



Province of the
EASTERN CAPE
EDUCATION

**NATIONAL
SENIOR CERTIFICATE/
NASIONALE
SENIOR SERTIFIKAAT**

GRADE/GRAAD 11

NOVEMBER 2016

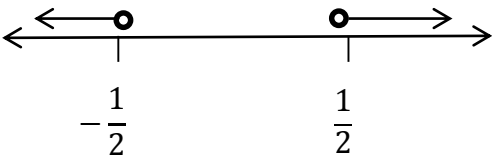
**MATHEMATICS P1/WISKUNDE V1
MEMORANDUM**

MARKS/PUNTE: 150

NOTE/LET OP:

- If a candidate answered a QUESTION TWICE, mark the FIRST attempt ONLY.
Indien 'n kandidaat 'n vraag TWEE keer beantwoord het, merk SLEGS die EERSTE poging.
- Consistent accuracy applies in ALL aspects of the memorandum.
Volgehoue akkuraatheid geld deurgaans in ALLE aspekte van die memorandum.
- If a candidate crossed out an attempt of a QUESTION and did not redo the question, mark the crossed-out attempt.
Indien 'n kandidaat 'n poging vir 'n vraag deurgetrek het en nie die vraag weer beantwoord het nie, merk die poging wat deurgetrek is.
- The mark for substitution is awarded for substitution into the correct formula.
Die punt vir substitusie word toegeken vir substitusie in die korrekte formule.

QUESTION/VRAAG 1

| | | |
|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.1.1 | $(x + 2)^2 = 1$ $x + 2 = \pm 1$ $x = -1$ or/of $x = -3$ OR/OF $(x + 2)^2 = 1$ $x^2 + 4x + 4 - 1 = 0$ $x^2 + 4x + 3 = 0$ $(x + 3)(x + 1) = 0$ $x = -3$ or/of $x = -1$ | <ul style="list-style-type: none"> ✓ ± 1 ✓ $x = -1$ ✓ $x = -3$ ✓ standard form/standaardvorm ✓ factors/faktore ✓ both x-values/beide x waardes (3) |
| 1.1.2 | $2x^2 - 11x - 4 = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $x = \frac{11 \pm \sqrt{(-11)^2 - 4(2)(-4)}}{2(2)}$ $x = \frac{11 \pm \sqrt{153}}{4}$ $x = 5,84$ or/of $x = -0,34$ | <ul style="list-style-type: none"> ✓ sub into correct formula/vervanging in korrekte formule ✓ simplification/vereenvoudiging ✓ $x = 5,84$ ✓ $x = -0,34$ (4) |
| 1.1.3 | $x^2 > \frac{1}{4}$; $x < 0$ $x^2 - \frac{1}{4} > 0$ $(x - \frac{1}{2})(x + \frac{1}{2}) > 0$  $x > \frac{1}{2}$ or/of $x < -\frac{1}{2}$ $x < -\frac{1}{2}$ | <ul style="list-style-type: none"> ✓ factors/faktore ✓ solutions/oplossings ✓ critical values and method/kritiese waarde en metode ✓ $x < -\frac{1}{2}$ only/alleenlik (4) |
| 1.1.4 | $x + 5 = \sqrt{3 - 3x}$ $x^2 + 10x + 25 = 3 - 3x$ $x^2 + 13x + 22 = 0$ $(x + 11)(x + 2) = 0$ $x = -2$ or/of $x = -11$ $x = -2$ | <ul style="list-style-type: none"> ✓ squaring both sides/kwadrering beide kante ✓ standard form/standaard vorm ✓ both x values/beide x waardes ✓ $x = -2$ (4) |

| | | |
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| 1.2.1 | $y^2 - 9x^2$ $(y - 3x)(y + 3x)$ | ✓ factors/faktore (1) |
| 1.2.2 | $y + 3x = 2 \dots \dots \dots (1)$ $y^2 - 9x^2 = 16 \dots \dots \dots (2)$ From/Vanaf (2) $(y - 3x)(y + 3x) = 16$ Sub (1) into/in (2) $2(y - 3x) = 16$ From/Vanaf (1) $y = 2 - 3x$ $2(2 - 3x - 3x) = 16$ $4 - 12x = 16$ $12x = -12$ $x = -1$ $y = 2 - 3(-1)$ $y = 5$ OR/OF From/vanaf (1) $y = 2 - 3x$ Sub into (2)/vervang in (2) $(2 - 3x)^2 - 9x^2 = 16$ $4 - 12x + 9x^2 - 9x^2 = 16$ $4 - 12x = 16$ $12x = -12$ $x = -1$ $\therefore y = 5$ | ✓ sub 2 for $(y + 3x)$ vervanging van 2 vir $(y + 3x)$ ✓ making y the subject/maak y die onderwerp. ✓ sub y/vervanging van y. ✓ x value/x-waarde ✓ y value/y-waarde ✓ $y = 2 - 3x$ ✓ Substitution/vervanging ✓ Simplification/vereenvoudiging ✓ x value/x-waarde ✓ y value/y-waarde (5) |

[21]

QUESTION/VRAAG 2

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|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| 2.1 | $\left(\frac{a^3}{2}\right)^2$ $= \frac{a^6}{4}$ | ✓ answer/antwoord (1) |
| 2.2 | $\frac{2^{x-3} - 3 \cdot 2^{x-1}}{2^{x-2}}$ $= \frac{2^x \left(\frac{1}{8} - \frac{3}{2}\right)}{2^x \left(\frac{1}{4}\right)}$ $= -\frac{11}{2}$ or/of $-5\frac{1}{2}$ or/of $-5,5$ | ✓ 2^x common factor/gemene faktor. ✓ $\frac{1}{8} - \frac{3}{2}$ ✓ $2^x \cdot \frac{1}{4}$ ✓ answer/antwoord (4) |
| 2.3 | 10^{x+3} $= 10^x \cdot 10^3$ $= 1,5 \times 1000$ $= 1500$ | ✓ sub/vervang $10^x = 1,5$ ✓ answer/antwoord (2) |

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| 2.4.1 | $2^x = 0,125$ $2^x = 2^{-3}$ $x = -3$ | ✓ $0,125$ as 2^{-3} ✓ answer/antwoord (2) |
| 2.4.2 | $(0,5)^x \cdot \sqrt{1 + \frac{9}{16}} = 10$ $\left(\frac{1}{2}\right)^x \cdot \sqrt{\frac{25}{16}} = 10$ $\left(\frac{1}{2}\right)^x = 10 \times \frac{4}{5}$ $\left(\frac{1}{2}\right)^x = 8$ $2^{-x} = 2^3$ $\therefore x = -3$ | ✓ $\sqrt{\frac{25}{16}}$ ✓ $10 \times \frac{4}{5}$ ✓ 2^{-x} ✓ 2^3 ✓ $x = -3$ (5) |

[14]

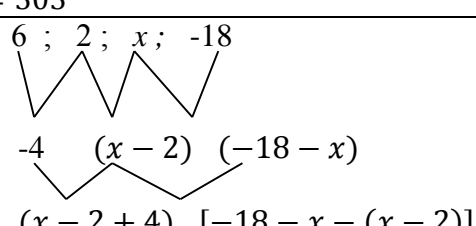
QUESTION/VRAAG 3

| | | |
|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| 3.1 | $2x(x + 1) + m = x$ $2x^2 + 2x + m - x = 0$ $2x^2 + x + m = 0$ $\Delta = b^2 - 4ac$ $= 1 - 4(2)(m)$ $= 1 - 8m$ For non-real roots/vir nie-reële wortels $\Delta < 0$ $1 - 8m < 0$ $8m > 1$ $m > \frac{1}{8}$ | ✓ standard form/standaardvorm ✓ sub into Δ /vervang in Δ ✓ $\Delta = 1 - 8m$ ✓ $\Delta < 0$ ✓ $m > \frac{1}{8}$ (5) |
| 3.2 | $f(x) = \frac{\sqrt{x+2}}{5-x^2}$ Undefined/ongedefinieerd $5 - x^2 = 0$ or/of $x + 2 < 0$ $x = \pm\sqrt{5}$ or/of $x < -2$ | ✓ $5 - x^2 = 0$ ✓ $x + 2 < 0$ ✓ $x < -2$ ✓ $x = \sqrt{5}$ ✓ or/of (5) |

[10]

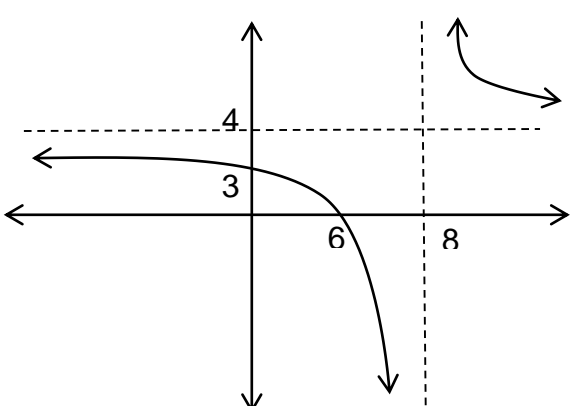
QUESTION/VRAAG 4

| | | |
|-------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 4.1.1 | 22 ; 27 | ✓ 22 ✓ 27 (2) |
| 4.1.2 | $T_n = 5n + 2$ | ✓ $5n$ ✓ 2 (2) |
| 4.1.3 | $5n + 2 = 12^5$ $5n = 12^5 - 2$ $n = 49766$ $T_{49766} = 12^5$ | ✓ $5n + 2 = 12^5$ ✓ $12^5 - 2$ ✓ $n = 49766$ (3) |
| 4.1.4 | General Term is multiples of 5 plus 2 therefor the numbers in the sequence will always end in a 2 or a 7 as multiples of 5 end with 0 or a 5. Die algemene term is veelvoude van 5 plus 2 en daarom sal die patroon altyd eindig in 'n 2 of 'n 5 omdat die veelvoude van 5 altyd eindig op 0 of 5 | ✓ multiples of 5 plus 2/veelvoude van 5 plus 2 ✓ ending in 2 or 7/eindig in 2 of 7 |

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| 4.2.1 | 39 | ✓ 39 | (1) |
| 4.2.2 | $2a = 2$ $a = 1$ $3a + b = 6$ $b = 3$ $a + b + c = 3$ $c = -1$ $T_n = n^2 + 3n - 1$ | ✓ $a = 1$ ✓ $3a + b = 6$ ✓ $b = 3$ ✓ $a + b + c = 3$ ✓ $c = -1$ | (5) |
| 4.2.3 | $n^2 + 3n - 1 = 269$ $n^2 + 3n - 270 = 0$ $(n - 15)(n + 18) = 0$ $n = 15$ $T_{16} = 16^2 + 3(16) - 1$ $T_{16} = 303$ | ✓ $n^2 + 3n - 1 = 269$ ✓ factors/faktore ✓ $n = 15$ ✓ $T_{16} = 303$ | (4) |
| 4.3 | ; 6 ; 2 ; x ; -18  | ✓ Method/metode | |
| 4.3.1 | $x + 2 = -2x - 16$ $3x = -18$ $x = -6$ $T_4 = -6$ $d_2 = -4$ | ✓ setting up of equation/opstel van vergelyking ✓ $x = -6$ ✓ second diff/tweede verskil | (4) |
| 4.3.2 | $d_1 = 0$ $T_1 = 6$ | ✓ $d_1 = 0$ ✓ $T_1 = 6$ | (3) |

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QUESTION/VRAAG 5

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|-------|---------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|-----|
| 5.1 | $x = 8$ $y = 4$ | ✓ $x = 8$ ✓ $y = 4$ | (2) |
| 5.2 | Domain $x \in R ; x \neq 8$ Range $y \in R ; y \neq 4$ | ✓ domain/gebied ✓ range/terrein | (2) |
| 5.3 |  | ✓ shape/vorm ✓ asymptotes/asimptote ✓ x-intercept/x-afsnit ✓ y-intercept/y-afsnit | (4) |
| 5.4.1 | $\frac{8}{x-8} \geq -4$ $\frac{8}{x-8} + 4 \geq 0$ $\therefore f(x) \geq 0$ $x \leq 6$ or/of $x > 8$ | ✓ $x \leq 6$ ✓ $x > 8$ ✓ or/of | (3) |

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| 5.4.2 | $f(x) \leq 3$ $0 \leq x < 8$ | ✓ $x \geq 0$ ✓ $x < 8$ ✓ notation/notasie | (3) |
| 5.5 | $y = x - 8 + 4$ $y = x - 4$ | ✓ $y = x - 8 + 4$ ✓ $x - 4$ | (2) |
| 5.6 | $g(x) = f(x - 2) - 2$ $g(x) = \frac{8}{x-10} + 2$ | ✓ $x - 10$ ✓ $+2$ | (2) |

[18]

QUESTION/VRAAG 6

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| 6.1 | $y = a(x - x_1)(x - x_2)$ $y = a(x + 5)(x + 1)$ $2 = a(0 + 5)(0 + 1)$ $a = \frac{2}{5}$ $y = \frac{2}{5}(x^2 + 6x + 5)$ $y = \frac{2}{5}x^2 + \frac{12}{5}x + 2$ | ✓ $(x + 5)(x + 1)$ ✓ sub of/vervang van (0; 2) ✓ a-value/a-waarde ✓ equation/vergelijking | (4) |
| 6.2 | $y = k \cdot m^x$ $2 = k \cdot m^0$ $k = 2$ $y = 2 \cdot m^x$ $6 = 2 \cdot m$ $m = 3 \quad \therefore g(x) = 2 \cdot 3^x$ | ✓ $k = 2$ ✓ Sub of/vervang van (1;6) ✓ $m = 3$ | (3) |
| 6.3 | $y = 0$ | ✓ answer/antwoord | (1) |
| 6.4.1 | x -value of turning point/ x -waarde van draaipunt. $x = -3$ decreasing/dalend $x < -3$ OR/OF $(-\infty; -3)$ | ✓ $x = -3$ ✓ $x < -3$ | (2) |
| 6.4.2 | $0 \leq x \leq 1$ | ✓ $x \geq 0$ ✓ $x \leq -1$ | (2) |
| 6.4.3 | $x \leq 0$ | ✓ answer/antwoord | (2) |
| 6.4.4 | $-5 < x < -1$ | ✓ $x > -5$ ✓ $x < -1$ | (2) |
| 6.5 | $(-5; 0)$ and y -intercept. $(0; 2)$ $m = \frac{y_2 - y_1}{x_2 - x_1}$ $m = \frac{0 - 2}{-5 - 0}$ $m = \frac{2}{5}$ | ✓ formula/formule ✓ substitution/vervanging ✓ answer/antwoord | (3) |

[19]

QUESTION/VRAAG 7

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|-----|-----------------------------------------------------------------------------|---------------------------------------------------------------------------|-----|
| 7.1 | $y = b^x$ $y = b^{x-2} + 4$ $8 = b^{4-2} + 4$ $4 = b^2$ $b = 2$ | ✓ $y = b^{x-2}$ ✓ $+4$ ✓ sub of/vervang van (4;8) ✓ $b = 2$ ✓ | (4) |
| 7.2 | $y = 2^{x-2} + 4$ | equation/vergelijking | (1) |

[5]

QUESTION/VRAAG 8

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|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 8.1 | $A = P(1 - i)^n$ $A = 7\,200 \left(1 - \frac{25}{100}\right)^3$ $A = R\,3\,037,50$ | <ul style="list-style-type: none"> ✓ formula/formule ✓ subst/vervanging ✓ answer/antwoord <p style="text-align: right;">(3)</p> |
| 8.2 | $A = P(1 + i)^n$ $1\,126,10 = 500 \left(1 + \frac{i}{2}\right)^{12}$ $\frac{1\,126,10}{500} = \left(1 + \frac{i}{2}\right)^{12}$ $i = 0,14$ <p>Interest rate/rentekoers = 14%</p> | <ul style="list-style-type: none"> ✓ formula/formule ✓ subst/vervanging ✓ simplification/vereenvoudiging ✓ answer/antwoord <p style="text-align: right;">(4)</p> |
| 8.3.1 | $1 + i_e = \left(1 + \frac{i_n}{m}\right)^m$ $i_e = \left(1 + \frac{7,2}{1200}\right)^{12} - 1$ $i_e = 0,07442 \dots$ $r = 7,442 \%$ | <ul style="list-style-type: none"> ✓ formula/formule ✓ subst/vervanging ✓ answer/antwoord <p style="text-align: right;">(3)</p> |
| 8.3.2 | $A = P(1 + i)^n$ $A = 120\,000(1 + 7,442\%)^3$ $A = 148\,834,46$ | <ul style="list-style-type: none"> ✓ formula/formule ✓ subst/vervanging ✓ answer/antwoord <p style="text-align: right;">(3)</p> |
| 8.3.3 | $A = 120\,000 \left(1 + \frac{7,2}{1200}\right)^{48}$ $A = R159\,913,20$ $A = 20\,000 \left(1 + \frac{7,2}{1200}\right)^{30}$ $A = 23\,931,47$ <p><i>Final amount</i> R159913,20 – 23 931,47</p> <p><i>Finale bedrag</i> = R 135 981,73</p> <p>OR/OF</p> $A = \left[120\,000 \left(1 + \frac{7,2}{1200}\right)^{18} - 20\,000\right] \left(1 + \frac{7,2}{1200}\right)^{30}$ $A = R\,135\,981,73$ | <ul style="list-style-type: none"> ✓ R 159913,20 ✓ R 23931,47 ✓ subtracting/aftrek ✓ answer/antwoord <p style="text-align: right;">(4)</p> |

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QUESTION/VRAAG 9

| <p>9.1</p> | | <ul style="list-style-type: none"> ✓ 1st branch of tree diagram/1^{ste} tak van boom diagram ✓ values on first branch/waardes op 1^{ste} tak ✓ 2nd branch/2^{de} tak ✓ values on 2nd branch/waardes op 2de tak ✓ first four outcomes/eerste vier uitkoms ✓ last 4 outcomes/laaste 4 uitkomste <p style="text-align: right;">(6)</p> | | | | | | | | | | | | | | | | |
|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|-------------------------------|------------------------|--------------------|----|----|----|-----------------------|----|----|----|----------------------|----|----|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>9.2.1</p> | $P(BB) = \frac{5}{10} \times \frac{4}{9}$ $P(BB) = \frac{20}{90} = 1,333 \dots$ | <ul style="list-style-type: none"> ✓ $\frac{5}{10} \times \frac{4}{9}$ ✓ answer/antwoord <p style="text-align: right;">(2)</p> | | | | | | | | | | | | | | | | |
| <p>9.2.2</p> | $P = \left(\frac{2}{10} \times \frac{3}{9}\right) + \left(\frac{3}{10} \times \frac{2}{9}\right)$ $P = \frac{6}{90} + \frac{6}{90}$ $P = \frac{12}{90}$ $P = 0,133$ | <ul style="list-style-type: none"> ✓ $\left(\frac{2}{10} \times \frac{3}{9}\right)$ ✓ $\left(\frac{3}{10} \times \frac{2}{9}\right)$ ✓ simplify/vereenvoud, ✓ adding/optel ✓ answer/antwoord <p style="text-align: right;">(5)</p> | | | | | | | | | | | | | | | | |
| <p>9.3.1</p> | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th>Sport</th> <th>No sport <i>Geen sport</i></th> <th>Total <i>Totaal</i></th> </tr> </thead> <tbody> <tr> <td>Boys/<i>Seuns</i></td> <td>50</td> <td>10</td> <td>60</td> </tr> <tr> <td>Girls/<i>Meisies</i></td> <td>40</td> <td>20</td> <td>60</td> </tr> <tr> <td>Total/<i>Totaal</i></td> <td>90</td> <td>30</td> <td>120</td> </tr> </tbody> </table> | | Sport | No sport <i>Geen sport</i> | Total <i>Totaal</i> | Boys/ <i>Seuns</i> | 50 | 10 | 60 | Girls/ <i>Meisies</i> | 40 | 20 | 60 | Total/ <i>Totaal</i> | 90 | 30 | 120 | <ul style="list-style-type: none"> ✓ labels/opskrifte ✓ boys row/seuns ry ✓ girls row/meisies ry ✓ column totals/totale van kolomme ✓ 120 <p style="text-align: right;">(5)</p> |
| | Sport | No sport <i>Geen sport</i> | Total <i>Totaal</i> | | | | | | | | | | | | | | | |
| Boys/ <i>Seuns</i> | 50 | 10 | 60 | | | | | | | | | | | | | | | |
| Girls/ <i>Meisies</i> | 40 | 20 | 60 | | | | | | | | | | | | | | | |
| Total/ <i>Totaal</i> | 90 | 30 | 120 | | | | | | | | | | | | | | | |
| <p>9.3.2</p> | <p>(a) $\frac{40}{120} = \frac{1}{3}$</p> | <ul style="list-style-type: none"> ✓ answer/antwoord <p style="text-align: right;">(1)</p> | | | | | | | | | | | | | | | | |
| | <p>(b) $\frac{10}{120} = \frac{1}{12}$</p> | <ul style="list-style-type: none"> ✓ answer/antwoord <p style="text-align: right;">(1)</p> | | | | | | | | | | | | | | | | |

[20]

TOTAL/TOTAAL: 150