Possible Answers
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QUESTION / VRAAG 1.1

Indicate your choice with an X Dui jou keuse aan met 'n X		
	TRUE WAAR	FALSE ONWAAR
1.1.1		X
1.1.2		X
1.1.3		X
1.1.4		X
1.1.5		X
1.1.6	X	
1.1.7	X	
1.1.8		X
1.1.9		X
1.1.10		X

QUESTION / VRAAG 1.2

Indicate your choice with an X Dui jou keuse aan met 'n X					
	A	B	C	D	
1.2.1		X			
1.2.2		X			
1.2.3			X		
1.2.4				X	
1.2.5		X			
1.2.6	X				
1.2.7		X			
1.2.8		X			
1.2.9				X	
1.2.10				X	

QUESTION / VRAAG 1.3

Indicate your choice
Dui jou keuse aan

1.3.1	O
1.3.2	P
1.3.3	K
1.3.4	M
1.3.5	I
1.3.6	L
1.3.7	C
1.3.8	A
1.3.9	D
1.3.10	E
1.3.11	R
1.3.12	B
1.3.13	J
1.3.14	F
1.3.15	G
1.3.16	H
1.3.17	N
1.3.18	Q
1.3.19	S
1.3.20	T

REMARK ONLY / SLEGS HERMERK						Question Vraag	*NORMAL MARKING / NORMALE MERK*					
Marks / Punte			Initials / Paraaf				Marks / Punte			Initials / Paraaf		
H	T	U	Mark	Mod	Cont		H	T	U	Mark	Mod	Cont
						1						
						2						
						3						
						4						
						5						
						6						
						7						
						Total Totaal						

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ANSWER / ANTWOORD 2.1.1
FOR LR (MOMENTS AROUND RR) / VIR LR (MOMENTE OM RR)

$(L \times 8m) = (4kN \times 6m) + (5kN \times 4m) + (8kN \times 2m)$

$8m\,L = 60\,kNm.$

$L = 60kNm / 8m$

$L = 7{,}5kN.$ ✓✓

ANSWER / ANTWOORD 2.1.1
FOR RR (MOMENTS AROUND LR) / VIR RR (MOMENTE OM LR)

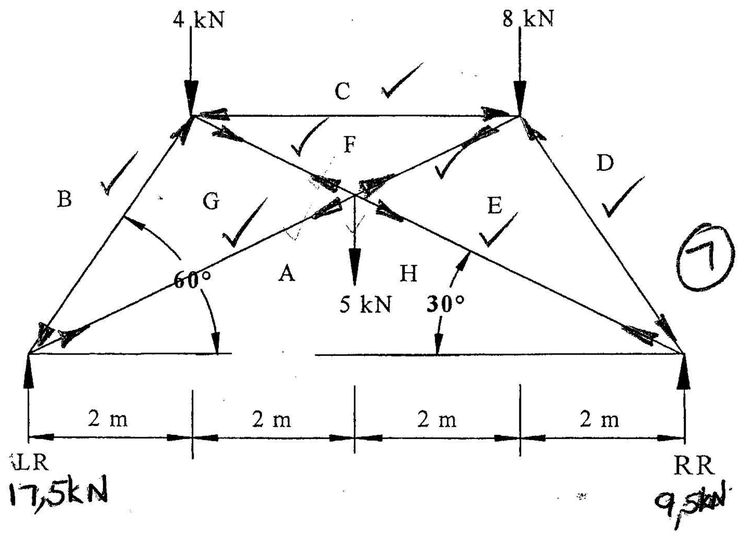
$(R \times 8m) = (4kN \times 2m) + (5kN \times 4m) + (8kN \times 6m)$

$8m\,R = 76kNm.$

$R = 76kNm / 8m$

$R = 9{,}5kN.$ ✓✓ (4)

answer / antwoord 2.1.3



(7)

DRAAI SKAAL OM
TURN SCALE AROUND

$\therefore AG = \frac{1kN}{8mm} \times \frac{60mm}{1} = 7{,}5kN$

$BG = \frac{1kN}{8mm} \times \frac{115mm}{1} = 14{,}4kN$

$CF = \frac{1kN}{8mm} \times \frac{150mm}{1} = 18{,}8kN$

$FG = \frac{1kN}{8mm} \times \frac{113mm}{1} = 14{,}1kN$

$\frac{1kN}{8mm} \times \frac{130mm}{1} = 16{,}3kN$

Answer / Antwoord 2.1.2

Possible Answers
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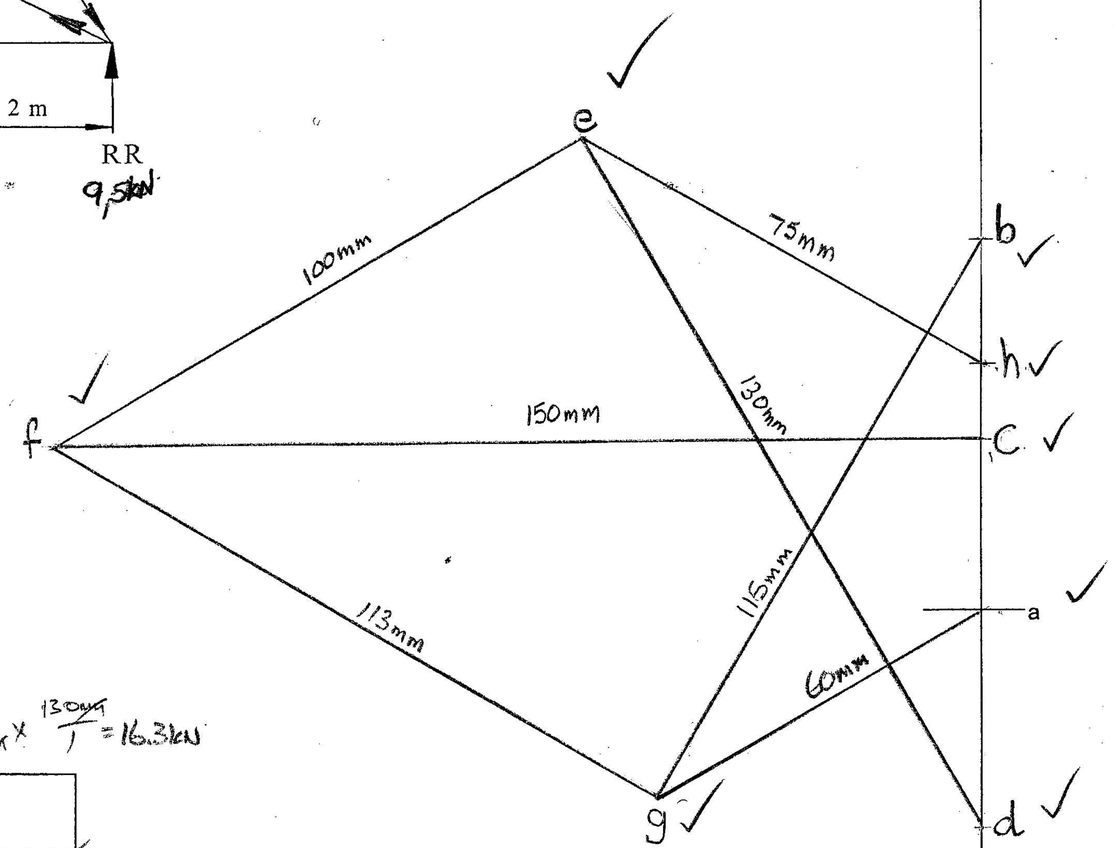

Force Diagram / Kragtediagram

SCALE / SKAAL 8 mm:1kN

(8)

ANSWER / ANTWOORD 2.1.4

MEMBER ONDERDEEL	MEASUREMENT AFMETING	FORCE KRAG	NATURE AARD
AG	60 mm ✓	7,5kN ✓	T ✓
BG	115 mm ✓	14,4kN. ✓	S ✓
CF	150mm ✓	18,8kN ✓	S ✓
FG	113 mm ✓	14,1kN ✓	T ✓
DE	130mm ✓	16,3kN. ✓	S ✓
EF	100mm ✓	12,5kN ✓	T ✓
EH	75mm ✓	9,4kN. ✓	T ✓

(21)

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ANSWER QUESTION 3 / ANTWOORD VRAAG 3

3.1.1 BENDING MOMENT / BUIGMOMENTE

BM (A) = (-6kN x 0m) = 0kNm ✓✓

BM (B) = (-6kN x 4m) = -24kNm ✓✓

BM(C) = (-6 kN x 8m) + (-10kN x 4m)

= -48 kNm - 40kNm

= -88kNm ✓✓

BM(D) = (-6kN x 10m) + (-10kN x 6m) + (-15kN x 2m)

= -60kNm - 60kNm - 30kNm

= -150 kNm. ✓✓ (8)

3.1.2 SHEAR FORCES / SKUIFKRAGTE

SF /SK (D) = 15kN + 10kN + 6kN = 31kN ✓✓

SF /SK (C) = 31kN - 15kN = 16 kN ✓✓

SF / SK (B) 16kN - 10kN = 6 kN ✓✓

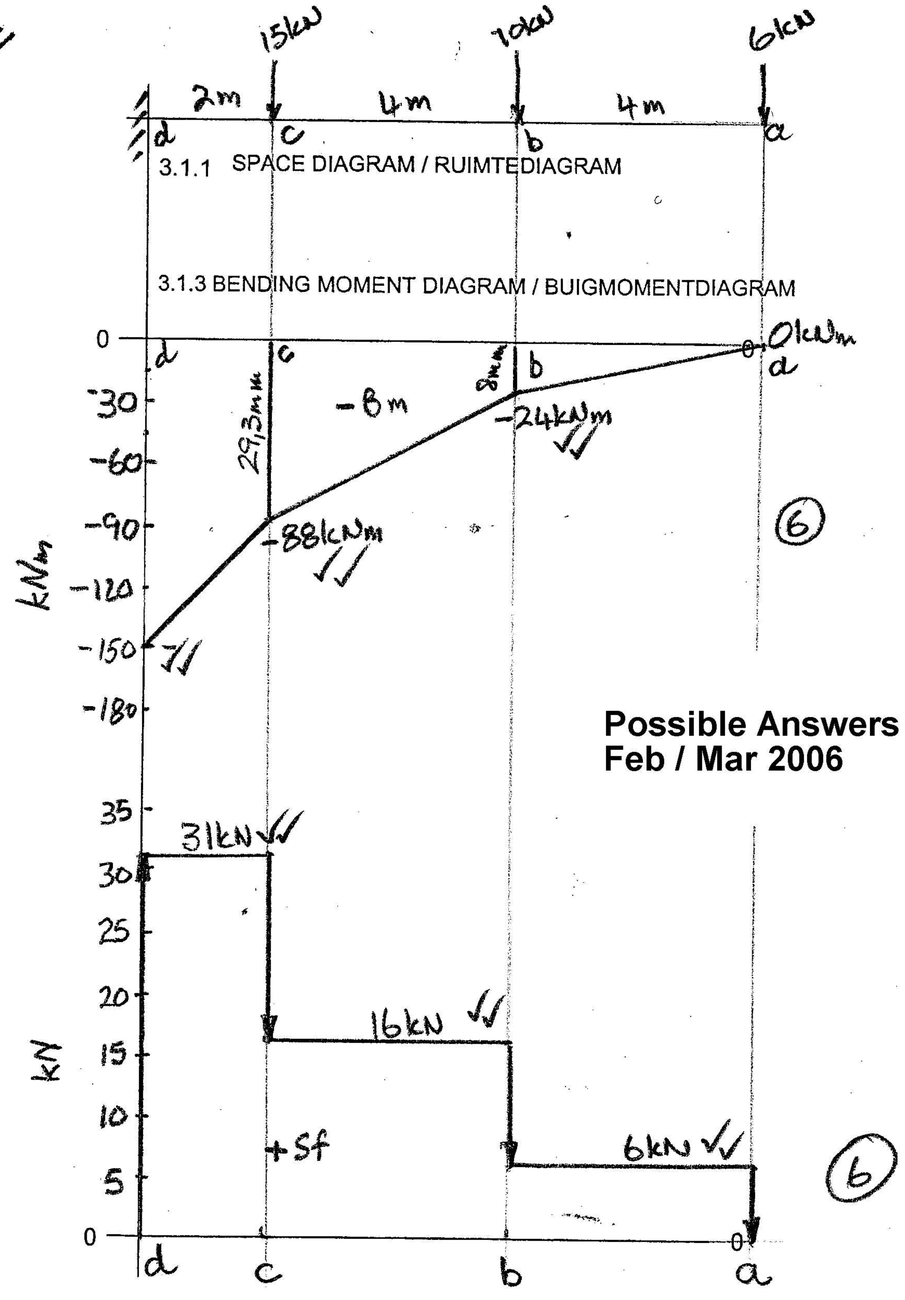
SF/SK (A) 6kN - 6kN = 0 kN ✓✓

(8)

(B) = $\frac{8mm}{3\ 15kN}$ x $\frac{-24kNm}{1}$ 8mm

(C) = $\frac{5mm}{15kN}$ x $\frac{88kNm}{1}$ = 29,3

(D) $\frac{5mm}{15kN}$ x $\frac{150kNm}{1}$



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3.1.4 SHEAR FORCE DIAGRAM / SKUIFKRAGDIAGRAM

(D) $\frac{2mm}{1kN}$ x $\frac{31kN}{1}$ = 62mm

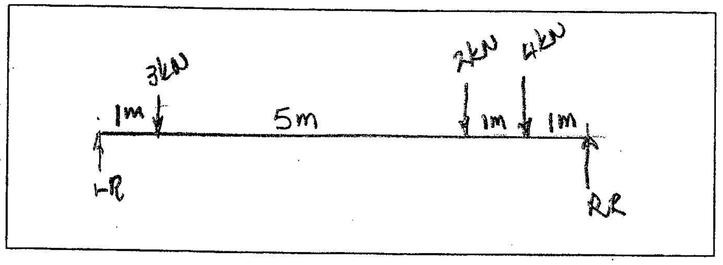
(C) $\frac{2mm}{1kN}$ x $\frac{16kN}{1}$ = 32

QUESTION / VRAAG 3.2

3.2.1 Conversion/ OMSKAKELING

$\frac{2kN}{m}$ x $\frac{2m}{1}$

= 4kN ✓✓ (2)



REDRAW DIAGRAM / HERTEKEN DIE DIAGRAM

3.2.2 FOR LR (MOMENTS AROUD RR) / VIR LR (MOMENTE

(LR x 8m) = (4kN x 1m) + (2kN x 2m) + (3kN x 7m)

8m LR = 4kNm + 4kNm + 21kNm

LR = 29kNm / 8m

LR = 3,6kN. ✓

FOR RR (MOMENTS AROUND LR) / VIR RR (MOMENTE OM LR)

(RR x 8m) = (3kN x 1m) + (2kN x 6m) + (4kN x 7m)

8m RR = 3kNm + 12kNm + 28kNm

RR = 43kNm / 8m

RR = 5,4kN ✓

(10)

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4.1.1 CHANGE IN LENGTH / LENGTEVERVORMING

$STRAIN = \frac{\Delta L}{L_0}$

$\Delta L = 53,33 \times 10^{-3} \times 300 mm$

$\Delta L = 16 mm$ (4)

4.1.2 STRESS / SPANNING = $E = \frac{SP./\delta}{STR (VV)}$

$\delta = E \times STRAIN$

$\delta = 12,73 \times 10^{9} \times 53,33 \times 10^{-3}$ (4)

$\delta = 679 MPa$

4.1. CROSS-SECTIONAL AREA / DEURSNEE-OPPERVLAKTE

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

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

$= \frac{120 \times 10^{3} N \, m^2}{679 \times 10^{6} N}$

$= 176,73 \times 10^{-6} m^2$ (4)

4.1.4 DIAMETER / DIAMETER

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

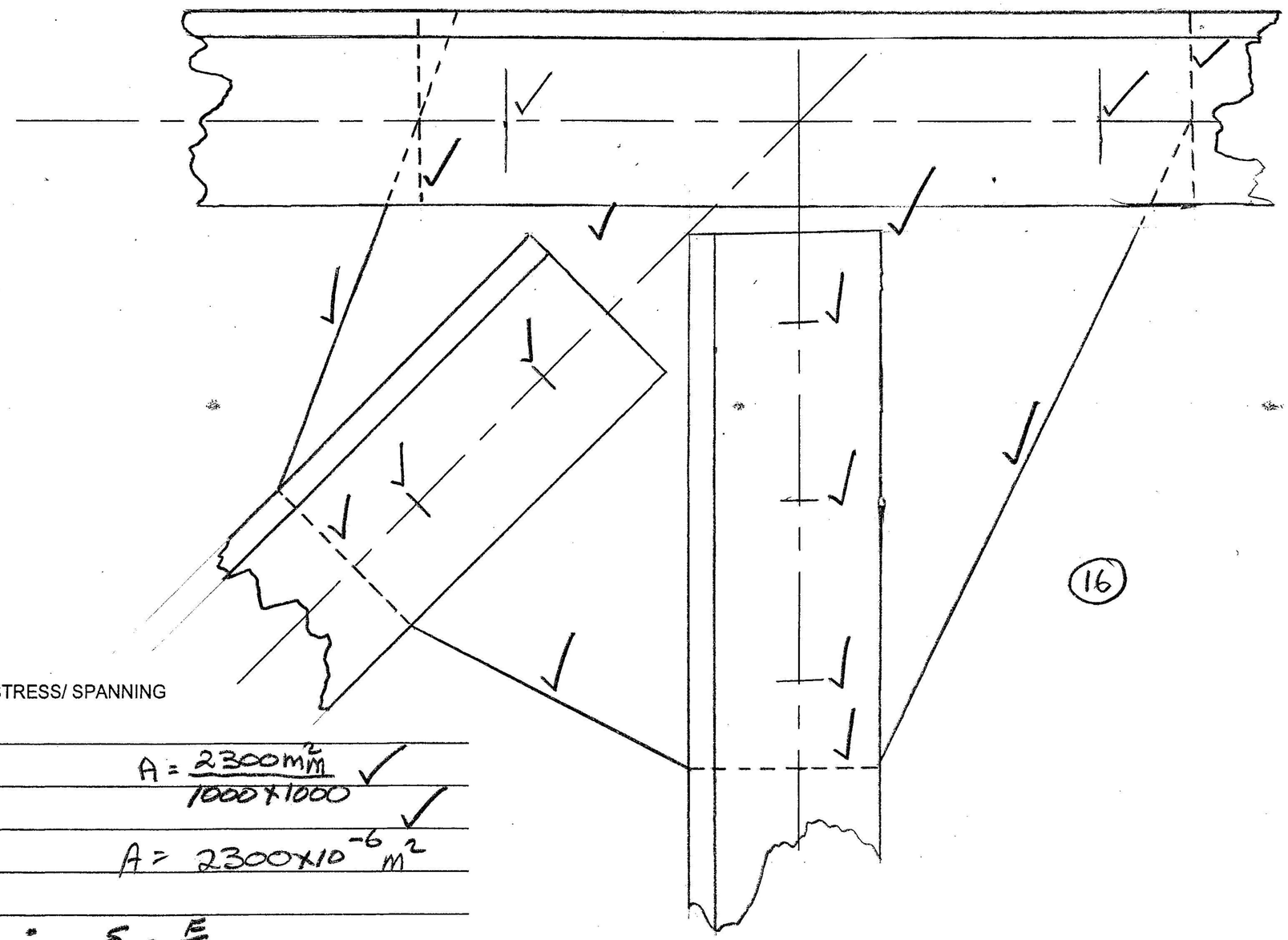
$D = \sqrt{\frac{A \times 4}{\pi}}$ (6)

$D = \sqrt{\frac{176,73 \times 10^{-6} \times 4}{\pi}}$

$D = 15 \times 10^{-3} m$

$D = 15 mm$

4.3 GUSSET PLATE / KNOOPPLAAT



(16)

4.2 STRESS/ SPANNING

$A = \frac{2300 mm^2}{1000 \times 1000}$

$A = 2300 \times 10^{-6} m^2$

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

$\delta = \frac{80 \times 10^{3} N}{2300 \times 10^{-6} m^2}$

$\delta = 34,78 \times 10^{6} Pa$ (6)

$\delta = 34,78 MPa$

Possible Answers
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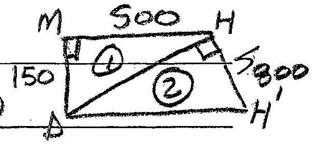
5.1.1 FOR TL YX^1 / VIR WL YX^1

$YX' = \sqrt{200^2 + 800^2}$

$YX' = 824{,}62mm$ (5)

5.1.2 FOR TL DH^1 / WARE LENGTE DH^1



$HD^2 = MH^2 + MD^2$ --- (1)

$(H'D)^2 = HD^2 + (H'H)^2$ --- (2)

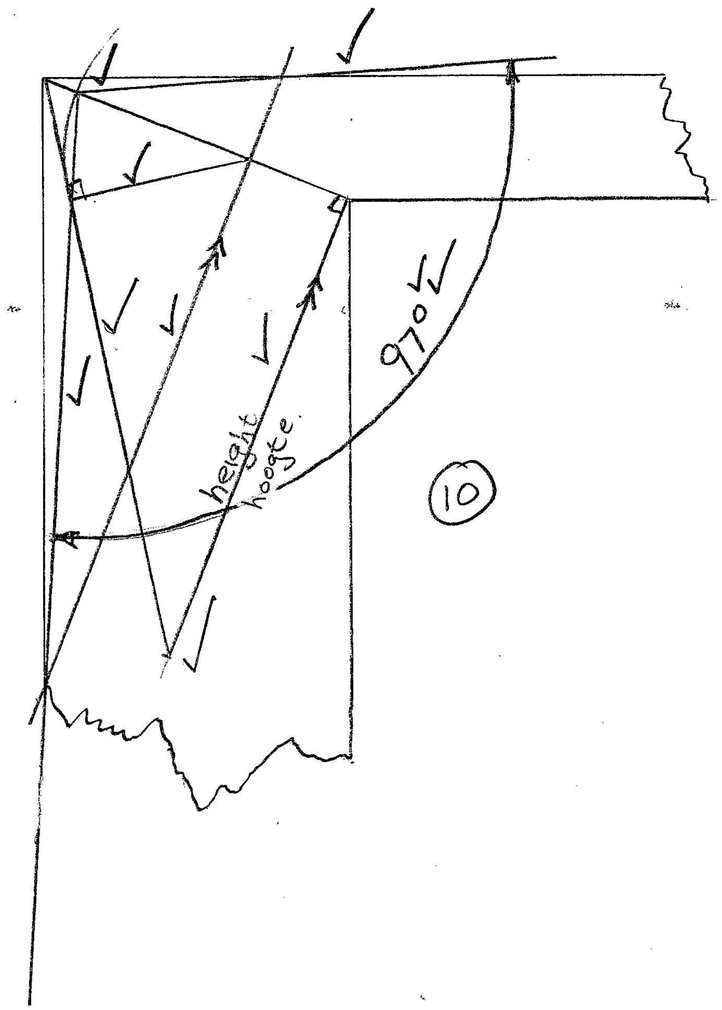
Replace (1) → (2) vervang (1) → (2)

$(H'D) = \sqrt{MH^2 + MD^2 + (H'H)^2}$

$= \sqrt{500^2 + 150^2 + 800^2}$

$= 955{,}25mm$ (10)

5.1.3 DIHEDRAL ANGLE / TWEEVLAK-HOEK



(10)

Possible Answers
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Question / Vraag 5

5.2
a) It saves time and money
b) Eliminates wastage of material
c) Eliminates repetitive marking off
d) They are very accurate
e) It is used for mass productions

a) Spaar tyd en geld
b) Elimineer die mors van materiaal
c) Elimineer herhaaldelike afmerkery
d) Dit is baie akkuraat
e) Word by massaproduksie gebruik

5.3 Ruler and steel tape
Punches, hammers and scribers
Drilling machines and planes
Hacksaw and coping saws
Set squares, chalk lines

Any other reasonable tools or equipment

Liniaal en staalmaatband
Ponse, hammers en kraspenne
Boormasjiene en skawe
Ystersaag en figuursaag
Winkelhake en krytlyn

5.4

Template paper	Maatvorm-papier
Cardboard	Karton
Hardboard	Hardebord
Wood	Hout
Thin plate	Dun plaat

5.5

Good lighting	Goeie beligting
Floor board must be diagonally across	Vloerpanele moet diagonaal geplaas word
Enough space	Genoegsame spasie

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6.1.1

ITEM	QUANTITY NEEDED GETAL BENODIG	MATERIAL NEEDED MATERIAAL BENODIG	MASS /m LENGTH MASSA/m LENGTE	TOTAL MASS TOTALE MASSA	TARRIF/kg TARIEF/kg	R c
A	2	100 100X 6 mm = (3,1×2) = 6,2m	9 kg/m	55,8 kg	R3.60/kg	R 200,88
B	2	100 100X 6 mm = (0,7×2) = 1,4m	9 kg/m	12,6 kg	R3.60/kg	R 45,36
C	4	50x50x 6 mm = (0,95×4) = 3,8m	4,5 kg/m	17,1 kg	R3.80/kg	R 64,98
D	3	50x50x 6 mm = (0,7×3) = 2,1 m	4,5 /m	9,45 kg	R3.80/kg	R 35,91
				WELDING MATERIAL COST SWEISMATERIAALKOSTE		R 90,00
				TOTAL MATERIAL COST TOTALE MATERIAALKOSTE		R 437,13

6.1.2 LABOUR COST / ARBEIDSKOSTE

$\frac{R120,00}{1h} \times \frac{6h}{1}$

= R720,00

Possible Answers
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6.1.3 OVERHEAD COST / OORHOOFSE KOSTE

$\frac{85}{100} \times \frac{R720,00}{1}$

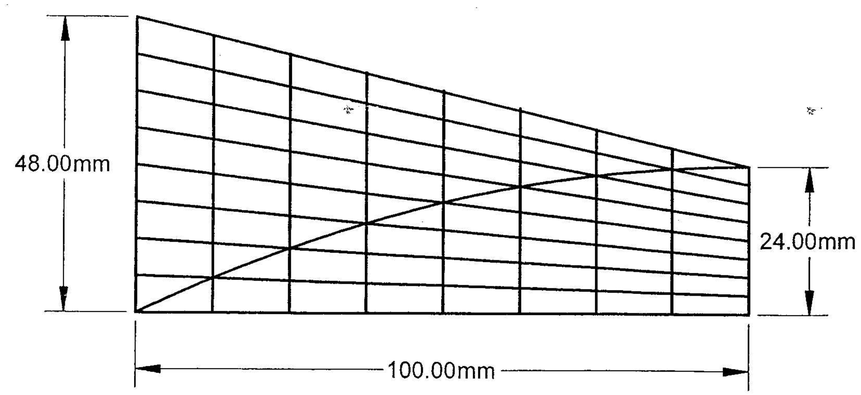
= R 612,00

6.1.4 TOTAL COST / TOTALE KOSTE

R437,13 + R720,00 + R612,00

= R 1769,13.

6.2 Draw camber on line / Teken kromming op die lyn
Scale / Skaal 1:50



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VRAAG 7

7.1

Undercut	Inkarteling
Poor fusion	Swak samesmelting
Cracks	Krake
Slag inclusions	Slak-insluiting
Distortion	Verwringing

7.2 *Any four of the following*
Increase ductility
Improve machining quality
Release tension
To change grain size
To increase hardness and tensile strength
To change the chemical composition of steel (case-hardening)
To change the magnetic properties
To change electrical conductivity
To cause toughness
To re-crystallize metals that have been cold worked

Enige vier van die volgende
Om rekbaarheid te verhoog
Om die masjineer-eienskappe van staal te verbeter
Om spanning te verlig
Om die korrelgrootte te verander
Om hardheid en trekspanning te verhoog
Om die chemiese samestelling van staal te verander (dopverharding)
Om die magnetiese eienskappe te verbeter
Om elektriese geleiding te verbeter
Om hardheid te verkry
Om korrelstrukture te herkristalliseer wat koudbewerk is

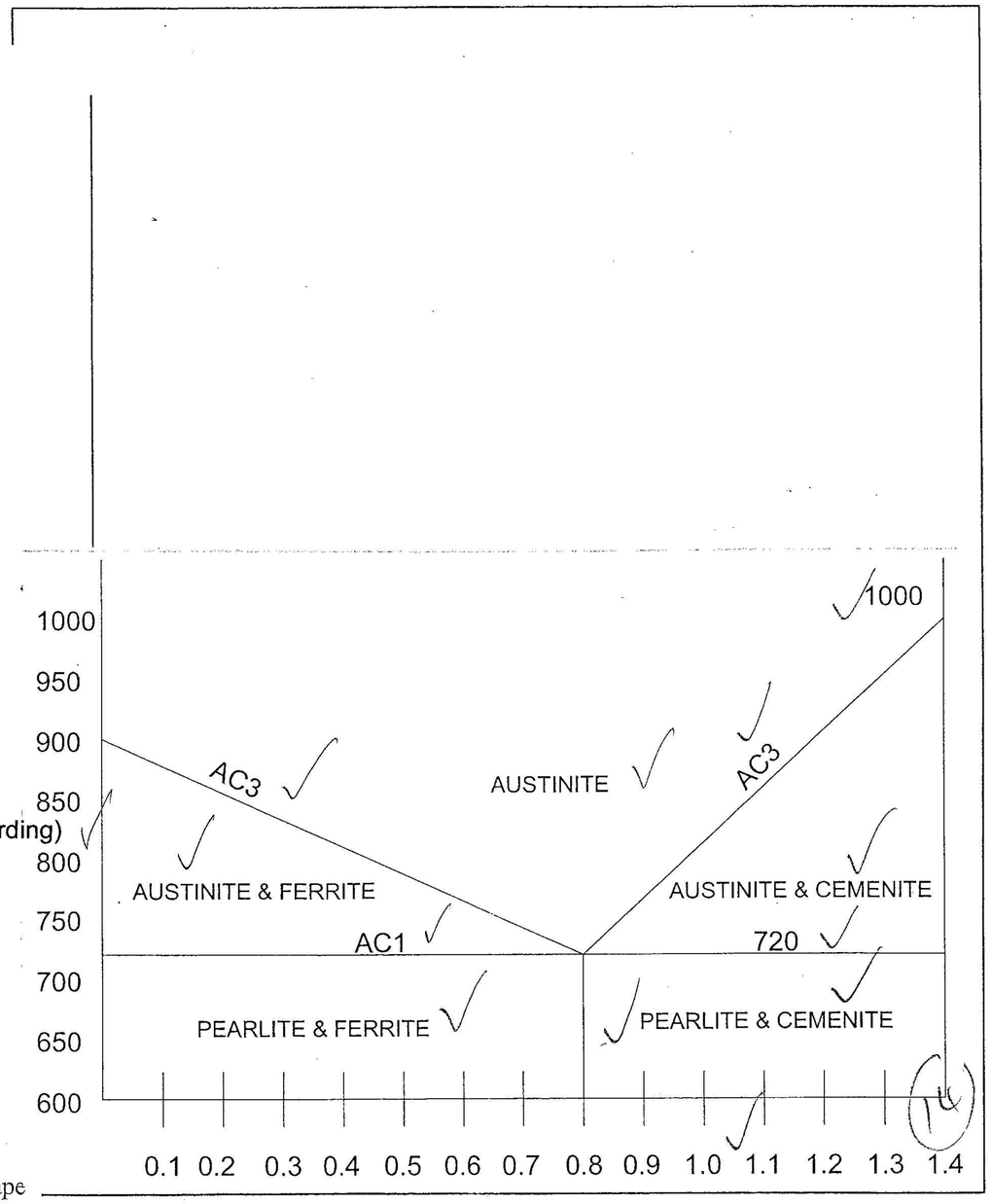
7.3

Chrome	Chroom
Nickel	Nikkel
Manganese	Mangaan
Tungstan	Wolfram
Silicon	Silikon

7.4 Elasticity is the ability of steel to return to its original shape and size after the load has been removed.

Elastitisteit is die vermoë van staal om na sy oorspronklike vorm en grootte terug te keer nadat die las verwyder is.

7.5



USE THE FOLLOWING SCALES
GEBRUIK DIE VOLGENDE SKALE

1CM : 0.1% CARBON /KOOLSTOF
1CM : 50°C

7.5.1 720°C

7.5.2

quenching	Onderdompeling
brush of cold air	Blaas met koue lug
cool in furnace	Verkoel in die oond
place between bricks	Plaas tussen bakstene
place at a wind-free corner	Plaas op 'n windvrye plek

7.5.3 cool in furnace — laat in oond afkoel

7.5.4 720°C

Possible Answers
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