

**CAPE WINELANDS
EDUCATION DISTRICT
KAAPSE WYNLAND
ONDERWYSDISTRIK**

**GEMEENSKAPLIKE VRAESTEL
COMMON PAPER**

GRAAD/GRADE 12

**WISKUNDE V1 / MATHEMATICS P1
MEMORANDUM**

SEPTEMBER 2018

PUNTE/MARKS: 150

- ACCEPT ALL MATHEMATICALLY VALID ALTERNATIVES
- ONLY PENALISE FOR ROUNDING IN 1.1.1

VRAAG 1 / QUESTION 1

QUESTION	SOLUTION	DESCRIPTORS	MARKS/ LEVELS
1.1.1	$x^2 - 10x - 3 = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $x = \frac{-(-10) \pm \sqrt{(-10)^2 - 4(1)(-3)}}{2(1)}$ $x = \frac{10 \pm \sqrt{112}}{2}$ $x = 10,29 \text{ or } x = -0,29$	<p>Incorrect formula : No marks</p> <p>✓ subst into correct formula</p> <p>✓ $x = 10,29$ ✓ $x = -0,29$</p> <p>-1 rounding</p> <p>Only penalise for rounding at this question</p>	(3) K
1.1.2	$(x + 2)(x - 9) = 0$ $x = -2 \text{ or } x = 9$ <p>OR</p> $x^2 - 7x - 18 = 0$ $(x - 9)(x + 2) = 0$ $x = 9 \text{ or } x = -2$	<p>✓✓ each factor ✓ answers CA</p> <p>✓ standard form ✓ factors ✓ answers CA</p>	(3) R
1.1.3	$3^x(3^x - 9) = 0$ $3^x(3^x - 9) = 0$ $3^x \neq 0 ; 3^x = 9$ $\therefore x = 2$	<p>✓ $3^x \neq 0$ ✓ $x = 2$</p>	(2) K
1.2	1.2.1 $16 - 4k \geq 0$ $4k \leq 16$ $k \leq 4$	<p>✓ $16 - 4k \geq 0$</p> <p>✓ answer</p>	(2) K/R
	1.2.2 $k = -5 \text{ or } 3 \text{ or } 0 \text{ or } 4 \text{ (any one)}$	✓ answer	(1) K

QUES	SOLUTION	DESCRIPTORS	MARKS/ LEVELS
1.3	$x(x - y + 1) = 0 \dots \dots \dots \quad (1)$ <i>en</i> $2x + y - 2 = 0$ $y = -2x + 2 \dots \dots \dots \quad (2)$ <i>stel (2) in (1)</i> $x[x - (-2x + 2) + 1] = 0$ $x(x + 2x - 2 + 1) = 0$ $x(3x - 1) = 0$ $x = 0 \text{ or } x = \frac{1}{3}$ $y = 2 \quad y = 1\frac{1}{3}$	✓ $y = -2x + 2$ ✓ <i>substitution into (1)</i> ✓ <i>factors</i> ✓ <i>values of x</i> ✓ $y = 2$ ✓ $y = 1\frac{1}{3}$	(6)R
1.4	1.4.1 $(x - 1)(x + 2) < 0$ $-2 < x < 1$	✓ $(x - 1)(x + 2) < 0$ ✓ <i>critical values</i> ✓ <i>notation</i>	(3)R/K
	1.4.2 $\sqrt{(x - 1)(x + 2)} = 2$ $(x - 1)(x + 2) = 4$ $x^2 + x - 2 = 4$ $x^2 + x - 6 = 0$ $(x + 3)(x - 2) = 0$ $x = -3 \text{ or } x = 2$ Both solutions valid	✓ $g'(x) = 2$ ✓ <i>squaring both sides</i> ✓ <i>standard form</i> ✓ <i>factors</i> ✓ <i>answers</i>	(5)C
			[25]

VRAAG 2 / QUESTION 2

QUES	SOLUTION	DESCRIPTORS	MARKS/ LEVELS
2.1	$\begin{aligned} S_n &= a + (a + d) + \dots + a + (n - 2)d + a + (n - 1)d \\ S_n &= a + (n - 1)d + a + (n - 2)d + \dots + (a + d) + a \end{aligned}$ <hr/> $2S_n = 2a + (n - 1)d \dots \text{for } n \text{ terms}$ $\therefore S_n = \frac{n}{2}[2a + (n - 1)d]$ <p>OR</p> $\begin{aligned} S_n &= a + (a + d) + \dots + (l - d) + l \\ S_n &= l + (l - d) + \dots + (a + d) + a \end{aligned}$ <hr/> $2S_n = a + l + a + l \dots \text{for } n \text{ terms}$ $2S_n = n(a + l)$ $S_n = \frac{n}{2}[a + l]$ <p>but $l = a + (n - 1)d$</p> $\therefore S_n = \frac{n}{2}[2a + (n - 1)d]$	✓ step 1 ✓ step 2 ✓ step 3 ✓ step 4 NO CA ✓ step 1 ✓ step 2 ✓ step 3 ✓ step 4 NO CA	(4)K
2.2	2.2.1 $T_n = a + (n - 1)d$ $35 = -5 + (n - 1)4$ $44 = 4n$ $n = 11$	✓ substitution ✓ simplification ✓ answer	(3)R
	2.2.2 $\begin{aligned} S_{11} &= \frac{11}{2}[2(-5) + 10(4)] \\ &= \frac{11}{2}(30) \\ &= 165 \end{aligned}$	✓ substitution ✓ answer	(2)R

QUESTION		SOLUTION	DESCRIPTORS	MARKS/ LEVELS
2.3	2.3.1	$\begin{aligned} S_1 &= 2(1) - 1^2 \\ &= 1 \\ \therefore T_1 &= 1 \end{aligned}$	✓ <i>sub</i> ✓ <i>answer</i> T_1	(2)C
	2.3.2	$\begin{aligned} S_{15} - S_{12} &= [2(15) - 15^2] - [2(12) - 12^2] \\ &= -195 - (-120) \\ &= -75 \end{aligned}$	✓ $M - S_{15}$ ✓ $M - S_{12}$ ✓ <i>answer</i>	(3)P
2.4		<p>aantal stawe/number of steel bars : 3 ; 7 ; 11</p> $n = \frac{75}{5} = 15 \text{ (ryoppervak/driving surface)}$ $\begin{aligned} T_{15} &= 3 + (14)(4) \\ &= 59 \end{aligned}$	✓ $a = 3$ and $d = 4$ ✓ $n = 15$ ✓ <i>answer</i>	(3)P
				[17]

VRAAG 3 / QUESTION 3

QUES	SOLUTION	DESCRIPTORS	MARKS/ LEVELS
3.1	3.1.1 $19; 7; -1; -5$	$\checkmark \checkmark \text{answer}$ (1mark per 2 terms)	(2)K
	3.1.2 $\begin{array}{lll} 2a = 4 & 3a + b = -12 & a + b + c = 19 \\ a = 2 & 3(2) + b = -12 & 2 - 18 + c = 19 \\ & b = -18 & c = 35 \end{array}$	$\checkmark a = 2$ $\checkmark b = -18$ $\checkmark c = 35$	(3)C
3.2	3.2.1 $\begin{array}{l} -1 < \frac{p}{4} < 1 \\ -4 < p < 4 \end{array}$	$\checkmark -1 < r < 1$ $\checkmark / \text{answer}$	(2)R/K
	3.2.2 $\begin{array}{l} S_{\infty} = \frac{4}{1 - \frac{p}{4}} = 3 \\ 4 = 3 - \frac{3p}{4} \\ 1 = -\frac{3p}{4} \\ -4 = 3p \\ p = \frac{-4}{3} \end{array}$	\checkmark <i>substitution into correct formula</i> \checkmark simplification \checkmark answer	(3)C
			[10]

VRAAG 4 / QUESTION 4

QUES	SOLUTION	DESCRIPTORS	MARKS/ LEVELS
4.1	$h(x) = -x + c$ $\text{subs } (2; 3):$ $3 = -(2) + c$ $5 = c$ $\therefore h(x) = -x + 5$	✓ subst (2; 3) into correct equation ✓ $h(x) = -x + 5$	(2)R
4.2	$\text{sub } y = 4:$ $4 = -x + 5$ $x = 1$ $\therefore \text{B } (1; 4)$	✓ subst $y = 4$ CA ✓ $x = 1$	(2)R
4.3	$f(x) = a(x + p)^2 + q$ $f(x) = a(x - 1)^2 + 4$ $\text{subst } (2; 3):$ $3 = a(2 - 1)^2 + 4$ $-1 = a$ $\therefore f(x) = -(x - 1)^2 + 4$ $f(x) = -(x^2 - 2x + 1) + 4$ $\therefore f(x) = -x^2 + 2x + 3$	✓ $f(x) = a(x - 1)^2 + 4$ ✓ substitution ✓ $a = 1$ ✓ $x^2 - 2x + 1$	(4)R
4.4	Eqn of g : $g(x) = \frac{k}{x-1} + 4$ deur (0;3) $3 = \frac{k}{-1} + 4$ $-1 = \frac{k}{-1}$ $\therefore k = 1$ $g(x) = \frac{1}{x-1} + 4$	✓ substituting asymptotes ✓ value of k ✓ answer	(3)R
4.5	$x = 0 ; y = 4$	✓ $x = 0$ ✓ $y = 4$	(2)K
4.6	$x > 1$	✓✓ answer only 1 mark $x \geq 1$	(2)C
			[15]

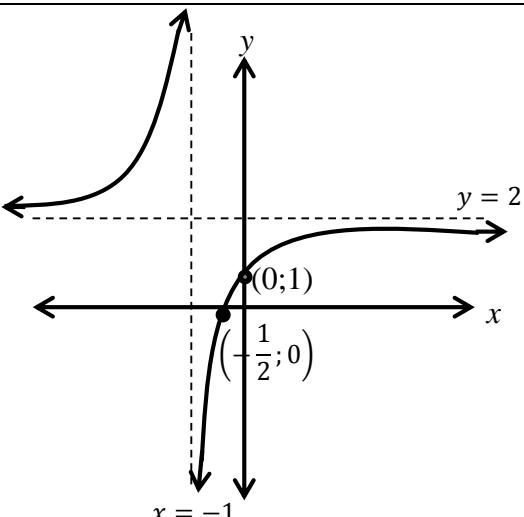
VRAAG 5 / QUESTION 5

QUES	SOLUTION	DESCRIPTORS	MARKS/ LEVELS
5.1	A (1;0)	✓ 1✓0	(2)K
5.2	$g^{-1} : x = \log_2 y$ $y = 2^x$	✓ swap x and y ✓ answer or ✓✓ answer only	(2)R
5.3	<p>The graph shows a curve that passes through the point (1, 0) on the x-axis. Another point, (2, -1), is also marked on the curve. The curve is decreasing as it moves from left to right.</p>	✓ x - intercept (1; 0) ✓ coordinates of any other point	(2)R
5.4	$\log_{\frac{1}{2}} x \geq 0$ $-\log_2 x \geq 0$ $0 < x \leq 1$	✓ values ✓ notation	(2)P
			[8]

VRAAG 6 / QUESTION 6

Gegee $f(x) = \frac{k}{x+p} + q$		
QUES	SOLUTION	DESCRIPTORS

The graph shows a rational function $f(x) = \frac{k}{x+p} + q$ plotted on a Cartesian coordinate system. The x-axis is labeled x and the y-axis is labeled y . A vertical dashed line at $x = -1$ represents a vertical asymptote. A horizontal dashed line at $y = 2$ represents a horizontal asymptote. The graph has two branches. One branch passes through the x-intercept $(-\frac{1}{2}, 0)$ and approaches the vertical asymptote from the left. The other branch passes through the y-intercept $(0, 1)$ and approaches the horizontal asymptote $y = 2$ as $x \rightarrow \infty$.

QUES	SOLUTION	DESCRIPTORS
		<ul style="list-style-type: none"> ✓ correct quadrants ✓ x-intercept ✓ y-intercept ✓ asymptotes ✓ shape

(5)K

[5]

VRAAG 7 / QUESTION 7

QUES	SOLUTION	DESCRIPTORS	MARKS/ LEVELS
7.1	$A = P(1 - i)^n$ $48\ 000 = 85\ 000 \left(1 - \frac{13,4}{100}\right)^n$ $\frac{48}{85} = (0,866)^n$ $n = \log_{0,866} \frac{48}{85}$ $n = 3,97 \text{ years/jaar}$	✓ subst into correct formula ✓ simplification ✓ using of logs ✓ answer	(4)R
7.2	7.2.1 $P = \frac{x[1 - (1 + i)^{-n}]}{i}$ $600\ 000 = \frac{x[1 - \left(1 + \frac{0,11}{12}\right)^{-20 \times 12}]}{\frac{0,11}{12}}$ $x = 6193,13$	✓ $n = -240$ ✓ $\frac{0,11}{12}$ ✓ subst into correct formula ✓ answer	(4)R
	7.2.2 $P = \frac{x[1 - (1 + i)^{-n}]}{i}$ $P = \frac{6193,13[1 - \left(1 + \frac{0,11}{12}\right)^{-6 \times 12}]}{\frac{0,11}{12}}$ $P = 325\ 370,62$	✓ $n = -72$ ✓ subst into correct formula CA from 8.2.1 ✓ answer	(3)C
	7.2.3 $A = P(1 + i)^n$ $= 125\ 370,62 \left(1 + \frac{0,11}{12}\right)^3$ $= 128\ 850,01$	✓ $n = 3$ ✓ subst into correct formula ✓ answer	(3) R
			[14]

VRAAG 8 / QUESTION 8

QUES	SOLUTION	DESCRIPTORS	MARKS/ LEVELS
8.1.1	<p>Gegee: $f(x) = 3 - x^2$</p> $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h)-f(x)}{h}$ $f'(x) = \lim_{h \rightarrow 0} \frac{[3-(x+h)^2]-[3-x^2]}{h}$ $f'(x) = \lim_{h \rightarrow 0} \frac{[3-(x^2+2xh+h^2)]-3+x^2}{h}$ $f'(x) = \lim_{h \rightarrow 0} \frac{3-x^2-2xh-h^2-3+x^2}{h}$ $f'(x) = \lim_{h \rightarrow 0} \frac{-2xh-h^2}{h}$ $f'(x) = \lim_{h \rightarrow 0} \frac{h(-2x-h)}{h}$ $f'(x) = -2x$	✓ <i>formule</i> ✓ $(x^2 + 2xh + h^2)$ ✓ $-2xh - h^2$ ✓ $\lim_{h \rightarrow 0} \frac{h(-2x-h)}{h}$ ✓ <i>answer</i> -1 for incorrect notation	(5)R
8.1.2	$f'(-1) = -2(-1)$ $= 2$	✓ <i>subst</i> ✓ <i>answer</i>	(2) R
8.2	Differensieer met betrekking tot x :		
8.2.1	$f(x) = -3x^3 - 2\sqrt{x}$ $f(x) = -3x^3 - 2x^{\frac{1}{2}}$ $f'(x) = -9x^2 - x^{-\frac{1}{2}}$	✓ $x^{\frac{1}{2}}$ ✓ <i>each derivative</i> ✓	(3)R
8.2.2	$xy = \left(x - \frac{1}{x^2}\right)\left(x + \frac{1}{x^2}\right)$ $xy = x^2 - \frac{1}{x^4}$ $y = x - \frac{1}{x^5}$ $y = x - 1x^{-5}$ $\frac{dy}{dx} = 1 + 5x^{-6}$	✓ simplification ✓ <i>y subject of formula</i> ✓ 1 ✓ $5x^{-6}$	(4)C

QUES	SOLUTION	DESCRIPTORS	MARKS/ LEVELS
8.3	8.3.1 $h(x) = kx^{-1}$ $h'(x) = -kx^{-2}$	✓ kx^{-1} ✓ answer	(2)C
	8.3.2 $h'(x) = -kx^{-2}$ $3 = -kx^{-2} \dots\dots(1)$ $h(x) = g(x)$ $\frac{k}{x} = 3x + 6$ $k = 3x^2 + 6x \dots(2)$ subst (2) in (1): $3 = -(3x^2 + 6x).x^{-2}$ $3 = -3 - 6x^{-1}$ $3x = -3x - 6$ $6x = -6$ $x = -1$ $\text{subst into (2): } k = 3(-1)^2 + 6(-1)$ $k = -3$	✓ equation (1) ✓ equation (2) ✓ subst ✓ value of x ✓ answer	(5)P
8.4	8.4.1 $p'(x) = 3x^2 + 2bx + 24$ $\text{subst } A(2; 0)$ $0 = 3(2)^2 + 2b(2) + 24$ $-36 = 4b$ $-9 = b$	✓ $p'(x)$ ✓ subst ✓ answer	(3)C
	8.4.2 $p'(x) = 0$ $3x^2 - 18x + 24 = 0$ $x^2 - 6x + 8 = 0$ $(x - 2)(x - 4) = 0$ $x = 2 ; x = 4$ $C(4; 0)$	✓ $p'(x) = 0$ ✓ factors ✓ $C(4; 0)$	(3)R
	8.4.3 $p \text{ stygend : } p'(x) > 0.$ $x < 2 \text{ or } x > 4$	✓ $p'(x) > 0$ ✓ $x < 2$ ✓ $x > 4$ CA from 8.4.2	(3)C
	8.4.4 $p \text{ konkaaf op : } p''(x) > 0$ $x > 3$	✓ $p''(x) > 0$ ✓ $x > 3$ CA from 8.4.2 (middle of 2 x-intercepts)	(2)C

QUES	SOLUTION	DESCRIPTORS	MARKS/ LEVELS
8.4.5		<ul style="list-style-type: none"> ✓(2; 0) ✓infl $x = 3$ ✓ TP $x = 4$ ✓ shape 	(4)C [36]

QUESTION 9/VRAAG 9

QUES	SOLUTION	DESCRIPTORS	MARKS/ LEVELS
9.1	$h(t) = -10t^2 + 300t + 9750$ $h(0) = -10(0)^2 + 300(0) + 9750$ $= 9750 \text{ meters}$	✓ $t = 0$ ✓ 9750 OR ✓✓ <i>answer only</i>	(2)K
9.2	$h'(t) = -20t + 300$ $h'(t) = 0$ $-20t + 300 = 0$ $-20t = -300$ $t = 15 \text{ sec}$	✓ $-20t + 300$ ✓ $h'(t) = 0$ ✓ <i>answer</i>	(3)R
9.3	$h(t) = -10t^2 + 300t + 9750$ $9750 = -10t^2 + 300t + 9750$ $-10t^2 + 300t = 0$ $-10t(t - 30) = 0$ $t = 30 \text{ sec}$ OR $t = 15 \times 2 = 30 \text{ sec}$	✓ $h = 9750$ ✓ 30 OR ✓✓ <i>answer only</i>	(2)C
			[7]

QUESTION 10/VRAAG 10

QUES	SOLUTION	DESCRIPTORS	MARKS/ LEVELS
10.1	$P(\text{nie vanilla}) = 1 - P(\text{vanilla})$ $= 1 - 0,23$ $0,77$	✓ formula ✓ $23\% = 0,23$ ✓ answer	(3)R
10.2	$P(D \text{ of } R) = P(D) + P(R) - P(D \text{ en } R)$ $P(D \text{ of } R) = \frac{13}{39} + \frac{20}{39} - 0$ $P(D \text{ of } R) = \frac{33}{39} = \frac{11}{13} = 0,85 = 84,62\%$	✓ $\frac{13}{39}$ and $\frac{20}{39}$ ✓ 0 ✓ answer	(3)C
10.3	$7! \times 2!$ $= 5040 \times 2$ $= 10080$	✓ $7! \times 2!$ ✓ answer	(2)C
10.4	Beskou die woord : CAPETOWN		
	10.4.1 <i>Number of arrangements</i> = $8!$ = 40 320	✓ 8! ✓ answer	(2)R
	10.4.2 C _ _ _ _ _ N $P(C - N) = \frac{6!}{40320}$ $= 0,02$	✓ numerator ✓ denominator ✓ answer	(3)C
			[13]

TOTAL = 150