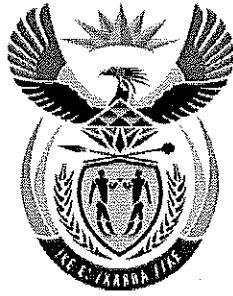basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

**NATIONAL
SENIOR CERTIFICATE/
*NASIONALE
SENIOR SERTIFIKAAT***

GRADE/*GRAAD* 10

MATHEMATICS P1/*WISKUNDE V1*

NOVEMBER 2015

MEMORANDUM

MARKS/*PUNTE*: 100

This memorandum consists of 9 pages.
Hierdie memorandum bestaan uit 9 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/antwoorde aan te neem om 'n probleem op te los.*

QUESTION/*VRAAG* 1

1.1.1	$x^4 - 81$ $= (x^2 - 9)(x^2 + 9)$ ✔ $= (x - 3)(x + 3)(x^2 + 9)$ ✔	✔ $(x^2 - 9)(x^2 + 9)$ ✔ $(x - 3)(x + 3)(x^2 + 9)$ **(2)**
1.1.2	$6x^2 y - 10xy + 15x - 25$ $= 2xy(3x - 5) + 5(3x - 5)$ $= (2xy + 5)(3x - 5)$ ✔ **OR/OF** $6x^2 y - 10xy + 15x - 25$ $= 3x(2xy + 5) - 5(2xy + 5)$ $= (2xy + 5)(3x - 5)$	✔ $2xy(3x - 5)$ ✔ $5(3x - 5)$ ✔ $(2xy + 5)(3x - 5)$ **(3)** ✔ $3x(2xy + 5)$ ✔ $-5(2xy + 5)$ ✔ $(2xy + 5)(3x - 5)$ **(3)**
1.2.1	$\dfrac{3}{a-4} + \dfrac{2}{a+3} - \dfrac{21}{a^2 - a - 12}$ $= \dfrac{3}{a-4} + \dfrac{2}{a+3} - \dfrac{21}{(a-4)(a+3)}$ ✔ $= \dfrac{3(a+3) + 2(a-4) - 21}{(a-4)(a+3)}$ ✔ $= \dfrac{3a + 9 + 2a - 8 - 21}{(a-4)(a+3)}$ $= \dfrac{5a - 20}{(a-4)(a+3)}$ ✔ $= \dfrac{5(a-4)}{(a-4)(a+3)}$ $= \dfrac{5}{a+3}$ ✔	✔ $(a-4)(a+3)$ ✔✔ $\dfrac{3(a+3) + 2(a-4) - 21}{(a-4)(a+3)}$ ✔ simplification, i.e./ *vereenvoudiging, d.i.* $\dfrac{5a - 20}{(a-4)(a+3)}$ ✔ answer/*antwoord* **(5)**

Please turn over/*Blaai om asseblief*

1.2.2	$\dfrac{10^{2x+3}.4^{1-x}}{25^{2+x}}$ $= \dfrac{(2.5)^{2x+3}.(2^2)^{1-x}}{(5^2)^{2+x}}$ ✔ p^b $= \dfrac{2^{2x+3}.5^{2x+3}.2^{2-2x}}{5^{4+2x}}$ ✔ $= 2^{2x+3+2-2x}.5^{2x+3-4-2x}$ ✔✔ $= 2^5.5^{-1}$ $= \dfrac{32}{5}$ $= 6\dfrac{2}{5}$	✔ writing bases in terms of prime factors/ *skryf basisse in terme van priemfaktore* ✔ simplification/ *vereenvoudiging* ✔ adding and subtracting indices/*optel en aftrek van eksponente* ✔ $2^5.5^{-1}$ or/*of* $\dfrac{32}{5}$ or/*of* $6\dfrac{2}{5}$ (4)	**4**
1.3.1	$\sqrt{27}$ ✔	✔ answer/*antwoord* (1)	**1**
1.3.2	$\sqrt{-27}$ ✔	✔ answer/*antwoord* (1) **[16]**	**1**

QUESTION/*VRAAG* 2

2.1.1	$15x^2 - 14x - 8 = 0$ ✔ $(5x+2)(3x-4) = 0$ ✔ $5x + 2 = 0$ or $3x - 4 = 0$ $x = -\dfrac{2}{5}$ ✔ or $x = \dfrac{4}{3}$ ✔	✔ standard form/*standaardvorm* ✔ factorisation/*faktorisering* ✔✔ answers/*antwoorde* (4)	**4**
2.1.2	$5^x = \dfrac{1}{125}$ $5^x = \dfrac{1}{5^3}$ $5^x = 5^{-3}$ ✔ $x = -3$ ✔ or $x = \dfrac{\log \frac{1}{125}}{\log 5}$ ✔ $= -3$ ✔	✔ 5^{-3} ✔ answer/*antwoord* (2)	**2**
2.2.1	$3(x+7) < \dfrac{x}{2} + 1$ ✔ $3x + 21 < \dfrac{x}{2} + 1$ $6x + 42 < x + 2$ ✔ $5x < -40$ $x < -8$ ✔ OR $3x - \dfrac{1}{2}x < -20$ $\dfrac{5}{2}x < -20$ $x < \dfrac{-20}{5/2}$ $x < -8$	✔ $3x + 21$ ✔ $6x + 42 < x + 2$ ✔ answer/*antwoord* (3)	**3**
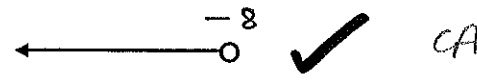
2.2.2		✓ indicating numbers to the left of –8 and –8 not included/ *dui getalle links van –8 aan met –8 nie ingesluit* (1)
2.3	Let the amount of money Mary had be R*x*/*Laat die bedrag geld wat Mary gehad het x wees.* $\frac{1}{5}x = \frac{1}{3}x - 28$ OR $N - E = 28$ $\frac{1}{3}x - \frac{1}{5}x$ $3x + 420 = 5x$ $2x = 420$ $x = 210$ Mary had R210/*Mary het R210 gehad.*	✓ $\frac{1}{3}x - 28$ ✓ $\frac{1}{5}x$ ✓ equation/*vergelyking* ✓ 210 (4) **[14]**

QUESTION/*VRAAG* 3

3.1.1	–7 ; –12	✓ –7 ✓ –12 (2)
3.1.2	$T_n = -5n + 13$ $T_n = 8 + (n-1)(-5)$ NB Brackets	✓ –5n ✓ 13 (2)
3.1.3	$T_n = -5n + 13$ $T_{30} = -5(30) + 13$ $= -137$	✓ substitution of/*substitusie van* $n = 30$ ✓ answer/*antwoord* (2)
3.1.4	$-5n + 13 = -492$ $-5n = -505$ $n = 101$	✓ $-5n + 13 = -492$ ✓ answer/*antwoord* (2)
3.2.1	$T_n = 2n - 1$ $T_n = 1 + (n-1)(2)$	✓ 2n ✓ –1 (2)
3.2.2	$T_n = (2n-1)^2$ $= 4n^2 - 4n + 1$	✓ $(2n-1)^2$ (1)
3.2.3	$T_n = (2n-1) - (2n-1)^2$ $= 2n - 1 - (4n^2 - 4n + 1)$ $= 2n - 1 - 4n^2 + 4n - 1$ $= -4n^2 + 6n - 2$ max $\frac{3}{4}$	✓ $(2n-1) - (2n-1)^2$ ✓ $2n - 1 - (4n^2 - 4n + 1)$ ✓ $2n - 1 - 4n^2 + 4n - 1$ ✓ answer/*antwoord* (4) **[15]**

QUESTION/*VRAAG* 4

4.1	$y = 1$ ✓		✓ answer/*antwoord* (1)
4.2			f: ✓ shape of f/*vorm van* f ✓ x-intercepts of f/ *x-afsnitte van* f ✓ y-intercept (TP) of f/*y-afsnit (DP)* *van* f g: ✓ shape of g/*vorm van* g ✓ asymptote of g/ *asimptoot van* g ✓ y-intercept of g/ *y-afsnit van* g (6)
4.3	Range of f/*Waardeversameling van* f: $y \in (-\infty; 2]$ ✓		✓ $(-\infty; 2]$ (1)
	OR/OF		
	Range of f/*Waardeversameling van* f: $y \le 2$		✓ $y \le 2$ (1)
4.4	Maximum of $3^{f(x)}$ will be obtained when $f(x)$ is at maximum. Max of $f(x)$ is 2 ✓ Max of h will be $3^2 = 9$ ✓ CA *Maksimum van* $3^{f(x)}$ *sal verkry word wanneer* $f(x)$ *by maksimum is.* *Maks van* $f(x)$ *is 2* *Maks van* h *sal* $3^2 = 9$ *wees.*		✓ Max of $f(x)$ is 2/ *Maks van f(x) is 2* ✓ Max of $h = 9$/ *Maks van h = 9* (2)
4.5	f would have been reflected in the x-axis ✓ ✓ *f sou in die x-as gereflekteer gewees het*		✓ reflected/*gereflekteer* ✓ in the x-axis/ *in die x-as* (2) **[12]**

QUESTION/*VRAAG* 5

5.1	a = gradient of g $$= \frac{-4-4}{-1-3}\ \checkmark$$ $$= 2$$ $$4 = 2(3) + q\ \checkmark$$ $$q = -2$$ $$g(x) = 2x - 2$$ **OR/OF** a = gradient of g $$= \frac{4-(-4)}{3-(-1)}$$ $$= 2$$ $$-4 = 2(-1) + q$$ $$q = -2$$ $$g(x) = 2x - 2$$ **OR/OF** $$g(x) = ax + q$$ $$4 = 3a + q \dots\dots\dots 1$$ $$-4 = -a + q \dots\dots\dots 2$$ $1 - 2:$ $$8 = 4a$$ $$a = 2$$ Substitute in 1/*Substitusie in 1*: $$4 = 3(2) + q$$ $$q = -2$$ $$g(x) = 2x - 2$$	$A(-1;-4)\quad B(3;4)$ $y = mx + c$ $m = \frac{4-(-4)}{3-(-1)}\ \checkmark\ m$ $= 2$ $\therefore\ y = 2x + c$ $sub\ B(3;4)$ $4 = 2(3) + c\ \checkmark$ $-2 = c$ $\therefore\ y = 2x - 2$ $but\ y = ax + q$ $\therefore\ \underline{a = 2\ and\ q = -2}$	$\checkmark\ a = \frac{-4-2}{-1-2}$ $\checkmark$ substituting/*substitusie* B(3 ; 4) **(2)** $\checkmark\ a = \frac{4-(-4)}{3-(-1)}$ $\checkmark$ substituting/*substitusie* A(–1 ; –4) **(2)** $\checkmark$ substituting both points/ *substitusie van beide punte* $\checkmark$ solving simultaneously/ *los gelyktydig op* **(2)**
5.2	$$\frac{1}{x} - 1 = 2x - 2\ \checkmark$$ $$\frac{1}{x} = 2x - 1$$ $$1 = 2x^2 - x$$ $$2x^2 - x - 1 = 0\ \checkmark$$ $$(2x+1)(x-1) = 0\ \checkmark$$ $$x = -\frac{1}{2} \qquad \text{or} \quad x = 1\ \checkmark$$		$\checkmark$ equating/*gelykstelling* $\checkmark$ standard form/ *standaardvorm* $\checkmark$ factors/*faktore* $\checkmark$ x-values/-*waardes* **(4)**

5.3	$-\dfrac{1}{2} \le x < 0$ or/*of* $x \ge 1$ **OR/OF** $x \in \left[-\dfrac{1}{2}\,;\,0\right) \cup [1\,;\infty)$	$\checkmark\, x \ge -\dfrac{1}{2}$ $\checkmark\, x < 0$ $\checkmark\, x \ge 1$ (3) $\checkmark\,[-0{,}5$ $\checkmark\,0)$ $\checkmark\,[1\,;\infty)$ (3)
5.4	$f(3) = \dfrac{1}{3} - 1$ sub correct expr $\quad = -\dfrac{2}{3}$ Length of BE $= 4 - f(3)$ $\qquad = 4 - \left(-\dfrac{2}{3}\right)$ $\qquad = 4 + \dfrac{2}{3}$ $\qquad = 4\dfrac{2}{3}$ $\dfrac{14}{3}$ $4{,}67$ **OR/OF** $\quad BE = 2x - 2 - \dfrac{1}{x} + 1$ $\qquad = \dfrac{2x^2 - x - 1}{x}$ $(x = 3)\ BE = \dfrac{2(3)^2 - (3) - 1}{3}$ $\qquad = \dfrac{18 - 4}{3}$ $\qquad = 4\dfrac{2}{3}$	$\checkmark\, \dfrac{1}{3} - 1$ or $-\dfrac{2}{3}$ $\checkmark\, 4 - f(3)$ $\checkmark$ answer/*antwoord* (3) $\checkmark\, 2x - 2 - \dfrac{1}{x} + 1$ $\checkmark\, \dfrac{2(3)^2 - (3) - 1}{3}$ $\checkmark$ answer/*antwoord* (3)
5.5	$h(x) = f(x) + 3$ $h(x) = \dfrac{1}{x} + 2$	$\checkmark$ answer/*antwoord* (1) **[13]**

QUESTION/*VRAAG* 6

6.1	$d - 5 + d - 1 = 0$ (or) $-\dfrac{(d-5)}{2} = d - 1$ ✓✓ $2d = 6$ $\dfrac{(d-5)+(d-1)}{2} = 0$ $d = 3$	✓ $d - 5 + d - 1 = 0$ ✓ $d = 3$ (2)	**2**
6.2	$y = a(x - 2)(x + 2)$ ✓ $-9 = a(1 - 2)(1 + 2)$ ✓ Sub $(1 ; -9)$ $-9 = a(-1)(3)$ $-3a = -9$ $a = 3$ ✓ $f(1) = -9$ $f(x) = 3(x^2 - 4)$ $f(x) = y$ $= 3x^2 - 12$ ✓ $x = 1 \quad y = -9$ $c = -12$ ✓ $(1 ; -9)$	✓ $y = a(x - 2)(x + 2)$ ✓ subs $(1 ; -9)$ ✓ $a = 3$ ✓ $c = -12$ (4) **[6]**	**4**

QUESTION/*VRAAG* 7

7.1	$\dfrac{\text{R} 5000}{9{,}518569 \text{ rands per dollar}} = \$525{,}29$ ✓✓ or O **OR/OF** R $5000 \times 0{,}105058$ dollars per rand $= \$525{,}29$	✓ selects/*kies* 9,515869 ✓ answer/*antwoord* (2) ✓ selects/*kies* 0,105058 ✓ answer/*antwoord* (2)	**2**
7.2.1	Compound interest $A = P(1 + i)^n$ ✓ $\dfrac{6{,}1}{100}$ $= 5000(1 + 0{,}061)^3$ ✓ $= \text{R} 5\,971{,}95$ ✓ Simple interest $\to O$	✓ formula/*formule* ✓ $5000(1 + 0{,}061)^3$ ✓ R5 971,95 (3)	**3**
7.2.2	Let the amount that Zach invests each year be *x/Laat die bedrag wat Zach elke jaar belê, x wees.* $x(1 + 0{,}09)^2 + x(1 + 0{,}09)^1 = 5980$ $x[1{,}09^2 + 1{,}09] = 5980$ $x = \dfrac{5980}{1{,}09^2 + 1{,}09}$ $= \text{R} 2\,624{,}99$ **OR/OF** Let the amount that Zach invests each year be *x/Laat die bedrag wat Zach elke jaar belê, x wees.* $[x(1 + 0{,}09)^1 + x](1 + 0{,}09)^1 = 5980$ ✓✓ $x(2{,}09)(1{,}09) = 5980$ ✓ $x = \dfrac{5980}{(2{,}09)(1{,}09)}$ $= \text{R} 2\,624{,}99$ ✓	✓ $x(1 + 0{,}09)^2$ ✓ $x(1 + 0{,}09)^1$ ✓ *x* as common factor/ *as gemeenskaplike faktor* ✓ answer/*antwoord* (4) ✓ $x(1 + 0{,}09)^1$ ✓ $[x(1 + 0{,}09)^1 + x]$ ✓ *x* as common factor/ *as gemeenskaplike faktor* ✓ answer/*antwoord* (4) **[9]**	**4**

QUESTION/*VRAAG* 8

$u = 64$ ✓

8.1.1		✓diagram shape/ *diagramvorm* ✓14 in correct position/ *in korrekte posisie* ✓10 in correct position/ *in korrekte posisie* ✓18 in correct position/ *in korrekte posisie* ✓22 in correct position/ *in korrekte posisie* (5)
8.1.2 (a)	$\text{P(Soccer and Rugby)} = \dfrac{10}{64} = \dfrac{5}{32} = 0,15625 = 15,63\%$	✓answer (in any form)/ *antwoord (in enige vorm)* (1)
8.1.2 (b)	$\text{P(Soccer or Rugby)} = \dfrac{14+10+18}{64} = \dfrac{42}{64} = \dfrac{21}{32} = 0,65625 = 65,63\%$ **OR / OF** $\text{P(Soccer or Rugby)} = 1 - \dfrac{22}{64} = \dfrac{21}{32}$	✓answer (in any form)/ *antwoord (in enige vorm)* (1)
8.1.3	No/*Nee.* Some boys play both soccer and rugby/*Party seuns speel sokker en rugby.* **OR/OF** No/*Nee* P(S and R) $\neq 0$ / P(S *en* R) $\neq 0$	✓ No/*Nee* ✓ Reason/*Rede* (2) ✓ No/*Nee* ✓ Reason/*Rede* (2)
8.2	$\text{P(more than 2 passengers per car)} / P(\textit{meer as 2 passasiers per kar})$ $= \dfrac{5+1}{7+11+6+5+1}$ $= \dfrac{6}{30}$ $= \dfrac{1}{5} = 0,2 = 20\%$	✓ numerator/*teller* 6 ✓ denominator/ *noemer* 30 ✓ answer/*antwoord* (accept/*aanvaar* $\dfrac{6}{30}$ or $\dfrac{1}{5}$ or/*of* 0,2 or/*of* 20%) (3)
8.3	$\text{P(not getting a six)} / P(\textit{nie 'n ses kry nie})$ $= 1 - \left(\dfrac{10}{36} + \dfrac{1}{36}\right)$ $= \dfrac{25}{36}$ (OR) use <table><tr><td>1,1</td><td>1,2</td><td>1,3</td><td>1,4</td><td>1,5</td><td>1,6</td></tr><tr><td>2,1</td><td>2,2</td><td>2,3</td><td>2,4</td><td>2,5</td><td>2,6</td></tr><tr><td>3,1</td><td>3,2</td><td>3,3</td><td>3,4</td><td>3,5</td><td>3,6</td></tr><tr><td>4,1</td><td>4,2</td><td>4,3</td><td>4,4</td><td>4,5</td><td>4,6</td></tr><tr><td>5,1</td><td>5,2</td><td>5,3</td><td>5,4</td><td>5,5</td><td>5,6</td></tr><tr><td>6,1</td><td>6,2</td><td>6,3</td><td>6,4</td><td>6,5</td><td>6,6</td></tr></table>	✓ $\left(\dfrac{10}{36} + \dfrac{1}{36}\right)$ ✓ $1 - \left(\dfrac{10}{36} + \dfrac{1}{36}\right)$ ✓ $\dfrac{25}{36}$ (3) **[15]**

TOTAL/*TOTAAL*:   100

5
1
1
2
3
3