basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE
NASIONALE SENIOR SERTIFIKAAT

GRADE/*GRAAD* 11

MATHEMATICS P1/*WISKUNDE V1*

NOVEMBER 2015

MEMORANDUM

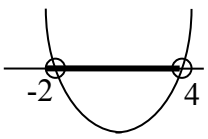
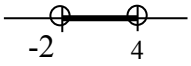
MARKS/*PUNTE*: 150

This memorandum consists of 19 pages.
Hierdie memorandum bestaan uit 19 bladsye.

NOTE:
- If a candidate answered a question TWICE, mark only the FIRST attempt.
- If a candidate crossed out an answer and did not redo it, mark the crossed-out answer.
- Consistent accuracy applies to ALL aspects of the marking memorandum.
- Assuming values/answers in order to solve a problem is unacceptable.

LET WEL:
- *As 'n kandidaat 'n vraag TWEE keer beantwoord het, sien slegs die EERSTE poging na.*
- *As 'n kandidaat 'n antwoord deurgehaal en nie oorgedoen het nie, sien die deurgehaalde antwoord na.*
- *Volgehoue akkuraatheid is op ALLE aspekte van die memorandum van toepassing.*
- *Dit is onaanvaarbaar om waardes/antwoordde aan te neem om 'n probleem op te los.*

QUESTION/*VRAAG* 1

1.1.1	$x^2 + x - 12 = 0$ $(x+4)(x-3) = 0$ $x = -4$ or $x = 3$	✓factors/*faktore* ✓answer/*antwoord* ✓answer/*antwoord* (3)
1.1.2	$\sqrt{2x+1} = x-1$ $2x+1 = (x-1)^2$ $2x+1 = x^2 - 2x + 1$ $x^2 - 4x = 0$ $x(x-4) = 0$ $x = 0$ or $x = 4$ n/a	✓squaring both sides/ *kwadreer aan albei kante* ✓standard form/*stand vorm* ✓factors/*faktore* ✓answers/*antwoord* ✓$x = 4$ (correct selection) *(korrekte keuse)* (5)
1.1.3	$2^{x\sqrt{x}} = 2^{27}$ $2^{x^{\frac{3}{2}}} = 2^{27}$ $x^{\frac{3}{2}} = 27$ $x = (27)^{\frac{2}{3}}$ $x = 9$	✓ $2^{x^{\frac{3}{2}}}$ ✓ $x^{\frac{3}{2}} = 27$ ✓raise both sides to $\frac{2}{3}$ ✓answer/*antwoord* (4)
1.1.4	$x^2 - 2x - 8 < 0$ $(x-4)(x+2) < 0$  **OR/** ***OF***  $-2 < x < 4$ **OR / OF** $x \in (-2\,;4)$	✓$(x+4)(x+2) < 0$ ✓critical values/*krit wrdes* ✓inequalities/*ongelykh* (3)

1.2.1	$5x^2 + 6x - 7 = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $= \frac{-6 \pm \sqrt{(6)^2 - 4(5)(-7)}}{2(5)}$ $= 0{,}73 \quad or \quad -1{,}93$	✓formula/*e* ✓substitution ✓✓answers/*antwoord* (4)
1.2.2	$5x^2 + 6x - d = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $= \frac{-6 \pm \sqrt{(6)^2 - 4(5)(-d)}}{2(5)}$ $36 + 20d = 0$ $d = -\frac{9}{5}$ **OR/OF** For equal roots/ *vir gelyke wortels* : $\Delta = 0$ $\Delta = b^2 - 4ac$ $= (6)^2 - 4(5)(-d)$ $36 + 20d = 0$ $d = -\frac{9}{5}$ **OR/OF** $5x^2 + 6x - d = 0$ $x^2 + \frac{6x}{5} = \frac{d}{5}$ $\left(x + \frac{3}{5}\right)^2 = \frac{d}{5} + \frac{9}{25}$ $= \frac{5d + 9}{25}$ For equal roots $\frac{5d + 9}{25} = 0$ $\therefore 5d + 9 = 0$ $d = \frac{-9}{5}$	✓substitution ✓$36 + 20d = 0$ ✓answer/*antwoord* (3) ✓ substitution ✓$36 + 20d = 0$ ✓answer/*antwoord* (3) ✓completing the square/ *voltooi die kwadraat* ✓$5d + 9 = 0$ ✓answer/*antwoord* (3)

1.3	$x = 2y - 3$ ... (1) $xy = 20$ ... (2) substitute (1) into (2): $(2y-3)y = 20$ $2y^2 - 3y - 20 = 0$ $(2y+5)(y-4) = 0$ $y = -\frac{5}{2}$ or $y = 4$ $x = -8$ or $x = 5$	✓making x the subject/ *maak x die o/w* ✓substitution ✓standard form/*stand vorm* ✓factors/*faktore* ✓y-values/*wrdes* ✓x-values/*wrdes* (6)
	OR/OF $x + 3 = 2y$ $y = \frac{x+3}{2}$ ... *(1)* $xy = 20$ ... *(2)* substitute *(1)* into *(2)*: $x\left(\frac{x+3}{2}\right) = 20$ $x^2 + 3x = 40$ $x^2 + 3x - 40 = 0$ $(x+8)(x-5) = 0$ $x = -8$ or $x = 5$ $y = -\frac{5}{2}$ or $y = 4$	✓making y the subject/ *maak y die o/w* ✓subst ✓standard form/*stand vorm* ✓factors/*faktore* ✓x-values/*wrdes* ✓y-values/*wrdes* (6)
	OR/OF $x - 2y = -3$ ... *(1)* $y = \frac{20}{x}$ ... *(2)* substitute *(2)* into *(1)*: $x - 2\left(\frac{20}{x}\right) = -3$ $x^2 - 40 = -3x$ $x^2 + 3x - 40 = 0$ $(x+8)(x-5) = 0$ $x = -8$ or $x = 5$ $y = -\frac{5}{2}$ or $y = 4$	✓making y the subject/ *maak y die o/w* ✓substitution ✓standard form/*stand vorm* ✓factors/*faktore* ✓x values/*wrdes* ✓y values/*wrdes* (6)
	OR/OF	

	$x-2y=-3 \quad \ldots (1)$ $x=\frac{20}{y} \quad \ldots (2)$ substitute (2) into (1): $\frac{20}{y}-2y=-3$ $20-2y^2=-3y$ $0=2y^2-3y-20$ $0=(2y+5)(y-4)$ $y=-\frac{5}{2}$ or $y=4$ $x=-8$ or $x=5$	✓making x the subject/ *maak x die o/w* ✓subst ✓standard form/*stand vorm* ✓factors/*faktore* ✓y values/*wrdes* ✓x values/*wrdes* (6) **[28]**

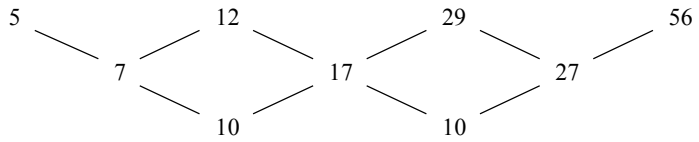
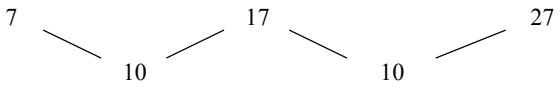
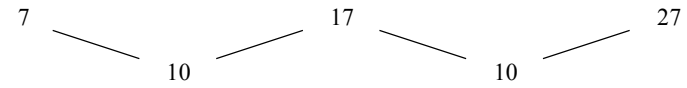
QUESTION/*VRAAG* 2

2.1.1	$\frac{2^{n+2}.4^{n+1}}{8^{n-1}}$ $=\frac{2^{n+2}.2^{2n+2}}{2^{3n-3}}$ $=2^{n+2+2n+2-(3n-3)}$ $=2^7$ $=128$ **OR/*OF*** $\frac{2^n.2^2.4^n.4}{8^n.8^{-1}}$ $=\frac{8^n.2^2.2^2}{8^n.2^{-3}}$ $=2^7$ $=128$	✓writing as prime bases/ *skryf as priembasisse* ✓applying exponential laws/ *pas ekspon.wette toe* ✓answer/*antwoord* (3) ✓writing as separate bases/ *skryf as aparte basisse* ✓applying exponential laws/ *pas ekspon.wette toe* ✓answer/*antwoord* (3)
2.1.2	$\sqrt{x+\sqrt{2x-1}}.\sqrt{x-\sqrt{2x-1}}$ $=\sqrt{\left(x+\sqrt{2x-1}\right)\left(x-\sqrt{2x-1}\right)}$ $=\sqrt{x^2-2x+1}$ $=\sqrt{(x-1)^2}$ $=x-1$ **OR/*OF*** Let $\sqrt{2x-1}=k$ $2x-1=k^2$ $\sqrt{x+k}.\sqrt{x-k}$ $=\sqrt{\left(x^2-k^2\right)}$ $=\sqrt{x^2-2x+1}$ $=\sqrt{(x-1)^2}$ $=x-1$	✓writing as one surd/ *skryf as een wortel* ✓ $\sqrt{x^2-2x+1}$ ✓$\sqrt{(x-1)^2}$ ✓answer/*antwoord* (4) ✓writing as one surd/ *skryf as een wortel* ✓ $\sqrt{x^2-2x+1}$ ✓$\sqrt{(x-1)^2}$ ✓answer/*antwoord* (4)
2.2.1	For P to be a real number, we cannot divide by 0 and $\frac{5}{x+2}$ must be positive, i.e. we must have: *Vir P om reëel te wees, kan ons nie deur 0 deel nie en* $\frac{5}{x+2}$ *moet positief wees, dus moet ons die vlg hê:* $x+2>0$ $x>-2$	✓ $x+2>0$ ✓answer/*antwoord* (2)

2.2.2	$P = \sqrt{\frac{5}{x+2}} + \frac{x}{3}$ $= \sqrt{\frac{5}{3+2}} + \frac{3}{3}$ $= 1 + 1$ $= 2$	✓substitution $x = 3$ ✓answer/*antwoord* (2)
2.3	$2^{2015} \times 5^{2019}$ $= 2^{2015} \times 5^{2015}.5^4$ $= 625 \times (2 \cdot 5)^{2015}$ $= 625 \times 10^{2015}$ $= 625\ 000\ 000...0$ $\therefore$ Sum of digits will be/*Som van die getalle* $6 + 2 + 5 + 0 + 0 + 0... + 0$ $= 13$	✓$5^4 \times 2^{2015} \times 5^{2015}$ ✓10^{2015} ✓ 625 000...0 ✓answer/*antwoord* (4) **[15]**

QUESTION/*VRAAG* 3

3.1.1	5 $\searrow^{-7}$ -2 $\searrow^{-7}$ -9 + First difference/*Eerste verskil* $d=-7$	✓ answer/*antwoord* (1)
3.1.2	$T_4=-16$	✓ answer/*antwoord* (1)
3.1.3	$T_n=-7n+12$ $-289=-7n+12$ $7n=301$ $n=43$	✓ $T_n=-7n+12$ ✓ $T_n=-289$ ✓ answer/*antwoord* (3)
3.2.1	$T_{22}=64+3+3$ $=70$	✓ answer/*antwoord* (1)
3.2.2	$T_{20}=3n+b$ $64=3(20)+b$ $b=4$ $T_n=3n+4$ $3T_5-2=3[3(5)+4]-2$ $=55$ $3n+4=55$ $3n=51$ $n=17$ **OR/*OF*** $T_{20}=3n+b$ $64=3(20)+b$ $b=4$ $T_5=64-15(3)$ $=19$ $T_n=3T_5-2$ $3n+4=3(19)-2$ $3n=51$ $n=17$	✓ $64=3(20)+b$ ✓ $3[3(5)+4]-2$ ✓ $3n+4=55$ ✓ $n=17$ (4) ✓ $64=3(20)+b$ ✓19 ✓ $3n+4=3(19)-2$ ✓ $n=17$ (4)

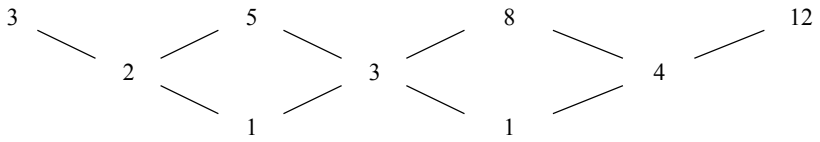
3.3.1	 93 ; 140	✓ 93 ✓ 140 (2)
3.3.2	 $T_n = 10n - 3$ $= (10n - 2) - 1$ $= 2(5n - 1) - 1$ Since $10n - 2 = 2(5n - 1)$, $10n - 2$ is even for any value of n. Thus T_n is always odd, since for any value of n, T_n is always one less than an even number *Aangesien* $10n - 2 = 2(5n - 1)$, *is* $10n - 2$ *dus ewe vir enige waarde van n.* *Dus* T_n *is altyd onewe, want vir enige waarde van n, is* T_n *altyd een minder as 'n ewe getal* **OR/*OF***  $T_n = 10n - 3$ **or** T_n **= 10*n* –3** 7; 17; 27; 37; 47; 57..... The sequence of first differences, for all values of n, will always end in a 7, since they are all multiples of 10 ($10n$) less three. Any number ending in 7 is odd. Therefore all the terms in the sequence of first differences will be odd numbers. **OR/*OF***	✓ $T_n = 10n - 3$ ✓ $10n - 2 = 2(5n - 1)$ ✓explanation/*verduidlkng* (3) ✓ $T_n = 10n - 3$ ✓all answers end in 7/ *alle antwoord eindig in 7* ✓explanation/*verduidlkng* (any logical explanation/ *enige logiese verduidlkng*) (3)

n	**10*n***	***T*$_n$ = 10*n* –3**
4	10 x 4 = 40	37
5	10 x 5 = 50	47
6	10 x 6 = 60	57
7	10 x 7 = 70	67
8	10 x 8 = 80	77

	Term 1 is odd and if the first difference of 10(even number) is added to an odd number, the answer remains odd. *Die ry van eerste verskille, vir alle waardes van n, sal altyd in 7 eindig want hulle is almal veelvoude van 10 (10n) min drie.* *Enige getal wat in 7 eindig, is onewe.* *Daarom sal alle getalle in die ry van eerste verskille onewe getalle wees.* ***OF*** *Term 1 is 'n onewe getal en as die eerste verskil van 10(ewe getal) by 'n onewe getal getel word, bly die antwoordoord 'n onewe getal.*	**[15]**

QUESTION/*VRAAG* 4

4.1



$2a = 1$

$a = \frac{1}{2}$ ✓ $a = \frac{1}{2}$

$3\left(\frac{1}{2}\right) + b = 2$

$b = \frac{1}{2}$ ✓ $b = \frac{1}{2}$

$a + b + c = 3$

$\frac{1}{2} + \frac{1}{2} + c = 3$

$c = 2$ ✓ $c = 2$

$T_n = \frac{n^2}{2} + \frac{n}{2} + 2$ ✓ $T_n = \frac{n^2}{2} + \frac{n}{2} + 2$

$T_{26} = \frac{26^2}{2} + \frac{26}{2} + 2$ ✓subst $n = 26$

$= 353$ ✓answer/*antwoord* (6)

OR/*OF*

$T_n = T_1 + (n-1)d_1 + \frac{(n-1)(n-2)d_2}{2}$ ✓ formula/*e*

$= 3 + (n-1)(2) + \frac{(n-1)(n-2)(1)}{2}$ ✓ substitution

$= 3 + 2n - 2 + \frac{n^2 - 3n + 2}{2}$

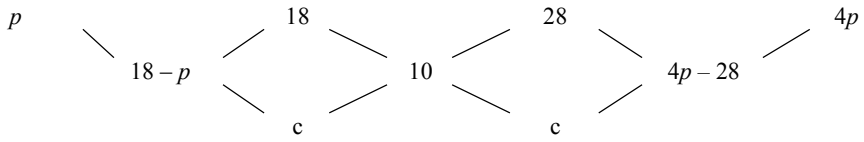
$= 2n + 1 + \frac{1}{2}n^2 - \frac{3}{2}n + 1$ ✓simplifying/*vereenv*

$= \frac{1}{2}n^2 + \frac{1}{2}n + 2$

$T_n = \frac{n^2}{2} + \frac{n}{2} + 2$ ✓ $T_n = \frac{n^2}{2} + \frac{n}{2} + 2$

$T_{26} = \frac{26^2}{2} + \frac{26}{2} + 2$ ✓substitution $n = 26$

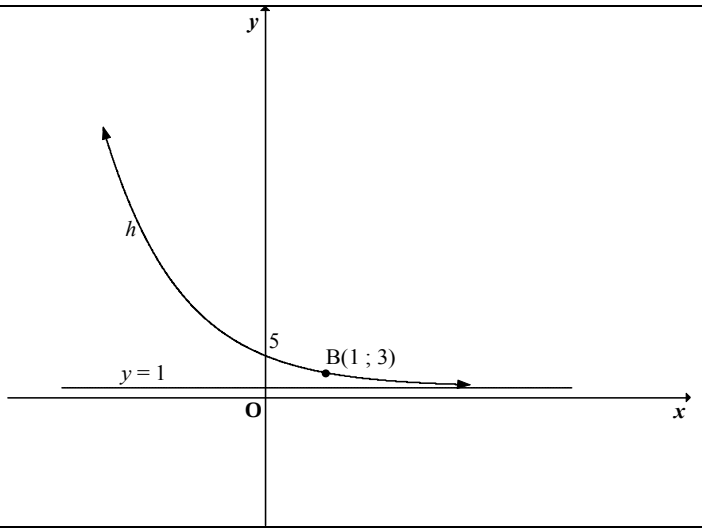
$= 353$ ✓answer/*antwoord* (6)

4.2	 $10-(18-p)=4p-28-10$ $10-18+p=4p-28-10$ $3p=30$ $p=10$	✓ $T_3=28$ ✓ $T_4=4p$ ✓ $10-(18-p)$ ✓ $4p-28-10$ ✓ equating ✓ answer/*antwoord* (6) **[12]**

QUESTION/*VRAAG* 5

5.1.1	$(1\,;-2)$	✓ for/*vir* 1 ✓ for/*vir* – 2 (2)
5.1.2	For *x*-intercept/*Vir x-afsnit*: $0=\frac{-9}{x-1}-2$ $2=\frac{-9}{x-1}$ $2(x-1)=-9$ $2x=-7$ $x=-\frac{7}{2}$ $\left(-\frac{7}{2}\,;\,0\right)$ For *y*-intercept/*Vir y-afsnit*: $y=\frac{-9}{0-1}-2$ $=9-2$ $=7$ $(0;7)$	✓ $y=0$ ✓ simplification/*vereenv* ✓ answer/*antwoord* ✓ $x=0$ ✓ answer/*antwoord* (5)
5.1.3	$y=-x-1$	✓ $-x$ ✓ -1 (2)

5.1.4	Closest point is a point of intersection between the axis of symmetry and the hyperbola/*Naaste punt is 'n snypunt tussen die simmetrie-as en die hiperbool*: $-x-1=\frac{-9}{x-1}-2$ $-x+1=\frac{-9}{x-1}$ $x-1=\frac{9}{x-1}$ $(x-1)^2=9$ $x-1=3 \quad \text{or} \quad x-1=-3$ $x=4 \qquad x=-2$ in the fourth quadrant, $x>0$, hence $x=4$ *only* $y=-4-1$ $y=-5$ Point/*Punt* is $(4;-5)$ **OR/*OF*** Closest point is a point of intersection between the axis of symmetry and the hyperbola/*Naaste punt is 'n snypunt tussen die simmetrie-as en die hiperbool*: $-x-1=\frac{-9}{x-1}-2$ $(-x-1)(x-1)=-9-2(x-1)$ $-x^2+1=-9-2x+2$ $0=x^2-2x-8$ $0=(x-4)(x+2)$ $x=4 \qquad x=-2$ in the fourth quadrant, $x>0$, hence $x=4$ *only* $y=-4-1$ $y=-5 \qquad$ Point is $(4;-5)$ **OR/*OF*** $y=\frac{-9}{x} \xrightarrow{\text{translate 1 right and 2 down}} f(x)=\frac{-9}{x-1}-2$ Under translation 1 right and 2 down, points in the fourth quadrant will stay in the fourth quadrant. Since the origin becomes A under the translation 1 right and 2 down and the point in the fourth quadrant which is the closest point on $y=\frac{-9}{x}$ to the origin is $(3;-3)$, The closest point on f to A is $(3+1;-3-2)$ i.e. $(4;-5)$	✓ equating/*vgl* ✓ $(x-1)^2=9$ ✓ answers for/*antwoord vir x* ✓ selects $x = 4$ only/ *kies slegs x = 4* ✓ answer for/*antwoord vir y* (5) ✓ equating/*vgl* ✓ $0=x^2-2x-8$ ✓ answers for/*antwoord vir x* ✓ selects $x = 4$ only/ *kies slegs x = 4* ✓ answer for/*antwoord vir y* (5) ✓points in 4th quad stay in 4th quad ✓ origin becomes A ✓closest point to origin on parent function is $(3;-3)$ ✓✓answer/*antwoord* (5)

	Onder die translasie 1 regs en 2 na onder, sal punte in die vierde kwadrant steeds in die vierde kwadrant wees. *Die oorsprong word A onder die translasie 1 regs en 2 na onder, en die punt in die vierde kwadrant wat die naaste punt aan* $y=\frac{-9}{x}$ *tot die oorsprong is, is* $(3;-3)$. *Die naaste punt op f aan A is* $(3+1;-3-2)$ *d.i.* $(4;-5)$	✓*punte in 4de kwad bly in 4de kwad* ✓*oorsprong word A* ✓*naaste punt aan oorsprong op moederfunksie is* $(3;-3)$ ✓✓answer/*antwoord* (5)
5.1.5	$y=\frac{9}{x-1}+2$	✓ $\frac{9}{x-1}$ ✓ +2 (2)
5.2.1	For *y*-intercept/*Vir y-afsnit* substitution $x = 0$: $y = 4.2^0 + 1$ $= 5$ H(0 ; 5)	✓$x = 0$ substitution into the equation/*in die vgl* ✓$y = 5$ (2)
5.2.2	For *x*-intercept/*Vir y-afsnit* $y = 0$ i.e./*d.i.* $4.2^{-x} + 1 = 0$ $4.2^{-x} = -1$ $2^{-x} = -\frac{1}{4}$, which is impossible, since $2^{-x} > 0$ for $x \in R$, *wat onmoontlik is omdat* $2^{-x} > 0$ *vir* $x \in R$ Therefore/*Dus*: no solution/*geen oplossing*, which means there will be no *x*-intercept/*wat beteken daar sal geen x-afsnit wees nie*. **OR/*OF*** The graph lies above its asymptote $y = 1$ because the coefficient of 2^{-x} is 4/*Die grafiek lê bokant sy asimptoot* $y = 1$ *want die koëffisiënt van* 2^{-x} *is* 4. **OR/*OF*** The range is $(1;\infty)$ or $y > 1$ *Die waardeversameling is* $(1;\infty)$ of $y > 1$	✓$4.2^{-x} + 1 = 0$ ✓$2^{-x} = -\frac{1}{4}$ and explanation/*en verduideliking* (2) ✓above/*bokant* ✓$y = 1$ (2) ✓✓correct range/*korrekte waardeversameling* (2)
5.2.3		✓ shape/*vorm* ✓*y*-intercept and other point/*y-afsnit en ander punt* ✓ asymptote/*asimptoot* (3)

5.2.4	$g(x) = 4\left(2^{-x} + 2\right)$ $= 4.2^{-x} + 8$ The graph of *h* is translated 7 units upwards to form *g*/ *Die grafiek van h word 7 eenhede na bo getransleer om g te vorm*.	✓ 7 units/*eenhede* ✓ upwards/*opwaarts* (2) **[25]**

QUESTION/*VRAAG* 6

6.1	$y = a(x-2)^2 + 9$ Substitution $(0\,;5)$: $5 = a(0-2)^2 + 9$ $5 = 4a + 9$ $a = -1$ $y = -1(x-2)^2 + 9$ $= -\left(x^2 - 4x + 4\right) + 9$ $= -x^2 + 4x + 5$	✓ substitution coordinates of TP ✓ substitution of/*van* $(0;5)$ ✓ value of/*waarde van a* ✓ simplification/*vereenv* (4)
6.2	Average Gradient $= \frac{9-5}{2-0}$ or $\frac{5-9}{0-2}$ $= 2$	✓ $\frac{9-5}{2-0}$ or $\frac{5-9}{0-2}$ ✓answer/*antwoord* (2)
6.3	*x*-intercepts of/*x-afsnitte van f*: $\frac{1}{2}x^2 - 8 = 0$ $x^2 = 16$ $x = 4$ or -4 At/*By* B: $x = -4$ *x*-intercepts of/*x-afsnitte van g*: $-x^2 + 4x + 5 = 0$ $x^2 - 4x - 5 = 0$ $(x-5)(x+1) = 0$ $x = -1$ or 5 At/*By* D: $x = 5$ Length of/*Lengte van* BD: $4 + 5 = 9$	✓ $\frac{1}{2}x^2 - 8 = 0$ ✓ -4 ✓ factors/*faktore* ✓ 5 ✓answer/*antwoord* (5)
6.4.1	$x \leq -4$ or $x \geq 4$	✓ $x \leq -4$ ✓ $x \geq 4$ (2)
6.4.2	$0 < x < 2$	✓ endpoints/*eindpunte* ✓ notation/*notasie* (2) **[15]**

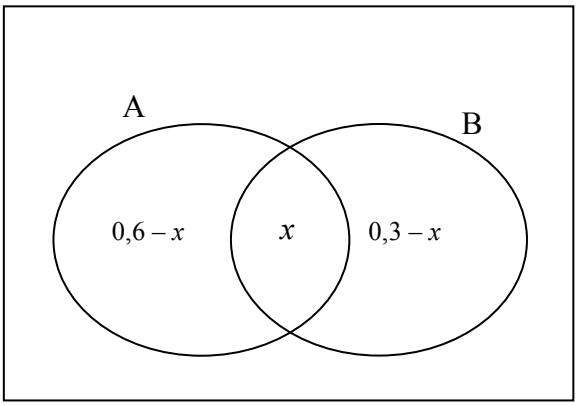
QUESTION/*VRAAG* 7

7.1	$\text{CD} = 2x+3-\left(-2x^2+14x+k\right)$ $= 2x+3+2x^2-14x-k$ $= 2x^2-12x+3-k$	✓✓ $f(x)-g(x)$ ✓ answer/*antwoord* (3)
7.2	Minimum value occurs at/*Minimum waarde vind plaas by* $x = \frac{-b}{2a}$ $= \frac{12}{2(2)}$ $= 3$ Minimum value/*Minimum waarde* $5 = 2(3)^2-12(3)+3-k$ $5 = 18-36+3-k$ $k = -20$ **OR/*OF*** $\text{CD} = 2x^2-12x+3-k$ $= 2\left(x^2-6x\right)+3-k$ $= 2\left[(x-3)^2-9\right]+3-k$ $= 2(x-3)^2-18+3-k$ $= 2(x-3)^2-15-k$ Hence the minimum value of CD is $-15-k$ The minimum value of CD is given to be 5 *Vervolgens is die minimum waarde van CD* $-15-k$ *Die minimum waarde van CD is gegee as 5* $5 = -15-k$ $k = -20$	✓ $x = \frac{-b}{2a}$ ✓x-value for minimum *x-waarde vir minimum* ✓ subst 5 ✓ answer/*antwoord* (4) ✓ $2(x-3)^2$ ✓ $\text{CD} = 2(x-3)^2-15-k$ ✓ $5 = -15-k$ ✓answer/*antwoord* (4) **[7]**

QUESTION/*VRAAG* 8

8.1	$A = P(1+i)^n$ $= 140\ 000(1+0{,}061)^4$ $=$ R177 414,69	✓140 000 ✓$(1+0{,}061)^4$ ✓answer/*antwoord* (3)
8.2	$1+i_{eff} = \left(1+\frac{0{,}07}{2}\right)^2$ $1+i_{eff} = (1+0{,}035)^2$ $i_{eff} = (1+0{,}035)^2 - 1$ $= 0{,}071225$ The effective interest rate/*Die effektiewe rentekoers* is 7,12% p.a.	✓ $\frac{0{,}07}{2}$ ✓$1+i_{eff} = (1+0.035)^2$ ✓ answer/*antwoord* (3)
8.3	$A = 24000\left(1+\frac{0{,}105}{12}\right)^{48} - 7000\left(1+\frac{0{,}105}{12}\right)^{30}$ $=$ R27 369,56 **OR/*OF*** $A = \left[24000\left(1+\frac{0{,}105}{12}\right)^{18} - 7000\right]\left(1+\frac{0{,}105}{12}\right)^{30}$ $=$ R27 369,56 **OR/*OF*** $A_{\text{after 18 months}} = 24000\left(1+\frac{0{,}105}{12}\right)^{18}$ $=$ R28 074,70 R28 074,70 – R7000 = R21 074,70 $A_{after\,4\,years} = 21074{,}70\left(1+\frac{0{,}105}{12}\right)^{30}$ $=$ R27 369,56	✓$\frac{0{,}105}{12}$ ✓ n=48 ✓ n=30 ✓correct substitution into correct formula/*korr subst in korr formule* ✓answer/*antwoord* (5) ✓$\frac{0{,}105}{12}$ ✓ n=18 ✓n=30 ✓correct substitution into correct formula/*korr subst in korr formule* ✓answer/*antwoord* (5) ✓$\frac{0{,}105}{12}$ ✓ n=18 ✓ 21 074,70 ✓n=30 ✓ answer/*antwoord* (5)
8.4	$102\,755{,}34 = 198\,000\left(1-\frac{r}{100}\right)^3$ $\sqrt[3]{\frac{102\,755{,}34}{198\,000}} = 1-\frac{r}{100}$ $1-\frac{r}{100} = 0{,}8036119818$ $-\frac{r}{100} = -0{,}1963880182$ $r = 19{,}64\%$	✓formula ✓correct substitution into correct formula/*korr subst in korr formule* ✓n =3 ✓$\sqrt[3]{\frac{102\,755{,}34}{198\,000}} = 1-\frac{r}{100}$ ✓ answer/*antwoord* (5)
		[16]

QUESTION/*VRAAG* 9

9.1	Given/*Gegee*: P(A) = 0,6 P(B) = 0,3 P(A or B) = 0,8 P(A and/*en* B) = 0,6 + 0,3 – 0,8 = 0,1 ≠ 0 Therefore A and B are not mutually exclusive. *Dus is A en B nie onderling uitsluitend nie* **OR/*OF***  $0,6-x+x+0,3-x=0,8$ $0,9-x=0,8$ $x=0,1$ There is an intersection between A and B/*Daar is snyding tussen A en B* Therefore A and B are not mutually exclusive/*Dus is A en B nie onderling uitsluitend nie*.	✓✓P(A and/*en* B) = 0,1 ✓justification/*regv* ✓Not mutually exclusive/*Nie onderling uitsluitend* (4) ✓Venn diagram ✓$x = 0,1$ ✓justification/*regv* ✓Not mutually exclusive/*Nie onderling uitsluitend* (4)
9.2.1a	$\frac{1832}{2646}=69,24\%$	✓1832 ✓2646 (2)
9.2.1b	$\frac{460}{2646}=\frac{230}{1323}=17,38\%$	✓answer/*antwoord* (1)
9.2.1c	$\frac{340+14}{2646}=\frac{59}{441}=13,38\%$	✓✓answer/*antwoord* (2)

9.2.2	Let the event of a randomly selected person living in Area 1 be A. Let the event of a randomly selected person earning less than R3 200 be B. *Laat die gebeurtenis van 'n persoon wat willekeurig gekies is wat in Gebied 1 woon, A wees.* *Laat die gebeurtenis van 'n persoon wat willekeurig gekies is wat minder as R3 200 verdien, B wees.* $P(A \text{ and } B) = \frac{500}{2646} = 18{,}90\%$ $P(A) \times P(B) = \frac{1832}{2646} \times \frac{960}{2646} = 25{,}12\%$ Clearly/*Duidelik*, $P(A \text{ and } B) \neq P(A) \times P(B)$ Hence A and B are not independent/*Vervolgens is A en B nie onafhanklik nie*. **OR/*OF*** Let the event of a randomly selected person living in Area 2 be C. Let the event of a randomly selected person earning less than R3200 be D. *Laat die gebeurtenis van 'n persoon wat willekeurig gekies is wat in Gebied 2 woon, C wees.* *Laat die gebeurtenis van 'n persoon wat willekeurig gekies is wat minder as R3 200 verdien, D wees.* $P(C \text{ and } D) = \frac{460}{2646} = 17{,}38\%$ $P(C) \times P(D) = \frac{814}{2646} \times \frac{960}{2646} = 11{,}16\%$ Clearly, $P(C \text{ and } D) \neq P(C) \times P(D)$ Hence C and D are not independent/*Vervolgens is C en D nie onafhanklik nie*.	✓ $P(A \text{ and } B)$ ✓$P(A)$ ✓$P(B)$ ✓ $P(A) \times P(B)$ ✓conclusion with justification/ *gevolgtrekking met motivering* (5) ✓ $P(C \text{ and } D)$ ✓$P(C)$ ✓$P(D)$ ✓ $P(C) \times P(D)$ ✓conclusion with justification/ *gevolgtrekking met motivering* (5)
9.2.3	$P(\text{Area 1 person earns less than R3200}) = \frac{500}{1832} = 27{,}29\%$ $P(\text{Area 2 person earns less than R3200}) = \frac{460}{814} = 56{,}51\%$ A person from Area 2 is more likely to earn less than R3200 $P(\textit{Gebied 1 persoon verdien minder as R3200}) = \frac{500}{1832} = 27{,}29\%$ $P(\textit{Gebied 2 persoon verdien minder as R3200}) = \frac{460}{814} = 56{,}51\%$ *Dis meer waarskynlik dat 'n persoon uit Gebied 2 minder as R3 200 sal verdien.*	✓ 27,29% ✓ 56,51% ✓conclusion/*vgl* (3) **[17]**

TOTAL/*TOTAAL*: 150