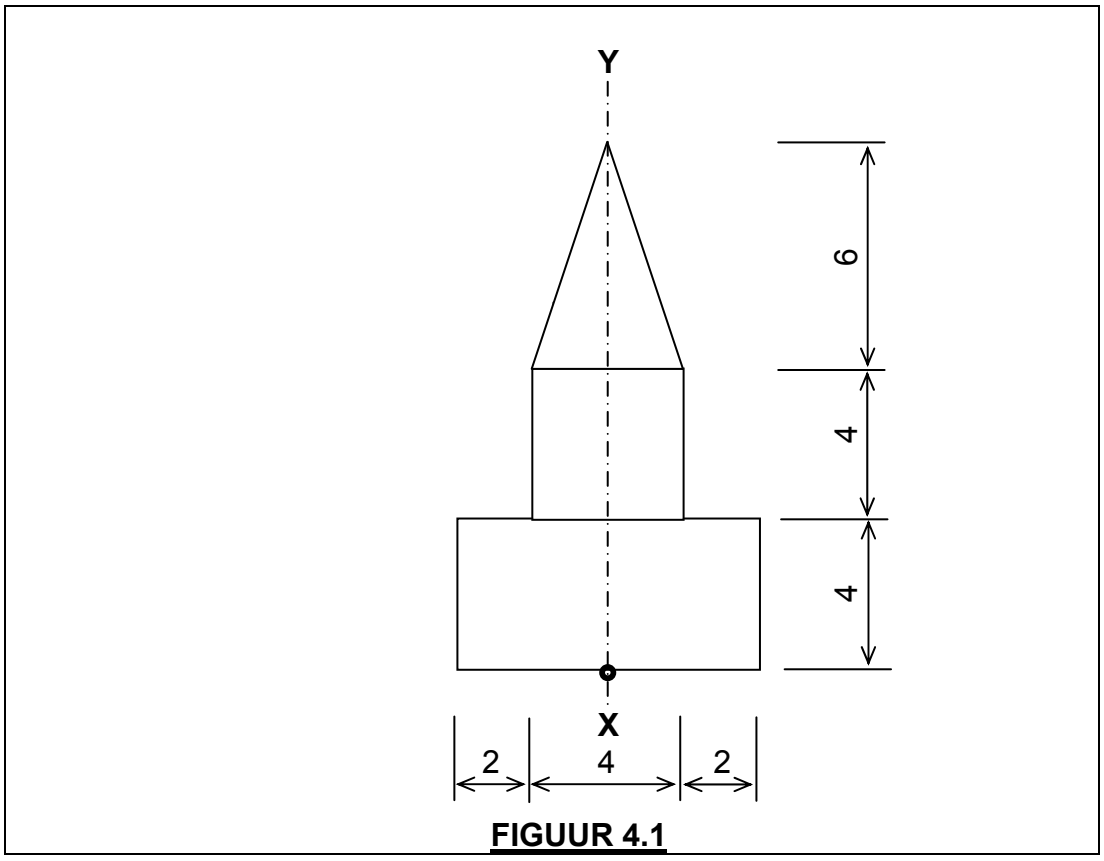
[40]

3.11 Wat is die doel van die verdigting van beton? (2)

3.12 Noem EEN metode om beton te verdig. (1)
[40]

VRAAG 4

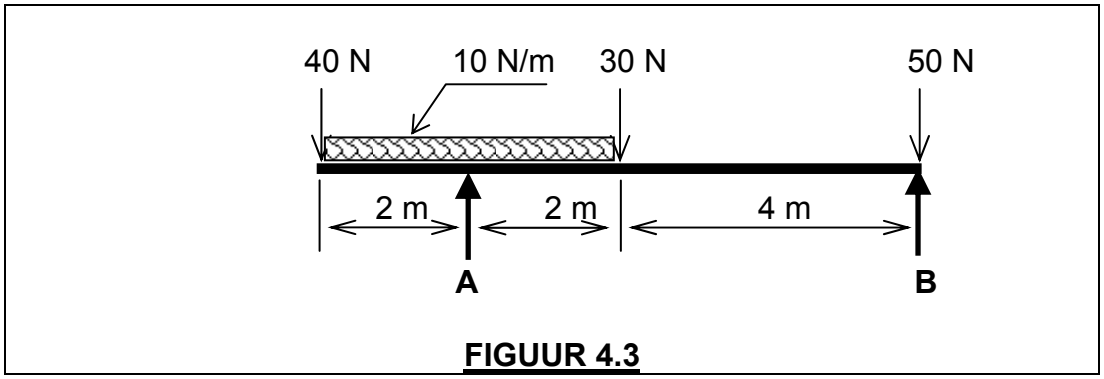
4.1 FIGUUR 4.1 toon 'n simmetriese liggaam op as XY.
Bereken die swaartepunt van die liggaam op die senterlyn vanaf X.
(Die tabel op Vel A kan gebruik word vir die berekeninge.)



FIGUUR 4.1 (11)

4.2 FIGUUR 4.2 op Vel A toon die ruimtediagram van 'n dakkap.
Bepaal grafies op Vel A die grootte en aard van die kragte in die onderdele van die kap deur die kragtediagram te teken en die tabel te voltooi. (9)

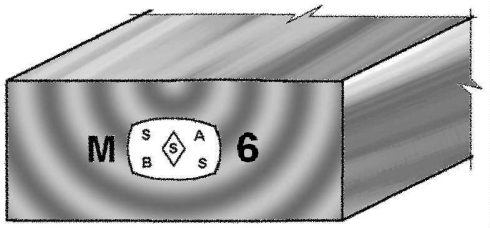
4.3 FIGUUR 4.3 toon 'n balk met verspreide- en puntbelasting.
Bereken die reaksiekragte in steunpunte A en B.



FIGUUR 4.3

VRAAG 3

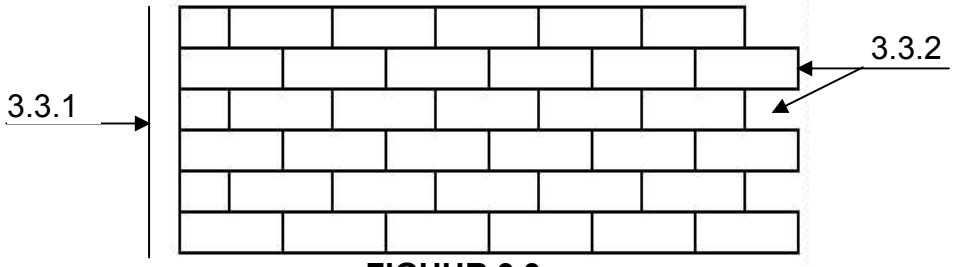
3.1 Verduidelik volledig die betekenis van die simbool op die hout in FIGUUR 3.1. (3)



FIGUUR 3.1

3.2 Wat is die standaard lengte-, breedte- en diktemates van ’n baksteen? (3)

3.3 Identifiseer die muurente 3.3.1 en 3.3.2 in FIGUUR 3.3. (2)



FIGUUR 3.3

3.4 Noem DRIE faktore wat die maksimum watertemperatuur van ’n sonverhittingstelsel bepaal. (3)

3.5 Voltooi die volgende beskrywing van ’n sonverhittingstelsel met ’n opgaarsilinder:

Water sirkuleer deur ...3.5.1... -pype waarna dit na ’n opgaarsilinder vloei. Die bak word van ’n ...3.5.2... stof soos ...3.5.3... gemaak. Die bodem is met ’n ...3.5.4... -materiaal, soos ...3.5.5..., uitgevoer waarop die ...3.5.6... gemonteer is. Die hele binnekant is met ’n ...3.5.7... matverf geverf. Die deksel bestaan uit deursigtige ...3.5.8... glas, wat in ’n raam gemonteer is. Die glas ...3.5.9... die sonstrale en voorkom dat ...3.5.10... die pype bedek. (10)

3.6 Noem VIER eienskappe van politeenpyp (PVC) vir watervoorsiening. (4)

3.7 Beskryf kortliks wat ’n stapelriool is. (4)

3.8 Beskryf kortliks die voordeel van wind kragopwekking bo steenkool kragopwekking. (2)

3.9 Waarom moet elektriese bedrading met ’n isoleer materiaal bedek word? (2)

3.10 Noem die VIER bestanddele van ’n betonmengsel. (4)

2.7 Noem EEN gebruik van elk van die volgende handgereedskapstukke:

2.7.1 Swaaihaak;

2.7.2 Enkelpenkruishout;

2.7.3 Reiskaaf;

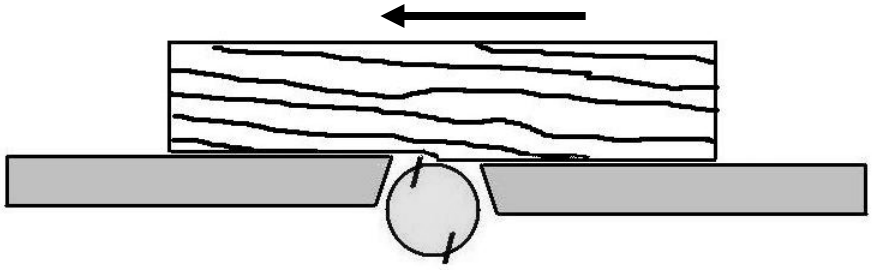
2.7.4 Kloofsaag;

2.7.5 Blokhamer. (5)

2.8 Beskryf DRIE veiligheidsmaatreëls wat toegepas moet word wanneer dwarssaagwerk met die sirkelsaag gedoen word. (6)

2.9 Wat is die hoofgebruik van die radiaalsaag? (1)

2.10 FIGUUR 2.10 toon 'n plank wat op 'n vlakskaaf geskaaf word.
Dui die figuur die korrekte skaafrigting aan? Motiveer jou antwoord. (2)



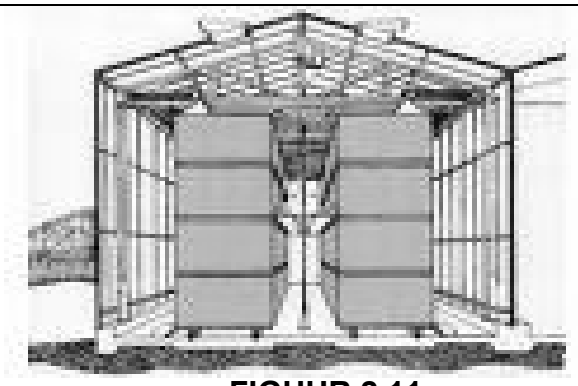
FIGUUR 2.10

2.11 Beantwoord die volgende vrae ten opsigte van die houtdrogingsmetode in FIGUUR 2.11.

2.11.1 Wat word die drogingsmetode genoem? (1)

2.11.2 Beskryf TWEE voordele van die drogingsmetode. (4)

2.11.3 Noem TWEE redes waarom hout gedroog moet word. (2)



FIGUUR 2.11

[40]

VRAAG 2

2.1 Noem TWEE verantwoordelikhede van die werkgewer in die toepassing van veiligheidsmaatreëls. (2)

2.2 Beskryf die doel van die ordinansie op konstruksiewerk. (4)

2.3 Noem VIER veiligheidsmaatreëls met betrekking tot die veilige berging van materiale. (4)

2.4 Jy is verantwoordelik vir die veiligheid in ’n werkswinkel.
Verduidelik kortliks waarom snygereedskap skerp moet wees. (2)

2.5 Identifiseer VIER van die volgende veiligheidsmaatreëls wat op steiers van toepassing is.

2.5.1 Dit mag nie verskuif word wanneer werkers nog op die steier is nie;

2.5.2 Die steier mag net geskuif word indien die werkers met harnasse vas is;

2.5.3 Steiers moet op ’n gelyk vlak opgerig word;

2.5.4 Steiers wat teen ’n helling opgerig word, se steierpype moet verleng word sodat die platvorm horisontaal is:

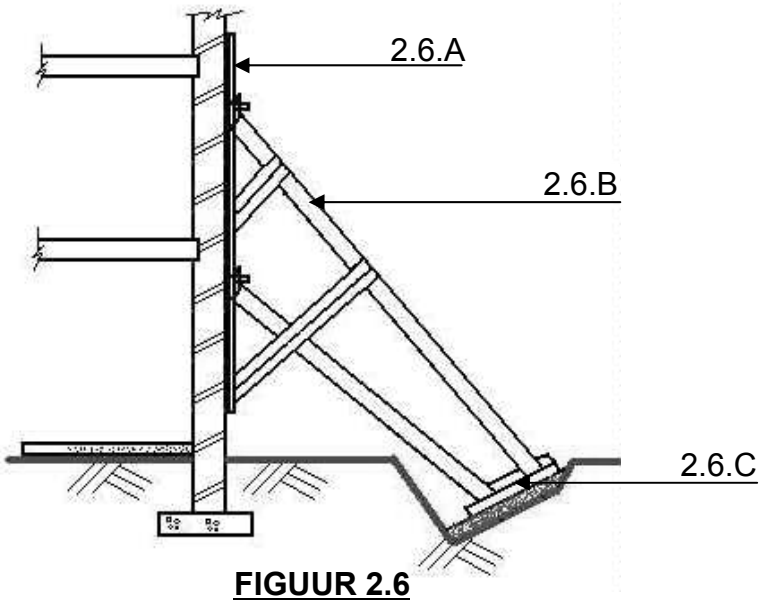
2.5.5 Hoë steiers moet met ankerdrade aan die grond geanker word;

2.5.6 Steiers mag nie hoër as ses verdiepings opgerig word nie;

2.5.7 ’n Beskermreling moet op die steier aangebring word;

2.5.8 Steiers moet regop opgerig word. (4)

2.6 Identifiseer die onderdele van die skoor in FIGUUR 2.6. (3)



FIGUUR 2.6

VRAAG 1

1.1 Jy is 'n skrynwerker en 'n kliënt verwag van jou om dakkappe vir sy huis te maak.

1.1.1 Teken volgens skaal 1:50 'n lyndiagram van 'n Suid-Afrikaanse dakkap met 'n spanwydte van 7 meter.
Die kap het 'n helling van 30° met 'n oorhang van 500 mm.
Benoem al die onderdele op die tekening. (12)

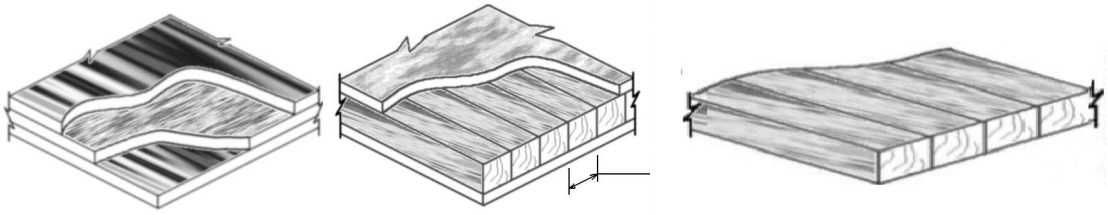
1.1.2 Noem die TWEE metodes wat gebruik word om die dakkapdele aanmekaar te heg. (2)

1.1.3 Stel 'n hoeveelheidslys op vir die maak van die dakkap wat jy geteken het. Alle onderdele word gemaak van 114 mm x 38 mm dennehout. (10)

1.2 Watter faktor bepaal die spasiëring tussen die dakkappe? (1)

1.3 Verduidelik die verskil tussen 'n stomptapgatvoeg en 'n deurlopende tapgatvoeg. (2)

1.4 Beantwoord die volgende vrae ten opsigte van die bordprodukte in FIGURE 1.4.A tot 1.4.C:



1.4.A **1.4.B** **1.4.C**

1.4.1 Identifiseer die borde in FIGURE 1.4.A tot 1.4.C; (3)

1.4.2 Noem VYF voordele van bord 1.4.A. (5)

1.4.3 Noem TWEE van die borde wat as bekistingmateriaal gebruik kan word. (2)

1.4.4 Wat word die dun lagie hout aan die buitekante van die bord 1.4.B genoem? (1)

1.4.5 Noem TWEE snymetodes om die dun lagie hout aan die buitekante van bord 1.4.B te vervaardig. (2)
[40]

BENODIGDHEDE:

1. Tekengereedskap
2. ’n Nie-programmeerbare sakrekenaar

INSTRUKSIES EN INLIGTING

1. Hierdie vraestel bestaan uit VYF vrae.
2. AL die vrae is VERPLIGTEND.
3. Beantwoord elke vraag as ’n geheel. MOET NIE onderafdelings skei NIE.
4. Begin elke vraag op ’n NUWE bladsy.
5. Sketse kan gebruik word om jou antwoorde te illustreer.
6. ALLE berekeninge en geskrewe antwoorde moet in die antwoordeboek gedoen word.
7. Tekeninge en sketse moet volledig en netjies van afmetings, byskrifte en titels voorsien word soos voorgeskryf deur SANS (SABS) se Gebruikskode vir Boutekenepraktyk.
8. Vir die doeleindes van hierdie vraestel moet die afmetings van ’n steen as 220 mm x 110 mm x 75 mm geneem word.
9. Gebruik jou eie oordeel waar afmetings en/of detail ontbreek.
10. Nie-programmeerbare sakrekenaars mag gebruik word.
11. Beantwoord VRAAG 4.1, VRAAG 4.2, VRAAG 4.4 en 5.2 op antwoordblaaie A tot C.

Province of the
EASTERN CAPE
EDUCATION

NASIONALE SENIOR SERTIFIKAAT

GRADE 12

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SIVIELE TEGNOLOGIE

PUNTE: 200

TYD: 3 uur

* C V L T E A *

Hierdie vraestel bestaan uit 9 bladsye en ’n 3 bladsy antwoordblad.