

POSSIBLE ANSWERS FOR:

TECHNIKA (SIVIEL)

TECHNICA (CIVIL)

SG

VRAAG 1 / QUESTION 1

1.1

- | | | |
|-------|-----|------------|
| 1.1.1 | ST. | <i>SH.</i> |
| 1.1.2 | IO. | <i>IE.</i> |
| 1.1.3 | LP. | <i>VP.</i> |
| 1.1.4 | BT. | <i>BT.</i> |
| 1.1.5 | B. | <i>B.</i> |
| 1.1.6 | SK. | <i>WC.</i> |

EEN PUNT ELK.

ONE MARK EACH.

1.2

- | | | |
|-------|--------|---------------|
| 1.2.1 | Blou. | <i>Blue.</i> |
| 1.2.2 | Swart. | <i>Black.</i> |
| 1.2.3 | Groen. | <i>Green.</i> |
| 1.2.4 | Bruin. | <i>Brown.</i> |

EEN PUNT ELK.

ONE MARK EACH.

1.3

- | | |
|-------|---|
| 1.3.1 | Gewone stene.
<i>Common bricks.</i> |
| 1.3.2 | Sierstene.
<i>Face bricks.</i> |
| 1.3.3 | Vuurvaste stene
<i>Fireproof bricks.</i> |
| 1.3.4 | Doelvervaardigde stene
<i>Purpose bricks.</i> |
| 1.3.5 | Uitgesoekte stene (Kleur of gehalte)
<i>Selected bricks. (Colour or quality)</i> |
| 1.3.6 | Geglasuurde stene.
<i>Glazed bricks.</i> |

ENIGE VYF EEN PUNT ELK.

ANY FIVE ONE MARK EACH

1.4

- 1.4.1 Rooktoets
Smoke test.
- 1.4.2 Watertoets.
Water test.
- 1.4.3 Lugdruktoets.
Hydraulic test.

EEN PUNT ELK.

ONE MARK EACH.

1.5

- 1.5.1 Alle mure, vensters en deure binne 'n radius van ses meter vanaf enige muurmeublemente moet getoon word.
All walls, windows and doors within a radius of six metres from any sanitary fitment must be shown.
- 1.5.2 Alle sanitêre muurmeublemente.
All sanitary fitments.
- 1.5.3 Die val en bodemdieptes van die riool.
The fall and invert depths of the drain.
- 1.5.4 Alle sanitêre pype en hulle groottes.
All sanitary pipes and their sizes.
- 1.5.5 Alle toegangsopeninge soos mangate, steeloë en inspeksieoë.
All access openings such as manholes, cleaning eyes (rodding eyes), and inspection eyes.
- 1.5.6 'n Terreinplan waarop die huis, buitegeboue en die voorgenome rioolaanleg aangedui is.
A site plan indicating the dwelling, outbuildings and the proposed drain layout.
- 1.5.7 Snitaansigte van elke deel van die rioleringstelsel, wat ook die aansluitings met die muurmeublemente toon.
Sectional views of every section of the drain, which must also show the connections to the various fitments.

EEN PUNT ELK.

ONE MARK EACH.

1.6

- 9 = aantal stawe in groep
- 12 = deursnee in mm
- 01 = staaf nommer
- 300 = hart-op-hartspasiering
- R = sagte-staal ronde staaf

- 9 = total number of bars in group
- 12 = diameter in mm
- 01 = bar mark number
- 300 = spacing centre to centre
- R = mild steel round bar

EEN PUNT ELK

ONE MARK EACH

1.7

- 1.7.1 Dit moet in staat wees om die trekspanning te weerstaan sonder enige noemenswaardige vervorming
It must be capable of achieving the tensile strength without undue strain.
- 1.7.2 Dit moet van 'n materiaal wees wat in die nodige vorm gebuig kan word
It must be of a material that can be easily bent to any required shape.
- 1.7.3 Die oppervlakte van die bewapening moet in staat wees om 'n verband met die beton te verseker sodat die ontwerp-trekspanning verkry kan word.
Its surface must be capable of developing an adequate bond between the concrete and the reinforcement to ensure that the required design tensile strength is obtained.
- 1.7.4 Dit moet gelyksoortige warmte-uitsettingskoeffisiënt hê om te verhoed dat onnodige spanning deur temperatuurveranderings veroorsaak word.
A similar coefficient of thermal expansion is required to prevent unwanted stresses being developed within the member due to temperature changes.
- 1.7.5 Dit moet vryelik in die handel beskikbaar wees teen billike pryse, en aanpasbaar wees by die ontwerp.
Availability at a reasonable cost which must be acceptable to the overall design concept.

TWEE PUNTE ELK.

TWO MARKS EACH

1.8

- 1.8.1 Die gebied moet omhein wees.
The area must be fenced in.
- 1.8.2 Die gebied moet skoon wees.
The area must be kept clean.
- 1.8.3 Die bougebied moet snags verlig wees.
The building area must be lit up at night.
- 1.8.4 Loopgange moet aangebring word onder hyskrane en bouwerk op syaadjies.
Walkways must be erected under cranes and building work on sidewalks.
- 1.8.5 'n Hardehoed en beskermingsklere moet gedra word.
A hard hat and protective clothing must be worn.
- 1.8.6 Voldoende kennisgewings moet duidelik op die perseel aangebring word.
Sufficient and unambiguous notices must be put up on the building site.
- 1.8.7 Ongemagtigde persone en onopgeleide werkers mag nie die perseel betree nie.
No unskilled labourers or other persons are allowed on the site.
- 1.8.8 Waar gevaarlike uitgrawings op die terrein plaasvind, moet dit omhein wees.
Where dangerous excavations are in progress, they must be effectively enclosed.
- 1.8.9 Steiers wat gebruik word moet stewig staan en skoon gehou word.
Scaffolding in use must stand firm and be kept clean
- 1.8.10 Materiaal wat nie dadelik gebruik word nie moet netjies geberg word.
Material, which is not immediately used, must be neatly stored

- 1.8.11 Voertuie wat op die terrein beweeg moet tot 'n minimum beperk word.
Vehicles moving around on the site must be kept to a minimum.

ENIGE TIEN EEN PUNT ELK. ANY TEN ONE MARK EACH.

1.9

- 1.9.1 Dit toon die posisie en diepte van die aansluitingspunte met die munisipale rioolstelsel.
It shows the position and depth of the connection with the municipal sewerage system.
- 1.9.2 Dit toon die posisie en plasing van alle muurmeublemente.
It shows all the sanitary fitments
- 1.9.3 Om die aansluitingspunte van die muurmeublemente met die woonhuis se rioolstelsel te toon.
To show the connection of all the fitments with the sewer system of the dwelling.
- 1.9.4 Om die uitleg van die hele rioolstelsel asook die helling van al die pype te toon.
To show the complete layout of the sewerage system as well as the slope of all the pipes.
- 1.9.5 Om die plasing van toegangsoopeninge soos inspeksieoë, steekoë en mangate te toon.
To show the placing of the following access openings, such as manholes, inspection eyes and rodding eyes.
- 1.9.6 Dit toon ook die posisie van die lugpype, rioolputte en diameter van al die pype wat in die stelsel gebruik word.
It shows the position of vent pipes, drains and the diameter of all pipes used in the system.

EEN PUNT ELK

ONE MARK EACH

1.10

- 1.10.1 Verskillende mure moet aan mekaar verbind word deur muurbinte.
Different walls must be connected by means of wall ties.
- 1.10.2 Die spasie tussen die mure mag nie minder as 50 mm, en nie wyer as 75 mm wees nie.
The gap between the walls must not be less than 50 mm, and not wider than 75 mm.
- 1.10.3 Gipsdagha met 'n mengverhouding van 1:2:9 moet gebruik word.
Mortar with a 1:2:9 mixing proportion must be used.
- 1.10.4 Die regte hoeveelheid muurbinte, soos deur die regulasies bepaal, moet gebruik word.
The correct number of wall ties, according to regulations, must be used.
- 1.10.5 Steene of blokke moet met 'n stewige verband gebou word.
Bricks or blocks must be laid in a strong bond.

EEN PUNT ELK

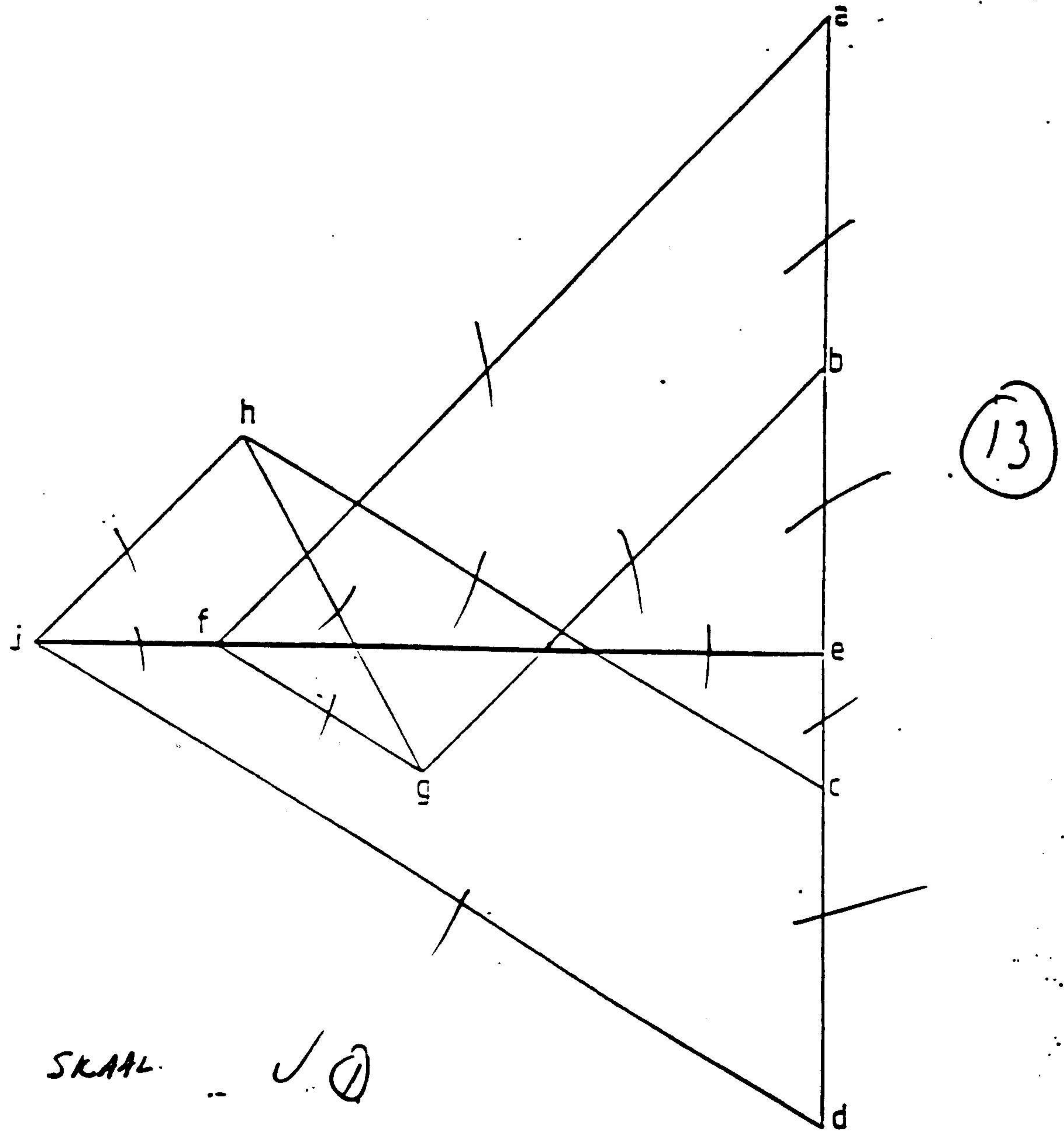
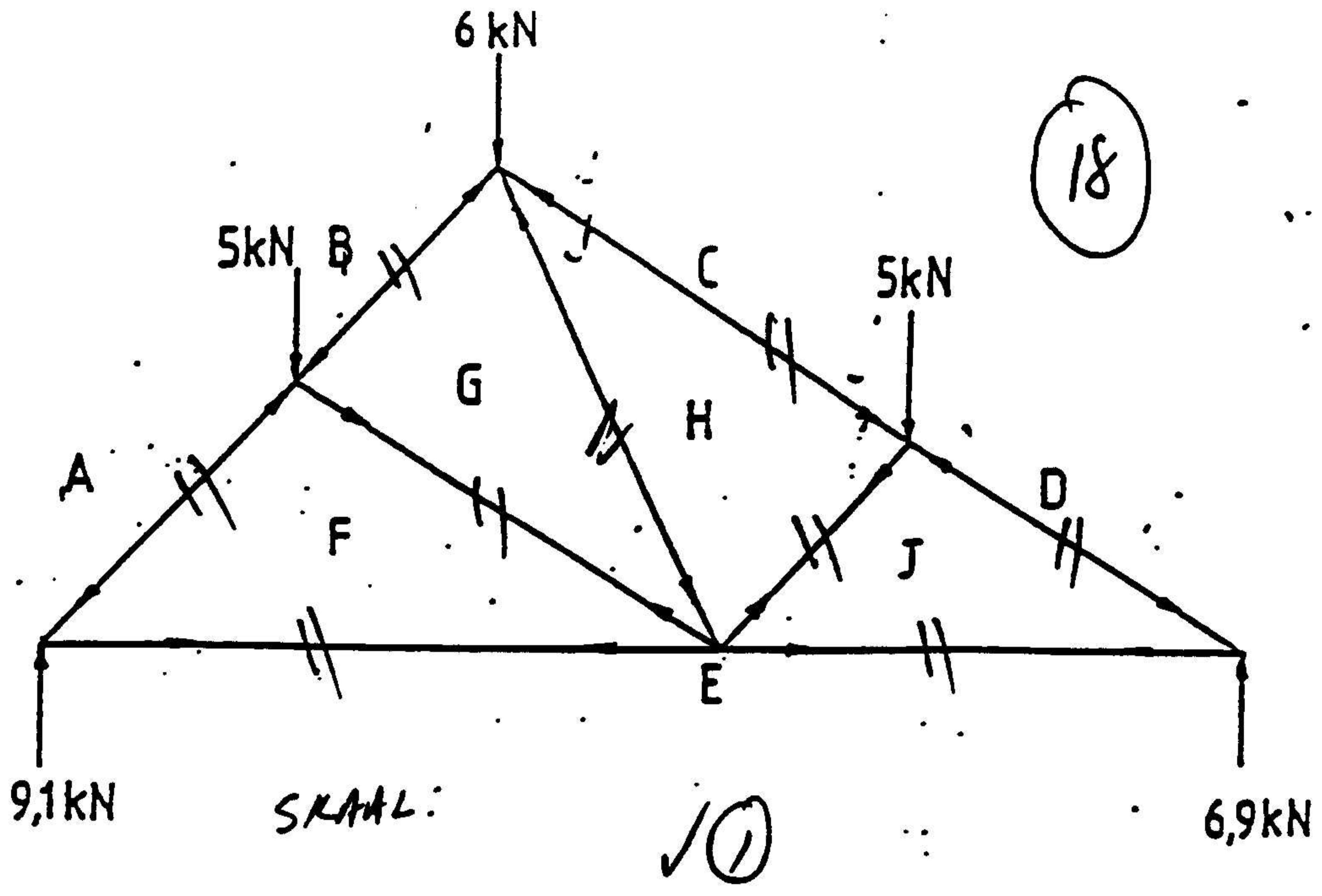
ONE MARK EACH

VRAAG 2 / QUESTION 2

ONDERDEEL MEMBER	GROOTTE MAGNITUDE	AARD NATURE
JE	✓ 11,7 kN ✓	STANG / TIE ✓
AF	✓ 12,8 kN ✓	STUT / STRUT ✓
HJ	✓ 4,2 kN ✓	STANG / TIE ✓
BG	✓ 8,2 kN ✓	STUT / STRUT ✓
GH	✓ 5,5 kN ✓	STUT / STRUT ✓
CH	✓ 10,0 kN ✓	STUT / STRUT ✓
DJ	✓ 13,5 kN ✓	STUT / STRUT ✓
FE	✓ 9,1 kN ✓	STANG / TIE ✓
GF	✓ 3,5 kN ✓	STANG / TIE ✓

18

9.



VRAAG 3 / QUESTION 3

A	B	C	D						
			Onderbou hartlyn / Substructure centre line						
			2 x 17 000 = \checkmark 34 000 mm \checkmark						
			2 x 11 000 = \checkmark 22 000 mm \checkmark						
			56 000 mm \checkmark						
			Minus 4 x 330 = \checkmark 1 320 mm \checkmark						
			54 680 mm \checkmark						
			Die hartlyn is / The centre line is 54,68 metres \checkmark						
			Hoogte van die onderbou is 450 mm						
			Height of the substructure is 450 mm						
			50 Stene per vierkante meter vir 'n halfsteenmuur						
			50 Bricks per square meter for a half-brick wall						
			Daar is 3 halfsteenmure						
			There are 3 half-brick walls.						
1/	\checkmark <table style="border-collapse: collapse; margin-left: 20px;"> <tr><td style="border-right: 1px solid black; padding-right: 5px;">54,68</td><td></td></tr> <tr><td style="border-right: 1px solid black; padding-right: 5px;">0,45</td><td></td></tr> <tr><td style="border-right: 1px solid black; padding-right: 5px;">24,606</td><td style="border-left: 1px solid black; padding-left: 5px;">24,606m</td></tr> </table>	54,68		0,45		24,606	24,606m	\checkmark 24,606m	
54,68									
0,45									
24,606	24,606m								
\checkmark 3/	<table style="border-collapse: collapse; margin-left: 20px;"> <tr><td style="border-right: 1px solid black; padding-right: 5px;">24,606</td><td></td></tr> <tr><td style="border-right: 1px solid black; padding-right: 5px;">50</td><td></td></tr> <tr><td style="border-right: 1px solid black; padding-right: 5px;">1 230,3</td><td style="border-left: 1px solid black; padding-left: 5px;">3 690,9</td></tr> </table>	24,606		50		1 230,3	3 690,9	3 690,9	Daar is 3 691 stene nodig 3 691 Bricks are required.
24,606									
50									
1 230,3	3 690,9								
			Bobou hartlyn / Superstructure centre line						
			2 x 17 000 = 34 000 mm						
			2 x 11 000 = 22 000 mm						
			56 000 mm						
			Minus 4 x 220 = \checkmark 880 mm \checkmark						
			55 120 mm \checkmark						
			Die hartlyn is / The centre line is 55,12 metres. \checkmark						
			Hoogte van die bobou is 2 900 mm \checkmark						
			Height of the superstructure is 2 900 mm \checkmark						
			50 Stene per vierkante meter vir 'n halfsteenmuur						
			50 Bricks per square meter for a half-brick wall						
			Daar is 2 halfsteenmure						
			There are 2 half-brick walls.						
1/	\checkmark <table style="border-collapse: collapse; margin-left: 20px;"> <tr><td style="border-right: 1px solid black; padding-right: 5px;">55,12</td><td></td></tr> <tr><td style="border-right: 1px solid black; padding-right: 5px;">2,9</td><td></td></tr> <tr><td style="border-right: 1px solid black; padding-right: 5px;">159,85</td><td style="border-left: 1px solid black; padding-left: 5px;">159,85</td></tr> </table>	55,12		2,9		159,85	159,85	\checkmark 159,85	
55,12									
2,9									
159,85	159,85								
2/	\checkmark <table style="border-collapse: collapse; margin-left: 20px;"> <tr><td style="border-right: 1px solid black; padding-right: 5px;">159,85</td><td></td></tr> <tr><td style="border-right: 1px solid black; padding-right: 5px;">50</td><td></td></tr> <tr><td style="border-right: 1px solid black; padding-right: 5px;">7 992,5</td><td style="border-left: 1px solid black; padding-left: 5px;">15 985</td></tr> </table>	159,85		50		7 992,5	15 985	15 985	Daar is 15 985 stene nodig 15 985 Bricks are required.
159,85									
50									
7 992,5	15 985								

15.

9.

			Balkvulling hartlyn / Beam filling centre line
			2 x 17 000 = 34 000 mm
			2 x 11 000 = 22 000 mm
			56 000 mm
			Minus $\left[\begin{array}{l} \times 110 = \\ 440 \text{ mm} \end{array} \right]$ $\left[\begin{array}{l} 55\,560 \text{ mm} \end{array} \right]$
			Die hartlyn is / The centre line is 55,56 metres.
			Hoogte van die balkvulling is 225 mm
			Height of the beam filling is 225 mm
			50 Stene per vierkante meter vir 'n halfsteenmuur
			50 Bricks per square meter for a half-brick wall
			Daar is 1 halfsteenmuur
			There is 1 half-brick wall
1/	$\left[\begin{array}{l} 55,56 \\ 0,225 \\ 12,501 \end{array} \right]$	12,501m	
1/	$\left[\begin{array}{l} 12,501 \\ 50 \\ 625,05 \end{array} \right]$	625,05	Daar is 625 stene nodig 625 Bricks are required.
			Totaal van struktuur sonder aftrekkings
			Total for structure without deductions
			Onderbou / Substructure { 3 691
			Bobou / Superstructure { 15 985
			Balkvulling / Beam filling { 625
			{ 20 301 Stene / Bricks
			Aftrekkings / Deductions
			Deure / Doors
			$\left[\begin{array}{l} 2 \times 2 \times 1 \end{array} \right]$
			50 Stene per vierkante meter vir 'n halfsteenmuur
			50 Bricks per square meter for a half-brick wall
			Daar is 2 halfsteenmure
			There are 2 half-brick walls.
2/	$\left[\begin{array}{l} 2 \\ 1 \\ 2 \end{array} \right]$	4 m	
2/	$\left[\begin{array}{l} 4 \\ 50 \\ 200 \end{array} \right]$	400	Daar is 400 stene There are 400 bricks.

7.

4

5.

			✓ Vensters / Windows
			5 x 2 x 1.5
			50 Stene per vierkante meter vir 'n halfsteenmuur
			50 Bricks per square meter for a half-brick wall
			Daar is 2 halfsteenmure
			There are 2 half-brick walls
✓ 5/	✓ 2 1.5 3	15 m	
2/	✓ 15 50 750	1 500	Daar is 1 500 stene There are 1 500 bricks
			Totale aftrekkings / Total deductions
			Deure / Doors 400 ✓ Vensters / Windows 1 500 ✓ 1 900 Stene / Bricks ✓
			Totale stene vir die struktuur
			Total bricks for the structure
			Struktuur / Structure 20 301 ✓ Aftrekkings / Deductions 1 900 ✓ 18 401 ✓
			Plus 6 % Vermorsing / Wastage
			18 401 ✓ 0.06 x ✓ 1 104,06 ✓ 1 104 ✓ 18 401 + ✓ 19 505 ✓
			Daar sal 19 505 stene nodig wees vir die struktuur There will be 19 505 bricks required for the structure
			Fondasie hartlyn / Foundation centre line A
			17 000 - 2/110 = 16 780 mm 7 000 - 2/110 = 6 780 mm Vloerdikte / Floor thickness 75 mm
	✓ 16,78 6,78 0,075 8,533	8,533m	

5

2

3

3

3

1

1

			Fondasie hartlyn / Foundation centre line B
			5 000 - 2/110 = 4 780 mm 4 000 - 2/110 = 3 780 mm Vloerdikte / Floor thickness 75 mm
✓	$\begin{array}{r} 4,78 \\ 3,78 \\ \hline 0,075 \\ 1,355 \end{array}$	1,355	
			Totale hoeveelheid beton Total amount of concrete
✓	$\begin{array}{r} 8,553 \\ 1,355 + \\ \hline 9,888 \end{array}$	9,888 m	Daar sal 9,888 kubieke meter beton nodig wees 9,888 Cubic metres of concrete will be required.

3

PUNTE SOOS AANGETOON

MARKS AS SHOWN

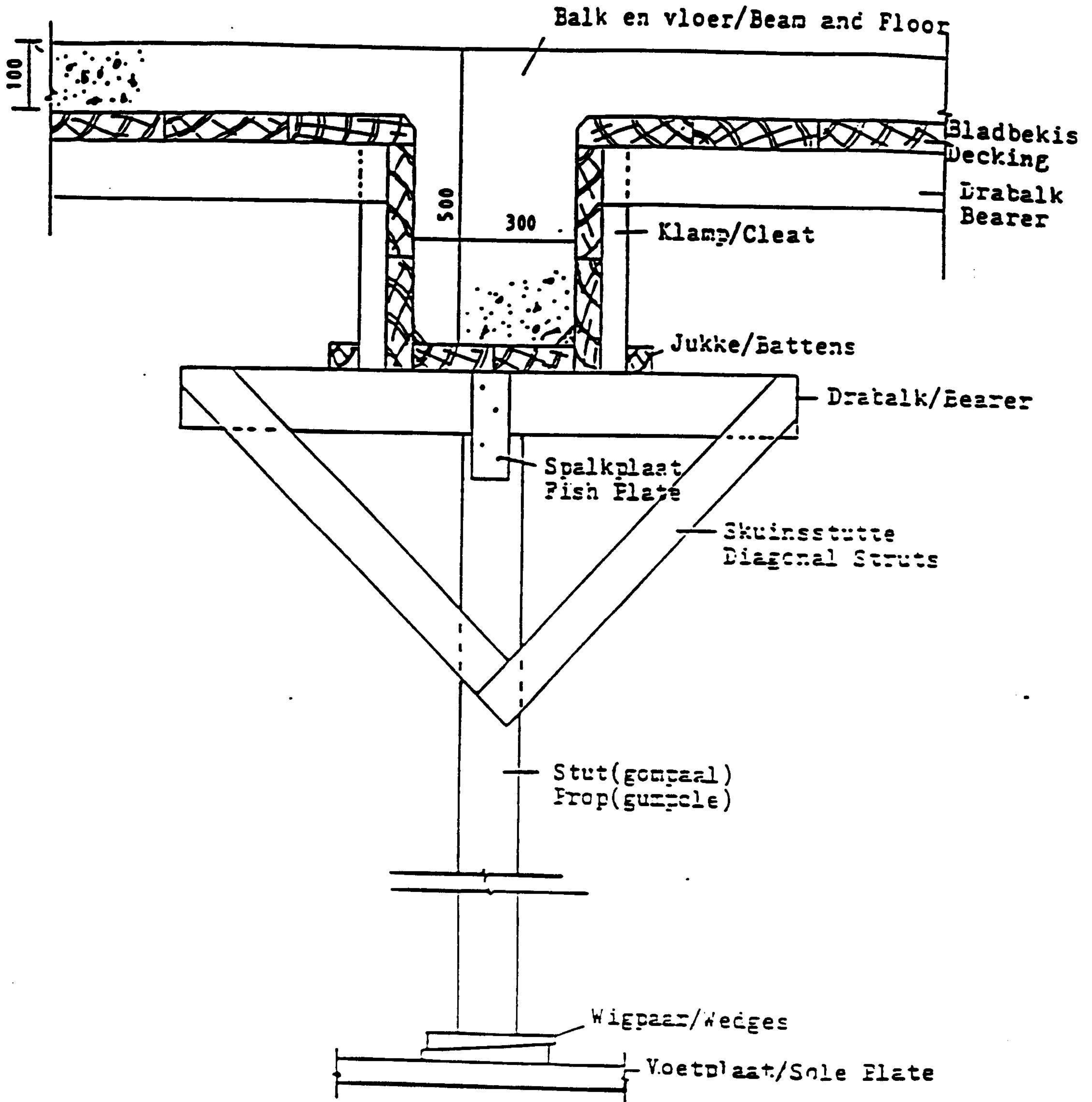
VRAAG 4 / QUESTION 4

4.1

BETONBALK EN BLAD

CONCRETE BEAM AND FLOOR

BALK	2	BEAM
VLOER	2	FLOOR
SOFFIET PLANKE	2	SOFFIT BOARDS
BALKE	2	JOISTS
KLAMPE	2	CLEATS
KOPDRAER	2	HEAD TREE
STUT	2	STRUTS
SKUINS STUTTE	2	DIAGONAL STRUTS
SPALKPLAAT	2	FISH PLATES
VOETPLAAT	2	SOLE PLATE
HEGSTROOK	2	FIXING PLATE
WIGPAAR	2	WEDGES
EKSTRA STUTTE	2	EXTRA STRUTS
BALK BEWAPENING	4	BEAM REINFORCING
BLAD BEWAPENING	4	SLAB REINFORCING
SKAAL	2	SCALE
AFMETINGS	2	DIMENSIONS
BYSKRIFTE	2	LABELS

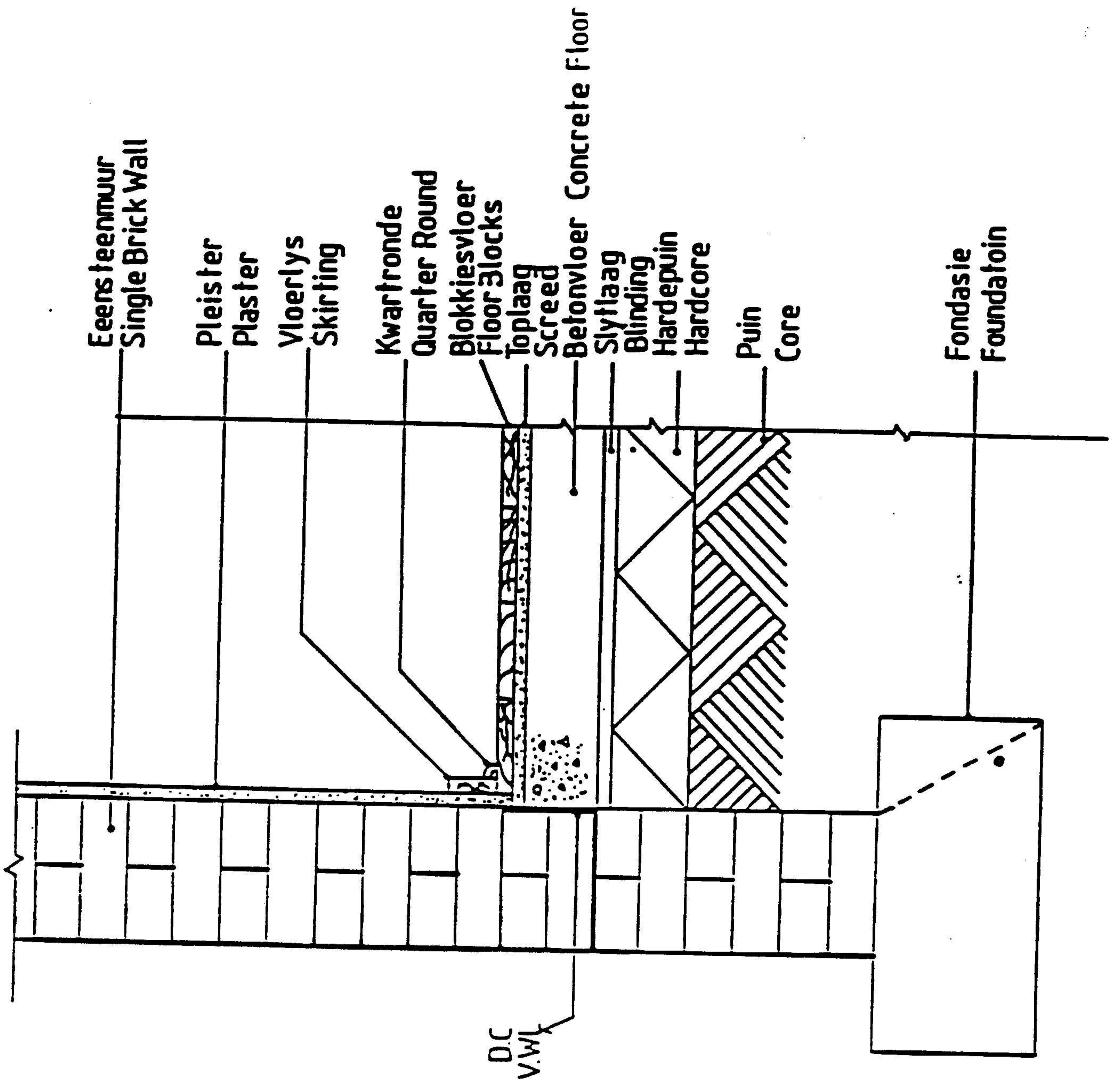


Skaal 1:10
Scale

BEKISTING VIR BALK EN VLOER
FORMWORK FOR BEAM AND FLOOR

EENSTEEN FONDASIEMUUR KONSTRUKSIE
ONE BRICK WALL FOUNDATION CONSTRUCTION

FONDASIE	1	FOUNDATION
FONDASIE MUUR	1	FOUNDATION WALL
PUINVULLING	1	CORE FILLING
HARDEPUIN	1	HARD CORE
GRONDVLAK	1	GROUND LEVEL
SLYTLAAG	1	BLINDING
TOPLAAG	1	SCREED
VOGWEERLAAG	1	DAMP PROOF
BLOKKIESVLOER	1	FLOOR BLOCKS
KWARTROND	1	QUARTER ROUND
VLOERLYS	1	SKIRTING
BUTEMUUR	1	OUTER WALL
PLEISTER	1	PLASTER
LYNWERK	2	LINEWORK
BYSKRIFTE	3	LABELLING
NETHEID	2	NEATNESS



VRAAG 5 / QUESTION 5**SUID-AANSIG**

DAKHOOGTE HULPAANSIG	6
DAKONTWERP	2
ONDERBOU	2
BOBOU	2
GEUT	2
FASSIEPLANK	2
AFLEIPYP	2
NOKPLAAT	2
VENSTER PLASING	2
VENSTERBANKE	2
OOPSWAAI RAME GETOON	6
BYSKRIFTE	2
LYNWERK	2
SKAAL	<u>2</u>
	36

SOUTH ELEVATION

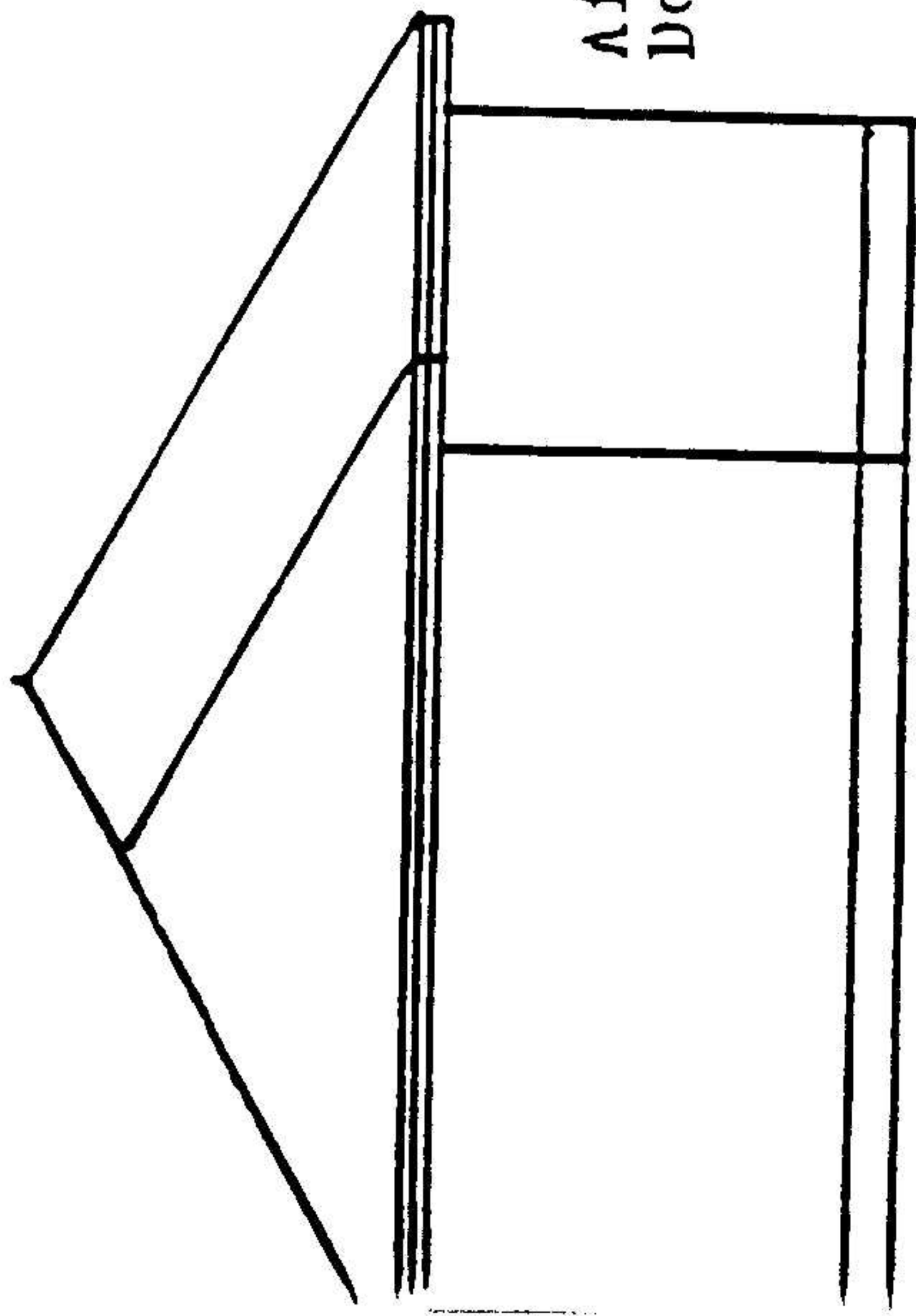
<i>ROOF HEIGHT AUXILLARY VIEW</i>
<i>ROOF DESIGN</i>
<i>SUBSTRUCTURE</i>
<i>SUPERSTRUCTURE</i>
<i>GUTTER</i>
<i>FASCIA BOARD</i>
<i>DOWN PIPE</i>
<i>RIDGING</i>
<i>WINDOW PLACING</i>
<i>WINDOW SILL</i>
<i>WINDOW OPENING</i>
<i>LABELLING</i>
<i>LINEWORK</i>
<i>SCALE</i>

OOS-AANSIG

DAKONTWERP	4
NOKPLAAT	2
FASSIE PLANK	2
GEUT	2
AFLEIPYP	2
ONDERBOU	2
BOBOU	2
NETHEID	4
LYNWERK	2
SKAAL	<u>2</u>
	24

EAST ELEVATION

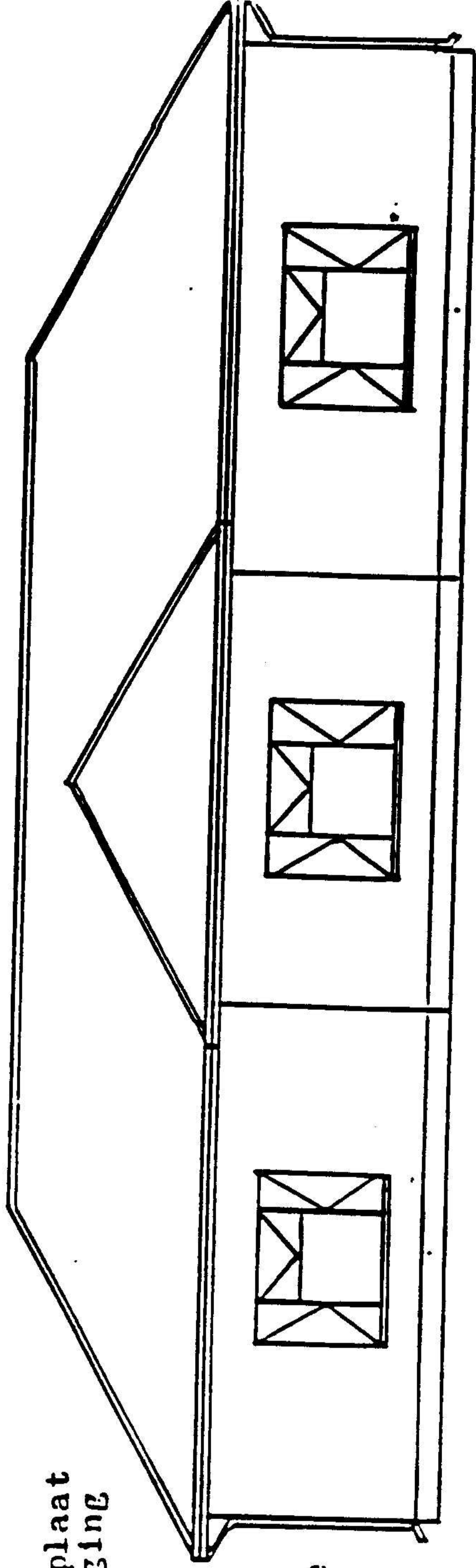
<i>ROOF DESIGN</i>
<i>RIDGING</i>
<i>FASCIA BOARD</i>
<i>GUTTER</i>
<i>DOWN PIPE</i>
<i>SUBSTRUCTURE</i>
<i>SUPERSTRUCTURE</i>
<i>NEATNESS</i>
<i>LINEWORK</i>
<i>SCALE</i>



Depaling van dakhoogte
Determination of roof height

Nokplaat
Ridging

Afleidpyp
Down Pipe

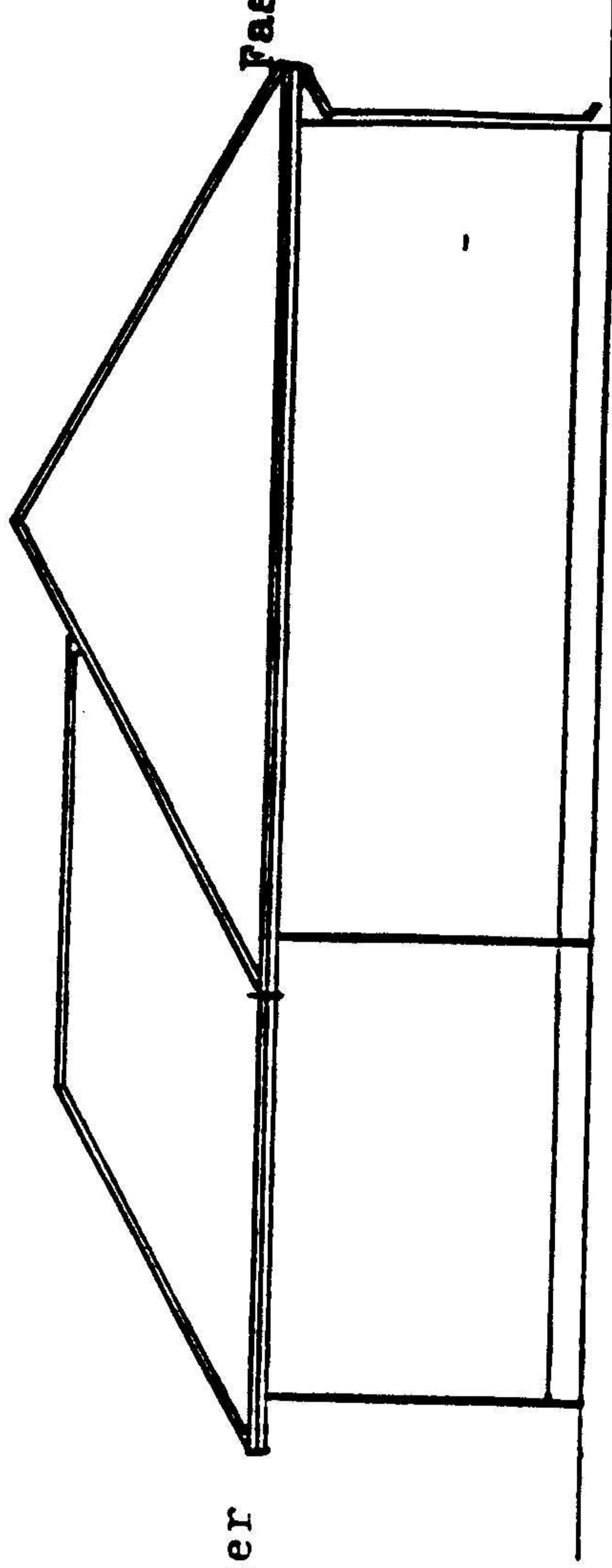


SUID-AANSIG

SOUTH ELEVATION

Geut/Gutter

Fassie/Fascia



OOS-AANSIG

EAST ELEVATION

Skaal. 1:100 Scale

VRAAG 6 / QUESTION 6

6.1

KNOOPPLAAT

NAATRANDE	4
BOUTSTEEK HOOFSTAAF	4
BOUTSTEEK STUTTE	4
KONTRAMERK HOOFSTAAF	3
KONTRAMERK STUTTE	3
KNOOPPLAAT	6
AFMETINGS	4
SKAAL	4
LYNWERK	4
NETHEID	<u>4</u>
	40

GUSSET PLATE

SEAM LAP
PITCH OF MAIN BEAM
PITCH OF STRUTS
CONTRA MARK MAIN BEAM
CONTRA MARK STRUTS
GUSSET PLATE
DIMENSIONS
SCALE
LINEWORK
NEATNESS

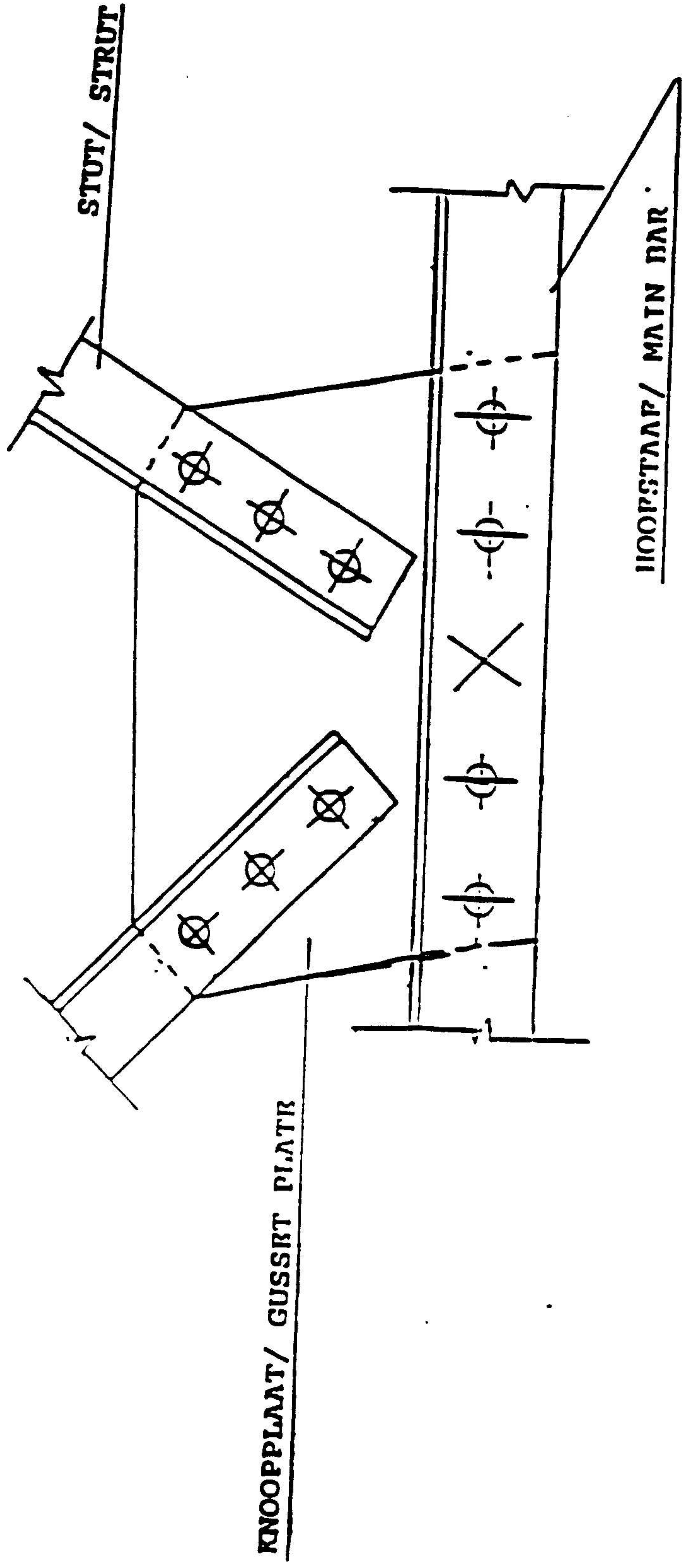
6.2

ISOMETRIESE LEUNSKOOR

MUURPLAAT
KLOS
NAALD
LEUNSKOOR
MUURHAAK
VOETPLAAT
BYSKRIFTE
AFMETINGS
SKAAL

ISOMETRIC RAKING SHORE

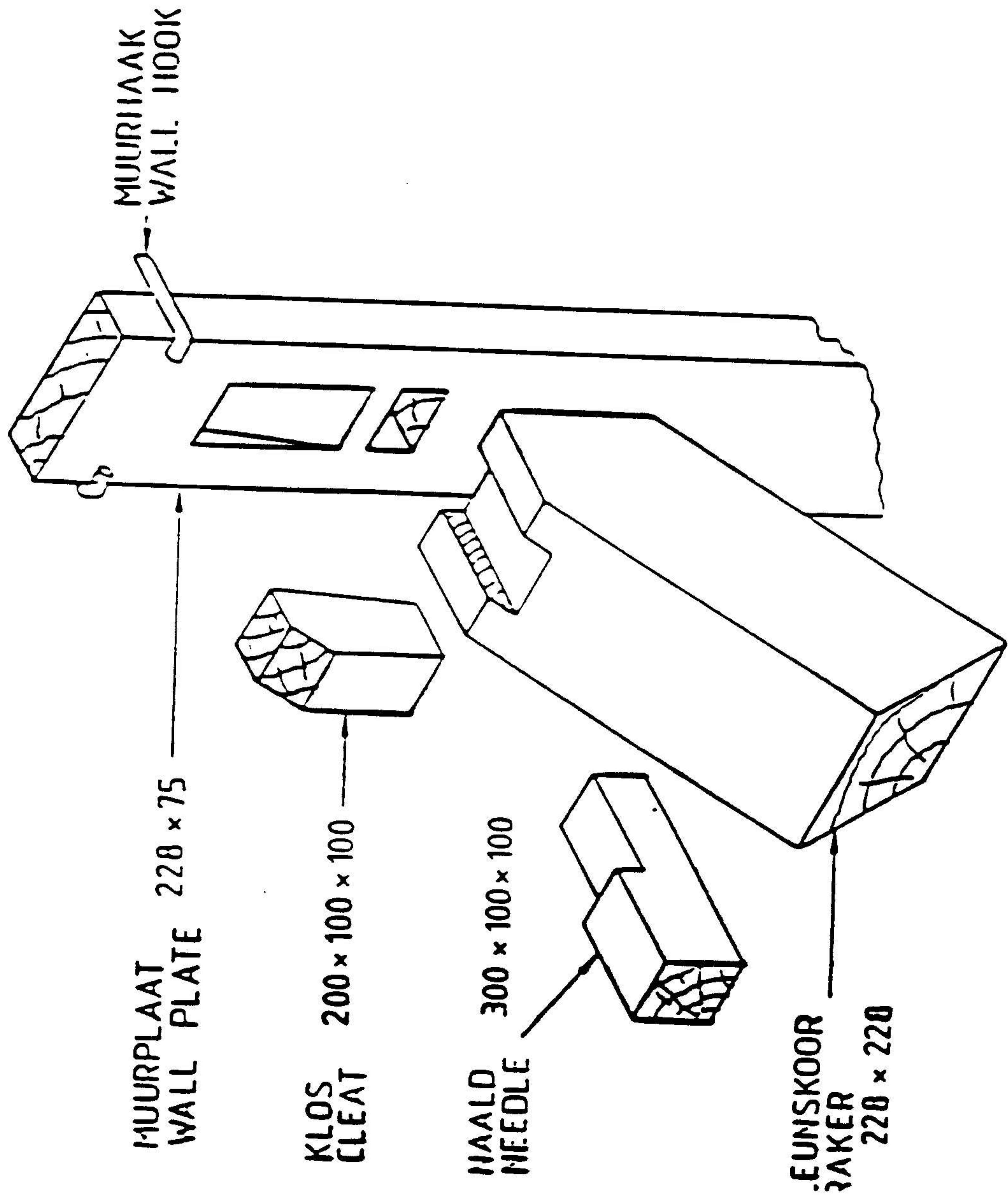
2	WALL PLATE
2	CLEAT
2	NEEDLE
2	RAKING SHORE
2	WALL HOOK
4	SOLE PLATE
2	LABELLING
2	DIMENSIONING
<u>2</u>	SCALE
20	



ENLARGED INTERSECTIONS OF RAKING SHORES

SKAAL 1:10

SCALE 1:10



LEUNSKOOR 228
RAKER

VRAAG 7 / QUESTION 7

BEREKEN LR

CALCULATE LR

L.O.M = R.O.M ✓

Neem momente om RR *Take moments about RR* ✓

$$\begin{aligned}
 10 \times LR &= (D \times 6) + (C \times 6) + (B \times 9) \\
 10 LR &= (6 \times 2) + (12 \times 6) + (4 \times 9) \\
 10 LR &= 12 + 72 + 36 \\
 10 LR &= \frac{120}{10} \\
 LR &= 12 \text{ kN}
 \end{aligned}$$

6

BEREKEN RR

CALCULATE RR

L.O.M = R.O.M ✓

Neem momente om LR *Take moments about LR* ✓

$$\begin{aligned}
 10 \times RR &= (B \times 1) + (C \times 4) + (D \times 8) \\
 10 RR &= (4 \times 1) + (12 \times 4) + (6 \times 8) \\
 10 RR &= 4 + 48 + 48 \\
 10 RR &= \frac{100}{10} \\
 RR &= 10 \text{ kN}
 \end{aligned}$$

6

TOETS / TEST

Opwaartse kragte = Afwaartse kragte ✓
Upward forces = *Downward forces*

2

$$\begin{aligned}
 12 \text{ kN} + 10 \text{ kN} &= 4 \text{ kN} + 12 \text{ kN} + 6 \text{ kN} \\
 22 \text{ kN} &= 22 \text{ kN}
 \end{aligned}$$

BEREKEN BUIGMOMENTE

CALCULATE BENDING MOMENTS

$$\begin{aligned}
 BMA &= (LR \times 0) \\
 &= 12 \times 0 \\
 &= 0 \text{ kNm}
 \end{aligned}$$

2.

$$\begin{aligned}
 BMB &= (LR \times 1) \\
 &= 12 \times 1 \\
 &= 12 \text{ kNm}
 \end{aligned}$$

2.

$$\begin{aligned}
 BMC &= (LR \times 4) - (B \times 3) \\
 &= (12 \times 4) - (4 \times 3) \\
 &= 48 - 12 \\
 &= 36 \text{ kNm}
 \end{aligned}$$

3.

$$\begin{aligned}
 BMD &= (LR \times 8) - (C \times 4) - (B \times 7) \\
 &= (12 \times 8) - (12 \times 4) - (4 \times 7) \\
 &= 96 - 48 - 28 \\
 &= 20 \text{ kNm}
 \end{aligned}$$

3.

$$\begin{aligned}
 \text{BME} &= (LR \times 10) - (D \times 2) - (C \times 6) - (B \times 9) \\
 &= (12 \times 10) - (6 \times 2) - (12 \times 6) - (4 \times 9) \\
 &= 120 - 12 - 72 - 36 \\
 &= 0 \text{ kNm}
 \end{aligned}$$

BEREKEN SKUIFKRAGTE

CALCULATE SHEAR FORCES

$$\begin{aligned}
 \text{SKA} / \text{SFA} &= LR \\
 &= 12 \text{ kN}
 \end{aligned}$$

$$\begin{aligned}
 \text{SKB} / \text{SFB} &= (LR - B) \\
 &= 12 - 4 \\
 &= 8 \text{ kN}
 \end{aligned}$$

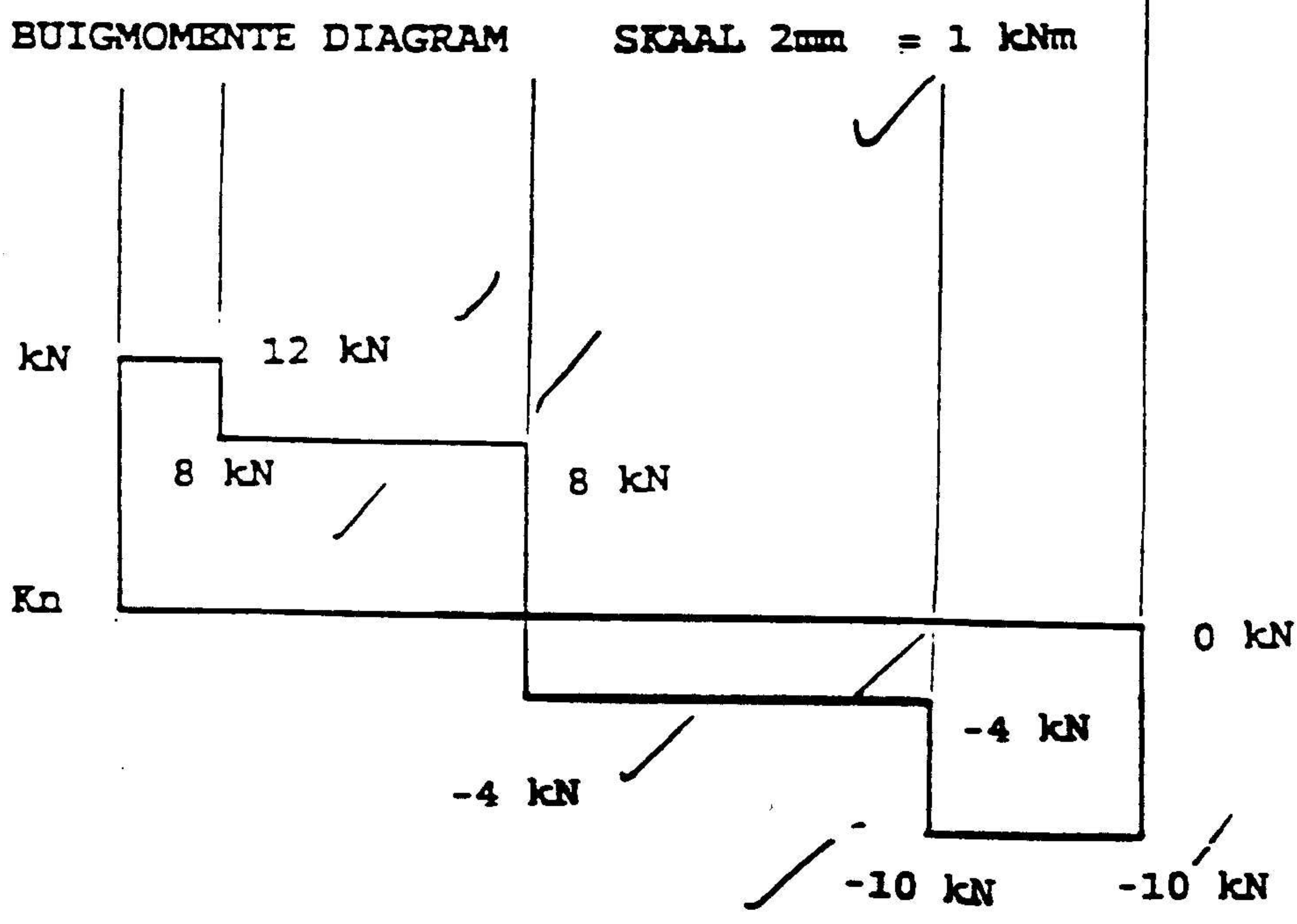
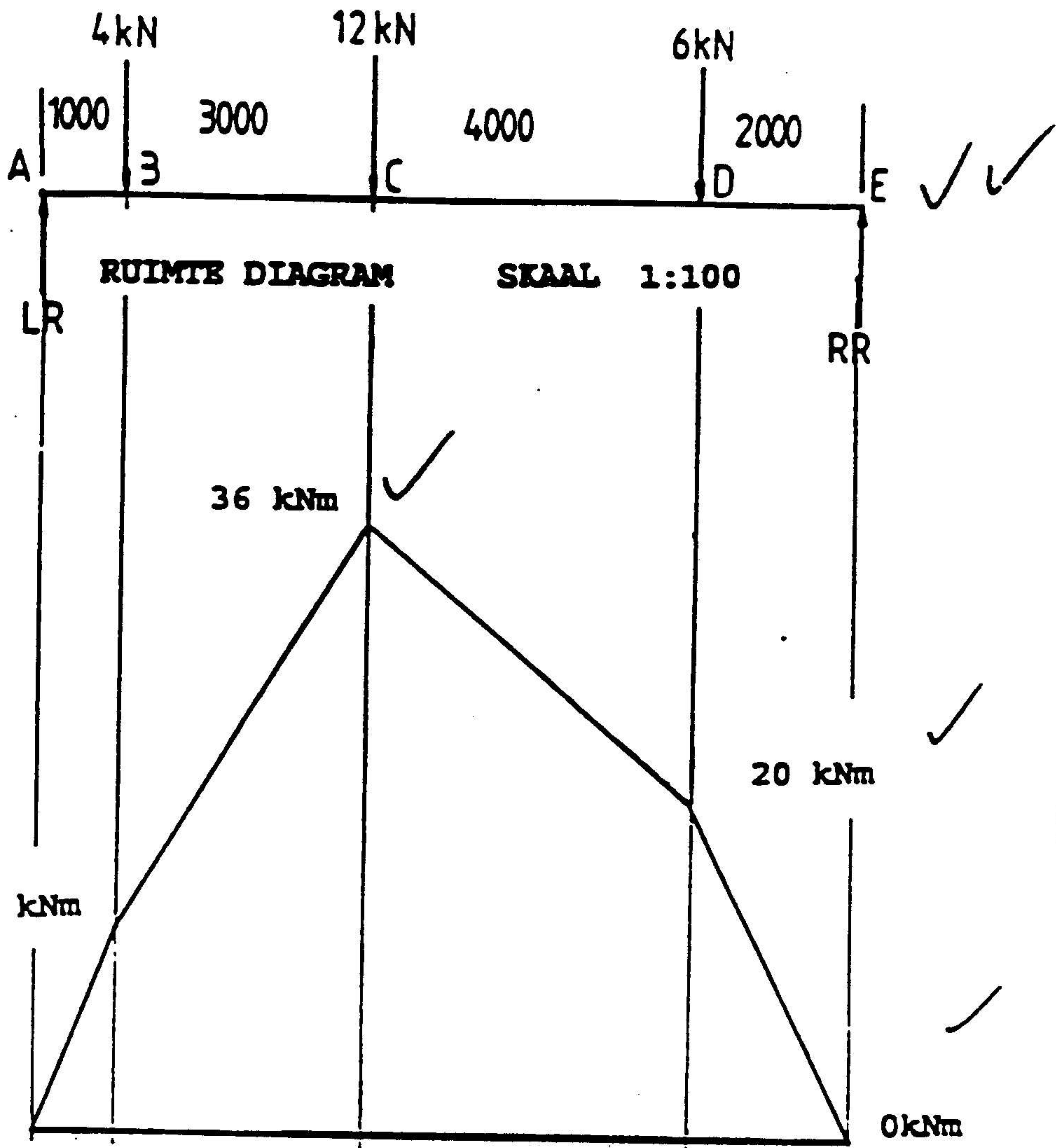
$$\begin{aligned}
 \text{SKC} / \text{SFC} &= (LR - B - C) \\
 &= 12 - 4 - 12 \\
 &= -4 \text{ kN}
 \end{aligned}$$

$$\begin{aligned}
 \text{SKD} / \text{SFD} &= (LR - B - C - D) \\
 &= (12 - 4 - 12 - 6) \\
 &= -10 \text{ kN}
 \end{aligned}$$

$$\begin{aligned}
 \text{SKE} / \text{SFE} &= (LR - B - C - D + E) \\
 &= (12 - 4 - 12 - 6 + 10) \\
 &= 0 \text{ kN}
 \end{aligned}$$

PUNTE SOOS AANGEDUI

MARKS AS SHOWN



(2)

(6)

(12)

20