

**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 OCT / NOV 2006

SECTION / AFDELING A

QUESTION 1 / VRAAG 1

1.1

$$2x + 3y = -4 \dots\dots\dots 1$$

$$x - 2y = 5 \dots\dots\dots 2$$

$$x = 2y + 5 \dots\dots\dots 3 \quad j$$

3 in 1:

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

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

$$7y = -14 \quad j$$

$$y = -2 \quad j$$

$$x = 2(-2) + 5$$

$$x = 1 \quad j$$

(1; -2)j

(7)

1.2.1

$$3x - 2y + 6 = 0$$

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

$$y = \frac{3}{2}x + 3$$

(2)

$$1.2.2 \quad m = \frac{3}{2} \text{ j}$$

(1)

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

(1)

$$1.2.4 \quad m = -\frac{2}{3} \text{ j}$$

(1)

[12]**QUESTION / VRAAG 2**2.1 A(0; 4), B(-6; 0):

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

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

$$= \frac{4}{6}$$

$$= \frac{2}{3} \text{ j}$$

(3)

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

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

$$= \frac{a - 1}{-6} \text{ j}$$

(2)

2.3

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

$$3(a - 1) = -12 \text{ j}$$

$$3a - 3 = -12$$

$$3a = -9$$

$$a = -3 \text{ j}$$

(3)

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

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

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

$$(-3; 2) \mathbf{j} \quad (3)$$

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

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

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

$$= \sqrt{36+16} \mathbf{j}$$

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

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

QUESTION / VRAAG 3

3.1

$$x^2 + y^2 = r^2 \mathbf{j}$$

$$(4)^2 + (3)^2 = r^2 \mathbf{j}$$

$$16+9 = r^2$$

$$r^2 = 25 \mathbf{j}$$

$$x^2 + y^2 = 25 \mathbf{j} \quad (4)$$

3.2 S (5 ; 0) \mathbf{j} (1)3.3 R (4 ; 3) S(5 ; 0):

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

$$= -3 \mathbf{j} \quad (2)$$

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

$$y - y_1 = m(x - x_1) \mathbf{j}$$

$$y - 0 = -3(x - 5) \mathbf{j}$$

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

or / of

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

$$y - y_1 = y_2 - y_1$$

$$x - x_1 = x_2 - x_1 \quad j$$

$$y - 3 = 0 - 3$$

$$x - 4 = 5 - 4 \quad j$$

$$y - 3 = -3$$

$$x - 4$$

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

$$y = -3x + 15 \quad j$$

(3)

[10]

[38]

SECTION B / AFDELING B

QUESTION / VRAAG 4

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

4.2.1
$$l^2 = 4^2 + 8^2 - 2(4)(8) \cos 70^\circ \quad j$$

$$= 58,1107 \quad j \quad j$$

$$l = 7,623 \dots\dots\dots$$

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

4.2.2

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

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

$$= 15,035 \dots\dots\dots$$

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

(3)

[9]

QUESTION / VRAAG 5

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

5.2.1

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

$$\frac{\sin P}{9} = \frac{\sin 56^\circ}{11} \quad j$$

$$\sin P = \frac{9 \sin 56^\circ}{11} \quad j$$

$$\sin P = 0,678 \dots\dots \quad j$$

$$P = 42,7^\circ \quad j$$

$$P = 42,7^\circ \quad j$$

$$P = 42,7^\circ \quad j$$

$$P = 42,7^\circ \quad j$$

(4)

$$5.2.2 \quad R = 180^\circ - (56^\circ + 43^\circ) \\ = 81^\circ \quad j \quad (1)$$

5.2.3

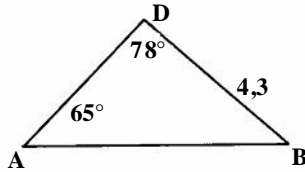
$$\frac{r}{\sin R} = \frac{p}{\sin P} \\ \frac{r}{\sin 81^\circ} = \frac{9}{\sin 43^\circ} \quad j \\ r = \frac{9 \sin 81^\circ}{\sin 43^\circ} \quad j \\ r(PQ) = 13,034 \dots \dots \dots \quad (3) \\ PQ = 13 \text{ cm} \quad j \quad [10]$$

QUESTION / VRAAG 6

$$6.1 \quad DAB = 180^\circ - (78^\circ + 37^\circ) \\ = 65^\circ \quad j \quad (1)$$

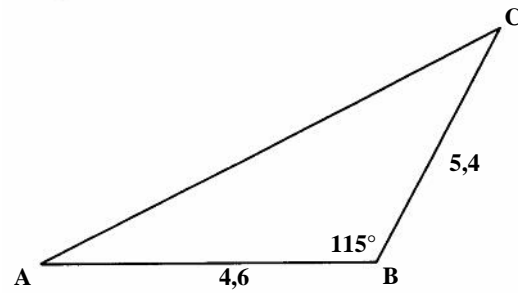
$$6.2 \quad B_1 = 78^\circ \quad j \quad (1)$$

6.3



$$\frac{d}{\sin D} = \frac{a}{\sin A} \quad j \\ \frac{d}{\sin 78^\circ} = \frac{4,3}{\sin 65^\circ} \quad j \\ d = \frac{4,3 \sin 78^\circ}{\sin 65^\circ} \quad j \\ d = 4,640 \dots \dots \dots \\ AB = 4,64 \quad j \quad (4)$$

6.4



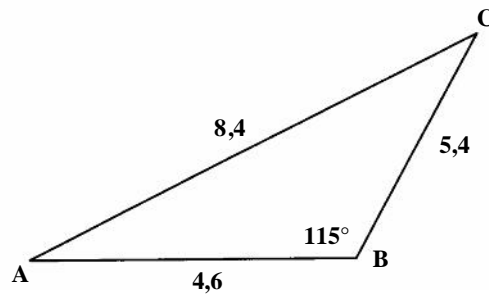
$$\begin{aligned}
 b^2 &= a^2 + c^2 - 2ac \cos B \\
 &= 4,6^2 + 5,4^2 - 2(4,6)(5,4) \cos(115^\circ) \\
 &= 4,6^2 + 5,4^2 - 2(4,6)(5,4) \cos(115^\circ) \\
 &= 71,315
 \end{aligned}$$

$$b = 8,444\dots$$

$$AC = 8,44$$

(5)

6.5



$$\begin{aligned}
 \frac{\sin C}{c} &= \frac{\sin B}{b} \\
 \frac{\sin C}{8,4} &= \frac{\sin 115^\circ}{5,4} \\
 \sin C &= \frac{8,4 \sin 115^\circ}{5,4} \\
 \sin C &= 0,496311407 \\
 C &= 29,75\dots \\
 C &= 30^\circ
 \end{aligned}$$

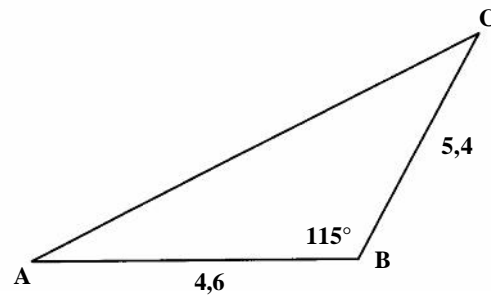
(5)

or / of

$$\begin{aligned}\cos C &= \frac{a^2 + b^2 - c^2}{2ab} \\ &= \frac{(5,4)^2 + (8,4)^2 - (4,6)^2}{2(5,4)(8,4)} \\ &= 0,86596\dots \\ C &= 30,0073\dots \\ C &= 30^\circ\end{aligned}$$

(5)

6.6



$$\begin{aligned}A &= \frac{1}{2} ac \sin B \\ &= \frac{1}{2} (5,4) (4,6) \sin 115^\circ \\ &= 11,2563\dots \\ &= 11,3 \text{ m}^2\end{aligned}$$

(3)

[19]

[38]

SECTION C / AFDELING C

QUESTION / VRAAG 7

$$7.1 \quad R5\,800 \times 12 = R69\,600 \quad (2)$$

$$\begin{aligned}7.2 \quad R16\,300 + 42\% \times R9\,600 \\ &= R16\,300 + R4\,032 \\ &= R20\,332\end{aligned} \quad (4)$$

$$\begin{aligned}7.3 \quad R20\,332 \div 12 \\ &= R1\,694,33\end{aligned} \quad (2)$$

$$\begin{aligned}7.4 \quad R5\,800 - R1\,694,33 \\ &= R4\,105,67\end{aligned} \quad (2)$$

[10]

QUESTION / VRAAG 8

8.1

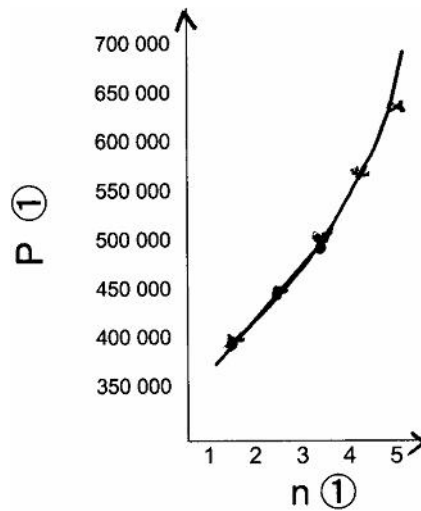
$$\begin{aligned}
 P &= A \left(1 + \frac{r}{100}\right)^n \\
 &= 356\,000 \left(1 + \frac{6}{100}\right)^{2 \times n} \\
 &= 356\,000 (1,06)^{2n}
 \end{aligned}
 \tag{4}$$

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)

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

$$= R535\,292 j \tag{2}$$

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

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

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

$$2n = 14$$

$$n = 7 j$$

(4)
[17]

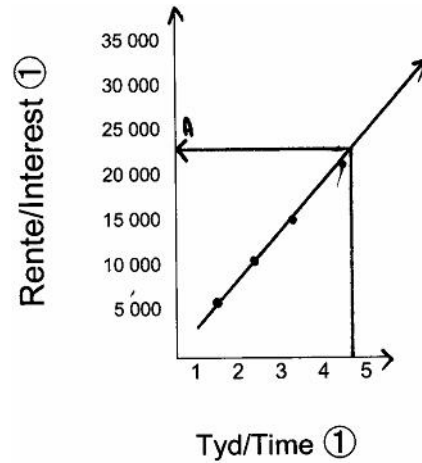
QUESTION / VRAAG 9

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 $A_t / B_y A - R_{23} 572$

(2)

[10]
[37]

SECTION / AFDELING D

10.1

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

(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

$$\text{Oppv/Area} = \frac{1}{2} r^2 \text{ ?}$$

$$700 = \frac{1}{2} (39)^2 \text{ ?}$$

$$700 = 760,5 \text{ ? j}$$

$$\text{?} = 0,92 \text{ rad j}$$

$$\text{?} = 52,7^\circ \text{ j}$$

[5]

QUESTION / VRAAG 12

$$12.1 \quad W = 2\pi f$$

$$= 2\pi (3) \text{ j}$$

$$= 18,8 \text{ rad/sek j}$$

(2)

$$12.2 \quad V = wr$$

$$= 18,8 (0,41) \text{ j}$$

$$= 7,73 \text{ m/s j}$$

(2)

$$12.3 \quad S = vt$$

$$= 7,73 \times 30 \text{ j}$$

$$= 231,9 \text{ m j}$$

(2)

[6]

QUESTION / VRAAG 13

$$13.1 \quad 110 \div 57,3 \text{ j}$$

$$= 1,92 \text{ rad j}$$

(2)

$$13.2 \quad S = r\text{?}$$

$$\frac{j}{j} \\ 20 (1,92)$$

$$\frac{j}{j} \\ = 38,4 \text{ cm}$$

(3)

$$13.3 \quad \text{Oppv/Area} = \frac{1}{2} r^2 (\text{?} - \sin \text{?})$$

$$= \frac{1}{2} (20)^2 (1,92 - \sin 1,92)$$

$$= 196,1 \text{ cm}^2 \text{ j}$$

(4)

$$\begin{aligned}
 13.4 \quad \text{Vol} &= \text{oppv}/\text{area} \times h \\
 &= 196,1 \times 40 \text{ j} \\
 &= 7\,842,5 \text{ cm}^3 \text{ j}
 \end{aligned}$$

(3)
[12]

QUESTION / VRAAG 14

$$\begin{aligned}
 14.1 \quad S &= r? \\
 \text{j} \quad \text{j} \\
 10 &= 12? \\
 \\
 ? &= \frac{10}{12} \\
 \\
 ? &= 0,83 \text{ rad j} \\
 \\
 ? &= 47,8^\circ \text{ j}
 \end{aligned}$$

(4)

$$\begin{aligned}
 14.2 \quad \text{Oppv. / Area} &= \frac{1}{2} rs \\
 \\
 &= \frac{1}{2} (10) (12) \\
 \\
 &= 60 \text{ j}
 \end{aligned}$$

(3)
[7]
[37]

SECTION / AFDELING E

QUESTION / VRAAG 15

$$15.1.1 \quad \frac{PS}{SQ} = \frac{PT}{TR} \text{ j}$$

(2)

$$15.1.2 \quad \frac{PQ}{PS} = \frac{PR}{PT} \text{ j}$$

(2)

$$\begin{aligned}
 15.2.1 \quad \frac{AD}{DF} &= \frac{AE}{EB} \text{ j} \\
 &\quad (DE \parallel FB) \\
 \\
 \frac{x}{3} &= \frac{8}{4} \text{ j} \\
 4x &= 24 \text{ j} \\
 x &= 6 \text{ j}
 \end{aligned}$$

(5)

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

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

$$8FC = 36 \text{ j}$$

$$FC = 4,5 \text{ j}$$

(5)
[14]**QUESTION / VRAAG 16**

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

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

$$15MT = 225 \text{ j}$$

$$MT = 15 \text{ j}$$

(5)

$$16.1.2 \quad TR = 25 - 15 = 10 \text{ j}$$

(1)
[6]**QUESTION / VRAAG 17**

$$17.1 \quad C = F \text{ j}$$

(1)

$$17.2 \quad \parallel \text{ j}$$

(1)

$$17.3 \quad \frac{AB}{DE} = \frac{AC}{DF} = \frac{BC}{EF} \text{ j}$$

(3)
[5]**QUESTION / VRAAG 18**18.1 In ΔTVQ and / en ΔTSP :

$$1. \quad T = T \text{ (common / } gemeen) \text{ j}$$

$$2. \quad V_2 = S \text{ (given / } gegee) \text{ j}$$

$$3. \quad Q_3 = P \text{ (} \angle^e ? / \angle^s ?) \text{ j}$$

(3)

$$18.2.1 \quad \frac{TV}{TS} = \frac{TQ}{TP} \quad (\Delta TVQ \parallel \Delta TSP)$$

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

$$36TV = 360 \text{ j}$$

$$TV = 10 \text{ j}$$

(4)

$$18.2.2 \quad \frac{TR}{TP} = \frac{TQ_j}{TS} \quad (QR \text{ : } SP)$$

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

$$24TR = 540 j$$

$$TR = 22,5 j \quad (4)$$

$$18.2.3 \quad VR = 22,5 - 10$$

$$= 12,5 j \quad (1)$$

[12]

[37]

SECTION / AFDELING F

QUESTION / VRAAG 19

$$19.1 \quad \text{IsiZulu } j \quad (1)$$

$$19.2 \quad \text{IsiNdebele } j \quad (1)$$

$$19.3 \quad 23,8\% - 1,6\% j$$

$$= 22,2\% j \quad (2)$$

$$19.4 \quad \text{English / English } -8,2\% j$$

$$\text{Setswana } 8,2\% j \quad (2)$$

$$19.5 \quad \text{German, French, Portuguese}$$

$$\text{Duits, Frans, Portugees} \quad (3)$$

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 $23,8 - (13,3 + 8,2)$

$= 23,8 - 21,5 \text{ j}$

$= 2,3 \text{ j}$

(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 4520.2 10 10 10 10 12 12 12 15 15 15 15 15 16 18 18 20 20 20
25 25 25 30 35 40 45Mode / *Modus*: 15 j (1)20.3 488j
25 j $= 19,52 \text{ j}$ (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 45Median / *Mediaan*: 16 jFirst quartile / *Eerste kwartiel*: 12 jThird quartile / *Derde kwartiel*: 25 j (3)

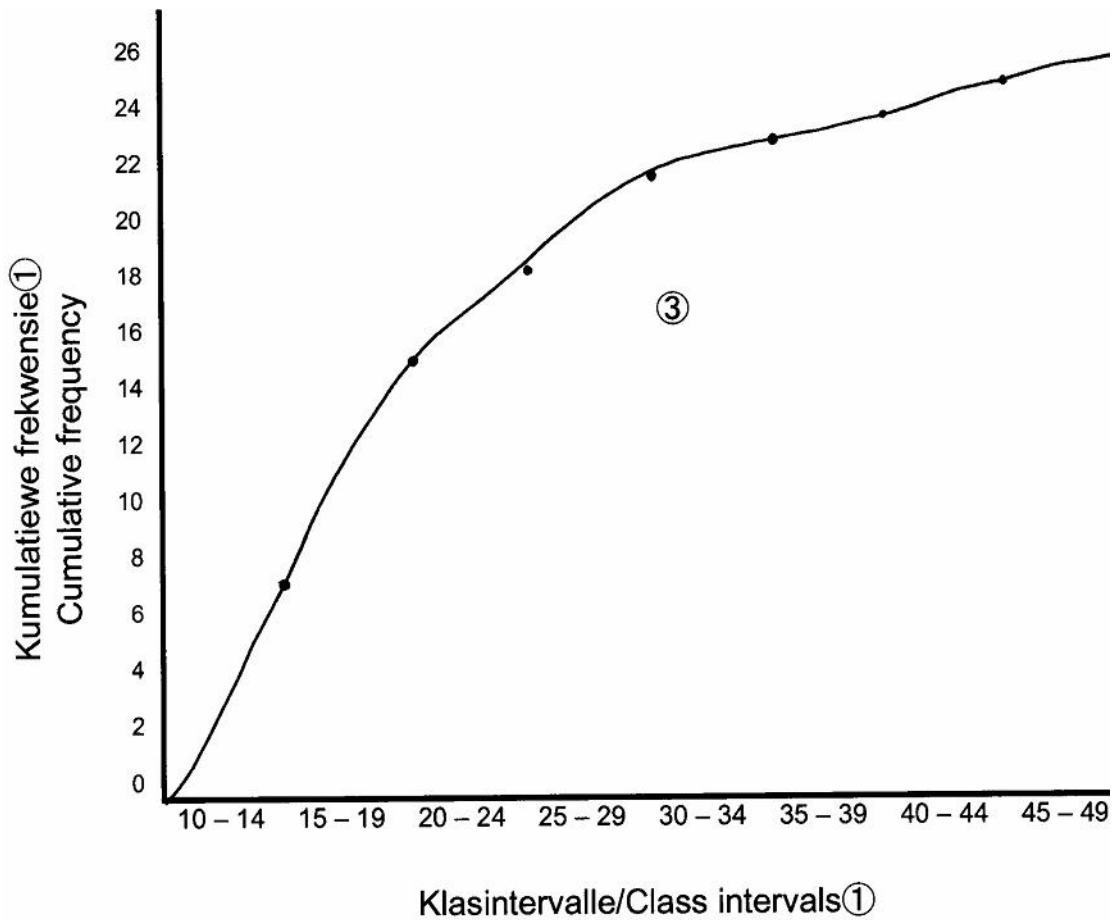
$$\begin{aligned} 20.5 \quad s &= \sqrt{\frac{\sum x^2 - nx^2}{n-1}} \\ &= \sqrt{\frac{11\,686j - 25(19,52)^2}{25-1}} \\ &= \sqrt{\frac{11\,686 - 9\,525,76j}{24}} \\ &= \sqrt{\frac{2\,160,24j}{24}} = \sqrt{90,01j} = 9,5j \end{aligned}$$

(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