GAUTENG DEPARTMENT OF EDUCATION
GAUTENGSE DEPARTEMENT VAN ONDERWYS

SENIOR CERTIFICATE EXAMINATION
SENIORSERTIFIKAAT-EKSAMEN

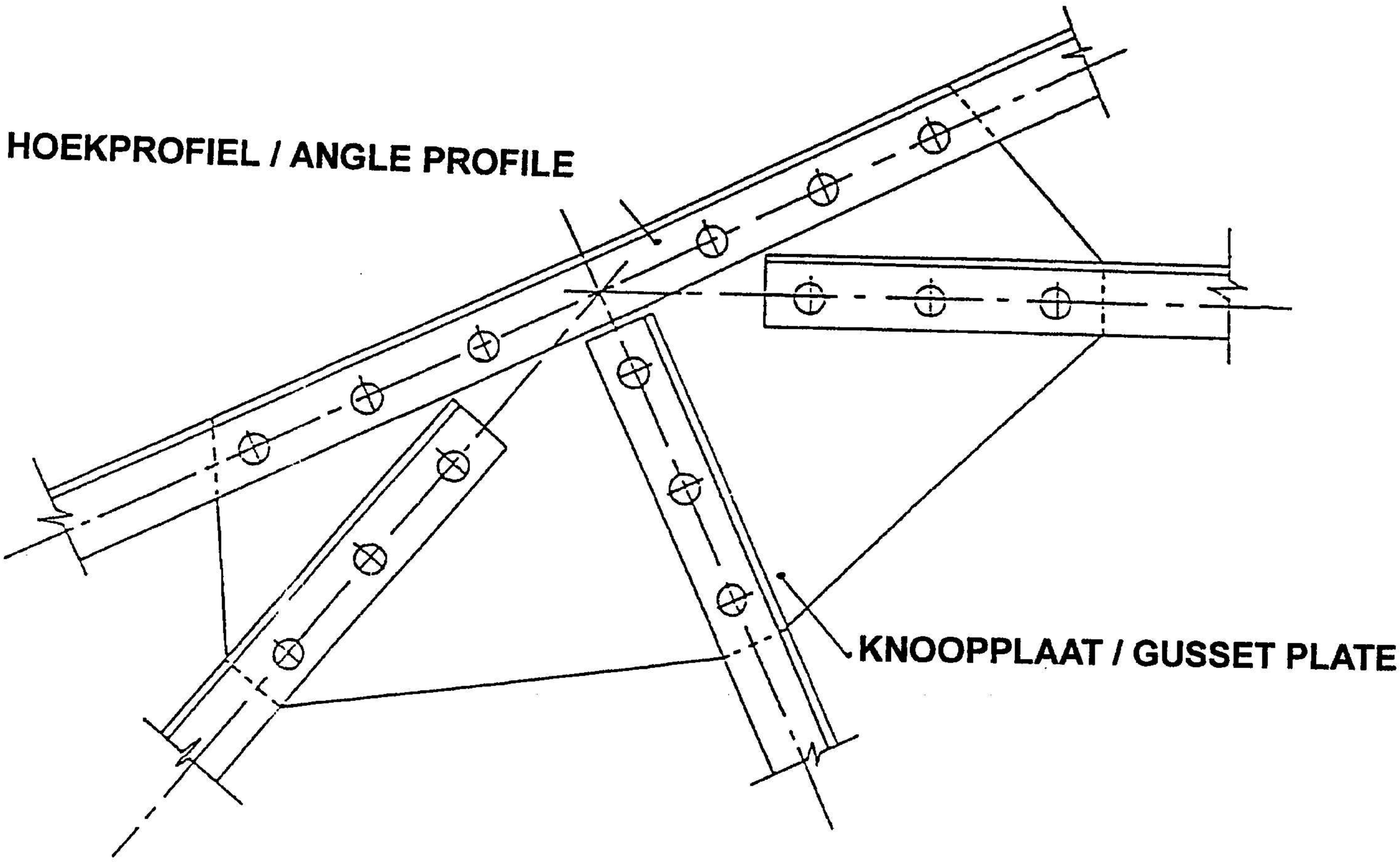
TECHNIKA (CIVIL) SG
TECHNIKA (SIVIEL) SG

QUESTION 1 / *VRAAG 1*

1.1

GUSSET PLATE		***KNOOPPLAAT***
SEAM LAP	4	*NAATRAND*
PITCH OF MAIN BEAM	4	*BOUTSTEEK HOOFSTAAF*
PITCH OF STRUTS	4	*BOUTSTEEK STUTTE*
BACK MARK MAIN BEAM	3	*KONTRAMERK HOOFSTAAF*
BACK MARK STRUTS	3	*KONTRAMERK STUTTE*
GUSSET PLATE	6	*KNOOPPLAAT*
DIMENSIONS	4	*AFMETINGS*
SCALE	4	*SKAAL*
LINEWORK	4	*LYNWERK*
NEATNESS	4	*NETHEID*
	40	

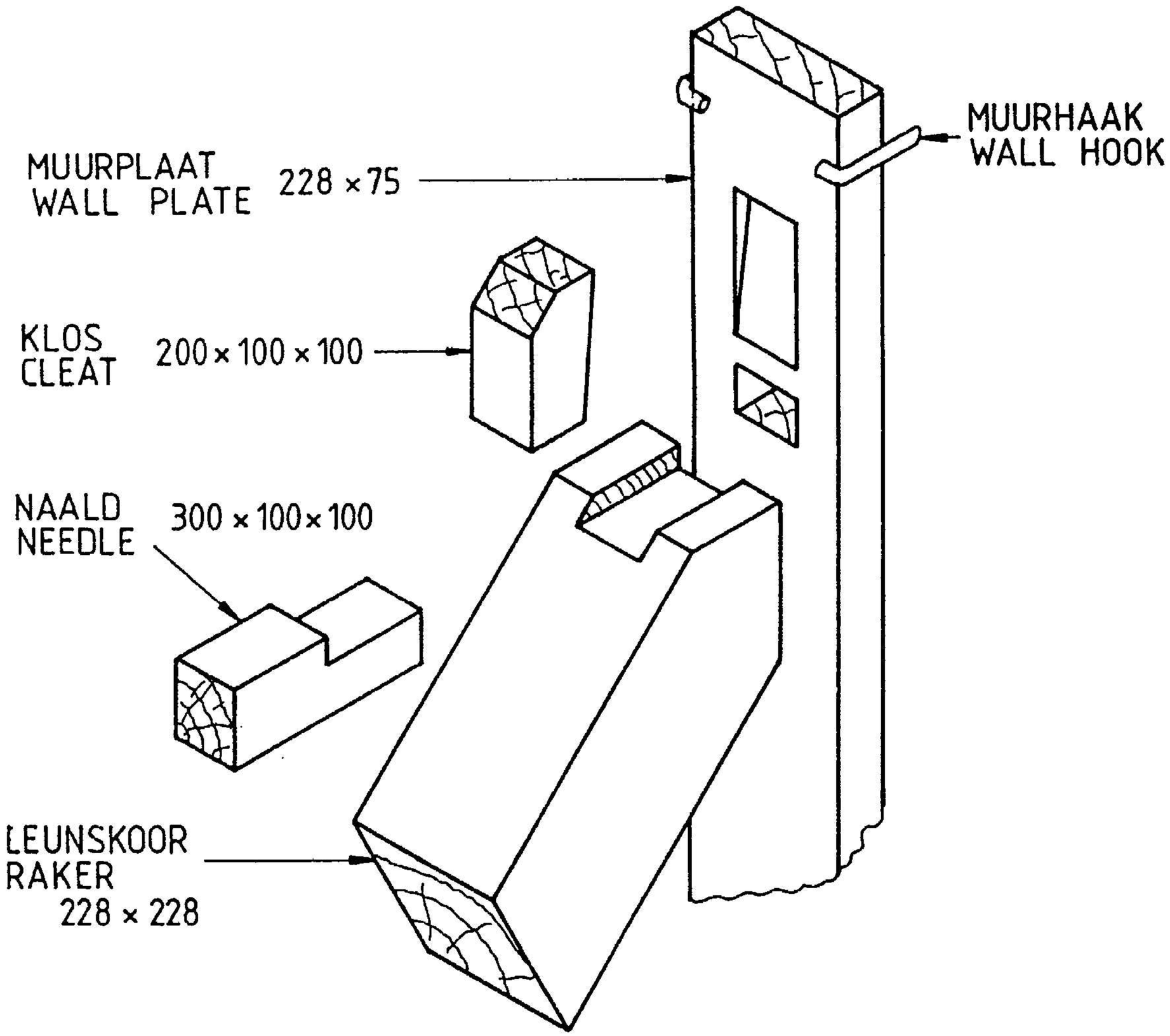
ISOMETRIC RAKING SHORE		***ISOMETRIESE LEUNSKOOR***
WALL PLATE	2	*MUURPLAAT*
CLEAT	2	*KLOS*
NEEDLE	2	*NAALD*
RAKING SHORE	2	*LEUNSKOOR*
WALL HOOK	2	*MUURHAAK*
SOLE PLATE	4	*VOETPLAAT*
LABELLING	2	*BYSKRIFTE*
DIMENSIONING	2	*AFMETINGS*
SCALE	2	*SKAAL*
	20	

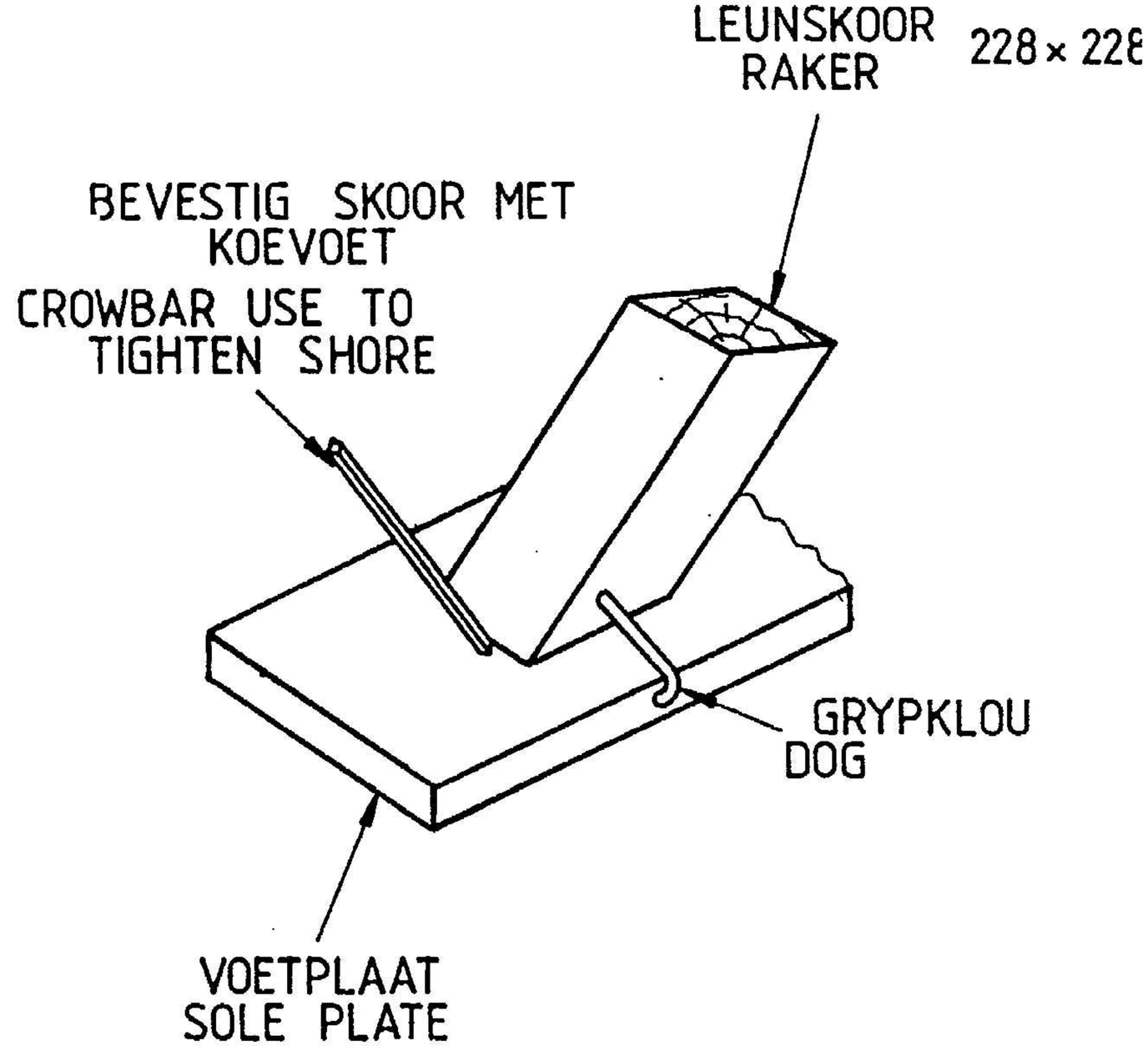

HOEKPROFIEL / ANGLE PROFILE
KNOOPPLAAT / GUSSET PLATE

VERGROTE SNITTE VAN LEUNSKORING
ENLARGED INTERSECTIONS OF RAKING SHORES

SKAAL 1:10

SCALE 1:10





QUESTION 2 / *VRAAG 2*

2.1 2.1.1 All walls, windows and doors within a radius of six metres from any sanitary fitment must be shown.
Alle mure, vensters en deure binne 'n radius van ses meter vanaf enige sanitêre toebehore (meublemente) moet getoon word.

2.1.2 All sanitary fitments
Alle sanitêre muurmeublemente

2.1.3 The fall and invert depths of the drain
Die val en bodemdieptes van die riool

2.1.4 All sanitary pipes and their sizes
Alle sanitêre pype en hulle groottes

2.1.5 All access openings such as manholes, cleaning eyes (rodding eyes), and inspection eyes
Alle toegangsopeninge soos magnate, steekoë en inspeksieoë

2.1.6 A site plan indicating the dwelling, outbuildings and the proposed drain layout
'n Terreinplan waarop die huis, buitegeboue en die voorgenome rioolaanleg aangedui is

2.1.7 Sectional views of every section of the drain, which must also show the connections to the various sanitary fitments.
Snitaansigte van elke deel van die rioleringstelsel, wat ook die aansluitings met die muurmeublemente toon. 1x7=(7)

2.2 2.2.1 Location of the stand (Environment)
Ligging van die erf (Omgewing)

2.2.2 Slope of the stand
Helling van die grond (standplaas)

2.2.3 Are municipal services available?
Is munisipale dienste beskikbaar?

2.2.4 Environmental pollution
Omgewingsbesoedeling

2.2.5 Main roads and freeways with a lot of noise
Hoofpaaie en snelweë met baie geraas

2.2.6 Formation of the soil
Grondformasie 1x5=(5)

2.3 2.3.1 It must be capable of withstanding the tensile strength without undue strain.
Dit moet in 'n staat wees om die trekspanning te weerstaan sonder enige noemenswaardige vervorming.

2.3.2 It must be of a material that can be easily bent to any required shape.
Dit moet van 'n materiaal wees wat in die nodige vorm gebuig kan word.

2.3.3 The surface of the reinforcement must be capable of developing an adequate bond between the concrete and the reinforcement to ensure that the required design tensile strength is obtained.
Die oppervlak van die bewapening moet in staat wees om 'n verband met die beton te verseker sodat die nodige ontwerp-trekspanning verkry kan word.

2.3.4 It must have a similar coefficient of thermal expansion to prevent unwanted stresses from developing within the member due to temperature changes.
Dit moet 'n gelyksoortige warmte - uitsettingskoëffisiënt hê om te verhoed dat onnodige spanning deur temperatuurverandering veroorsaak word.

2.3.5 Availability at a reasonable cost which must be adaptable to the overall design concept.
Dit moet vryelik in die handel beskikbaar wees teen billike pryse en aanpasbaar by die ontwerp wees. 1x3=(3)

2.4 2.4.1 Raking shores
Leunskore (1)

2.4.2 Dead shores
Staanskore (1)

2.4.3 Flying shoring
Lugskore (1)

ONE MARK EACH *EEN PUNT ELK.*

2.5 2.5.1 Lime
Kalk (1)

2.5.2 Sand
Sand (1)

2.5.3 Cement
Sement (1)

2.5.4 Water
Water (1)

2.6 2.6.1 Cleat
Klos

2.6.2 Needle
Naald

2.6.3 Wall-plate
Muurplaat

2.6.4 Raking shore
Leunskoor

2.6.5 Wall hook
Muurhaak

(any / *enige*) 4x1=(4)

2.7 2.7.1 Owner
Eienaar

2.7.2 The architect
Die argitek

2.7.3 Quantity surveyor
Bourekenaar

2.7.4 Engineer (Civil, Electrical, Mechanical)
Ingenieur (Siviel, Elektries, Meganies)

2.7.5 Contractor
Kontrakteur

2.7.6 Building surveyor
Bouopmeter

2.7.7 Buyer
Aankoper

2.7.8 Accountant
Rekenmeester

2.7.9 Building manager
Boubestuurder

2.7.10 General foreman
Algemene voorman

2.7.11 Trades foreman
Ambagsvoorman

2.7.12 Tradesmen and apprentices
Ambagsmanne en vakleerlinge

	2.7.13	Operators and labourers *Operateurs en arbeiders*	*(any/enige)*	9x1=(9)
2.8	2.8.1	Moisture content of the wood *Voginhoud van die hout*		(1)
	2.8.2	Defects in the wood *Defekte in hout*		(1)
	2.8.3	Lengths in which available *Lengtes waarin beskikbaar*		(1)
	2.8.4	Twisting *Buigbaarheid*		(1)
	2.8.5	Grading of wood *Gradering van die hout*		(1)
2.9	2.9.1	Glass panes *Ruite*		
	2.9.2	Mirrors *Spieëls*		
	2.9.3	Decorative wall panels *Dekoratiewe muurpanele*		
	2.9.4	Light panels *Ligpanele*		
	2.9.5	Glass bricks *Glasstene*		
	2.9.6	Lights amd lampshades *Ligte en lampskerms*	(any/*enige*)	4x1=(4)
2.10	2.10.1	Black *Swart*		(1)
	2.10.2	Brown *Bruin*		(1)
	2.10.3	Red *Rooi*		(1)
	2.10.4	Green *Groen*		(1)

2.11	2.11.1 SVP	*VLP*	(1)
	2.11.2 OVP	*LUP*	(1)
	2.11.3 WHB	*HWB*	(1)
	2.11.4 HSS	*HOWB*	(1)
	2.11.5 MSP	*WSP*	(1)
	2.11.6 WP	*VWP*	(1)
	2.11.7 ID	*BD*	(1)
	2.11.8 GT	*VV*	(1)
2.12	2.12.1 Measure horizontal angles *Horisontale hoeke te meet*		(1)
	2.12.2 Measure vertical distances *Vertikale afstande te meet*		(1)
	2.12.3 Measure horizontal distances *Horisontale afstande te meet*		(1)
	2.12.4 Measure vertical angles *Vertikale hoeke te meet*		(1)

QUESTION 3 / *VRAAG 3*

A	B	C	D
			Substructure centre line / *Onderbou hartlyn*
			2 x 6 000 = 12 000 mm
			2 x 7 000 = 14 000 mm
			26 000 mm
			Minus 4 x 330 = 1 320 mm
			24 680 mm
			The centre line is / *Die hartlyn is* 24 680 m
			Height of the substructure is 450 mm
			Hoogte van die onderbou is 450 mm
			50 bricks per square metre for a half-brick wall
			50 stene per vierkante meter vir 'n halfsteenmuur
			There are 3 half-brick walls.
			Daar is 3 halfsteenmure.
1/	24.68 0,45 11,106	11,106 m	
3/	11,106 50 555,3	1665,9	1666 bricks are required. *Daar is 1666 stene nodig.*
			Superstructure centre line / *Bobou hartlyn*
			2 x 6 000 = 12 000 mm
			2 x 6 000 = 14 000 mm
			26 000 mm
			Minus 4 x 220 = 880 mm 25 120 mm
			The centre line is / *Die hartlyn is* 25,12 m
			Height of the superstructure is 2 800 mm.
			Hoogte van die bobou is 2 800 mm.
			50 bricks per square metre for a half-brick wall
			50 stene per vierkante meter vir 'n halfsteenmuur
			There are 2 half-brick walls.
			Daar is 2 halfsteenmure.
1/	25,12 2,8 70,336	70,336	
2/	70,336 50 3516,8	7033,6	7 034 bricks are required. *Daar is 7 034 stene nodig.*

			Beam filling centre line / *Balkvulling hartlyn*
			2 x 6 000 = 12 000 mm
			2 x 6 000 = 14 000 mm
			26 000 mm
			Minus 4 x 110 = 440 mm
			25 560 mm
			The centre line is / *Die hartlyn is* 25,56 m
			Height of the beam filling is 225 mm.
			Hoogte van die balkvulling is 225 mm.
			50 bricks per square metre for a half-brick wall
			50 stene per vierkante meter vir 'n halfsteenmuur
			There is 1 half-brick wall(s).
			Daar is 1 halfsteenmure.
1/	25,56 0,225 5,751	5,751 m	
1/	5,751 50 287,5	288	288 bricks are required *Daar is 288 stene nodig*
			Inner wall centre line / *Binnemuur hartlyn*
			1 x 5 000 = 5 000
			The centre line is / *Die hartlyn is* 5,0 m
			Height of the superstructure is 2 800 mm.
			Hoogte van die bobou is2 800 mm.
			50 bricks per square metre for a half-brick wall
			50 stene per vierkante meter vir 'n halfsteenmuur
			There is 1 half-brick walls.
			Daar is 1 halfsteenmuur/ -mure.
1/	5,00 2,8 14	14	
1/	14		700 bricks are required.
	50	700	Daar is 700 stene nodig.
	700		
			Total for structure without deductions
			Totaal vir struktuur sonder aftrekkings
			Substructure/ *Onderbou* 1 666
			Superstructure / *Bobou* 7 034
			Beam filling / *Balkvulling* 288
			Inner wall / *Binnemuur* 700
			9 688 Bricks / *Stene*

			Deductions / *Aftrekkings*
			Doors / *Deure*
			2 x 2 x 0,9
			50 bricks per square metre for a half-brick wall
			50 stene per vierkante meter vir 'n halfsteenmuur
			There are 3 half-brick walls.
			Daar is 3 halfsteenmure.
2/	2 0,9 3,6	3,6 m	
[ ] /	3,6 50 180	540	There are 540 bricks. *Daar is 540 stene.*
			Windows / *Vensters*
			Window / *Venster* A
			2 x 2 x 1.5
			50 bricks per square metre for a half-brick wall
			50 stene per vierkante meter vir 'n halfsteenmuur
			There are 2 half-brick walls.
			Daar is 2 halfsteenmure.
2/	2		
	1,5	6 m	
	3		
2/	6		There are 600 bricks.
	50	600	*Daar is 600 stene.*
	300		
			Window / *Venster* B
			3 x 0.900 x 1.5
			50 bricks per square metre for a half-brick wall
			50 stene per vierkante meter vir 'n halfsteenmuur
			There are 2 half-brick walls.
			Daar is 2 halfsteenmure.
3/	0.9		
	1.5	4,05 m	
	1.35		
2/	4,05		There are 405 bricks.
	50	405	*Daar is 405 stene.*
	202,5		

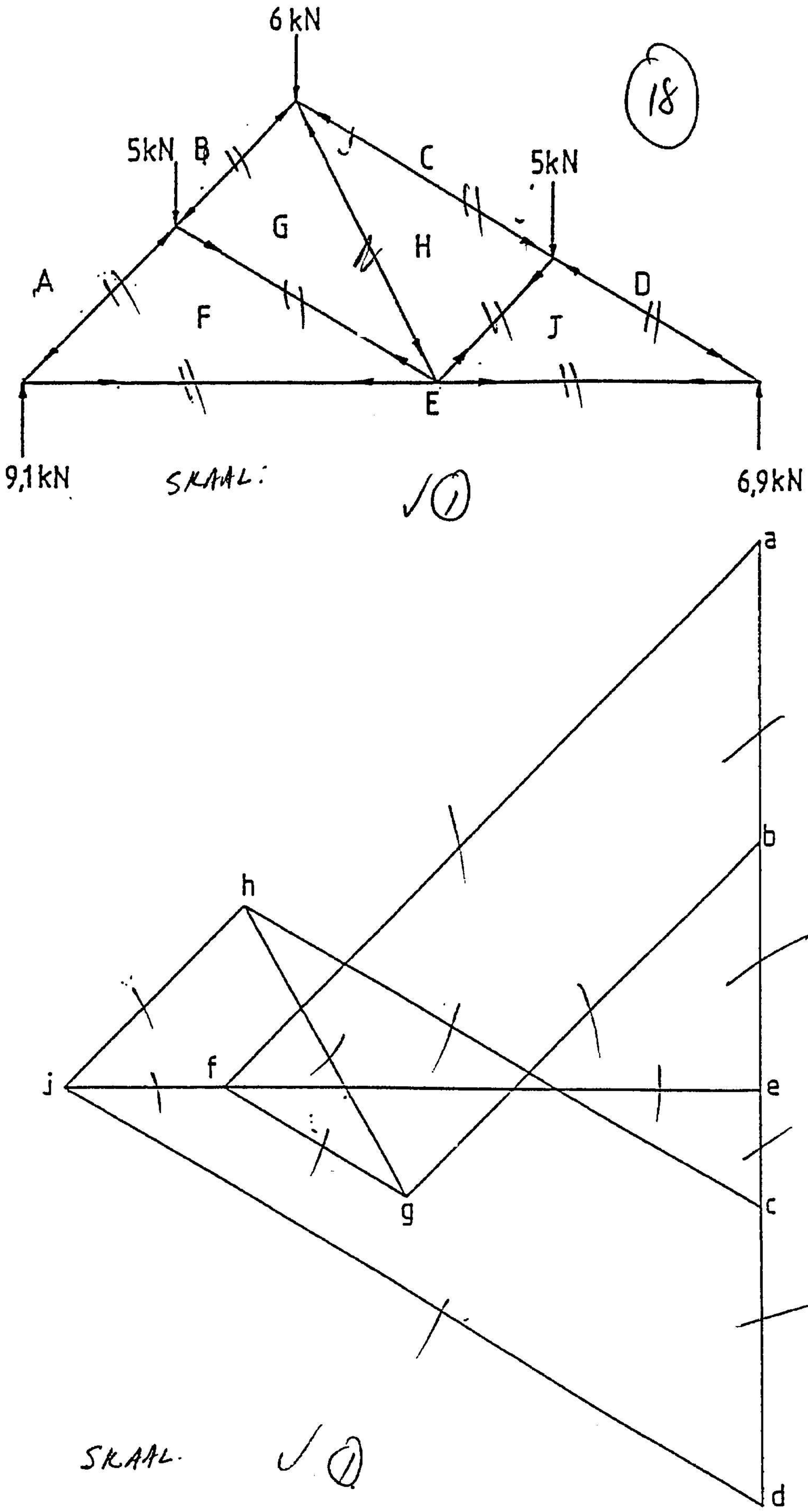
			Total Deductions / *Totale aftrekkings*
			Doors / *Deure* 540
			Windows / *Vensters* 1 005
			1 545 Bricks / *Stene*
			Total bricks for the structure
			Totale stene vir die struktuur
			Structure / *Struktuur* 9 688
			Deductions / *Aftrekkings* 1 545
			8 141
			Plus 6 % Wastage / *Vermorsing*
			8 141
			x 0,06
			488,5
			8141
			plus 489
			8 630
			8 630 bricks will be required for the structure.
			Daar sal 8 630 stene nodig wees vir die struktuur.

QUESTION 4 / *VRAAG 4*

4.3

MEMBER *ONDERDEEL*	MAGNITUDE *GROOTTE*	NATURE *AARD*
JE	11.7 kN	TIE / *STANG*
AF	12,8 kN	STRUT / *STUT*
HJ	4,2 kN	TIE / *STANG*
BG	8,2 kN	STRUT / *STUT*
GH	5,5 kN	STRUT / *STUT*
CH	10,0 kN	STRUT / *STUT*
DJ	13,5 kN	STRUT / *STUT*
FE	9,1 kN	TIE / *STANG*
GF	3,5 kN	TIE / *STANG*

[60]



18

SKAAL:

✓ (1)

13

SKAAL.

✓ (1)

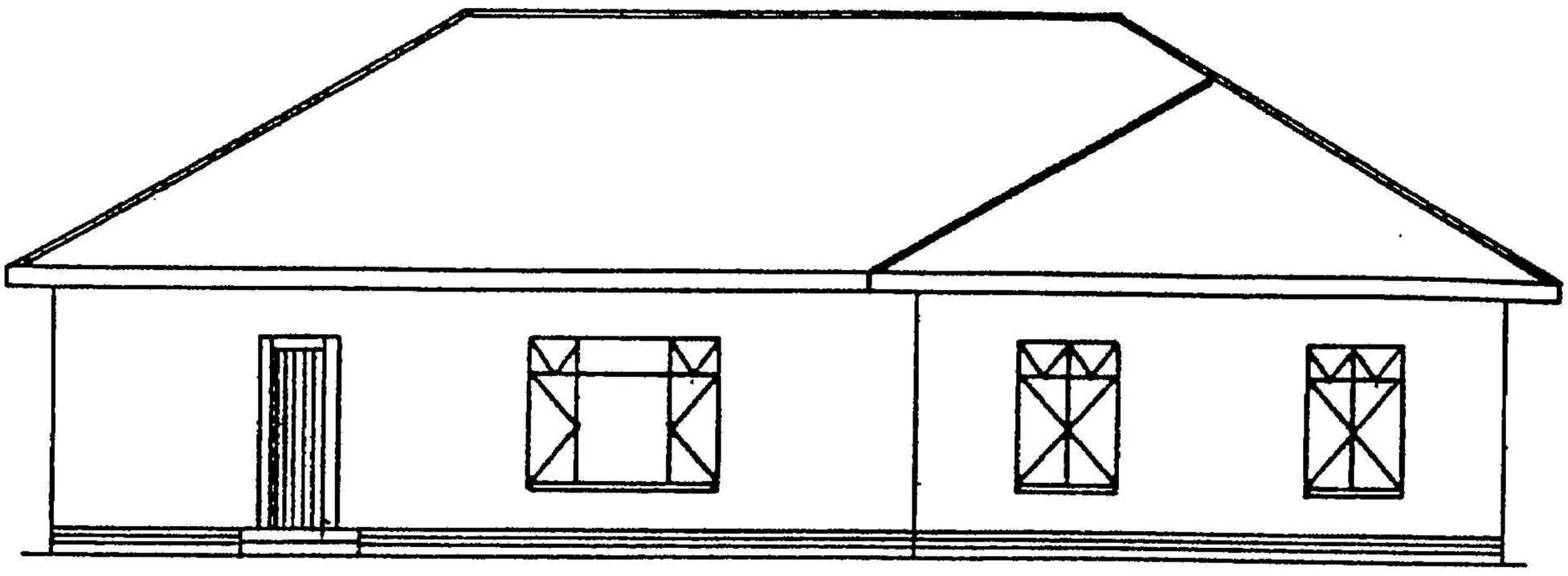
QUESTION 5 / *VRAAG 5*

1.1

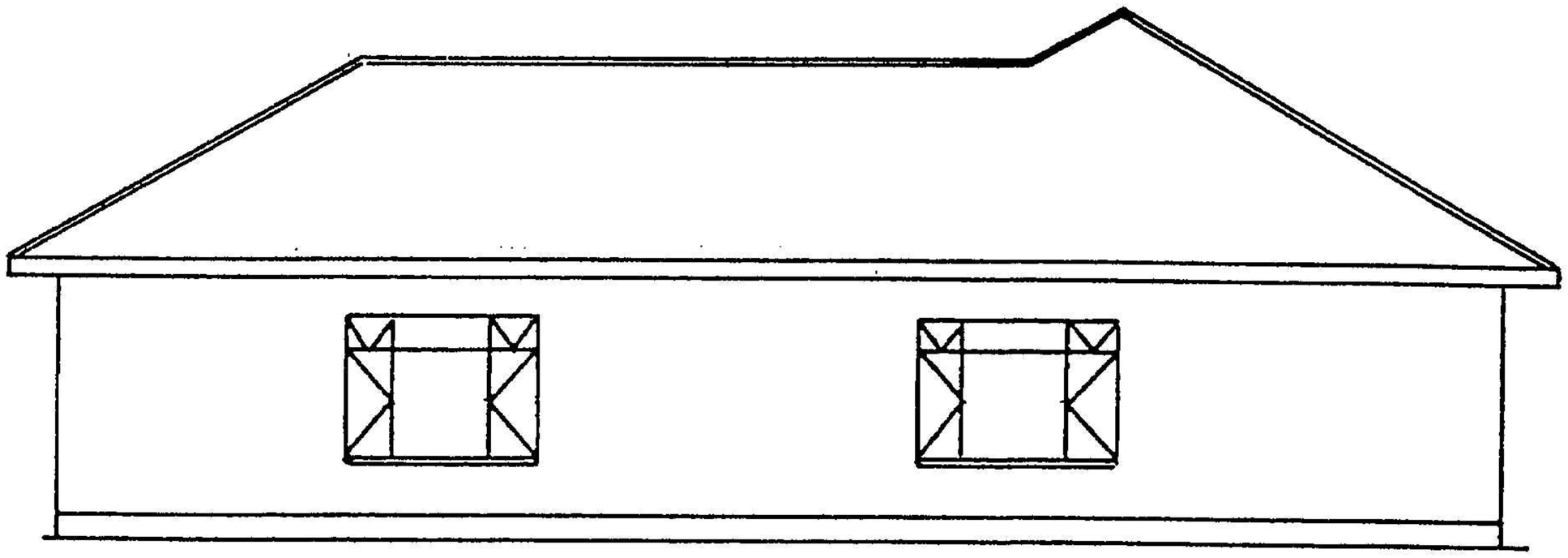
SOUTH ELEVATION		***SUIDAANSIG***
DETERMINE ROOF HEIGHT	2	*DAKHOOGTE BEPALING*
SUBSTRUCTURE	2	*ONDERBOU*
SUPERSTRUCTURE	2	*BOBOU*
WINDOW PLACING	2	*VENSTERPLASING*
WINDOW OPENERS	2	*VENSTER OOPMAKERS*
WINDOW SILLS	2	*VENSTERBANKE*
DOWNPIPES	2	*AFLEIPYPE*
GUTTER	2	*GEUT*
FASCIA BOARD	2	*FASSIEPLANK*
ROOF CONSTRUCTION	2	*DAKKONSTRUKSIE*
RIDGE CAPPING	2	*NOKPLAAT*
DOOR	2	*DEUR*
DOOR FRAME	2	*DEURRAAM*
STEP	2	*TRAPPIE*
OVERHANG	2	*OORHANG*
LINEWORK	2	*LYNWERK*
NEATNESS	2	*NETHEID*
SCALE	2	*SKAAL*
	36	

EAST ELEVATION		***OOSAANSIG***
SUBSTRUCTURE	2	*ONDERBOU*
SUPERSTRUCTURE	2	*BOBOU*
WINDOW PLACING	2	*VENSTERPLASING*
WINDOW OPENERS	2	*VENSTER OOPMAKERS*
WINDOW SILLS	2	*VENSTERBANKE*
GUTTER	2	*GEUT*
DOWNPIPES	2	*AFLEIPYPE*
OVERHANG	2	*OORHANG*
ROOF CONSTRUCTION	2	*DAKKONSTRUKSIE*
NEATNESS	2	*NETHEID*
SCALE	2	*SKAAL*
LABELS	2	*BYSKRIFTE*
	20	

[60]

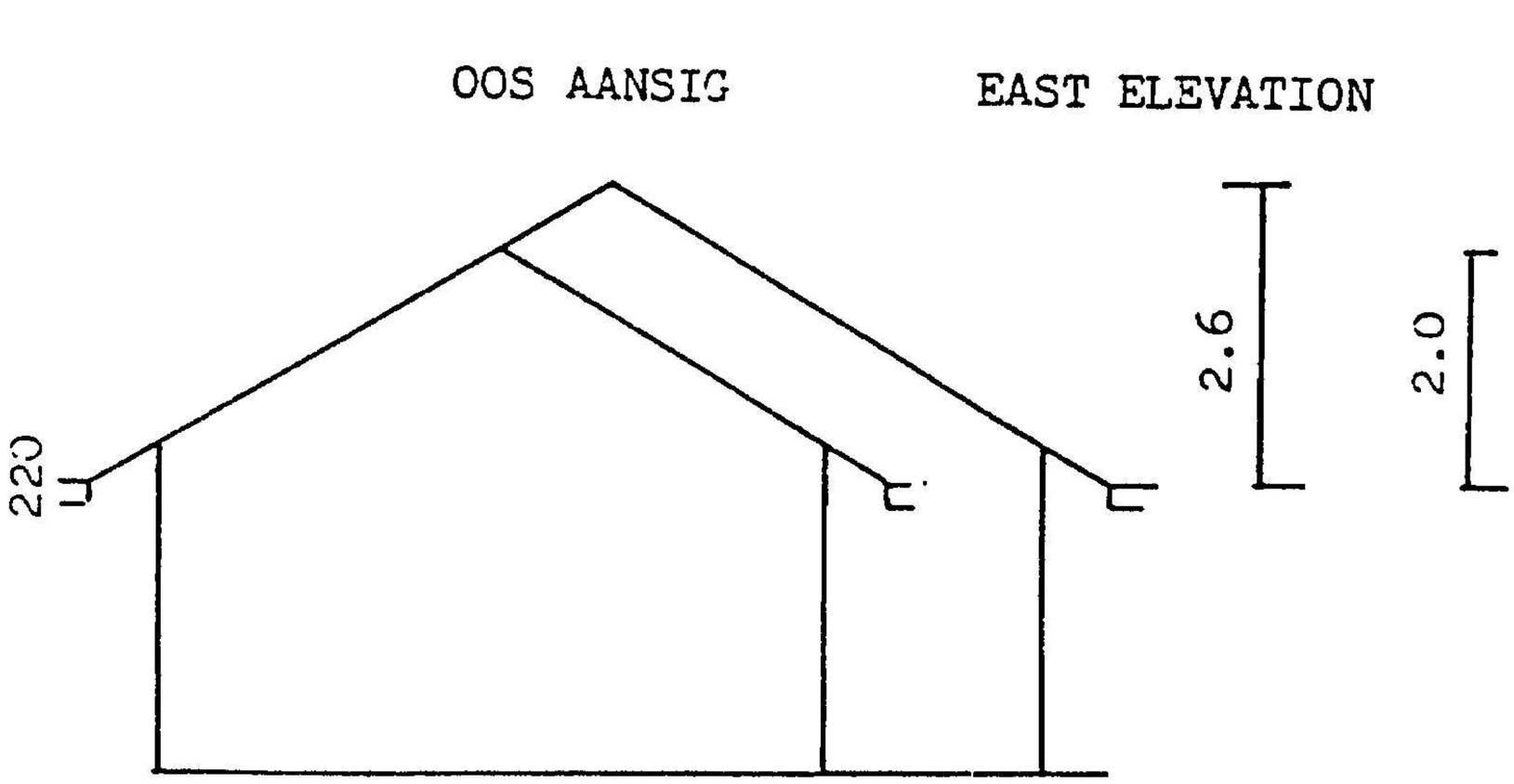


SUID AANSIG
SOUTH ELEVATION



OOS AANSIG

EAST ELEVATION



QUESTION 6 / *VRAAG 6*

6.1

Longitudinal section through beam		***Lengtesnit deur balk***
Vertical section correct	2	*Vertikale snit korrek*
Main bars placed correctly	2	*Hoofstawe korrek geplaas*
Shear bars correctly placed	2	*Skuifstawe korrek geplaas*
Anchor bars correct	2	*Ankerstawe korrek*
Stirrups correctly placed	4	*Beuels korrek geplaas*
Scale	2	*Skaal*
Neatness	2	*Netheid*
Dimensions	2	*Afmetings*
Line work	2	*Lynwerk*
	20	

6.1

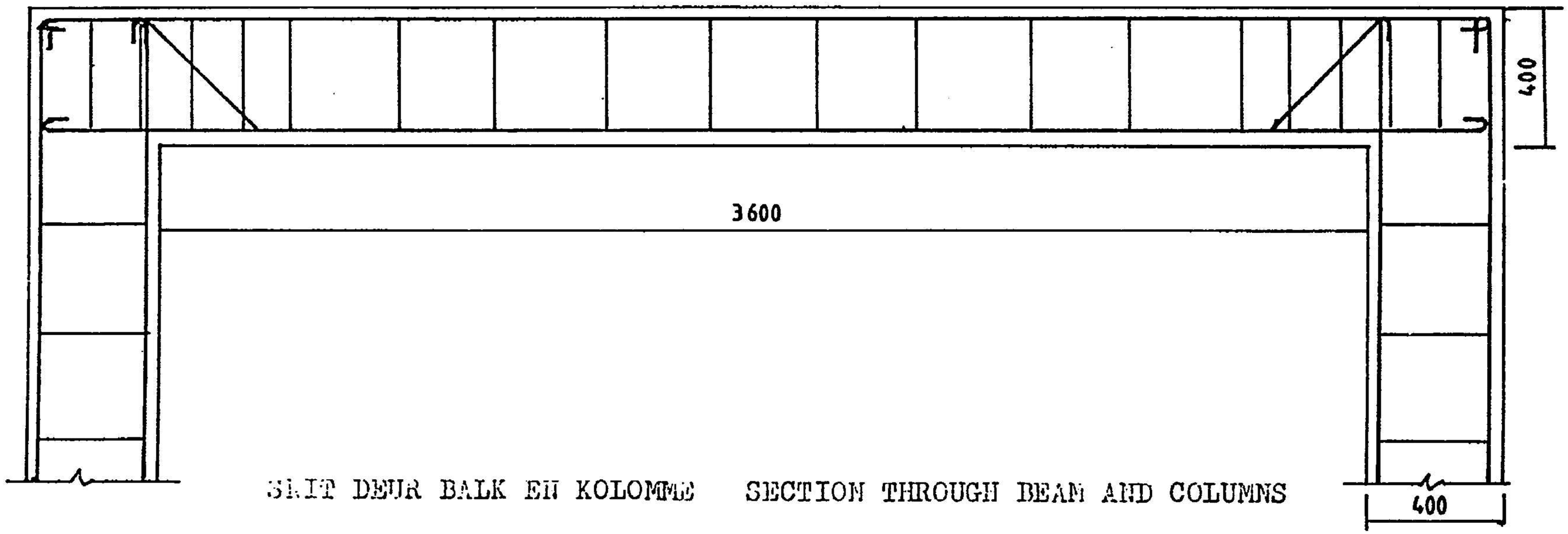
Longitudinal section through columns		***Lengtesnit deur kolomme***
Vertical section correct	2	*Vertikale snit korrek*
Main bars correct	2	*Hoofstawe korrek geplaas*
Stirrups correct	2	*Beuels korrek*
Joining at beam correct	2	*Aansluitings by balk korrek*
Labels	2	*Byskrifte*
Dimensions	2	*Afmetings*
Scale	2	*Skaal*
Line work	2	*Lynwerk*
	16	

6.2

Vertical section through middle of beam		***Vertikale snit deur middel van balk***
Main bars shown	2	*Hoofstawe getoon*
Stirrups shown	2	*Beuels getoon*
Anchor bars shown correctly	2	*Ankerstawe korrek*
Shear reinforcement shown	2	*Skuifbewapening getoon*
Neatness	2	*Netheid*
Scale	2	*Skaal*
	12	

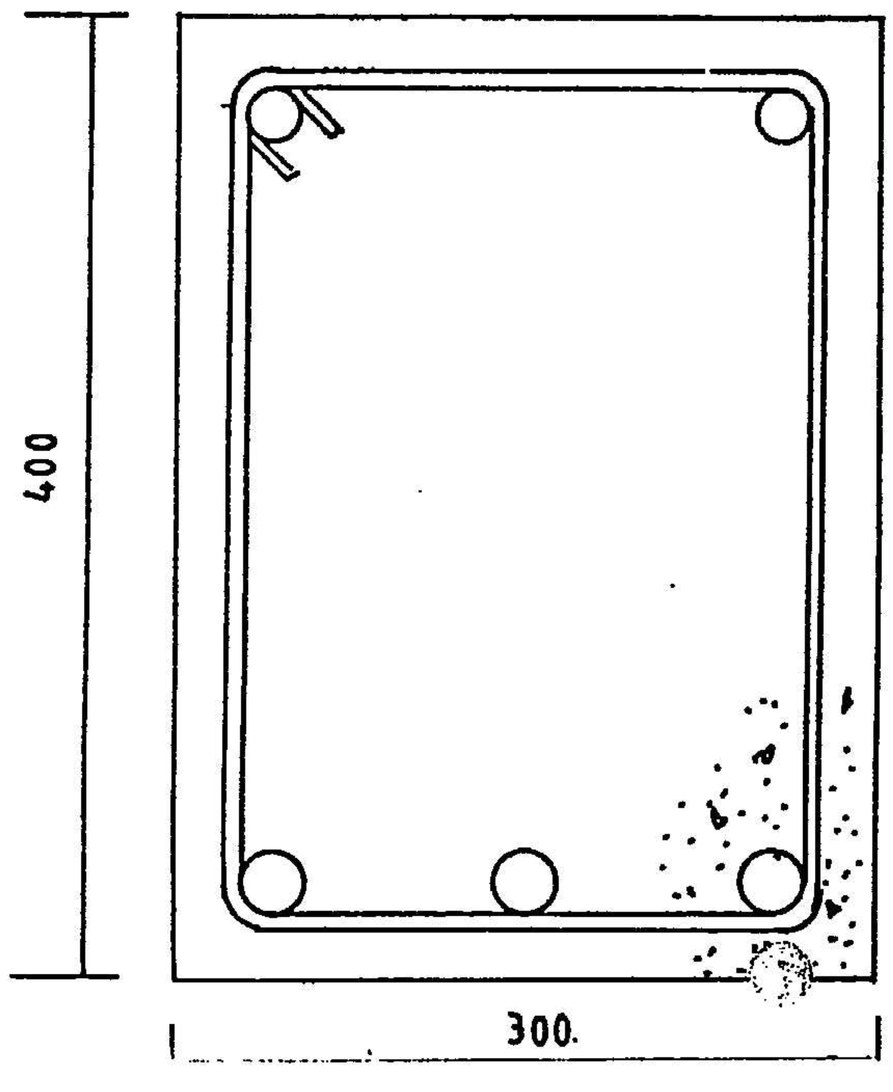
6.3

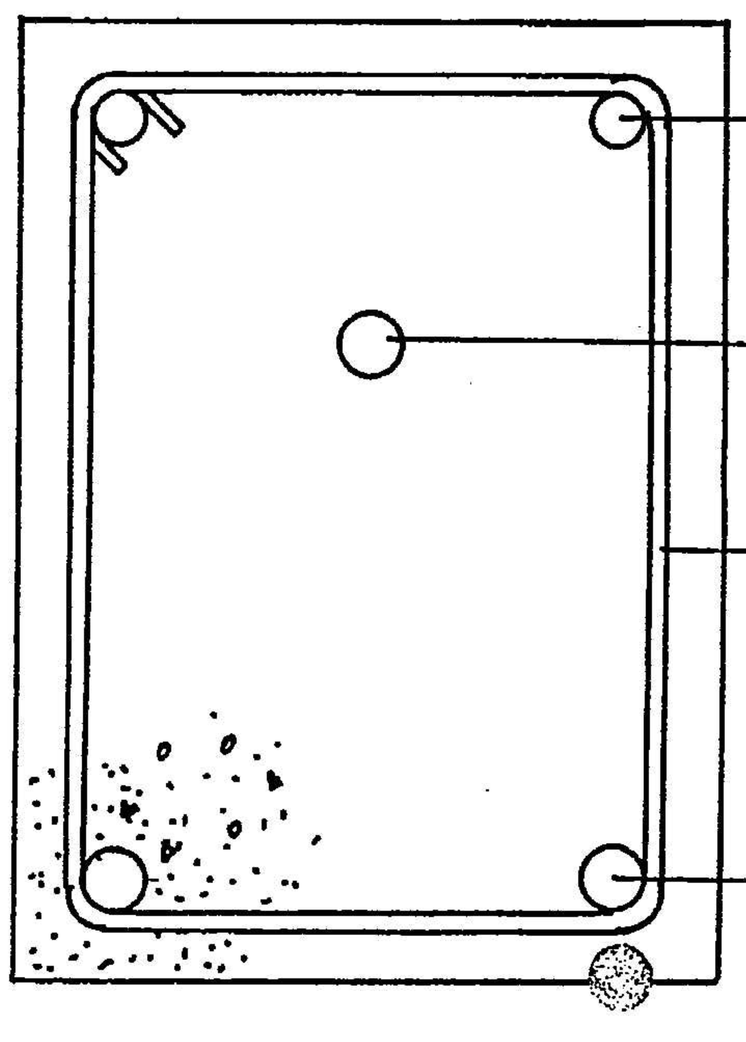
Section through beam at right-hand side		***Snit deur balk by regterkant***
Concrete cover	2	*Betondekking*
Main bars shown	2	*Hoofstawe getoon*
Shear reinforcement	2	*Skuifbewapening getoon*
Anchor bars shown	2	*Ankerstawe getoon*
Stirrups	2	*Beuels*
Labels	2	*Byskrifte*
	12	



SNIT DEUR BALK EN KOLOMME SECTION THROUGH BEAM AND COLUMNS

Skaal 1:20
Scale





Ankerstawe/Anchor Bars

Skuifwapening
Shear reinforcing

Beuels/Stirrups

Hoofstawe
Main Bars

Skaal 1:5

QUESTION 7 / *VRAAG 7*

7.1

Calculate P / ***Bereken P***

Take moments about Q / *Neem momente om Q*

ROM = *LOM*

P x 8 = (4 x 2) + (3 x 4) + (5 x 6)
8P = 8 + 12 + 30
8P = 50
P = 50/8
P = 6,25 kN

Calculate Q / ***Bereken Q***

Take moments about P / *Neem momente om P*

Q x 8 = (5 x 2) + (3 x 4) + (4 x 6)
8Q = 10 + 12 + 24
8Q = 46
Q = 46/8
Q = 5,75 kN

Test / *Toets*

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

6,25 kN + 5,75 kN = 5 kN + 3 kN + 4 kN
12 kN = 12 kN

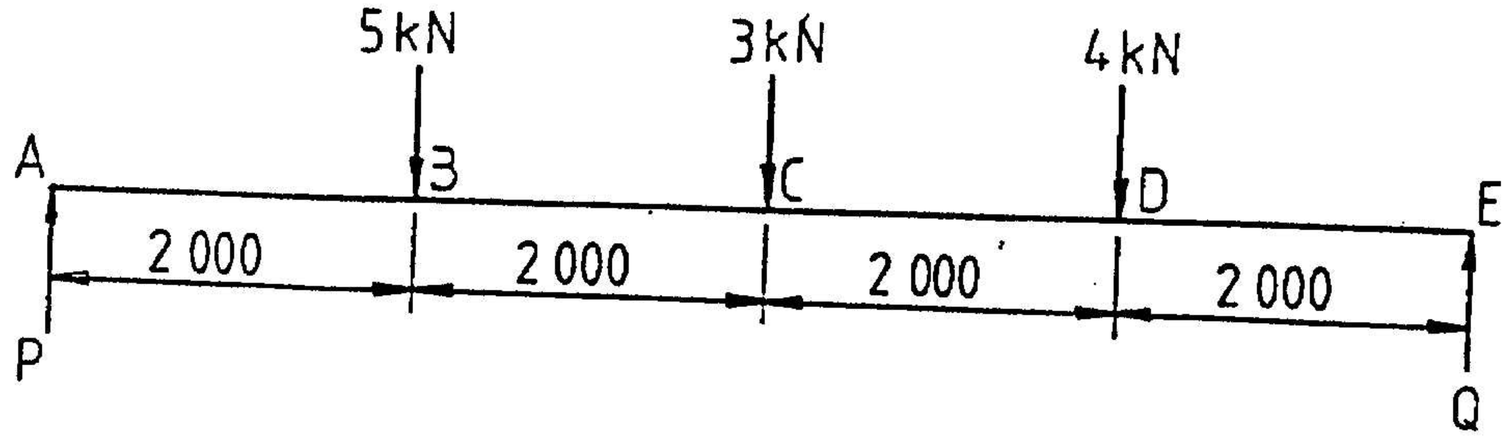
BMB = 6.25 x 2 = **12,5 kNm**
BMA = 6.25 x 0 = **0 kNm**

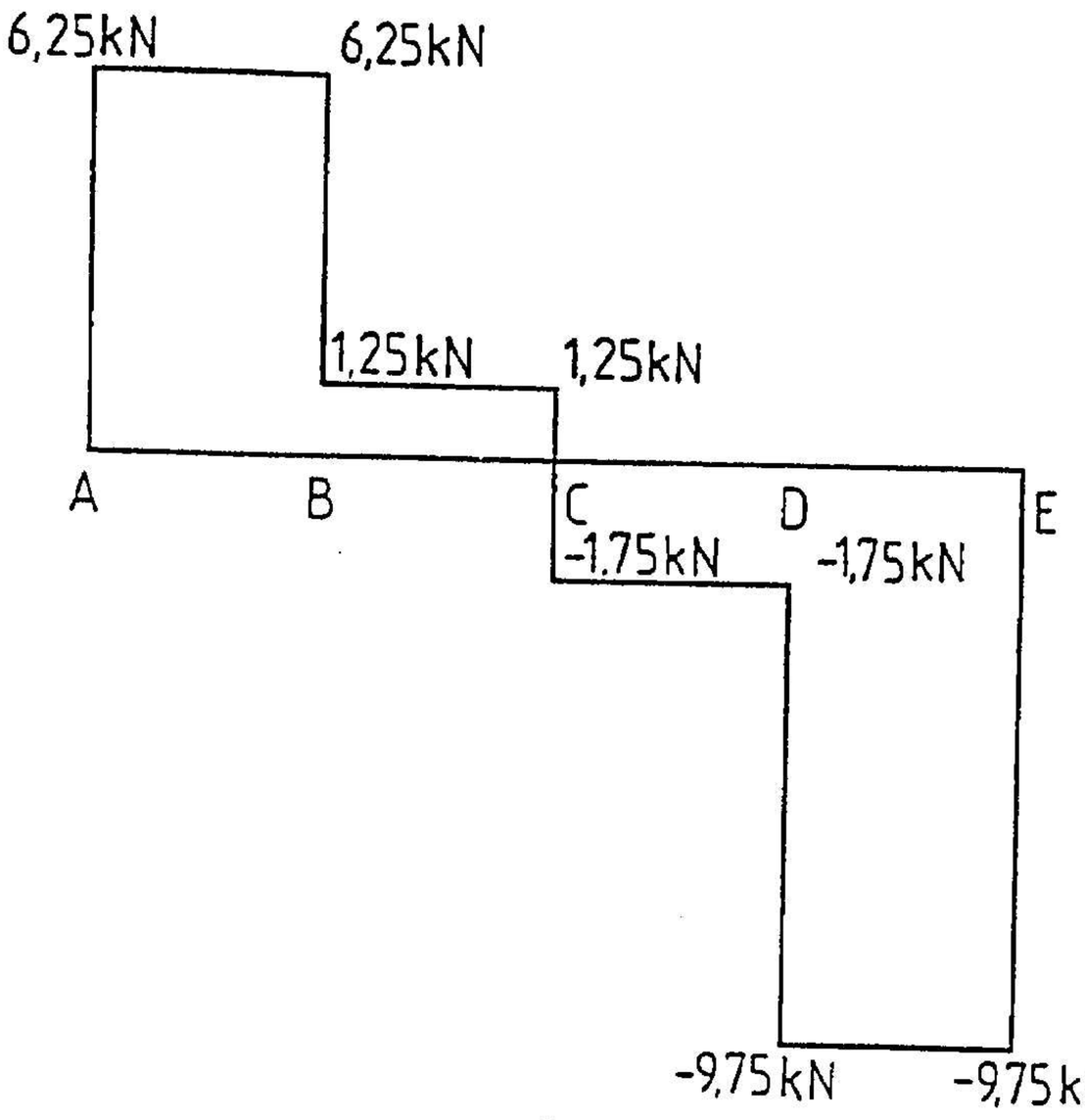
BMD = (6,25 x 6) – (3 x 2) – (5 x 4)
BMC = (6,25 x 4) – (5 x 2)

BME = (6,25 x 8) – (4 x 2) – (3 x 4) – (5 x 6)
= 50 – 8 – 12 – 30
= **0 kNm**

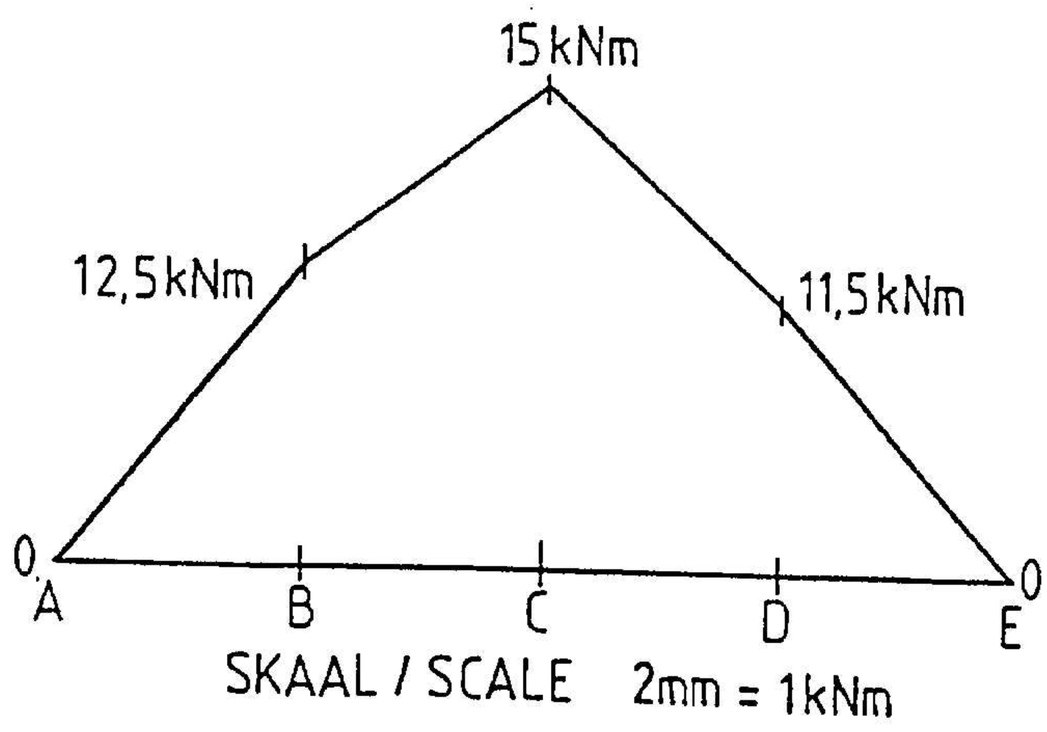
CALCULATE SHEAR FORCES *BEREKEN SKUIFKRAGTE*

SFA	*SKA*	=	**6,25 Kn**
SFB-	*SKB-*	=	**6,25 kNm**
SFB+	*SKB+*	=	(6,25 – 5) **1,25 kNm**
SFC-	*SKC-*	=	(6,25 – 5) **1,25 kNm**
SFC+	*SKC+*	=	(6,25 – 5 – 3) – **1,75 kNm**
SFD-	*SKD-*	=	(6,25 – 5– 3) – **1,75 kNm**
SFD+	*SKD+*	=	(6,25 – 5– 3 – 8) – **9,75 kNm**
SFE-	*SKE-*	=	(6,25 – 5– 8) – **9,75 kNm**
SFE+	*SKE+*	=	(6,25 – 5– 8 + 5,75) **0 kNm**





SKAAL / SCALE 5mm = 1kN



SKAAL / SCALE 2mm = 1kNm