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

FUNCTIONAL MATHEMATICS SG
FUNKSIONELE WISKUNDE SG
(Second Paper: Geometry)
(*Tweede Vraestel: Meetkunde*)

POSSIBLE ANSWERS OCT / NOV 2006

SECTION / *AFDELING A*

QUESTION 1 / *VRAAG 1*

1.1

$2x+3y=-4$.....1

$x-2y=5$.....2

$x=2y+5$.....3 j

3 in 1:

$2(2y+5)+3y=-4$ j

$4y+10+3y=-4$ j

$7y=-14$ j

$y=-2$ j

$x=2(-2)+5$

$x=1$ j

(1; -2) j (7)

1.2.1

$3x-2y+6=0$

$-2y=-3x-6$ j

$y=\frac{3}{2}x+3$ j (2)

1.2.2 $m=\frac{3}{2}$ j (1)

1.2.3 $m=\frac{3}{2}$ j (1)

1.2.4 $m=-\frac{2}{3}$ j (1)

[12]

QUESTION / *VRAAG* 2

2.1 A (0 ; 4), B (-6 ; 0):

$m_{AB}=\frac{y_2-y_1}{x_2-x_1}$ j

$=\frac{0-4}{-6-0}$ j

$=\frac{4}{6}$

$=\frac{2}{3}$ j (3)

2.2 C (4 ; 1), D(-2 ; a):

$m_{CD}=\frac{a-1}{-2-4}$ j

$=\frac{a-1}{-6}$ j (2)

2.3

$\frac{2}{3}=\frac{a-1}{-6}$

$3(a-1)=-12$ j

$3a-3=-12$

$3a=-9$ (3)

$a=-3$ j

2.4 A (0 ; 4), B (-6 ;0):

$M_{AB}\left(\frac{x_1+x_2}{2};\frac{y_1+y_2}{2}\right)$ j

$\left(\frac{0-6}{2};\frac{4-0}{2}\right)$ j

$(-3;2)$ j (3)

2.5 A (O ; 4), B (-6 ; 0):

$d_{AB}=\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$ j

$=\sqrt{(-6-0)^2+(0-4)^2}$ j

$=\sqrt{36+16}$ j

$=\sqrt{52}$ j (5)

$=2\sqrt{13}$ j **[16]**

QUESTION / *VRAAG* 3

3.1

$x^2+y^2=r^2$ j

j

$(4)^2+(3)^2=r^2$

$16+9=r^2$

$r^2=25$ j

$x^2+y^2=25$ j (4)

3.2 S (5 ; 0) j (1)

j

3.3 R (4 ; 3) S(5 ; 0):

$m_{RS}=\frac{0-3}{5-4}$ j

$=-3$ j (2)

3.4 m = -3 S (5 ; 0):

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

$y-0=-3(x-5)$ j

$y=-3x+15$ j (3)

or / *of*

R (4 ; 3) S (5 ; 0):

$$\frac{y-y_1}{x-x_1} = \frac{y_2-y_1}{x_2-x_1} \quad \text{j}$$

$$\frac{y-3}{x-4} = \frac{0-3}{5-4} \quad \text{j}$$

$$\frac{y-3}{x-4} = -3$$

$$y-3 = -3x+12$$

$$y = -3x+15 \quad \text{j} \qquad (3)$$

[10]

[38]

SECTION B / *AFDELING B*

QUESTION / *VRAAG* 4

4.1 $l^2 = k^2 + m^2 - 2km\cos L$ (j) (j) (2)

4.2.1 $l^2 = 4^2 + 8^2 - 2\,(4)\,(8)\cos 70° \quad \text{j}$

$= 58,1107 \quad \text{j} \quad \text{j}$

$l = 7,623$ .....

$l = 7,62 \text{ m} \quad \text{j}$ (4)

4.2.2

$$A = \frac{1}{2} km \sin L \quad \text{j}$$

$$= \frac{1}{2}(4)(8)\sin 70° \quad \text{j}$$

$= 15,035$.....

$= 15,04 \text{ m}^2 \quad \text{j}$ (3)

[9]

QUESTION / *VRAAG* 5

5.1 $\frac{\sin P}{p} = \frac{\sin Q}{q} = \frac{\sin R}{r}$ (2)

5.2.1

$$\frac{\sin P}{p} = \frac{\sin Q}{q}$$

$$\frac{\sin P}{9} = \frac{\sin 56°}{11} \quad \text{j}$$

$$\sin P = \frac{9\sin 56°}{11} \quad \text{j}$$

$\sin P = 0,678.....$ j

$P = 42,7° \quad \text{j}$ (4)

5.2.2 $R = 180° - (56° + 43°)$
$= 81°$ j (1)

5.2.3

$$\frac{r}{\sin R} = \frac{p}{\sin P}$$

$$\frac{r}{\sin 81°} = \frac{9}{\sin 43°}\ j$$

$$r = \frac{9 \sin 81°}{\sin 43°}\ j$$

$r(PQ) = 13{,}034.....$ (3)

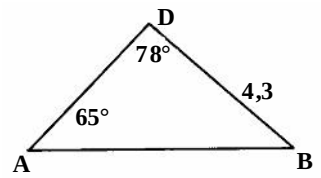
$PQ = 13\,cm$ j **[10]**

QUESTION / *VRAAG* 6

6.1 $DAB = 180° - (78° + 37°)$
$= 65°$ j (1)

6.2 $B_1 = 78°$ j (1)

6.3



$$\frac{d}{\sin D} = \frac{a}{\sin A}\ j$$

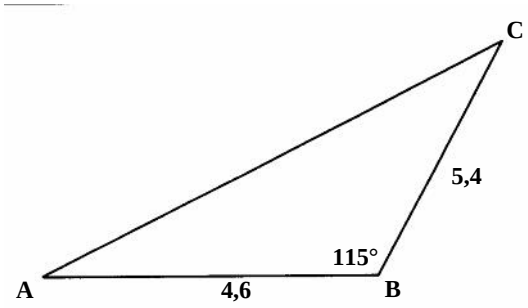
$$\frac{d}{\sin 78°} = \frac{4{,}3}{\sin 65°}\ j$$

$$d = \frac{4{,}3 \sin 78°}{\sin 65°}\ j$$

$d = 4{,}640.....$

$AB = 4{,}64$ j (4)

6.4



$b^2 = a^2 + c^2 - 2ac \cos B$ j

j j

$= 4{,}6^2 + 5{,}4^2 - 2\,(4{,}6)\,(5{,}4) \cos (37° + 78°)$

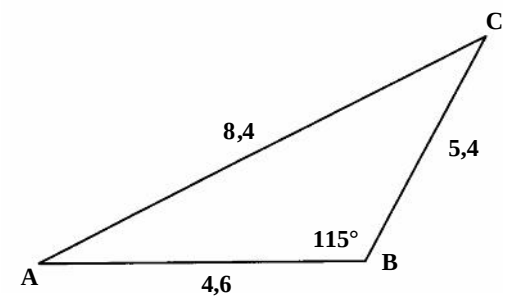
$= 4{,}6^2 + 5{,}4^2 - 2\,(4{,}6)\,(5{,}4) \cos (115°)$

$= 71{,}315$ j

$b = 8{,}444.....$

$AC = 8{,}44$ j (5)

6.5



$\frac{\sin C}{c} = \frac{\sin B}{b}$ j

$\frac{\sin C}{4{,}6} = \frac{\sin 115°}{8{,}4}$ j

$\sin C = \frac{4{,}6 \sin 115°}{8{,}4}$ j

$\sin C = 0{,}496311407$ j

$C = 29{,}75.....$

$C = 30°$ j (5)

or / *of*

$$\cos C = \frac{a^2 + b^2 - c^2}{2ab} \quad j$$

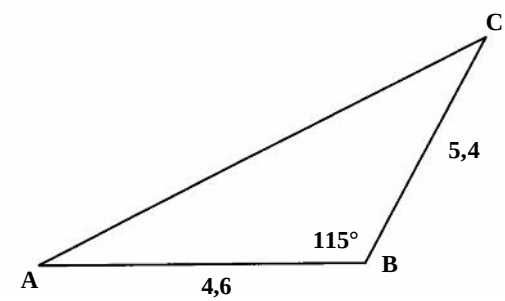
$$= \frac{(5,4)^2 + (8,4)^2 - (4,6)^2}{2(5,4)(8,4)} \quad j \quad j$$

$$= 0,86596..... \quad j$$

$$C = 30,0073....$$

$$C = 30° \quad j$$ (5)

6.6



$$A = \frac{1}{2} ac \sin B \quad j$$

$$= \frac{1}{2}(5,4)(4,6)\sin 115° \quad j$$

$$= 11,2563....$$ (3)

$$= 11,3\ m^2 \quad j$$ **[19]**

[38]

SECTION C / *AFDELING C*

QUESTION / *VRAAG 7*

7.1 R5 800 x 12 = R69 600 j j (2)

7.2 R16 300 + 42% x R9 600 j j j

= R16 300 + R4 032 j

= R20 332 (4)

7.3 R20 332 ÷ 12 j j

=R1 694,33 j (2)

7.4 R5 800 – R1 694,33 j

= R4 105,67 j (2)

[10]

QUESTION / *VRAAG* 8

8.1

$$P = A(1 + \frac{r}{100})^n$$ j

$$= 356\,000\,(1 + \frac{6}{100})^{2 \times n}$$ j j

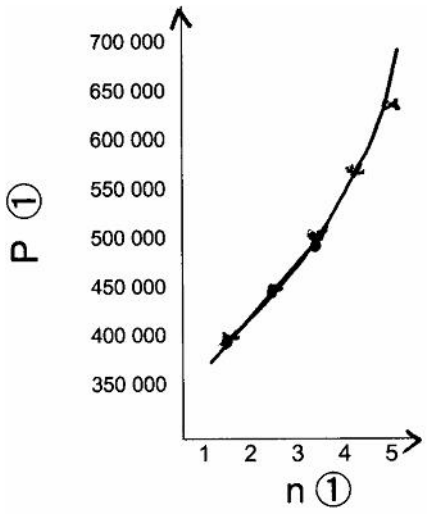
$$= 356\,000\,(1{,}06)^{2n}$$ j (4)

8.2

1	2	3	4	5
400 002	449 442	504 993	567 410	637 542
	j	j	j	j

(4)

8.3



(3)

8.4 $P = 356\,000\,(1{,}06)^{2 \times 3{,}5}$ j

$= R535\,292$ j (2)

8.5 $804\,881 = 356\,000\,(1{,}06)^{2n}$ j

$(1{,}06)^{2n} = 2{,}260901695$ j

$(1{,}06)^{2n} = (1{,}06)^{14}$

$2n = 14$

(4)

$n = 7$ j **[17]**

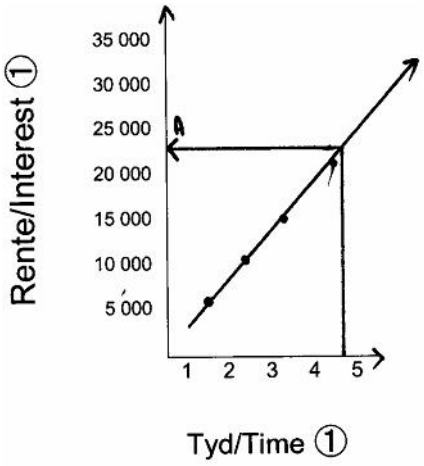
QUESTION / *VRAAG* 9

9.1

1	2	3	4	5
5 243	10 476	15 714	20 952	26 191
	j	j	j	j

(4)

9.2



(4)

9.3 At / *By* A - R23 572 j j (2)

[10]

[37]

SECTION / *AFDELING* D

10.1

Degrees *Grade* j	90°	225°	180° j
Radians *Radiale*	$\pi/2$	$5/4\pi$ j	π

(3)

10.2.1 78,4 ÷ 57,3 j

= 1,37 rad j (2)

10.2.2 4,91 rad x 57,3 j

= 281,3° j (2)

[7]

QUESTION / *VRAAG* 11

Oppv/Area = ½ r^2 ?
j j
700 = ½ $(39)^2$?

700 = 760,5 ? j

? = 0,92 rad j

? = 52,7° j **[5]**

QUESTION / *VRAAG* 12

12.1 W = $2\pi f$

= 2π (3) j

= 18,8 rad/sek j (2)

12.2 V = wr

= 18,8 (0,41) j

= 7,73 m/s j (2)

12.3 S = vt

= 7,73 x 30 j

= 231,9 m j (2)
[6]

QUESTION / *VRAAG* 13

13.1 110 ÷ 57,3 j

= 1,92 rad j (2)

13.2 S = r?
j j
20 (1,92)
j
= 38,4 cm (3)

13.3 Oppv/Area = ½ r^2 (? - sin ?)
j j j
= ½ $(20)^2$ (1,92 – sin 1,92)

= 196,1 cm^2 j (4)

13.4 Vol = oppv/area x h

= 196,1 x 40 j

= 7 842,5 cm^3 j (3)

[12]

QUESTION / *VRAAG* 14

14.1 S = r?
j j
10 = 12?

? = $10/12$

? = 0,83 rad j

? = 47,8° j (4)

14.2 Oppv. / Area = ½ rs

= ½ (10) (12)

= 60 j (3)

[7]

[37]

SECTION / *AFDELING* E

QUESTION / *VRAAG* 15

15.1.1 $\frac{PS}{SQ} = \frac{PT}{TR}$ j j (2)

15.1.2 $\frac{PQ}{PS} \perp \frac{PR}{PT}$ j j (2)

15.2.1 $\frac{AD}{DF} = \frac{AE}{EB}$ j (DE ¦¦ FB) j

$\frac{x}{3} = \frac{8}{4}$ j

$4x = 24$ j

$x = 6$ j (5)

15.2.2 $\frac{AF}{FB} = \frac{AE}{EB}$ j (FE ¦ CB) j

$\frac{9}{FC} = \frac{8}{4}$ j

$8FC = 36$ j

$FC = 4,5$ j (5)

[14]

QUESTION / *VRAAG* 16

16.1.1 $\frac{MS}{MN} = \frac{MT}{MR}$ j (ST ¦ NR) j

$\frac{9}{15} = \frac{MT}{25}$ j

$15MT = 225$ j

$MT = 15$ j (5)

16.1.2 $TR = 25 - 15 = 10$ j (1)

[6]

QUESTION / *VRAAG 17*

17.1 $C = F$ j (1)

17.2 ¦¦ j (1)

17.3 $\frac{AB}{DE} = \frac{AC}{DF} = \frac{BC}{EF}$ j j (3)

[5]

QUESTION / *VRAAG* 18

18.1 In ΔTVQ and / *en* ΔTSP:

1. $T = T$ (common / *gemeen)* j
2. $V_2 = S$ (given / *gegee)* j
3. $Q_3 = P$ ($\angle^e$? / $\angle^s$?) j (3)

18.2.1 $\frac{TV}{TS} = \frac{TQ}{TP}$ j (ΔTVQ ¦¦ ΔTSP)

$\frac{TV}{24} = \frac{15}{36}$ j

$36TV = 360$ j

$TV = 10$ j (4)

18.2.2 $\frac{TR}{TP} = \frac{TQ}{TS}$ j (QR ¦ SP)

$\frac{TR}{36} = \frac{15}{24}$ j

24TR = 540 j

TR = 22,5 j (4)

18.2.3 VR = 22,5 – 10

= 12,5 j (1)

[12]

[37]

SECTION / *AFDELING* F

QUESTION / *VRAAG* 19

19.1 IsiZulu j (1)

19.2 IsiNdebele j (1)

19.3 23,8% - 1,6% j

= 22,2% j (2)

19.4 English / *English* –8,2% j

Setswana 8,2% j (2)

19.5 German, French, Portuguese
Duits, Frans, Portugees (3)

19.6

Other / *Ander*	0,5%
IsiNdebele	1,6%
Tshivenda	2,3%
SiSwati	2,7%
Xitsonga	4,5%
Sesotho	7,9%
English	8,2%
Setswana	8,2%
Sepedi	9,3%
Afrikaans	13,3%
IsiXhosa	17,6%
IsiZulu	23,8% (1)

j

Median / *Mediaan:* Sesotho and / *en* English /*Engels* (2)

19.7 23,8 – (13,3 + 8,2)

= 23,8 – 21,5 j

= 2,3 j (2)
[14]

QUESTION / *VRAAG* 20

20.1 10 10 10 10 12 12 12 15 15 15 15 15 16 18 18 20 20 20
25 25 25 30 35 40 45

20.2 10 10 10 10 12 12 12 [15 15 15 15 15] 16 18 18 20 20 20
25 25 25 30 35 40 45

Mode / *Modus:* 15 j (1)

20.3 488 j
25 j

=19,52 j (3)

20.1 10 10 10 10 12 [12 12] 15 15 15 15 15 [16] 18 18 20 20 20
[25 25] 25 30 35 40 45

Median / *Mediaan:* 16 j

First quartile / *Eerste kwartiel:* 12 j

Third quartile / *Derde kwartiel:* 25 j (3)

20.5 $s = \sqrt{\frac{\sum x^2 - nx^2}{n-1}}$

$= \sqrt{\frac{11\,686 \text{ j} - 25\,(19{,}52)^2}{25-1}}$

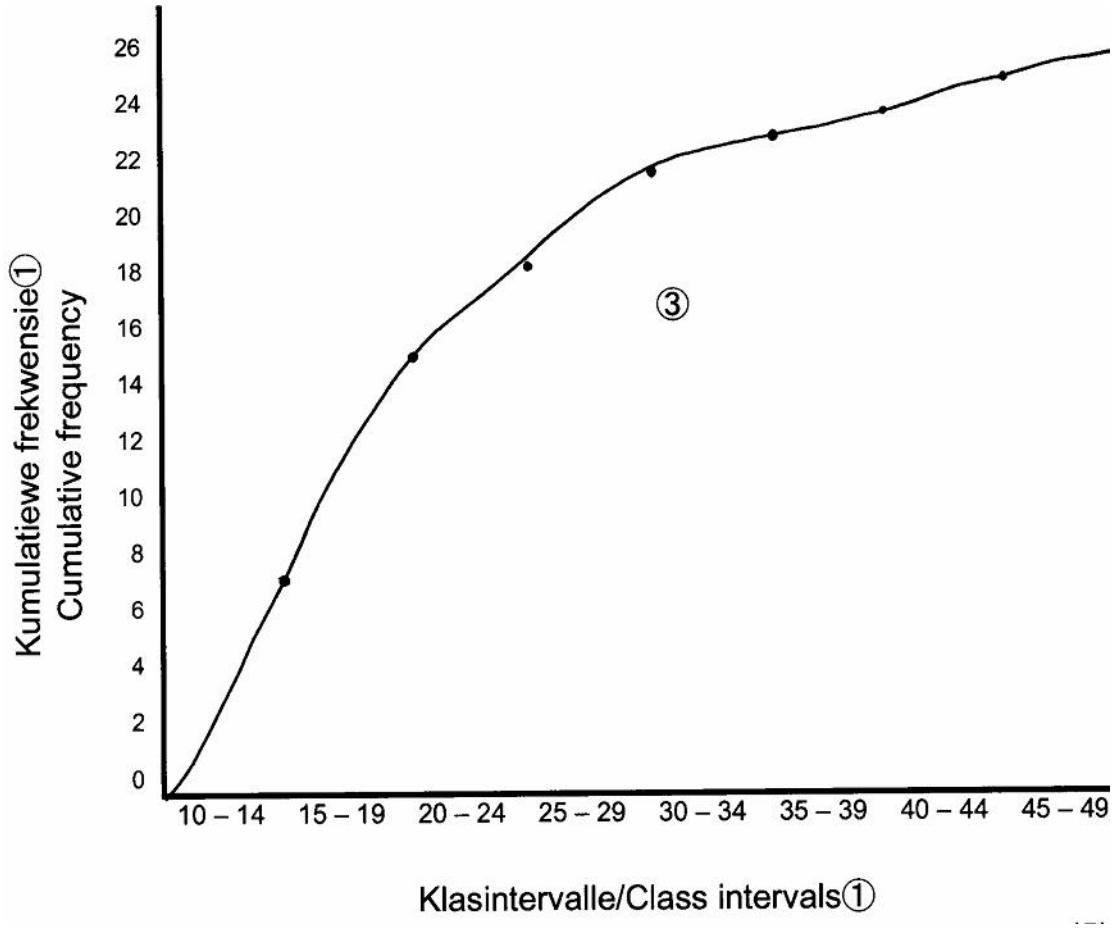
$= \sqrt{\frac{11\,686 - 9\,525{,}76 \text{ j}}{24}}$

$= \sqrt{\frac{2\,160{,}24 \text{ j}}{24}} = \sqrt{90{,}01 \text{ j}} = 9{,}5 \text{ j}$ (5)

INTERVAL / *INTERVAL*	SCORE *TELLING*	FREQUENCY *FREKWENSIE*	CUMULATIVE FREQUENCY *KUMULATIEWE FREKWENSIE*
10 – 14	||||| ||	7	7
15 – 19	||||| |||	8	15
20 – 24	|||	3	18
25 – 29	|||	3	21
30 – 34	|	1	22
35 – 39	|	1	23
40 – 44	|	1	24
45 – 49	| j	1 k	25 k

(5)

20.7



(5)
[23]
[37]

TOTAL / *TOTAAL:* **150**