

**GAUTENG DEPARTMENT OF EDUCATION
GAUTENGSE DEPARTEMENT VAN ONDERWYS
SENIOR CERTIFICATE EXAMINATION
SENIORSER TIFIKAAT-EKSA MEN**

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

POSSIBLE ANSWERS / MOONTLIKE ANTWOORDE SUPP 2007

SECTION / AFDELING A

QUESTION 1 / VRAAG 1

1.1.1 B (2 ; -1) and / en C (4 ; -2):

$$\begin{aligned} M_{BC} &= \left(\begin{array}{cc} x_1 + x_2 & y_1 + y_2 \\ 2 & 2 \end{array} \right) j \\ &= \left(\begin{array}{cc} 2+4 & -1-2 \\ 2 & 2 \end{array} \right) j \\ &M_{BC} (3; -\frac{3}{2}) \end{aligned} \quad (3)$$

1.1.2 B (2 ; -1) and / en C (4 ; -2)

$$\begin{aligned} m_{BC} &= \frac{y_2 - y_1}{x_2 - x_1} j \\ &= \frac{-2+1}{4-2} j \\ &= -\frac{1}{2} j \end{aligned} \quad (3)$$

1.1.3

$$\begin{aligned} m &= -\frac{1}{2} B (2;-1): j \\ y - y_1 &= m(x - x_1) j \\ y + 1 &= -\frac{1}{2}(x - 2) \\ y &= -\frac{1}{2}x + 1 - 1 \\ y &= -\frac{1}{2}x j \end{aligned} \quad (4)$$

1.1.4 A (1 ; 3), B (2 ; -1):

$$\begin{aligned}
 dAB &= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \quad j \\
 &= \sqrt{(2-1)^2 + (-1-3)^2} \quad j \\
 &= \sqrt{1^2 + (-4)^2} \\
 &= \sqrt{1+16} \quad j \\
 &= \sqrt{17} \quad j
 \end{aligned} \tag{4}$$

1.2.1

$$2y - 3x = 1:$$

$$x\text{-intercept} / x\text{-afsnit} : y = 0$$

$$2(0) - 3x = 1 \quad j$$

$$-3x = 1$$

$$x = -\frac{1}{3} \quad j \quad (-\frac{1}{3}; 0)$$

$$y\text{-intercept} / y\text{-afsnit} : x = 0$$

$$2y - 3(0) = 1 \quad j$$

$$2y = 1$$

$$y = \frac{1}{2} \quad j \quad (0; \frac{1}{2})$$

(4)

1.2.2

$$2y - 3x = 1$$

j

$$2y = 3x + 1$$

$$y = \frac{3}{2}x + \frac{1}{2} \quad j \tag{2}$$

$$1.2.3 \quad m = \frac{3}{2} \quad j \tag{1}$$

$$1.2.4 \quad m = \frac{3}{2} \quad j \tag{1}$$

1.2.5

$$m = -\frac{2}{3} (0; 0):$$

j

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

$$y - 0 = -\frac{2}{3} (x - 0)$$

$$y = -\frac{2}{3}x \quad j \tag{5}$$

[27]

QUESTION 2 / VRAAG 2

2.1

D (-2;1), E (1; 4), G (2; 5):

$$m_{DE} = \frac{4-1}{1-(-2)} = \frac{3}{3} = 1$$

$$m_{EG} = \frac{5-4}{2-1} = 1$$

$$\therefore m_{DE} = m_{EG}$$

$\therefore$ D, E, G is on the same line.

D, E, G is op dieselfde lyn.

(4)

2.2

$$y + x = 8 \dots 1 \quad x^2 + y^2 = 32 \dots 2$$

$$x = 8 - y \dots 3$$

$$3 \text{ in } 2: (8 - y)^2 + y^2 = 32$$

$$64 - 16y + y^2 + y^2 = 32$$

$$2y^2 - 16y + 32 = 0$$

$$y^2 - 8y + 16 = 0$$

$$(y - 4)(y - 4) = 0$$

$$y = 4$$

$$x = 8 - 4$$

$$x = 4$$

(7)

[11]

[38]

SECTION B / AFDELING B

QUESTION 3 / VRAAG 3

3.1.1

$$\frac{s}{\sin S} = \frac{p}{\sin P}$$

(2)

3.1.2

$$y^2 = s^2 + p^2 - 2sp \cos Y$$

(2)

3.1.3

$$A \Delta PSY = \frac{1}{2} sp \sin S$$

(2)

3.2.1

$$\begin{aligned}
 \frac{a}{\sin A} &= \frac{c}{\sin C} \\
 \frac{a}{\sin 60^\circ} &= \frac{13}{\sin 55^\circ} \\
 a &= \frac{13 \sin 60^\circ}{\sin 55^\circ} \\
 a &= 13,743 \dots \text{ j} \\
 a &= 13,7 \text{ j}
 \end{aligned}
 \tag{4}$$

3.2.2

$$\begin{aligned}
 \hat{B} &= 180^\circ - (60^\circ + 55^\circ) \\
 &= 65^\circ \text{ j}
 \end{aligned}
 \tag{1}$$

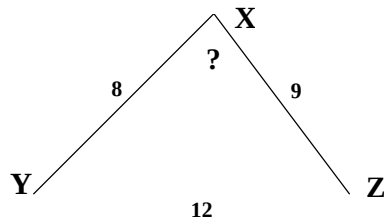
3.2.3

$$\begin{aligned}
 \text{Area } \triangle ABC &= \frac{1}{2} ac \sin B \text{ j} \\
 &= \frac{1}{2} (13) (13,7) \sin 65^\circ \\
 &= 80,706 \\
 &= 81 \text{ m}^2 \text{ j}
 \end{aligned}
 \tag{3}$$

[14]

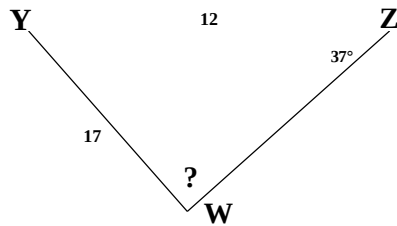
QUESTION 4 / VRAAG 4

4.1.1



$$\begin{aligned}
 \cos X &= \frac{y^2 + z^2 - x^2}{2yz} \text{ j} \\
 &= \frac{9^2 + 8^2 - 12^2}{2(9)(8)} \text{ j} \\
 &= \frac{81 + 64 - 144}{144} \text{ j} \\
 &= 0,0069 \dots \text{ j} \\
 \hat{X} &= 89,602 \dots \text{ j} \\
 \hat{X} &= 89,6^\circ \text{ j}
 \end{aligned}
 \tag{5}$$

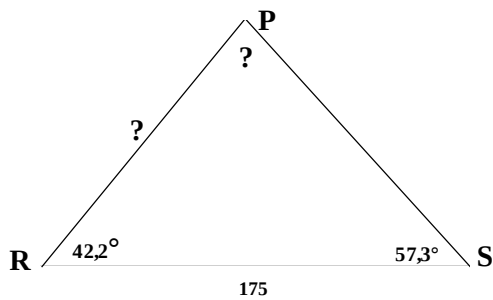
4.1.2



$$\begin{aligned} \frac{\sin W}{w} &= \frac{\sin Z}{z} \\ \sin W &= \frac{\sin 37^\circ}{12} \cdot 17 \\ \sin W &= \frac{17 \sin 37^\circ}{12} \\ \sin W &= 0,4248 \dots \\ \hat{W} &= 25,1^\circ \end{aligned}$$

(5)
[10]**QUESTION 5 / VRAAG 5**

5.1



$$\begin{aligned} \hat{SPR} &= 180^\circ - (42,2^\circ + 57,3^\circ) \\ &= 80,5^\circ \end{aligned}$$

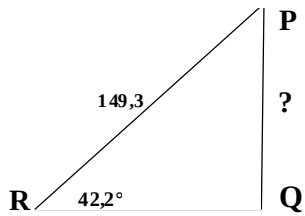
(1)

5.2

$$\begin{aligned} \frac{s}{\sin S} &= \frac{p}{\sin P} \\ \frac{s}{\sin 57,3^\circ} &= \frac{175}{\sin 80,5^\circ} \\ s &= \frac{175 \sin 57,3^\circ}{\sin 80,5^\circ} \\ s &= 149,312 \dots \\ PR &= 149,31 \end{aligned}$$

(4)

5.3



$$\begin{aligned} \frac{r}{\sin R} &= \frac{q}{\sin Q} \\ \frac{r}{\sin 42,2^\circ} &= \frac{149,3}{\sin 90^\circ} \\ r &= \frac{149,3 \sin 42,2^\circ}{\sin 90^\circ} \\ PQ &= 100 \text{ m} \end{aligned}$$

(4)
[9]**QUESTION 6 / VRAAG 6**

$$\begin{aligned} m^2 &= k^2 + l^2 - 2kl \cos M \\ &= (12,3)^2 + (16,4)^2 - 2(12,3)(16,4) \cos 123,6^\circ \\ &= 643,510 \dots \\ m &= 25,367 \dots \\ KL &= 25,37 \end{aligned}$$

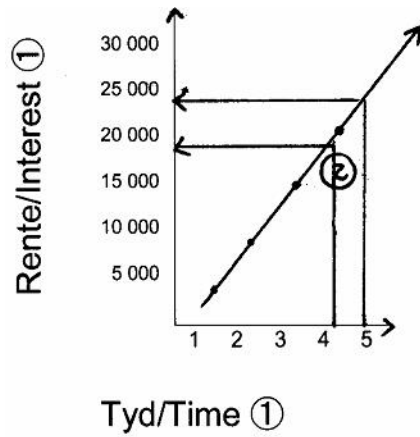
[5]
[38]**SECTION C / AFDELING C****QUESTION 7 / VRAAG 7**

7.1

1	2	3	4	5
4 244	8 487	12 731	16 974	21 218
j	j	j	j	j

(4)

7.2



(4)

7.3

7.3.1 R19 095 j j

(2)

7.3.2 R55 717 j j

(2)

[12]

QUESTION 8 / VRAAG 8

8.1

$$\begin{aligned}
 P &= A \left(1 + \frac{r}{100}\right)^2 \\
 &= 124\,000 \left(1 + \frac{2,25}{100}\right)^{4 \times n} \\
 &= 124\,000 (1,0225)^{4n}
 \end{aligned}$$

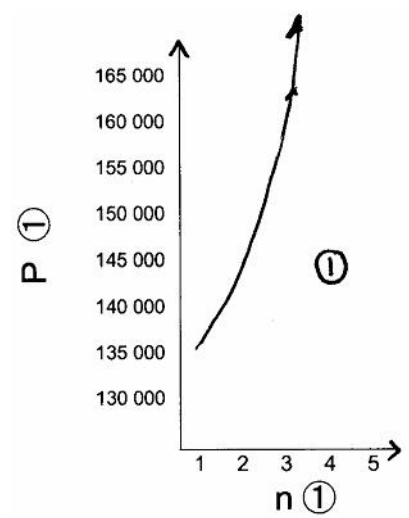
(4)

8.2

2	3	4	5
148 159	161 950	177 025	193 503
j	j	j	j

(4)

8.3



(3)

$$8.4 \quad R177\,025 - R124\,000 \quad j$$

$$= R53\,025 \quad j \quad (2)$$

$$8.5 \quad 211\,515 = 124\,000 (1,0225)^{4n}$$

$$1,0225^{4n} = 1,705 \quad j$$

$$1,0225^{4n} = (1,0225)^{24} \quad j$$

$$4n = 24$$

$$n = 6 \quad j \quad (4)$$

[17]

QUESTION 9 / VRAAG 9

$$9.1 \quad R6\,200 \times 12 \quad j$$

$$= R74\,400 \quad j \quad (2)$$

$$9.2 \quad 16\,300 + 42\% \times 14\,400$$

$$= 16\,300 + 6\,048 \quad j$$

$$= 22\,348 \quad j \quad (4)$$

$$9.3 \quad R22\,348 \div 12 = R1\,862,33 \quad j \quad (2)$$

[8]

[37]

SECTION D / AFDELING D**QUESTION 10 / VRAAG 10**

$$10.1 \quad 49,7^\circ \div 57,3 \quad j$$

$$= 0,87 \text{ rad} \quad j \quad (2)$$

$$10.2 \quad 2,78 \times 57,3 \quad j$$

$$= 159,3^\circ \quad j \quad (2)$$

$$10.3 \quad \frac{23\pi}{60} \times \frac{180}{\pi} \quad j$$

$$= 69^\circ \quad j \quad (2)$$

$$\begin{aligned}
 10.4 \quad & 45^\circ \times \frac{\pi}{180} \text{ j} \\
 & = \frac{1}{4} \pi \text{ rad j}
 \end{aligned}
 \quad \begin{array}{l} (2) \\ [8] \end{array}$$

QUESTION 11 / VRAAG 11

$$\begin{aligned}
 11.1 \quad & 76^\circ = 1,33 \text{ rad j} \\
 & s = r? \\
 & = 8,5 (1,33) \\
 & = 11,3 \text{ j}
 \end{aligned}
 \quad (4)$$

$$\begin{aligned}
 11.2 \quad & \text{Area/Oppv} = \frac{1}{2} r^2 ? \\
 & = \frac{1}{2} (8,5)^2 (1,33) \\
 & = 48,0 \text{ j}
 \end{aligned}
 \quad (3)$$

$$\begin{aligned}
 11.3 \quad & \text{Area/Oppv} = \frac{1}{2} r^2 (? - \sin ?) \\
 & = \frac{1}{2} (8,5)^2 (1,33 - \sin 70^\circ) \\
 & = 13 \text{ j}
 \end{aligned}
 \quad \begin{array}{l} (4) \\ [11] \end{array}$$

QUESTION 12 / VRAAG 12

$$\begin{aligned}
 12.1 \quad & 27^\circ \div 57,3 \text{ j} \\
 & = 0,47 \text{ rad j}
 \end{aligned}
 \quad (2)$$

$$\begin{aligned}
 12.2 \quad & \text{Area/Oppv} = \frac{1}{2} r^2 ? \\
 & = \frac{1}{2} (88) (0,47) \\
 & = 1819,8 \text{ j}
 \end{aligned}
 \quad (3)$$

$$\begin{aligned}
 12.3 \quad & \text{Area/Oppv} = \frac{1}{2} b \times h \\
 & = \frac{1}{2} (88) (52) \\
 & = 2288 \text{ j}
 \end{aligned}
 \quad (3)$$

$$12.4 \quad \text{Area/Oppv} = \Delta - \text{sector}$$

$$= 2288 - 1819,8$$

$$= 468,2 \text{ j}$$

(2)

[10]**QUESTION 13 / VRAAG 13**

$$13.1.1 \quad 40 \div 60 \text{ j}$$

$$= 0,66 \text{ rps / ops j}$$

(2)

$$13.1.2 \quad \omega = 2\pi f$$

$$= 2\pi (0,66) \text{ j}$$

$$= 4,19 \text{ rad/sek j}$$

(2)

$$13.2.1 \quad 24 \text{ cm}$$

$$= 0,24 \text{ m j}$$

(1)

$$13.2.2 \quad V = \omega r$$

$$= 175,9 \text{ j} \times 0,24 \text{ j}$$

$$= 42,2 \text{ m/s j}$$

(3)

[8]**[37]****SECTION E / AFDELING E****QUESTION 14 / VRAAG 14**

$$14.1$$

$$\begin{array}{l} KO = KP \text{ j} \\ OL \text{ j} PM \end{array}$$

(2)

$$14.2.1$$

In ?AEC is

$$AB = EF \text{ j} \quad \text{j}$$

$$BC = FC \text{ (BF} \perp \text{ AE)}$$

$$\frac{AB}{6} = \frac{2}{4} \text{ j}$$

$$4AB = 12$$

$$AB = 3 \text{ j}$$

(4)

14.2.2

$$\begin{aligned}
 &\text{In } \triangle ABC \text{ is:} \\
 &DE \parallel AB \quad (BE, AD) \\
 &EC = BC \\
 &DE = \frac{3}{6} \cdot AB \\
 &DE = 3
 \end{aligned}$$

(4)

[10]

QUESTION 15 / VRAAG 15

$$\begin{aligned}
 &XS = ZT \\
 &SY = TY \quad (XZ, ST) \\
 &\frac{8}{4} = \frac{y+1}{2} \\
 &4(y+1) = 16 \\
 &4y+4 = 16 \\
 &4y = 12 \quad y = 3
 \end{aligned}$$

[6]

QUESTION 16 / VRAAG 16

$$16.1.1 \quad \hat{C} = \hat{L} \quad (1)$$

$$16.1.2 \quad \triangle ABC \parallel \triangle KML \quad (1)$$

$$16.1.3 \quad \frac{AB}{KM} = \frac{BC}{ML} = \frac{AC}{LK} \quad (3)$$

16.2.1 In $\triangle DBP$ and $\triangle EBQ$:

$$1. \quad \hat{B} = \hat{B} \quad (\text{both } \angle \text{bei } 60^\circ)$$

$$2. \quad \hat{D}_1 = \hat{E}_1 \quad (\text{both } \angle \text{bei } 90^\circ)$$

$$3. \quad \hat{P}_1 = \hat{Q}_1$$

$$\therefore \triangle DBP \parallel \triangle EBQ \quad (\angle \angle \angle) \quad (4)$$

$$16.2.2 \quad \frac{EB}{DB} = \frac{BQ}{BP} = \frac{QE}{PD} \quad (2)$$

16.2.3

$$\begin{aligned}
 &PD = 9 \\
 &\frac{8}{12} = \frac{9+3}{PD} \\
 &12PD = 72 \\
 &PD = 6
 \end{aligned}$$

(4)

[15]

QUESTION 17 / VRAAG 17

In $\triangle DFE$ en $\triangle HFG$:

1. $\hat{F}_1 = \hat{F}_2$ (vertically opp / regoorst)
2. $\hat{D} = \hat{H}$ (alternate angles / oënskynlike)
3. $\hat{E} = \hat{G}$ (")

$\therefore \triangle DFE \cong \triangle HFG$ ($\angle\angle\angle$)

$$\therefore \frac{DF}{HF} = \frac{EF}{GF} \quad [6]$$

TOTAL FOR SECTION E / TOTAAL VIR AFDELING E: [37]

SECTION F / AFDELING F**QUESTION 18 / VRAAG 18**

- 18.1 Northern Cape / Noor d-Kaap (1)
- 18.2 KwaZulu/Natal (1)
- 18.3 $9\,800\,000 - 850\,000$
- $= 8\,950\,000$ (3)
- 18.4 Mpumalanga 3,3 million / miljoen (2)
North West / Noor d-Wes 3,8 million / miljoen

OR / OF

Mpumalanga 3,3 / Free State / Vrystaat 2,8

- 18.5 $46\,650\,000$ (1)
- 18.6 $46\,650\,000$ (3)
9
 $= 5183\,333$

18.7

Northern Cape / <i>Noord-Kaap</i>	850 000
Freestate / <i>Vrystaat</i>	2,8 mil.
Mpumulanga	3,3 mil.
North-West / <i>Noord-wes</i>	3,8 mil.
Western Cape / <i>Wes-Kaap</i>	4,7 mil.
Limpopo	5,5 mil.
Eastern Cape / <i>Oos-Kaap</i>	6,7 mil.
Gauteng	9,2 mil.
KwaZulu/Natal	9,8 mil.

Median/*Mediaan* – Western Cape / *Wes-Kaap* (3)

18.9 9,8 mil. – (2,8 mil. + 3,8 mil.) $\div$ 2

= 9,8 mil. – 6,6 mil.

= 3,2 mil. $\div$ 2 (2)

[16]

QUESTION 19 / VRAAG 19

19.1 1 1 2 2 2 3 4 5 5 5 5 5 5 6 6 6 7 7 7 7 8 9 10 10 12 (1)

19.2 1 1 2 2 2 3 4 5 5 5 5 5 5 6 6 6 7 7 7 7 8 9 10 10 12 (1)

Mode / *Modus*: 5 $\div$ 2

19.3 $\frac{140}{25} = 5,60$ (3)

19.4 1 1 2 2 2 3 4 5 5 5 5 5 5 6 6 6 7 7 7 7 8 9 10 10 12

Median / *Mediaan*: 5 $\div$ 2

First quartile / *Eerste kwartiel*: 3 and/en 4 $\div$ 2

Third quartile / *Derde kwartiel*: 7 $\div$ 2 (3)

19.5

$$\begin{aligned}
 s &= \sqrt{\frac{\sum x^2 - nx^2}{n-1}} \\
 &= \sqrt{\frac{982j - 25(5,6)^2}{25-1}} \\
 &= \sqrt{\frac{982-784j}{24}} \\
 &= \sqrt{\frac{198j}{24}} \\
 &= \sqrt{8,25j} \\
 &= 2,9j
 \end{aligned}$$

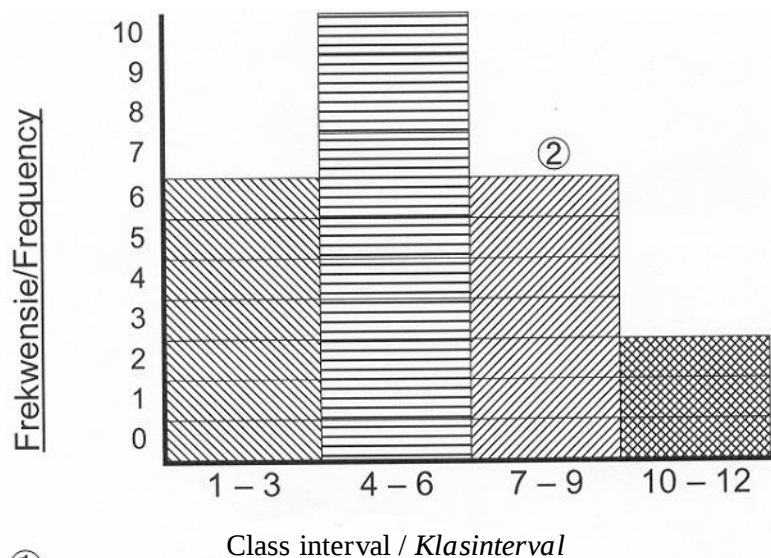
(5)

19.6

INTERVAL	SCORE / <i>TELLING</i>	FREQUENCY <i>FREKWENSIE</i>	CUMULATIVE FREQUENCY <i>KUMULATIE WE FREKWENSIE</i>
1 – 3		6	6
4 – 6		10	16
7 – 9		6	22
10 – 12	j	3 k	25 k

(5)

19.7



(3)

[21]

TOTAL FOR SECTION F / *TOTAAL VIR AFDE LING F:*

[37]

TOTAL / *TOTAAL:*

150