

**GAUTENG DEPARTMENT OF EDUCATION  
GAUTENGSE DEPARTEMENT VAN ONDERWYS  
SENIOR CERTIFICATE EXAMINATION  
SENIORSERTIFIKAAT-EKSAMEN**

**WELDING AND METALWORKING SG  
SWEIS- EN METAALBEWERKING**

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**QUESTION / VRAAG 1**

1.1	1.1.1	TRUE	WAAR
	1.1.2	FALSE	ONWAAR
	1.1.3	TRUE	WAAR
	1.1.4	TRUE	WAAR
	1.1.5	TRUE	WAAR
	1.1.6	TRUE	WAAR
	1.1.7	FALSE	ONWAAR
	1.1.8	TRUE	WAAR
	1.1.9	TRUE	WAAR
	1.1.10	FALSE	ONWAAR
	1.1.11	TRUE	WAAR
	1.1.12	FALSE	ONWAAR
	1.1.13	FALSE	ONWAAR
	1.1.14	FALSE	ONWAAR
	1.1.15	FALSE	ONWAAR

(15)

- 1.2 1.2.1 H
- 1.2.2 T
- 1.2.3 J
- 1.2.4 Q
- 1.2.5 A
- 1.2.6 B
- 1.2.7 P
- 1.2.8 O
- 1.2.9 N
- 1.2.10 C
- 1.2.11 D
- 1.2.12 S
- 1.2.13 R
- 1.2.14 E
- 1.2.15 F
- 1.2.16 L
- 1.2.17 G
- 1.2.18 I
- 1.2.19 K
- 1.2.20 M

(20)

- 1.3 1.3.1 D
- 1.3.2 C
- 1.3.3 B
- 1.3.4 A
- 1.3.5 D

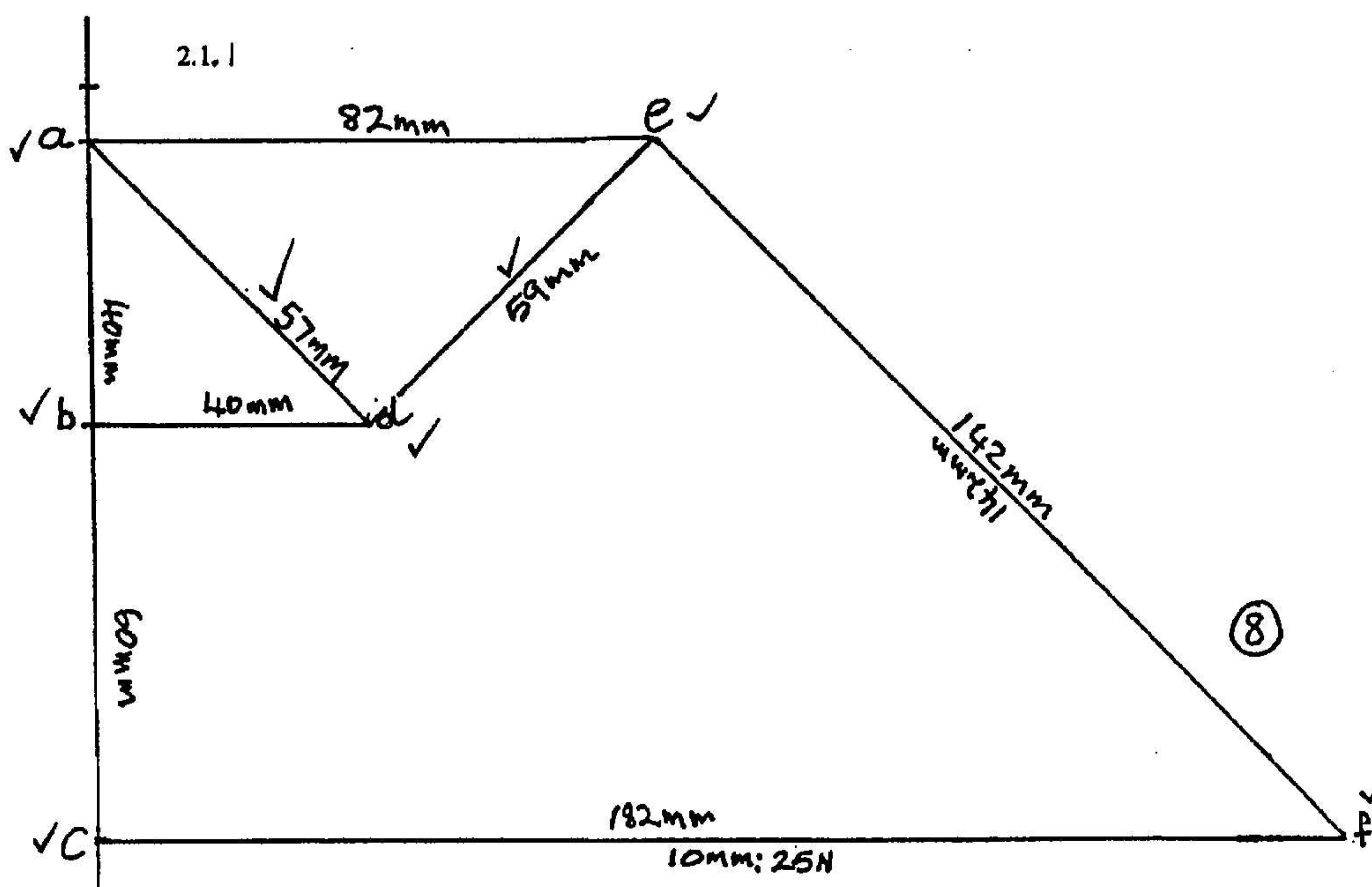
(5)

TOTAL FOR QUESTION 1 (COMPULSORY): /  
TOTAAL VIR VRAAG 1 (VERPLIGTEND):

[40]

QUESTION / VRAAG 2

2.1.1



2.1.2

MEMBER ONDERDEEL	MEASUREMENT AFMETING	TIE SPANBALK	STRUT STUTBALK
DA	57 mm	142,5 N	
DB	40 mm		100 N
DE	59 mm		145,5 N
FE	142 mm	355 N	
FC	182 mm		455
EA	82 mm	205 N	

Turn Scale around  
*Draai skaal om*  
 $\frac{25\text{N}}{10\text{mm}} \times \frac{\text{Force / Krag}}{1}$

(12)

2.1.3

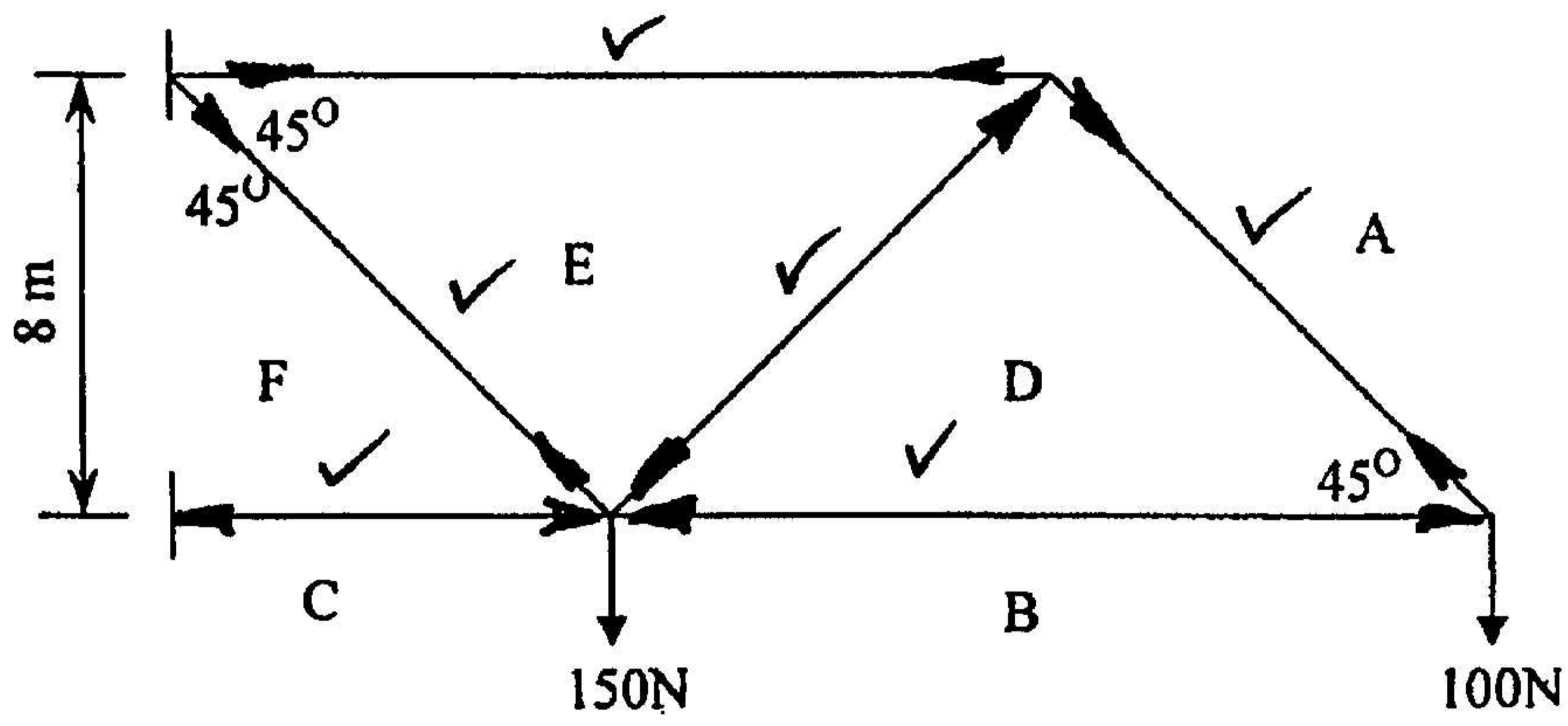


Figure / Figuur 1

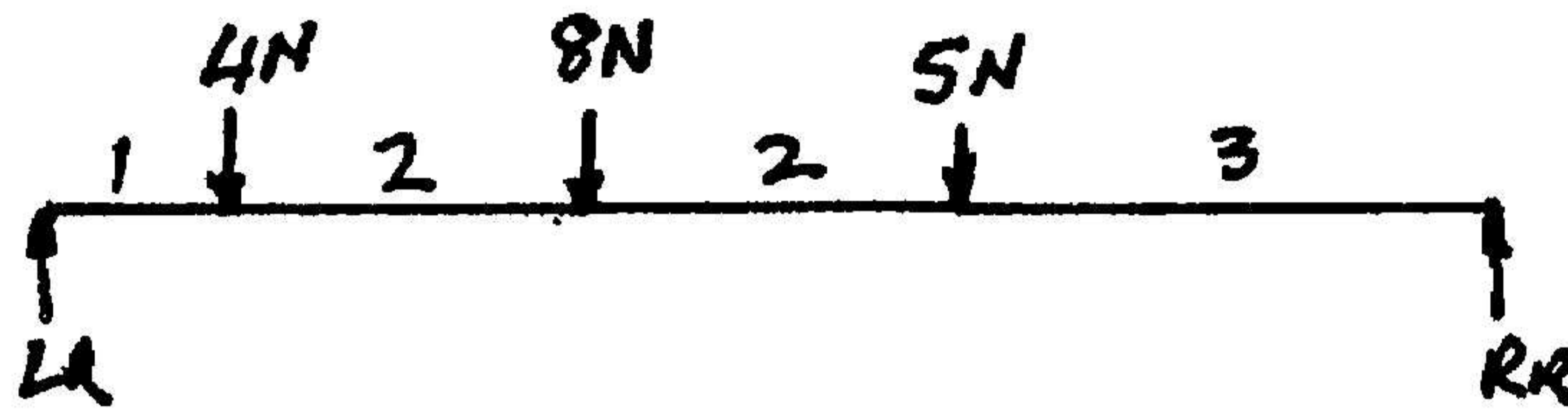
(6)

## QUESTION / VRAAG 2

2.2.1

$$\frac{2N}{1m} \times \frac{4m}{1} = 8N \quad \text{(2) of } 4 \times 2N = 8N$$

2.2.2



$$(LR \times 8m) = (4N \times 7m) + (8N \times 5m) + (5N \times 3m)$$

$$8LRm = 83Nm$$

$$LR = \frac{83Nm}{8m}$$

$$LR = 10,4N$$

$$(RR \times 8m) = (5N \times 5m) + (8N \times 3m) + (4N \times 1m)$$

$$8RRm = 53Nm$$

$$RR = \frac{53Nm}{8m}$$

$$RR = 6,6N$$

(12)

TOETS / TEST.  $\uparrow = \downarrow$ .

$$6,6 + 10,4 = 4 + 8 + 5.$$

$$17N = 17N$$

## QUESTION / VRAAG 3

3.1

$$(LR \times 10m) = (4N \times 2m) + (2N \times 4m) + (6N \times 8m)$$

$$10LRm = 64Nm$$

$$LR = \frac{64Nm}{10m}$$

$$LR = 6,4N$$

$$(RR \times 10m) = (6N \times 2m) + (2N \times 6m) + (4N \times 8m)$$

$$10RRm = 56Nm$$

$$RR = \frac{56Nm}{10m}$$

$$RR = 5,6N$$

⑩

$$3.2 \quad Bm(e) = 0Nm \checkmark$$

$$Bm(d) = 5,6N \times 2m = 11,2Nm \checkmark$$

$$Bm(c) = (5,6N \times 4m) + (-4N \times 2m) = +14,4Nm \checkmark$$

$$Bm(b) = (5,6N \times 8m) + (-4N \times 6m) + (-2N \times 4m) = 12,8Nm \checkmark$$

$$Bm(a) = (5,6N \times 10m) + (-4N \times 8m) + (-2N \times 6m) + (-6N \times 2m) = 0Nm \checkmark$$

3.3 SF/SK

$$(a) = LR = +6,4N \checkmark$$

$$(b) = +6,4N - 6N = 0,4N \checkmark \text{ asook } 6,4N$$

$$(c) = +6,4N - 6N - 2N = -1,6N \checkmark \text{ asook } 0,4N$$

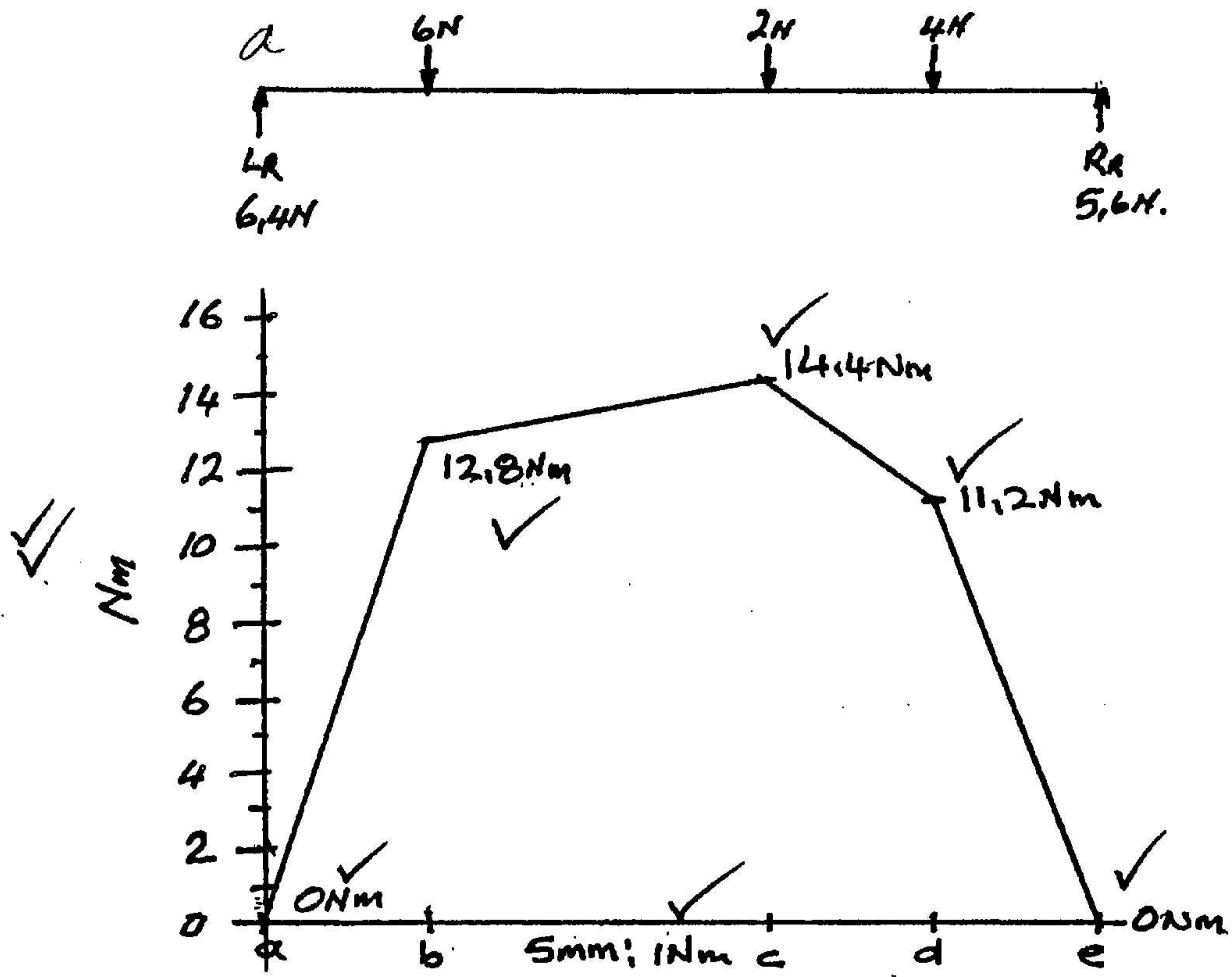
$$(d) = +6,4N - 6N - 2N - 4N = -5,6N \checkmark \text{ asook } -1,6N$$

$$(e) = 6,4N - 6N - 2N - 4N + 5,6N = 0N \checkmark$$

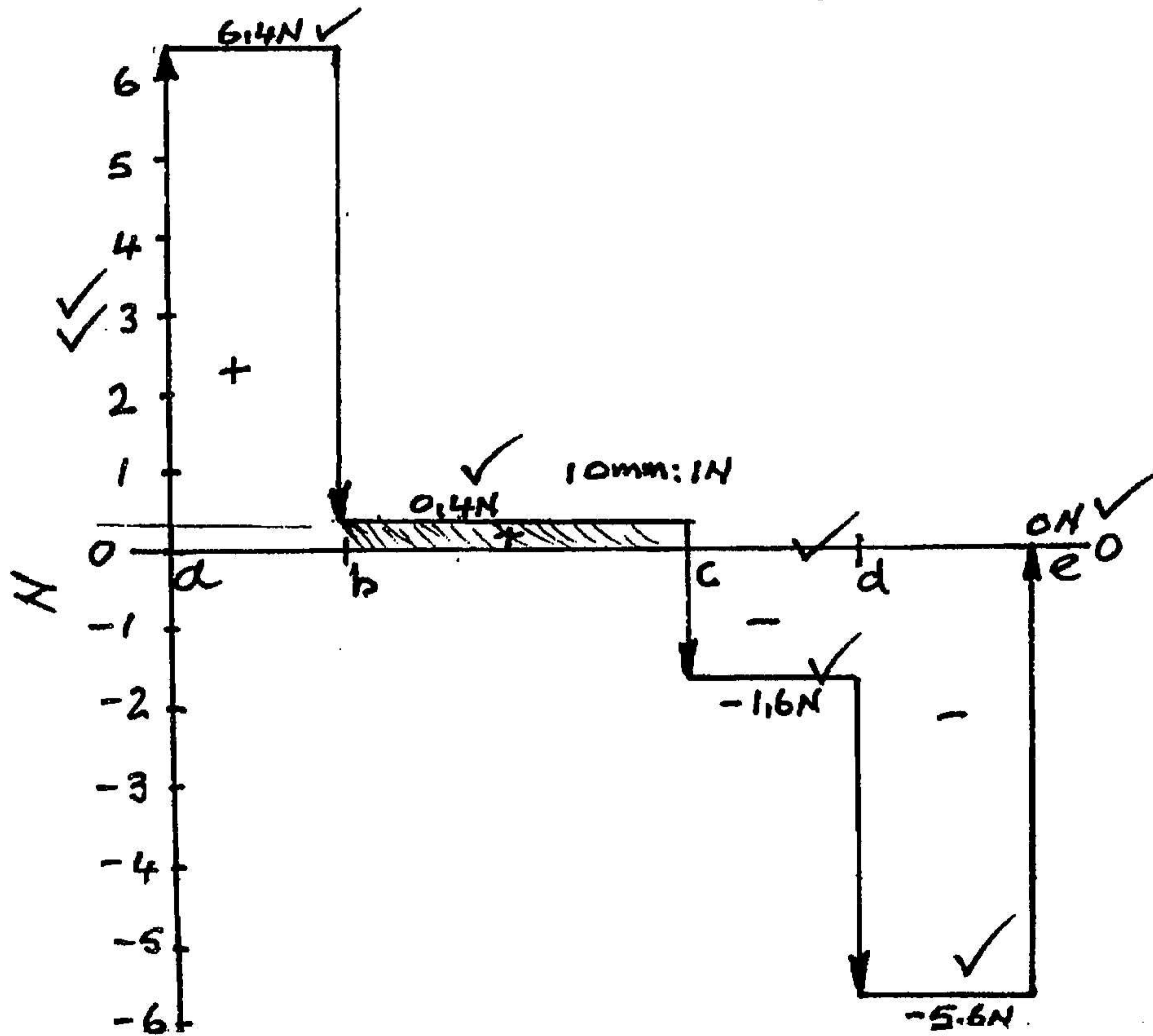
⑧

QUESTION / VRAAG 3

3.4



3.5



## QUESTION / VRAAG 4

4.1.1. VERAND. IN LENGTE. / CHANGE IN LENGTH ( $\Delta L$ ) = ~~OL~~  $P_L - O_L$ .  
 $\Delta L = 106 \text{ mm} - 100 \text{ mm} \checkmark$   
 $\Delta L = 6 \text{ mm} \checkmark$  (3)

4.1.2. VV. IN DIE STAAF / STRAIN.  
 $\frac{VV}{\text{STRAIN}} = \frac{\Delta L}{O_L} \checkmark$   
 $STR. = \frac{6 \text{ mm}}{100 \text{ mm}} \checkmark$   
 $\text{STRAIN} = 60 \times 10^{-3} \checkmark \checkmark$  (5)

4.1.3.  $E = \frac{\sigma \text{ (SPANNING / STRESS)}}{\text{STRAIN. (FORMVERANDERING)}}$   
 $E \times \text{STRAIN} = \sigma \checkmark$   
 $\sigma = 180 \times 10^9 \times 60 \times 10^{-3} \checkmark$   
 $\sigma = 10,8 \times 10^9 \text{ Pa} \checkmark$   
 $\sigma = 10,8 \text{ GPa} \checkmark$  (8)

4.1.4.  $\frac{30 \text{ mm}}{1000} = 0,03 \text{ m} \checkmark$   
 $area / opp = \frac{\pi D^2}{4} \checkmark$   
 $a = \frac{\pi (0,03)^2}{4} \checkmark \checkmark$   
 $a = 706,86 \times 10^{-6} \text{ m}^2 \checkmark$

4.1.5. Belasting / FORCE.  
 $\sigma = \frac{F}{A} \checkmark$   
 $F = \sigma \times A \checkmark$   
 $F = 10,8 \times 10^9 \text{ Pa} \times 706,86 \times 10^{-6} \text{ m}^2 \checkmark$   
 $F = 7,63 \times 10^6 \text{ N} \checkmark$   
 $f = 7,63 \text{ MN} \checkmark \checkmark$

4.1.4. en 4.1.5 kan gelyktydig uitgewerk word, soos aangetoon in saamgestelde handboek wat deur die meanderheid gebruik word.

Belasting =  $\sigma \times a / opp$ .  
 $= 10800 \times 10^6 \times 55 \text{ D}^2 \text{ (mm)} \checkmark$   
 $= \frac{10800 \times 10^6 \times 55 (30)^2 \text{ N/m}^2}{4 \times 10^6 \text{ m}^2}$   
 $= 7,634 \text{ M.N.}$

(12)

## QUESTION / VRAAG 4.2

4.2

VIR opp / FOR AREA.

$$\delta = \frac{F}{A} \checkmark$$

$$A = \frac{F}{\delta} \checkmark$$

$$A = \frac{381,9 \times 10^3 \text{ N}}{1,2 \times 10^9 \text{ N/m}^2} \checkmark$$

$$A = \underline{318,25 \times 10^{-6} \text{ m}^2} \checkmark$$

$$A = \frac{\pi D^2}{4} \checkmark$$

$$D = \sqrt{\frac{A \times 4}{\pi}} \checkmark$$

$$D = \sqrt{\frac{318,25 \times 10^{-6} \times 4}{\pi}} \checkmark$$

$$D = 20,12 \times 10^{-3} \text{ m} \checkmark$$

$$D = \underline{20 \text{ mm}} \checkmark$$

(15)  
[40]



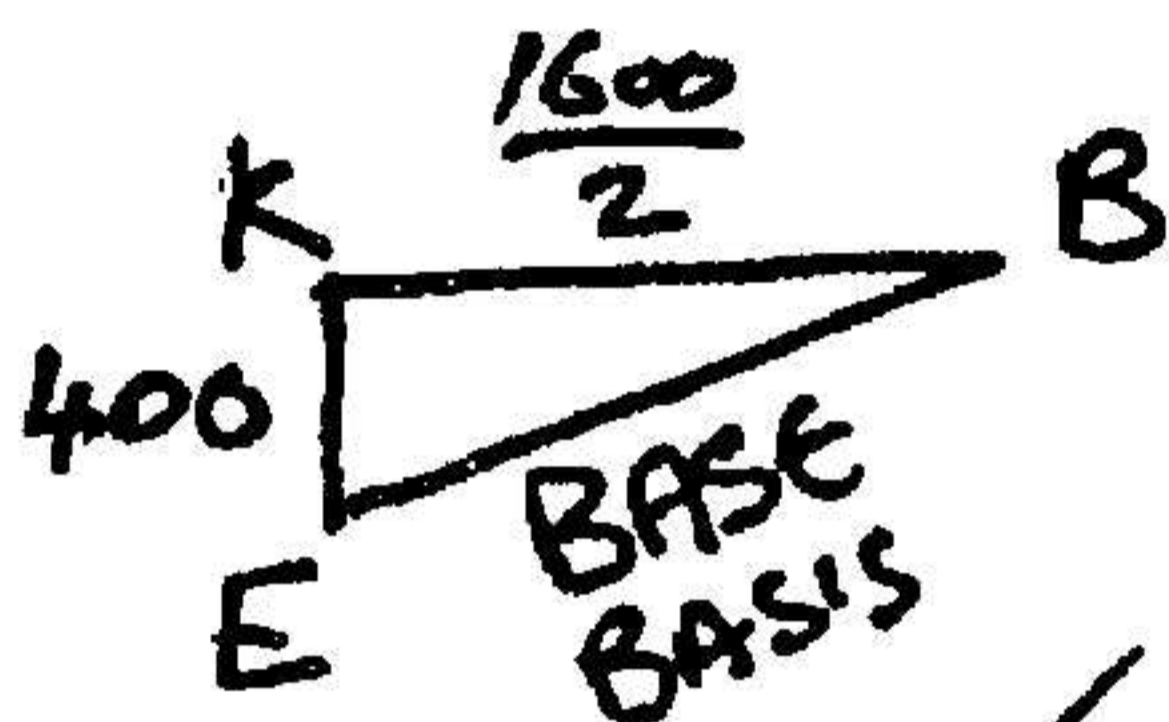
## QUESTION / VRAAG 5

5.1.1 FOR./VIR  $\alpha\alpha'$ 

$$\frac{D-\phi}{2} = \frac{1600-800}{2} = \underline{400\text{mm}}$$

$$\begin{aligned} \therefore \text{T.L. of Plate/WL von plaat} \\ &= \sqrt{400^2 + 1100^2} \\ &= \underline{1170,47\text{mm}} \end{aligned}$$

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5.1.2 TL. BE' / WL BE'

$$\begin{aligned} \therefore EB &= \sqrt{800^2 + 400^2} \\ &= \underline{894,4\text{mm}} \end{aligned}$$



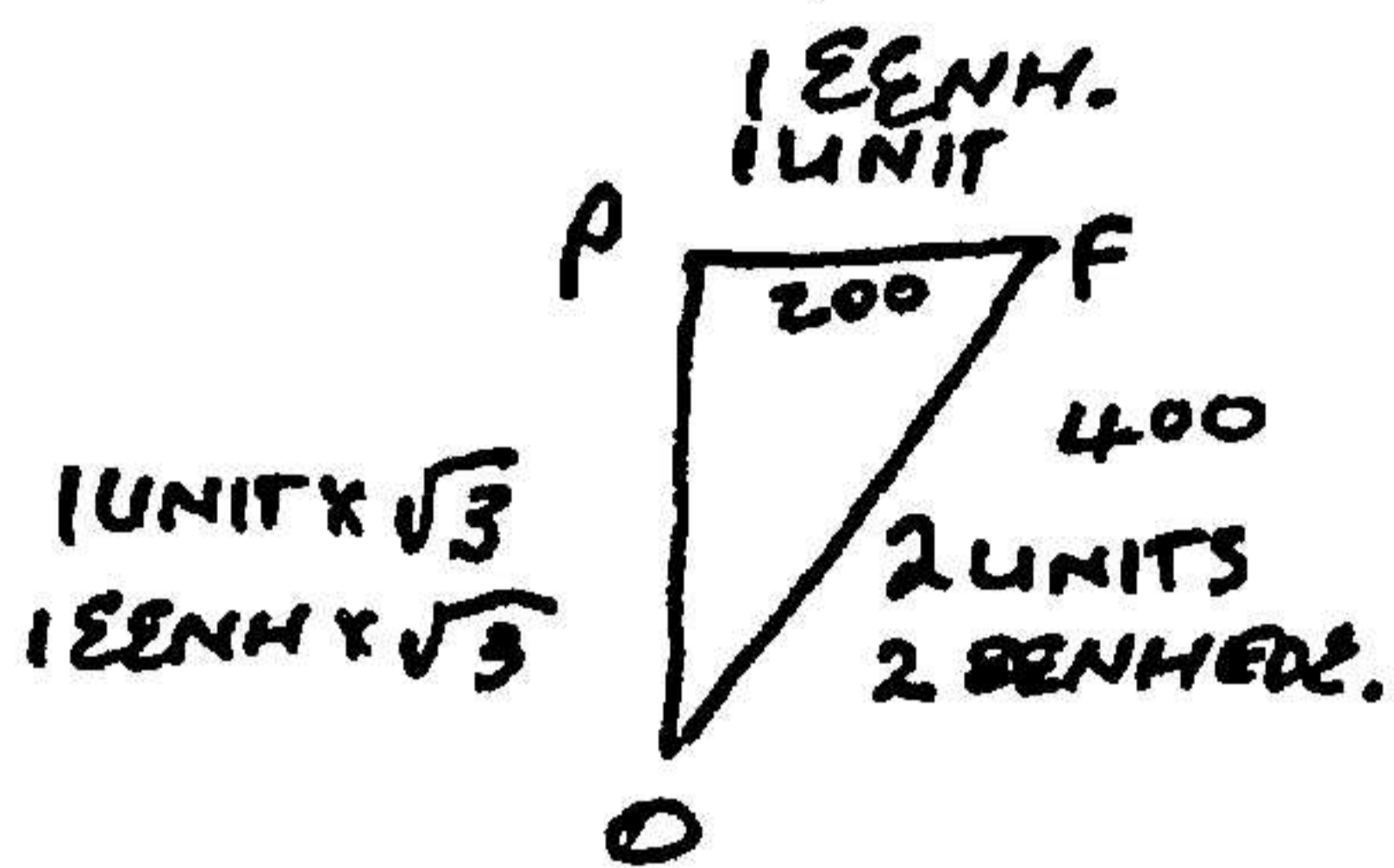
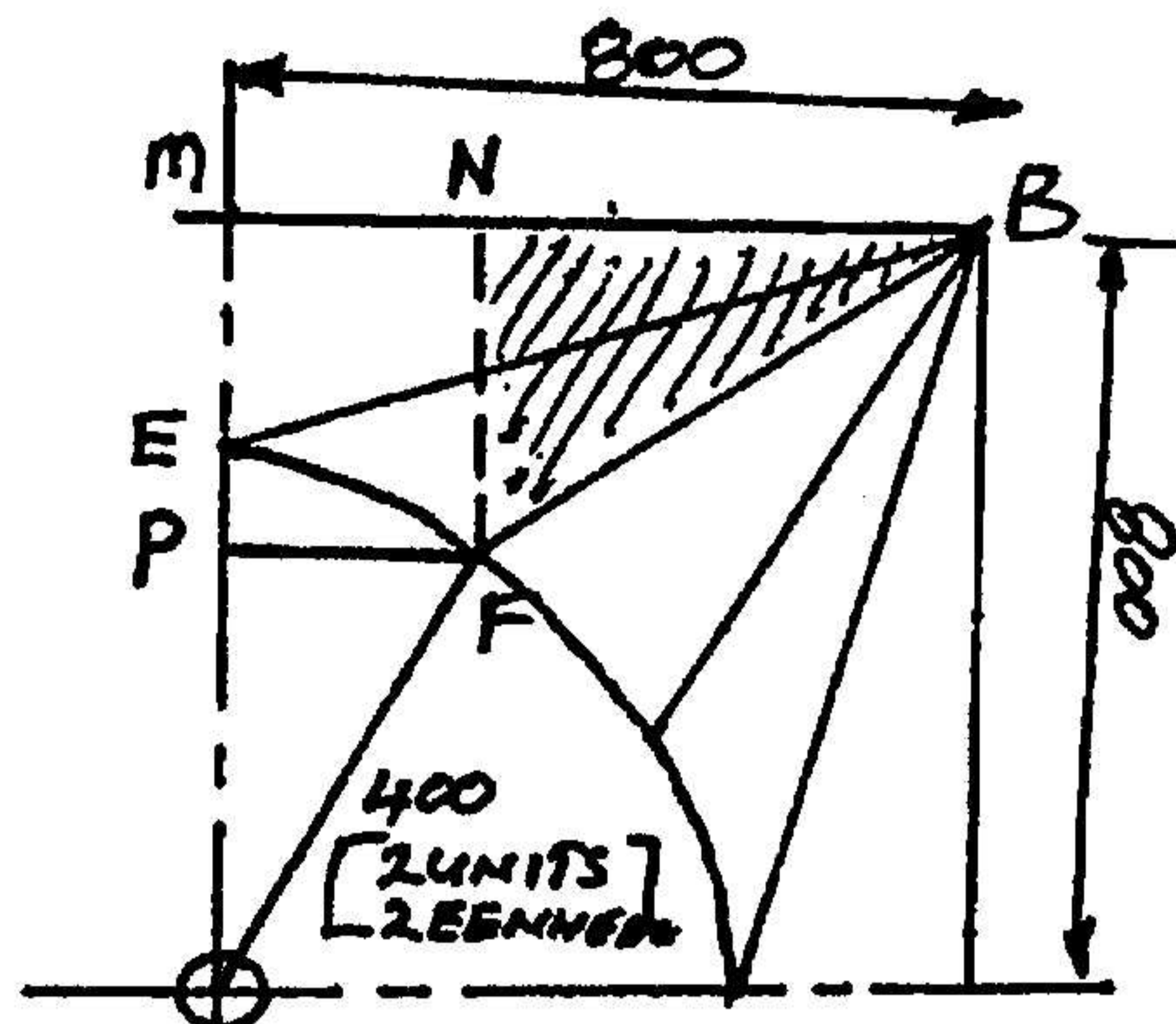
$$\begin{aligned} E'B &= \sqrt{EB^2 + h^2} \\ &= \sqrt{894,4^2 + 1100^2} \\ &= \underline{1417,7\text{mm}} \end{aligned}$$

or  
of

$$\begin{aligned} BE' &= \sqrt{800^2 + 400^2 + 1100^2} \\ &= \underline{1417,74\text{mm}} \end{aligned}$$

(10)

5.1.3. *hantöckenning?*



① VIR/FOR OF

$$OF = \phi \div 2 \cdot \checkmark$$

$$OF = 800/2 \checkmark$$

$$OF = 400 \text{ mm} \checkmark$$

② VIR PF/FOR PF

$$PF = 400/2 \checkmark$$

$$PF = 200 \text{ mm} \checkmark$$

③ FOR NB/VIRNB

$$NB = MB - MN \checkmark$$

$$NB = 800 - 200 \checkmark$$

$$NB = 600 \text{ mm} \checkmark$$

④ FOR PO/VIR PO

$$PO = 1 \text{ UNIT} \times \sqrt{3}$$

$$PO = 200 \sqrt{3}$$

$$PO = 346,41 \text{ mm} \checkmark$$

⑤ FOR/VIR NF

$$NF = MO - PO \checkmark$$

$$NF = 800 - 346,41 \checkmark$$

$$NF = 453,59 \text{ mm} \checkmark$$

⑥ TL/WL BF' in of.

$$BF' = \sqrt{NB^2 + NF^2 + h^2}$$

$$BF' = \sqrt{600^2 + 453,59^2 + 1100^2}$$

$$BF' = 1332,57 \text{ mm} \checkmark$$

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Planlängte BF

$$BF^2 = 600^2 + 453,6^2$$

$$BF = \sqrt{600^2 + 453,6^2}$$

$$= 752,166 \text{ mm} \checkmark$$

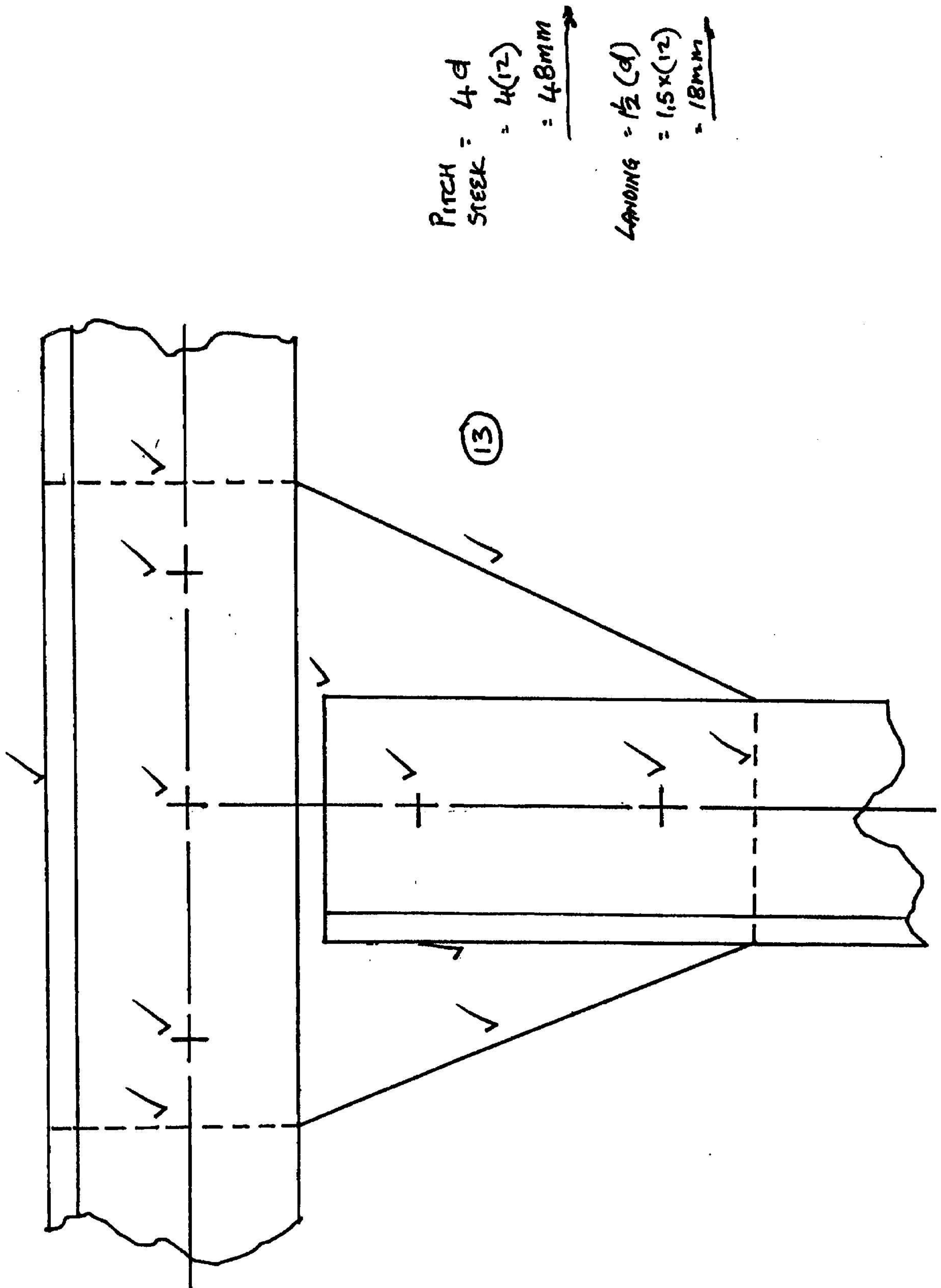
Winkelänge BF.

$$BF^2 = 752,166 + 1100^2$$

$$BF = \sqrt{752,166 + 1100^2}$$

$$= 1332,57 \text{ mm} \checkmark$$

QUESTION / VRAAG 6.1



## QUESTION / VRAAG 6.2-7

6.2	Saves time saves money avoid repetitive marking off eliminates wastage of material	<i>Bespaar tyd Bespaar geld Voorkom herhaaldelike afmerk Voorkom die mors van materiaal</i>
6.3	must have good lighting floor must be painted black floor boards must be diagonal	<i>moet goeie beligting hê vloer moet swart geverf wees vloerpanele moet diagonaal wees</i>
6.4	job number number to be manufactured type of material to be used diameter of holes to be drilled	<i>werksnommer aantal wat gemaak moet word tipe materiaal wat gebruik moet word diameter van gate wat geboor moet word.</i>
6.5	template paper (thick paper) hard board plastic thin plate wood thick plate	<i>maatvormpapier (dik papier) hardebord plastiek dun plaat hout dik plaat</i>