GAUTENG DEPARTMENT OF EDUCATION

GAUTENGSE DEPARTEMENT VAN ONDERWYS

OCTOBER / NOVEMBER 2003
OKTOBER / NOVEMBER 2003

POSSIBLE ANSWERS FOR / MOONTLIKE ANTWOORDE VIR :

FUNCTIONAL MATHEMATICS SG PAPER 2
FUNKSIONELE WISKUNDE SG VRAESTEL 2
303-2/2

Okt/Feb 2003

Koordinaatmeetkunde

Vraag 1

A(2; 3) B(-4; -6)

1.1. $d = \sqrt{(x_2-x_1)^2 + (y_2-y_1)^2}$ ①

$= \sqrt{(2+4)^2 + (3+6)^2}$ ①

$= \sqrt{(-4;-2)^2 + (-6;-3)^2}$

$= \sqrt{(-6)^2 + (-9)^2}$ ① ①

$= \sqrt{36 + 81}$ ①

$= \sqrt{117}$ (5)

1.2 M.dpt $\left(\frac{x_1+x_2}{2}; \frac{y_1+y_2}{2}\right)$ ①

$= \left(\frac{2-4}{2}; \frac{3-6}{2}\right)$

$= (-1; -1\frac{1}{2})$ ① ① (3)

1.3 $m = \frac{y_2-y_1}{x_2-x_1}$ ①

$\frac{-6-3}{-4-2}$ ① / $\frac{3+6}{2+4}$

$= \frac{-9}{-6}$ / $\frac{9}{6}$

$= 1\frac{3}{2}$ ① (3)

1.4. $y-y_1 = m(x-x_1)$ ①

$y-3 = \frac{3}{2}(x-2)$ ① / $y+6 = \frac{3}{2}(x+4)$

$y-3 = \frac{3}{2}x - 3$ / $y+6 = \frac{3}{2}x + 6$

$y = \frac{3}{2}x$ ① (4)

of

$y = mx + c$ ①

$3 = \frac{3}{2}(2) + c$ ① / $-6 = \frac{3}{2}(4) + c$

$3 = 3 + c$ ① / $-6 = -6 + c$

$0 = c$ / $0 = 0$

$y = \frac{3}{2}x$ ① (4)

✓ [15]

Vraag 2.

2.1 $3y - 2x = 6$

$y = \frac{2}{3}x + 2$ ①

2.2 $m = \frac{2}{3}$ ① ②

2.3 $M_1 = M_2$ ①

$\frac{2}{3} = m_2$ ① (2)

2.4. $M_1 \times M_2 = -1$ ①

$\frac{2}{3} \times m_2 = -1$ ①

$m_2 = -\frac{3}{2}$. (3)

✓ [7]

Vraag 3

3.1 $x^2 + y^2 = r^2$ ① ②

$(3)^2 + (4)^2 = r^2$ ①

$25 = r^2$ ①

$\therefore x^2 + y^2 = 25$ (4)

3.2. $m = \frac{y_2-y_1}{x_2-x_1}$

$= \frac{-3-4}{-4-3}$ ① / $\frac{4+3}{3+4}$

$= 1$ ① / $= 1$

$y-y_1 = m(x-x_1)$

$y-4 = 1(x-3)$ ① / $y+3 = 1(x+4)$

$y-4 = 1x-3$ / $y+3 = 1x+4$

$y = x + 1$ ① (4)

✓

Vraag 3.3

$x^2 + y^2 = 25$

$y = x + 1$

$x^2 + (x+1)^2 = 25$ ①

$x^2 + x^2 + 2x + 1 = 25$ ①

$2x^2 + 2x - 24 = 0$

$x^2 + x - 12 = 0$ ①

$(x+4)(x-3) = 0$ ①

$x = -4$ ① $x = 3$ ①

$y = -4+1$ ① $y = 3+1$ ①

$= -3$ $= 4$

$(-4; -3)$ $(3; 4)$

(8)

✓ [16]

Total = 38 ✓

$y = mx + c$

$-3 = 1(-4) + c$ ① / $4 = 1(3) + c$

$-3 = -4 + c$ / $4 = 3 + c$

$1 = c$ / $1 = c$

$y = x + 1$ ①

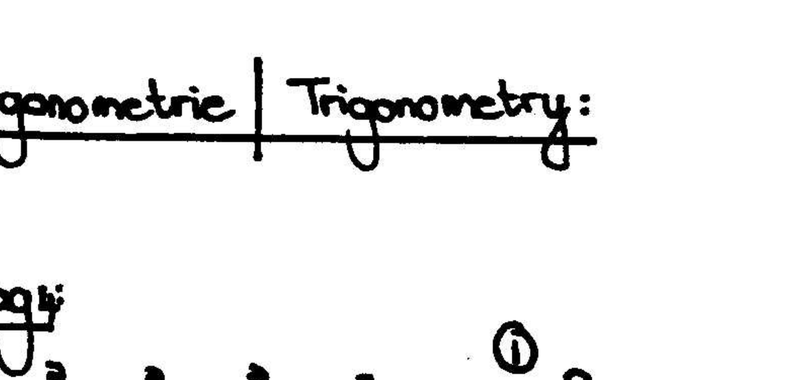
Trigonometrie | Trigonometry:

Vraag 4:

4.1.1 $p^2 = r^2 + q^2 - 2rq\cos P$ ①

4.1.2 $\frac{q}{\sin Q} = \frac{r}{\sin R}$ ① ①

4.2.1



$AC^2 = AB^2 + BC^2 - 2(AB)(BC)\cos B$ ①

$= (4,1)^2 + (5,2)^2 - 2(4,1)(5,2)\cos 120°$ ①

$= 16,81 + 27,04 - 42,64(-0,5)$ ①

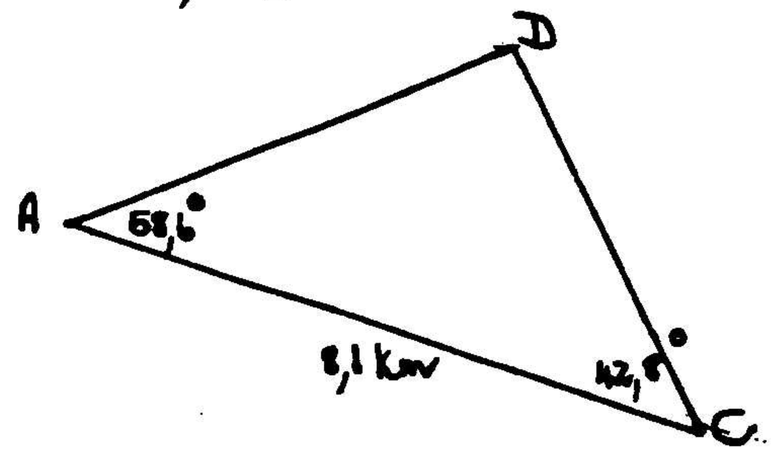
$= 43,85 + 21,32$

$= 65,17$ ①

$\therefore AC = 8,07279688$

$\therefore AC \approx 8,1$ ①

4.2.2



$\hat{D} = 180° - (58,6° + 42,8°)$

$= 180° - 101,4°$

$= 78,6°$ ①

$\frac{AD}{\sin C} = \frac{AC}{\sin D}$

$\therefore \frac{AD}{\sin 42,8°} = \frac{8,1}{\sin 78,6°}$ ①

$\therefore AD = \frac{8,1 \sin 42,8°}{\sin 78,6°}$ ①

$= 5,6142369$

$\therefore AD = 5,6$ km. ①

✓ (4)

[12]

(1) **Vraag 5:**

5.1 Opp $\triangle PQR = \frac{1}{2}(q)(r)\sin P$ ①

(2)

5.2. $Opp = \frac{1}{2}(QP)(PR)\sin P$

$\therefore 16,4 = \frac{1}{2}(9,6)(5,4)\sin P$ ①

$\therefore 16,4 = 25,92 \sin P$ ①

$\therefore \sin P = \frac{16,4}{25,92}$

$\therefore \sin P = 0,633716$ ①

$\therefore \hat{P} = 180° - 39,3°$ ①

$\therefore \hat{P} = 140,7°$ ①

✓ (5)

[6]

Vraag 6:

6.1 $\hat{X}_1 = 74° - 43°$ (buitel $\angle$. ext. $\angle$ $\triangle$)

$\therefore \hat{X}_1 = 31°$ ①

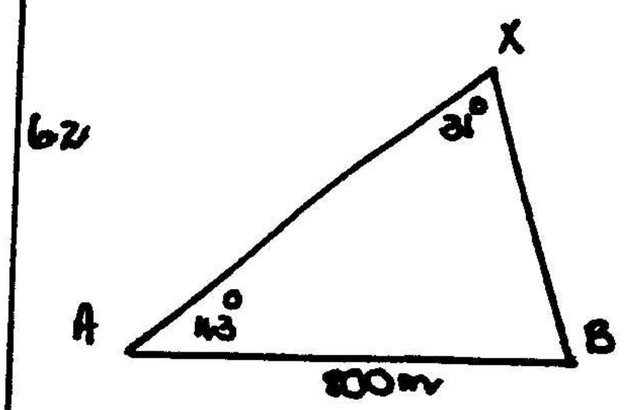
(5)

$\hat{B}_1 = 74° - 66°$

$\therefore \hat{B}_1 = 8°$ ①

(2)

6.2



$\frac{XB}{\sin A} = \frac{AB}{\sin X}$ ①

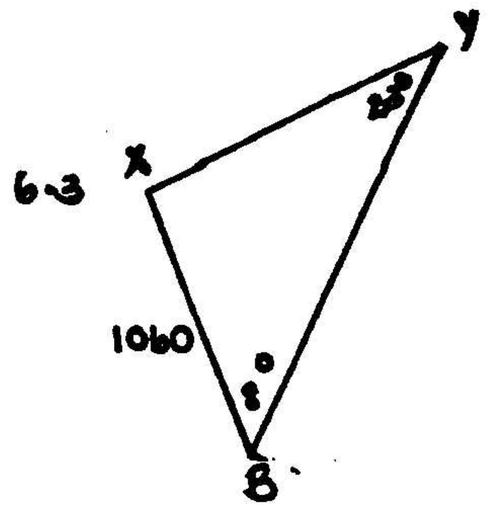
$\therefore \frac{XB}{\sin 43°} = \frac{800}{\sin 31°}$ ①

$\therefore XB = \frac{800 \sin 43°}{\sin 31°}$ ①

$= 1059,3366$

✓ $XB \approx 1059$ ①

(4)



$$\frac{XY}{\sin B} = \frac{XB}{\sin Y} \quad (1)$$

$$\therefore \frac{XY}{\sin 8^\circ} = \frac{1060}{\sin 23^\circ} \quad (1)$$

$$\therefore XY = \frac{1060 \sin 8^\circ}{\sin 23^\circ} \quad (1)$$

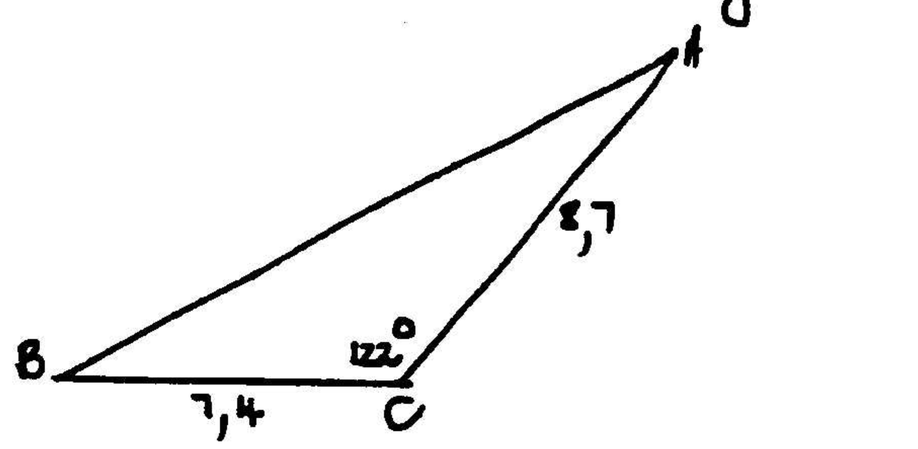
$$\therefore XY = 377,56785$$

$$\therefore XY \approx 377,6 \text{ m.} \quad (1) \quad (4)$$

✓

[10]

7.2 $\hat{C}_2 = 122^\circ$ $\angle$'s op in reguit $\angle$'s on straight line.



$$AB^2 = BC^2 + AC^2 - 2\,BC\,AC \cos \hat{C} \quad (1)$$

$$= (7,4)^2 + (8,7)^2 - 2(7,4)(8,7)\cos 122^\circ \quad (1)$$

$$= 54,76 + 75,69 - 128,76(-0,5299192) \quad (1)$$

$$= 130,45 + 68,2324404$$

$$= 198,6824 \quad (1)$$

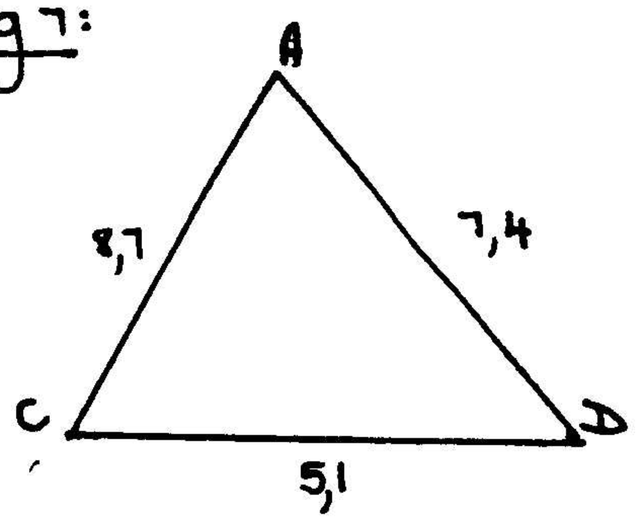
$$\therefore AB = 14,1 \text{ eenhede.} \quad (1) \quad (5)$$

✓

[10]

Vraag 7:

7.1



$$\cos C = \frac{AC^2 + CD^2 - AD^2}{2(AC)(CD)} \quad (1)$$

$$\therefore \cos C = \frac{(8,7)^2 + (5,1)^2 - (7,4)^2}{2(8,7)(5,1)} \quad (1)$$

$$= \frac{75,69 + 26,01 - 54,76}{88,74} \quad (1)$$

$$= \frac{46,94}{88,74}$$

$$\therefore \cos C = 0,528961 \quad (1)$$

✓ $\therefore C = 58,1^\circ$ (1) (5)

Memorandum.

8.

8.1

Jaar	2000	2001	2002	2003	2004
Waarde	60 000	52 800	46 464	40 889	35 983
				①	①

(2)

8.2. $60\,000 - 52\,800$

$= 7200$ ①

$\frac{7200}{60000} \times 100$ ①

$= 12\%$ ①

(3)

8.3. 2003 (Lees af)

(1)

8.4. $A = 60000\left(1 - \frac{12}{100}\right)^5$

(1)

$= 31663,91$

[7]

✓

Memorandum.

$A = P(1 + \frac{r}{100})^n$ ①

7. (i) $21000\left(1 + \frac{8}{100}\right)^{10}$ ① ① ①

$= 45\ 337$ ①

$\therefore$ Opsie (i) ①. (8)

(ii) $21000\left(1 + \frac{1}{100}\right)^{60}$ ① ①

$= 38150$ ①

✓ [8].

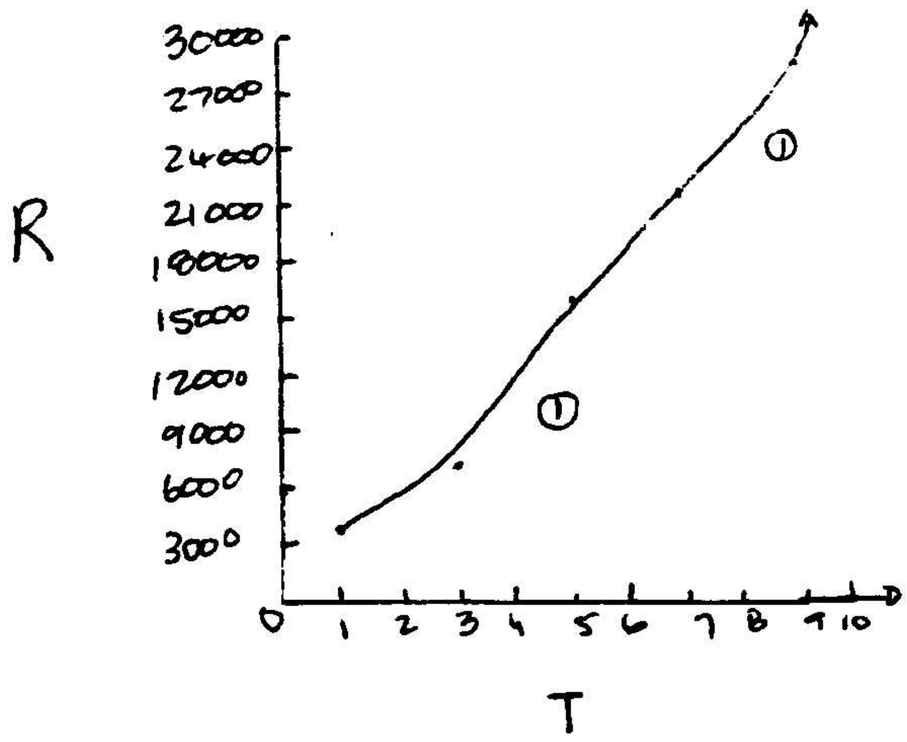
Memorandum.

10.1

Tyd (jaar)	1	3	5	7	9
Rente (R)	3008	6016	15041	21057	27073

① ① ① (3)

10.2.



grafiekpapier.

(2)

10.3.1. R 18049 (1)

10.3.2. 8 jaar. (1)

10.4. $I = \frac{23140 \times 13 \times 12}{100}$

$= \underline{36098,40}$ ①

Totale bedrag = 23140 + 36098,40 (2)

$= \underline{59238,40}$ ①

✓

[9].

Memorandum

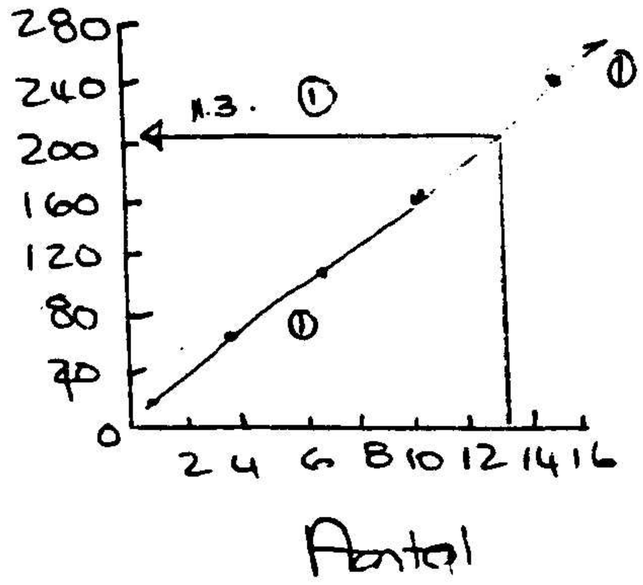
11.1

Aantal	1	4	7	10	15
Kamm	16	64	112	160	240

① ① ①

(3)

1.2



grafiek papier

(3)

11.3. R209. ①①

(2)

✓

[8] ✓

Memorandum

12. R15 800 − 8300 ①

= 7500 ①

∴ 7,5 ① × 33,80 ①

= 253,50 ① maandelikse paaiement ✓ (5)

[5]

✓

Total [37]

Boogmaat

Vraag 13

13.1 $2,63 \times 57,3$ ①

$= 150,7°$ ① (2)

13.2 $97,4 \div 57,3$ ①

$= 1,7$ rad ① (2)

13.3.1 $60 \times \frac{\pi}{180}$ ①

$= \frac{\pi}{3}$ rad ① (2)

13.3.2 $\frac{3\pi}{4} \times \frac{180}{\pi}$ ①

$= 135°$ ① (2)

✓ [8]

Vraag 14

14.1 $r^2 = 5^2 + 12^2$ ① ①

$= 25 + 144$ ①

$= 169$ ①

$r = 13$ ① (5)

14.2 $84° = 1,47$ rad ① (1)

14.3 $S = r\theta$ ①

$= 13 \times 1,47$ ①

$= 19,11$ ① (3)

✓ [9]

Vraag 15

$73° = 1,3$ rad ①

15.1 $O_{ppv} = \frac{1}{2}r^2\theta$ ①

$= \frac{1}{2}(12)^2(1,3)$ ① ①

$= 93,6$ mm² ① (4)

15.2 $Opp_{segment} = \frac{1}{2}r^2(\theta - \sin\theta)$ ①

$= \frac{1}{2}(12)^2(1,3 - \sin 73°)$ ① ①

$= \frac{1}{2}(12)^2(0,343)$ ①

$= 24,7$ mm² ① (5)

15.3 Tot oppv $= 93,6 + 24,7$ ①

$= 118,3$ mm² ① (2)

✓ [11]

Vraag 16

16.1 $V = \omega r$ ①

$= 560 \times 130$ ①

$= 72800$ mm/s ① (3)

16.2.1 $\omega = 2\pi f$ ①

$= 2\pi(3)$ ①

$= 18,85$ rad/min ① (3)

16.2.2 $V = \omega r$ ①

$= 18,85 \times 6$ ①

$= 113,1$ cm/min ① (3)

✓ [9]

[37] ✓

AFDELING/SECTION E

VERHOUDING, EWEREDIGHEID EN GELYKVORMIGHEID
RATIO, PROPORTION AND SIMILARITY

VRAAG/QUESTION 17

17.1 $XY \parallel BC$ (1) (1) (2)

17.2

17.2.1 $\frac{AD}{DB} = \frac{AE}{EC}$ $(DE \parallel BC)$ (1)

$\frac{AD}{DB} = \frac{3}{2}$ (1)

$\therefore AD = \frac{3}{5} \times \frac{15cm}{1}$

$= 9cm$ (1) (3)

OF/OR

$\frac{AD}{AB} = \frac{CG}{GB}$ $(DG \parallel AC)$

$\frac{AD}{DB} = \frac{3}{2}$

$\therefore AD = \frac{3}{5} \times \frac{15cm}{1}$

$= 9cm$

17.2.2 $DB = \frac{2}{5} \times \frac{15cm}{1}$ (1)

$= 6m$ (1) (2)

OF/OR

$DB = 15 - 9 = 6cm$

17.2.3 $\frac{BC}{BG} = \frac{5}{2}$ (1) (1)

17.3

17.3.1 $\frac{KP}{PL} = \frac{KQ}{Qm}$ $(PQ \parallel Lm)$ (1)

$\frac{x+1}{3} = \frac{4}{x}$ (1)

$x(x+1) = 12$ (1)

$x^2 + x = 12$

$x^2 + x - 12 = 0$

$(x+4)(x-3) = 0$ (1)

$x = -4$ or $x = 3$ (5)

17.3.2 $KP = x + 1$

$= 3 + 1$ (1)

$= 4$ (1) (2)

✓ [15]

VRAAG/QUESTION 18

18.1

18.1.1 $\hat{L} = 70°$ (1)

$\hat{Q} = 70°$ (1) (2)

18.1.2 $\frac{KL}{PQ} = \frac{Km}{PR} = \frac{Lm}{QR}$ (1) (1) (1) (3)

18.1.3 $\Delta KLm \overset{(1)}{|||} \Delta PQR$ (1)

✓

18.2

18.2.1

In ΔABC EN/AND ΔCBD

$\hat{A} = \hat{C}_4$ [Gegee Ⓡ / Given]

$\hat{B} = \hat{B}$ [Gem Ⓡ L / Common L]

$\hat{C} = \hat{D}_1$ [L^e Ⓡ / L^s Δ]

(3) $\therefore \Delta ABC \,|||\, \Delta CBD$ (LLL)

18.2.2 (a) $AD = 12 - 3 = 9\text{cm}$ Ⓡ (1)

(b) $\frac{CD}{BD} = \frac{AC}{BC}$ Ⓡ ($\Delta ABC|||\Delta CBD$)

$\frac{CD}{3} = \frac{10}{6}$ Ⓡ

$6CD = 30$ Ⓡ (4)

$\therefore CD = 5\text{cm}$ Ⓡ

OF/OR

$\frac{CD}{BC} = \frac{AC}{AB}$ ($\Delta ABC|||\Delta CBD$)

$\frac{CD}{6} = \frac{10}{12}$

$12CD = 60$

$\therefore CD = 5\text{cm}$

18.2.3 $\frac{AB}{BC}$ Ⓡ $= \frac{BC}{BD}$ Ⓡ $= \frac{AC}{CD}$ Ⓡ

✓ (3)

[11]

URAAG / QUESTION 19

19.1

19.1.1 In ΔMNO EN/AND ΔTSO

$\hat{M} = \hat{T}$ [Vern. L^e Ⓡ / Alt. L^s]

$\hat{N} = \hat{S}$ [Vern. Ⓡ L^e / Alt. L^s]

$\hat{O}_1 = \hat{O}_2$ [L^e Ⓡ Δ / L^s Δ]

(3) OF/OR

[Regoorst L^e / Vert opp. L^s]

$\therefore \Delta MNO \,|||\, \Delta TSO$ (LLL)

19.1.2 $\frac{MN}{TS} = \frac{NO}{SO}$ ($\Delta MNO|||\Delta TSO$)

$\frac{16}{x} = \frac{20}{5}$ Ⓡ

$20x = 80$ (2)

$x = 4\text{cm}$ Ⓡ

✓ [5]

TOTAAL / TOTAL = 37 ✓

Afdeling F: Statistiek

Vraag 20:

20.1 144 ① (1)

20.2 152 ① (1)

20.3 140 ① (1)

20.4 140 141 141 142 142 143 143 144 144 144 144 145 146 145
146 146 147 148 148 148 160 160 161 152

∴ 145 ① (1)

20.5 Gemiddelde lengte = $\frac{3480}{24}$ ① ①

= 145 ① (3)

20.6 20.1 - modus ①

20.4 - mediaan ①

20.5 - rekenkundige gemiddelde ① (3)

20.7 Variasiewydte = 152 - 140 ① ①

= 12 (2)

20.8 143 ← eerste Kwartiel. ① ① (2)

148 ← derde Kwartiel ① ① (2)

20.9 $S = \sqrt{\frac{\sum x^2 - n\bar{x}^2}{n-1}}$ ①

$= \sqrt{\frac{507474 - 24(145)}{23}}$ ① ①

$= \sqrt{\frac{507474 - 3480}{23}}$ ①

$= \sqrt{\frac{503994}{23}}$

$= \sqrt{21912,783}$ ①

= 148,03 ① (6)

507465 - 24(145)

503985

21912,39

148,03

[22]

Vraag 2:

2.1.1

Vak	Skool A			Skool B		
	Frekwensie	Relatiewe frekwensie	Relatiewe persentasie	Frekwensie	Relatiewe frekwensie	Relatiewe persentasie
Wiskunde	105	$\frac{105}{335} = 0,31$	31%	65	$\frac{65}{215} = 0,30$	30%
Aardrykskk.	60	0,18	18%	30	= 0,14	14%
Houtwerk	15	0,04	4%	6	= 0,03	3%
Biologie	80	0,24	24%	70	= 0,33	33%
TiK	75	0,22	22%	44	= 0,20	20%
	335			215		
		②	②		②	②

(8)

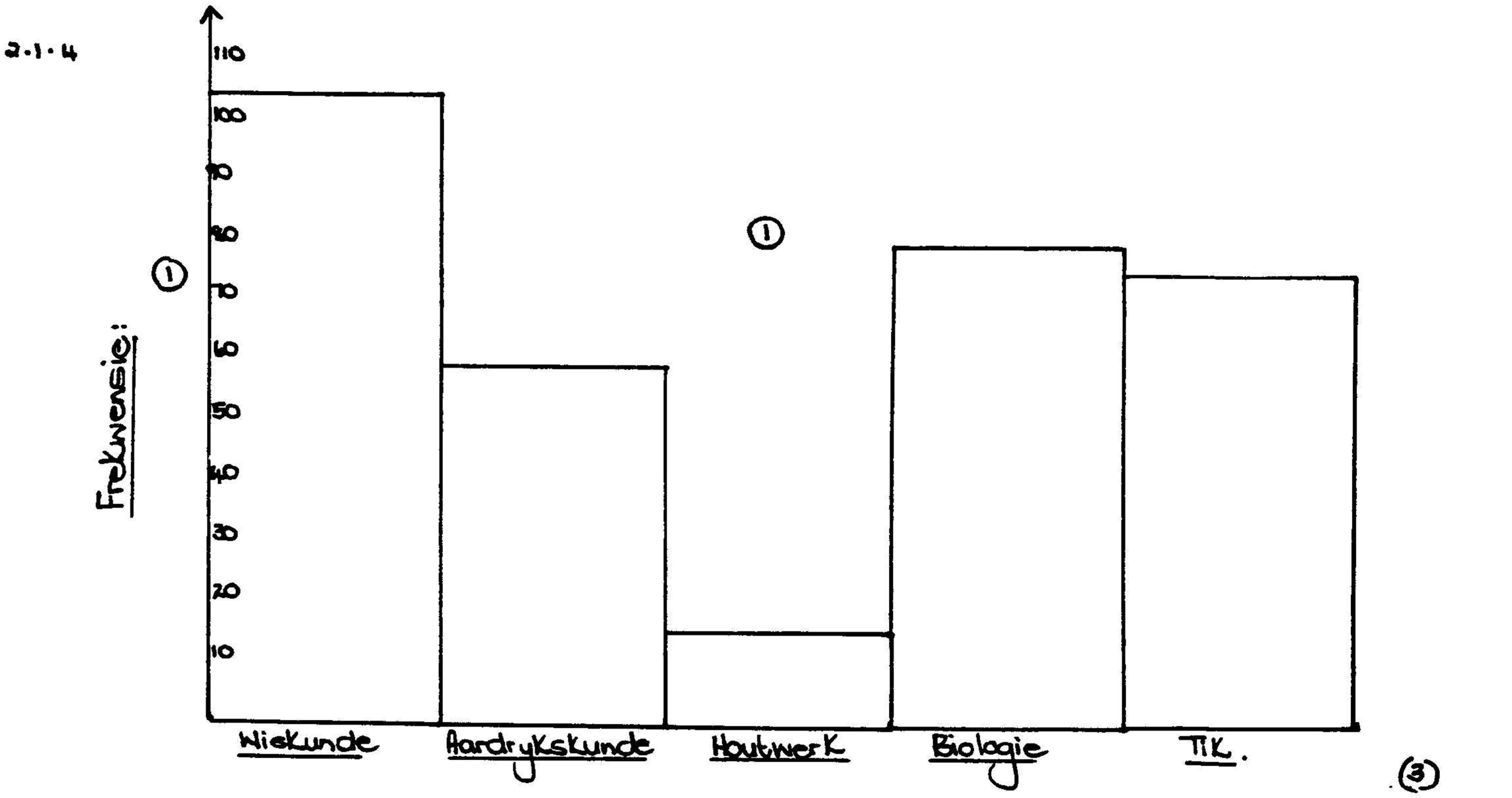
2.1.2 Skool A → Wiskunde ①

Skool B → Biologie ①

(2)

2.1.3 Skool ① B → Relatiewe frekwensie hoër ① in skool B as in A. (2)

2.1.4



① ①

(3)

① [15] ✓

✓