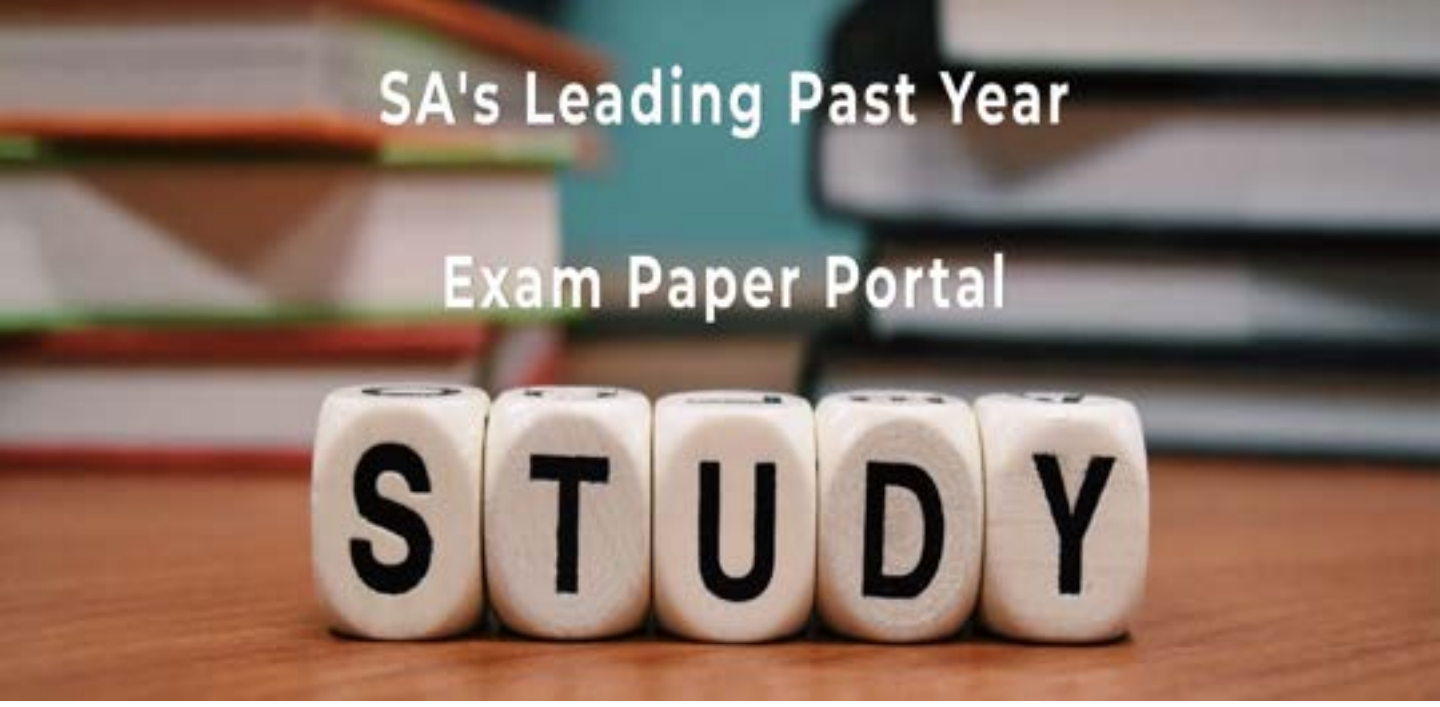

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WISKUNDE V1 / MATHEMATICS P1
MEMORANDUM

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

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

VRAAG 2 / QUESTION 2

QUES	SOLUTION		DESCRIPTORS	MARKS/ LEVELS
2.1	$S_n = a + \quad (a+d) + \cdots \quad + a + (n-2)d + a + (n-1)d$ $S_n = a + (n-1)d + a + (n-2)d + .. + (a+d) \quad + a$ $2S_n = 2a + (n-1)d \ldots . for\ n\ terms$ $\therefore S_n = \frac{n}{2}[2a + (n-1)d]$ OR $S_n = a + (a+d) + \cdots \quad + \quad (l-d) \quad + \quad l$ $S_n = l + (l-d) + \cdots \quad + \quad (a+d) \quad + \quad a$ $2S_n = a + l + a + l \ldots . for\ n\ terms$ $2S_n = n(a+l)$ $S_n = \frac{n}{2}[a+l]$ $but\ l = a + (n-1)d$ $\therefore S_n = \frac{n}{2}[2a + (n-1)d]$		✓ *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	$S_{11} = \frac{11}{2}[2(-5) + 10(4)]$ $= \frac{11}{2}(30)$ $= 165$	✓*substitution* ✓*answer*	(2)R

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

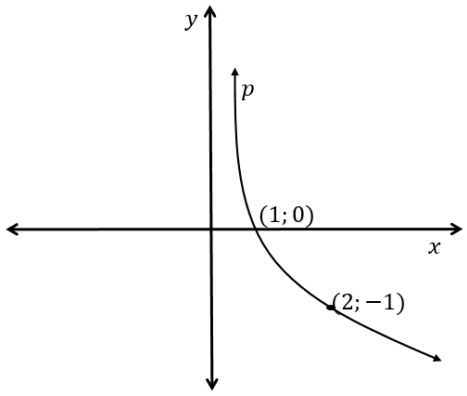
VRAAG 3 / QUESTION 3

QUES	SOLUTION		DESCRIPTORS	MARKS/ LEVELS
3.1	3.1.1	$19; 7; -1; -5$	✓✓*answer* **(1mark per 2 terms)**	(2)K
	3.1.2	$2a = 4$ $\quad 3a + b = -12$ $\quad a + b + c = 19$ $a = 2$ $\quad 3(2) + b = -12$ $\quad 2 - 18 + c = 19$ $b = -18$ $\quad c = 35$	✓$a = 2$ ✓$b = -18$ ✓$c = 35$	(3)C
3.2	3.2.1	$-1 \leq \frac{p}{4} \leq 1$ $-4 \leq p \leq 4$	✓$-1 \leq r \leq 1$ ✓*answer*	(2)R/K
	3.2.2	$S_\infty = \frac{4}{1 - \frac{p}{4}} = 3$ $4 = 3 - \frac{3p}{4}$ $1 = -\frac{3p}{4}$ $-4 = 3p$ $p = \frac{-4}{3}$	✓ *substitution into correct formula* ✓ simplification ✓*answer*	(3)C
				[10]

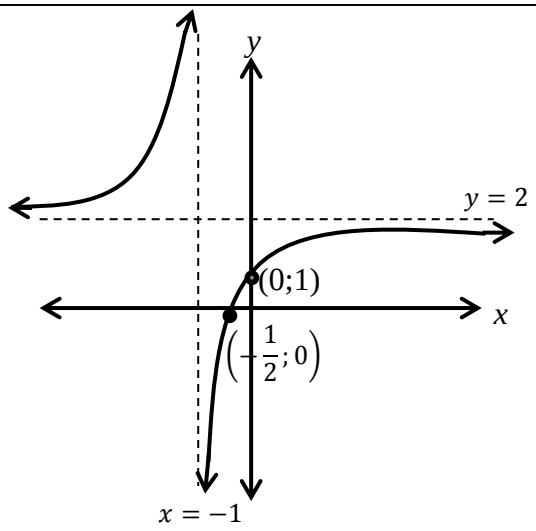
VRAAG 4 / QUESTION 4

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

VRAAG 5 / QUESTION 5

QUES	SOLUTION	DESCRIPTORS	MARKS/ LEVELS
5.1	A (1;0)	✓ 1✓0	(2)K
5.2	$g^{-1}: x = log_2 y$ $y = 2^x$	✓ *swop x and y* ✓ *answer* *or* ✓✓*answer only*	(2)R
5.3		✓ $x - intercept\ (1; 0)$ ✓ *coordinates of any other point*	(2)R
5.4	$log_{½} x \geq 0$ $-log_2 x \geq 0$ $0 < x \leq 1$	✓ *values* ✓ *notation*	(2)P
			[8]

VRAAG 6 / QUESTION 6

Gegee $f(x) = \frac{k}{x+p} + q$			
QUES	**SOLUTION**	**DESCRIPTORS**	**MARKS/ LEVELS**
		✓ *correct quadrants* ✓ $x - intercept$ ✓ $y - intercept$ ✓*asymptotes* ✓*shape*	(5)K
			[5]

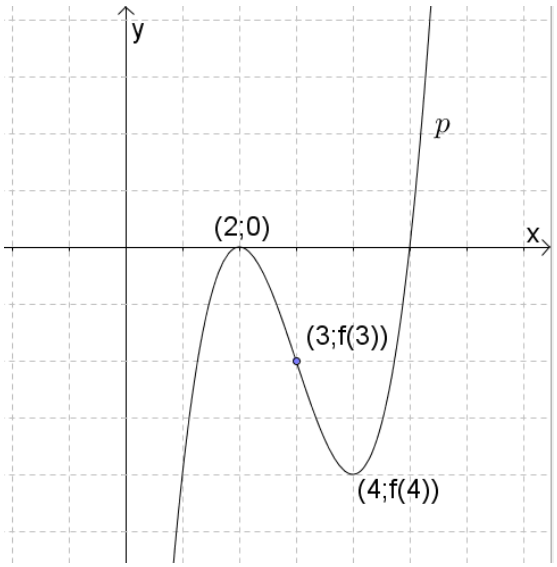
VRAAG 7 / QUESTION 7

QUES	SOLUTION		DESCRIPTORS	MARKS/ LEVELS
7.1	$A = P(1-i)^n$ $48\,000 = 85\,000\left(1-\frac{13{,}4}{100}\right)^n$ $\frac{48}{85} = (0{,}866)^n$ $n = log_{0{,}866}\frac{48}{85}$ $n = 3{,}97\ \ years/jaar$		✓ *subst into correct formula* ✓ *simplification* ✓*using of logs* ✓*answer*	(4)R
7.2	7.2.1	$P = \frac{x[1-(1+i)^{-n}]}{i}$ $600\,000 = \frac{x[1-\left(1+\frac{0{,}11}{12}\right)^{-20\times12}]}{\frac{0{,}11}{12}}$ $x = 6193{,}13$	✓ $n = -240$ ✓$\frac{0{,}11}{12}$ ✓ *subst into correct formula* ✓ *answer*	(4)R
	7.2.2	$P = \frac{x[1-(1+i)^{-n}]}{i}$ $P = \frac{6193{,}13[1-\left(1+\frac{0{,}11}{12}\right)^{-6\times12}]}{\frac{0{,}11}{12}}$ $P = 325\,370{,}62$	✓ $n = -72$ ✓ *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	$f(x) = 3 - x^2$ $f'(x) = \lim_{h\to 0} \frac{f(x+h)-f(x)}{h}$ $f'(x) = \lim_{h\to 0} \frac{[3-(x+h)^2]-[3-x^2]}{h}$ $f'(x) = \lim_{h\to 0} \frac{[3-(x^2+2xh+h^2)-3+x^2}{h}$ $f'(x) = \lim_{h\to 0} \frac{3-x^2-2xh-h^2-3+x^2}{h}$ $f'(x) = \lim_{h\to 0} \frac{-2xh-h^2}{h}$ $f'(x) = \lim_{h\to 0} \frac{h(-2x-h)}{h}$ $f'(x) = -2x$	✓$formule$ ✓$(x^2 + 2xh + h^2)$ ✓$-2xh - h^2$ ✓$\lim_{h\to 0} \frac{h(-2x-h)}{h}$ ✓$answer$ **-1 for incorrect notation**	(5)R
8.1.2	$f'(-1) = -2(-1)$ $= 2$	✓$subst$ ✓$answer$	(2) R
8.2	8.2.1 $f(x) = -3x^3 - 2\sqrt{x}$ $f(x) = -3x^3 - 2x^{\frac{1}{2}}$ $f'(x) = -9x^2 - x^{-\frac{1}{2}}$	✓$x^{\frac{1}{2}}$ ✓ $each\ derivative$ ✓	(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 ✓ $y\ subject\ of\ formula$ ✓ 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	$h'(x) = -kx^{-2}$ $3 = -kx^{-2}$ .....(1) $h(x) = g(x)$ $\frac{k}{x} = 3x + 6$ $k = 3x^2 + 6x$ ... (2) $subst\ (2) in\ (1)$: $3 = -(3x^2 + 6x).x^{-2}$ $3 = -3 - 6x^{-1}$ $3x = -3x - 6$ $6x = -6$ $x = -1$ $subst\ into\ (2): k = 3(-1)^2 + 6(-1)$ $k = -3$	✓ equation (1) ✓ equation (2) ✓$subst$ ✓ $value\ of\ x$ ✓ $answer$	(5)P
8.4	8.4.1	$p'(x) = 3x^2 + 2bx + 24$ $subst\ A(2;0)$ $0 = 3(2)^2 + 2b(2) + 24$ $-36 = 4b$ $-9 = b$	✓ $p'(x)$ ✓ $subst$ ✓ $answer$	(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 increase : $p'(x) > 0$. $x < 2\ \ or\ \ x > 4$	✓ $p'(x) > 0$ ✓ $x < 2$ ✓ $x > 4$ **CA from 8.4.2**	(3)C
	8.4.4	p concave up : $p''(x) > 0$ $x > 3$	✓ $p''(x) > 0$ ✓ $x > 3$ **CA from 8.4.2 (middle of 2 $x-intercepts$)**	(2)C

QUES		SOLUTION	DESCRIPTORS	MARKS/ LEVELS
	8.4.5		✓$(2;0)$ ✓$infl\ x = 3$ ✓ TP $x = 4$ ✓ $shape$	(4)C
				[36]

QUESTION 9/VRAAG 9

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

QUESTION 10/VRAAG 10

QUES	SOLUTION		DESCRIPTORS	MARKS/ LEVELS
10.1	$P(not\ Vanilla) = 1 - P(Vanilla)$ $= 1 - 0{,}23$ $0{,}77$		✓ $formula$ ✓ $23\% = 0{,}23$ ✓ $answer$	(3)R
10.2	$P(D\ of\ R) = P(D) + P(R) - P(D\ en\ R)$ $P(D\ of\ R) = \frac{13}{39} + \frac{20}{39} - 0$ $P(D\ of\ R) = \frac{33}{39} = \frac{11}{13} = 0{,}85 = 84{,}62\%$		✓$\frac{13}{39}\ and\ \frac{20}{39}$ ✓0 ✓ $answer$	(3)C
10.3	$7!\times 2!$ $= 5040 \times 2$ $= 10080$		✓$7!\times 2!$ ✓ $answer$	(2)C
10.4		CAPETOWN		
	10.4.1	$Number\ of\ arrangements = 8!$ $= 40\ 320$	✓$8!$ ✓$answer$	(2)R
	10.4.2	C _ _ _ _ _ _ _ N $P(C - N) = \frac{6!}{40320}$ $= 0{,}02$	✓$numerator$ ✓$denominator$ ✓ $answer$	(3)C
				[13]

$$\boldsymbol{TOTAL = 150}$$