Province of the
EASTERN CAPE
EDUCATION

NATIONAL SENIOR CERTIFICATE/ NASIONALE SENIOR SERTIFIKAAT

GRADE/GRAAD 12

SEPTEMBER 2015

MATHEMATICS P1/WISKUNDE V1 MEMORANDUM

MARKS/PUNTE: 150

This memorandum consists of 15 pages./
Hierdie memorandum bestaan uit 15 bladsye.

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.

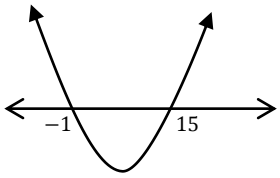
QUESTION 1/*VRAAG 1*

1.1.1	$(x+3)(3x-1)=m$ $(x+3)(3x-1)=0$ $x=-3$ or/of $x=\frac{1}{3}$ If a candidate removes brackets and factorised incorrectly, maximum 1 mark if both x-values are correct./ As kandidaat hakies verwyder en verkeerd faktoriseer, maksimum 1 punt indien beide x-waardes korrek is.	✓✓ x-values/waardes (2)
1.1.2	$(x+3)(3x-1)=m$ $(x+3)(3x-1)=6$ $3x^2-x+9x-3=6$ $3x^2+8x-9=0$ $x=\frac{-8\pm\sqrt{(8)^2-4(3)(-9)}}{2(3)}$ $x=\frac{-8\pm\sqrt{172}}{6}$ $x=0{,}85$ or/of $x=-3{,}52$ Penalise 1 mark for incorrect rounding off./ Penaliseer 1 punt vir verkeerde afronding. If stopped at $\frac{-8\pm\sqrt{172}}{6}$: max 3 marks As stop by $\frac{-8\pm\sqrt{172}}{6}$: maks 3 punte	✓ simplification/vereenvoudiging ✓ standard form/standaardvorm ✓ substitution/substitusie ✓✓ x-values/waardes (5)
1.1.3 (a)	The graph should be shifted $8\frac{1}{3}$ units upwards / Die grafiek moet $8\frac{1}{3}$ eenhede opwaarts geskuif word.	✓ $8\frac{1}{3}$ ✓ upwards/opwaarts (2)
(b)	$k>8\frac{1}{3}$	✓ answer/antwoord (1)

1.2	$x - 2y = 3$ $x = 2y + 3$ $4x^2 - 5xy = 3 - 6y$ $4(2y + 3)^2 - 5y(2y + 3) = 3 - 6y$ $4(4y^2 + 12y + 9) - 10y^2 - 15y = 3 - 6y$ $16y^2 + 48y + 36 - 10y^2 - 15y = 3 - 6y$ $6y^2 + 39y + 33 = 0$ $2y^2 + 13y + 11 = 0$ $(2y + 11)(y + 1) = 0$ $y = \frac{-11}{2}$ or/of $y = -1$ $x = -8$ or/of $x = 1$ If formula is used, award factor's mark for substitution. As formule gebruik word, ken faktore-punt toe vir substitusie. **OR/OF** If a candidate makes a mistake and both equations become linear, max. 3 marks. Indien 'n kandidaat 'n fout begaan en beide vergelykings word lineêr, maks. 3 punte. $x - 2y = 3$ $-2y = 3 - x$ $2y = x - 3$ $y = \frac{x-3}{2}$ $4x^2 - 5x\left(\frac{x-3}{2}\right) = 3 - 6\left(\frac{x-3}{2}\right)$ $8x^2 - 5x(x - 3) = 6 - 6(x - 3)$ $8x^2 - 5x^2 + 15x = 6 - 6x + 18$ $3x^2 + 21x - 24 = 0$ $x^2 + 7x - 8 = 0$ $(x + 8)(x - 1) = 0$ $x = -8$ or/of $x = 1$ $y = \frac{-11}{2}$ or/of $y = -1$	✓ $x = 2y + 3$ ✓ substitution/substitusie ✓ standard form/standaardvorm ✓ factors/faktore ✓ y-values/waardes ✓ x-values/waardes ✓ $y = \frac{x-3}{2}$ ✓ substitution/substitusie ✓ standard form/standaardvorm ✓ factors/faktore ✓ x-values/waardes ✓ y-values/waardes (6)
1.3	$(3^x - 1)(3^x - 12) = 0$ $3^x - 1 = 0$ or/of $3^x - 12 = 0$ $3^x = 1$ or/of $3^x = 12$ $x = 0$ or/of $log3^x = log12$ **OR/OF** $x = log_3 12$ $xlog3 = log12$ $x = 2{,}26$ $x = \frac{log12}{log3}$ $x = 2{,}26$	✓ $3^x = 1$ or/of $3^x = 12$ ✓ $x = 0$ ✓ use of logs/gebruik van logs ✓ $x = 2{,}26$ (4)

1.4

$-n^2 + 14n + 15 \geq 0$
$n^2 - 14n - 15 \leq 0$
$(n - 15)(n + 1) \leq 0$

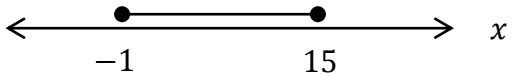


$-1 \leq n \leq 15$

OR/OF

$n \in [-1; 15]$

OR/OF



Note/Let op:
If/As $n \leq 15$ and/en $n \geq -1$ Full marks/volpunte
If/As $-1 < n < 15$ max/maks 2 punte.
If/As $n \leq 15$ or/of $n \geq -1$ max/maks 2 marks/punte.
If/As $n \leq 15$ or/of $n \leq -1$ max/maks 2 marks/punte.
If correct graphical solution but concludes incorrectly, max 3 marks. As korrekte grafiese oplossing, maar maak verkeerde gevolgtrekking, maks 3 punte.

✓ factors/faktore

✓ critical values/kritieke waardes
✓✓ solution/oplossing

(4)
[24]

QUESTION 2/*VRAAG 2*

2.1.1	$14 \; ; \; 9 \; ; \; 4 \; ; \ldots$ $T_n = a + (n-1)d$ $= 14 + (49)(-5)$ $= -231$ Answer ONLY: 3 marks SLEGS antwoord: 3 punte	✓ $d = -5$ ✓ substitution/substitusie ✓ answer/antwoord (3)
2.1.2	$S_{50} = \frac{50}{2}[2(14) + (49)(-5)]$ $= -5425$ **OR/OF** $S_{50} = \frac{50}{2}[14 - 231]$ $= -5425$ If a candidate expands series but gives incorrect answer: 0 marks/ Indien 'n kandidaat reeks uitbrei, maar gee verkeerde antwoord: 0 punte Answer ONLY: 2 marks SLEGS antwoord: 2 punte	✓ substitution/substitusie ✓ answer/antwoord ✓ substitution/substitusie ✓ answer/antwoord (2)
2.2	$T_2 - T_1 = T_3 - T_2$ $p - (-24) = p^2 - p$ $p^2 - 2p - 24 = 0$ $(p-6)(p+4) = 0$ $p = 6$ or/of $p = -4$ BOTH answers ONLY: 4 marks SLEGS ALBEI antwoorde: 4 punte ONE answer ONLY: 1 mark SLEGS EEN antwoord: 1 punt	✓ $T_2 - T_1 = T_3 - T_2$ ✓ standard form/standaardvorm ✓ factors/faktore ✓ answers/antwoorde (4)
2.3.1	$r = \frac{m}{3}$ $-1 < r < 1$ $-1 < \frac{m}{3} < 1$ $-3 < m < 3$	✓ r ✓ $-1 < r < 1$ ✓ answer/antwoord (3)
2.3.2	$S_\infty = \frac{a}{1-r}$ $\frac{3}{1-\frac{m}{3}} = \frac{27}{7}$ $27 - 9m = 21$ $-9m = -6$ $m = \frac{6}{9}$ or/of $\frac{2}{3}$ or/of 0,67 Wrong formula/verkeerde formule 0 marks/punte **OR/OF** $\frac{3}{1-\frac{m}{3}} = \frac{27}{7}$ $\frac{9}{3-m} = \frac{27}{7}$ $27(3-m) = 63$ $81 - 27m = 63$ $-27m = -18$ $m = \frac{18}{27}$ or/of $\frac{2}{3}$ or/of 0,67	✓ substitution/substitusie ✓ simplification/vereenvoudiging ✓ answer/antwoord ✓ substitution/substitusie ✓ simplification/vereenvoudiging ✓ answer/antwoord (3)

2.4	$S_3 = 31\frac{1}{2} \quad T_4 + T_5 + T_6 = 3\frac{15}{16}$ $a + ar + ar^2 = 31\frac{1}{2}$ $ar^3 + ar^4 + ar^5 = 3\frac{15}{16}$ $r^3(a + ar + ar^2) = 3\frac{15}{16}$ $r^3\left(31\frac{1}{2}\right) = 3\frac{15}{16}$ $r^3 = \frac{1}{8}$ $r = \frac{1}{2}$ Answer ONLY: 1 mark SLEGS antwoord: 1 punt	✓ $a + ar + ar^2 = 31\frac{1}{2}$ ✓ $ar^3 + ar^4 + ar^5 = 3\frac{15}{16}$ ✓ common factor/gemene factor ✓ substitution/substitusie ✓ answer/antwoord (5) **[20]**

QUESTION 3/VRAAG 3

3.1	9; 15; 24; 36 ... $2a = 3$ $\therefore a = \frac{3}{2}$ $3a + b = 6$ $3\left(\frac{3}{2}\right) + b = 6$ $\therefore b = \frac{3}{2}$ $a + b + c = 9$ $\frac{3}{2} + \frac{3}{2} + c = 9$ $\therefore c = 6$ $T_n = \frac{3}{2}n^2 + \frac{3}{2}n + 6$ **OR/OF** $T_n = an^2 + bn + c$ $9a + 3b + c = 24$ ... (1) $4a + 2b + c = 15$ ... (2) $a + b + c = 9$ ... (3) $(1) - (2)$ ... $5a + b = 9$ $(2) - (3)$ ... $3a + b = 6$ $2a = 3$ $\therefore a = \frac{3}{2}$ $3\left(\frac{3}{2}\right) + b = 6$ $\therefore b = \frac{3}{2}$ $\frac{3}{2} + \frac{3}{2} + c = 9$ $\therefore c = 6$ $T_n = \frac{3}{2}n^2 + \frac{3}{2}n + 6$ Answer ONLY: 4 marks SLEGS antwoord: 4 punte	✓ common 2nd difference/gemene tweede verskil ✓ a-value/waarde ✓ b-value/waarde ✓ c-value/waarde ✓ method/metode ✓ a-value/waarde ✓ b-value/waarde ✓ c-value/waarde (4)

3.2	$T_{20} = \frac{3}{2}(19)^2 + \frac{3}{2}(19) + 6$ $= 576$ Fifth term in Row 20/Vyfde term in Ry 20: $576 + 9 = 585$ **OR/OF** If $n = 20$, answer = 645: 1 mark As $n = 20$, antwoord = 645: 1 punt	✓ $n = 19$; $T_n = \frac{3}{2}n^2 + \frac{3}{2}n + 6$ ✓ method/metode ✓ answer/antwoord

Ry 1	3						
Ry 2	6	9					
Ry 3	12	15	18				
Ry 4	21	24	27	30			
Ry 5	33	36	39	42	45		
Ry 6	48	51	54	57	60	63	
Ry 7	66	69	72	75	78	81	84

	Terms in 5th column/terme in 5de kolom 45; 60; 78; ... $T_n = \frac{3}{2}n^2 + 10\frac{1}{2}n + 33$ $T_{16} = \frac{3}{2}(16)^2 + 10\frac{1}{2}(16) + 33$ $= 585$ If $n = 20$, answer = 843: 1 mark As $n = 20$, antwoord = 843: 1 punt	✓ method/metode ✓ $n = 16; T_n = \frac{3}{2}n^2 + 10\frac{1}{2}n + 33$ ✓ answer/antwoord (3) **[7]**

QUESTION 4/*VRAAG 4*

4.1.1	$F = 2000\left(1+\frac{0,08}{12}\right)^{24} + \frac{1200\left[\left(1+\frac{0,08}{12}\right)^{24}-1\right]}{\frac{0,08}{12}}$ $= R33\,465,60$ If used present value formula: max 2 marks As huidige waarde formule gebruik: maks 2 punte **OR/OF** $F = 800\left(1+\frac{0,08}{12}\right)^{24} + \frac{1200\left[\left(1+\frac{0,08}{12}\right)^{25}-1\right]}{\frac{0,08}{12}}$ $= R33\,465,60$ If ONLY compound formula or ONLY future value formula used: max 3 marks Indien SLEGS saamgestelde formule of SLEGS toekomstige waarde formule gebruik: maks 3 punte	✓ $i = \frac{0,08}{12}$ ✓ $2000\left(1+\frac{0,08}{12}\right)^{24}$ ✓ $n = 24$ in F ✓ $\frac{1200\left[\left(1+\frac{0,08}{12}\right)^{24}-1\right]}{\frac{0,08}{12}}$ ✓ answer/antwoord ✓ $i = \frac{0,08}{12}$ ✓ $800\left(1+\frac{0,08}{12}\right)^{24}$ ✓ $n = 25$ in F ✓ $\frac{1200\left[\left(1+\frac{0,08}{12}\right)^{25}-1\right]}{\frac{0,08}{12}}$ ✓ answer/antwoord (5)
4.1.2	$A = 33\,465,60\left(1+\frac{0,08}{12}\right)^{5}$ $= R34\,596,10$ or/of $R34\,596,09$ Wrong formula/ Verkeerde formule 0 marks/punte	✓ 33 465,60 ✓ substitution/substitusie ✓ answer/antwoord (3)
4.2.1	$150\,000\left(1+\frac{0,15}{12}\right)^{2} = \frac{x\left[1-\left(1+\frac{0,15}{12}\right)^{-94}\right]}{\frac{0,15}{12}}$ $x = R2\,790,10$ If/Indien: $150\,000 = \frac{x\left[1-\left(1+\frac{0,15}{12}\right)^{-94}\right]}{\frac{0,15}{12}}$ $x = R2\,721,64$ 4 marks/punte If used present value formula: max 2 marks As huidige waarde formule gebruik: maks 2 punte	✓ $i = \frac{0,15}{12}$ ✓ $150\,000\left(1+\frac{0,15}{12}\right)^{2}$ ✓ $n = -94$ ✓ $\frac{x\left[1-\left(1+\frac{0,15}{12}\right)^{-94}\right]}{\frac{0,15}{12}}$ ✓ answer/antwoord (5)
4.2.2	$1+i = \left(1+\frac{0,15}{12}\right)^{12}$ $i = 16,08\%$ **OR/OF** $A = 100\left(1+\frac{0,15}{12}\right)^{12}$ $A = 116,08$ $i = 16,08\%$ Wrong formula: 0 marks Verkeerde formule: 0 punte	✓ substitution/substitusie ✓ answer/antwoord ✓ substitution/substitusie ✓ answer/antwoord (2) **[15]**

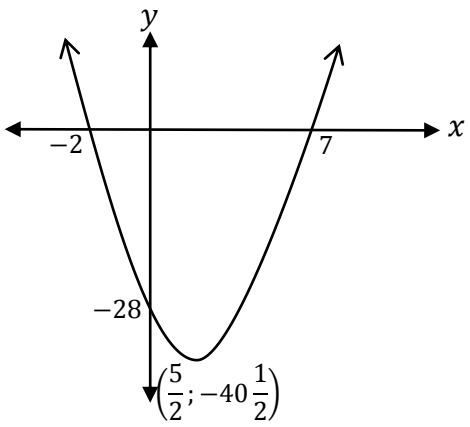
QUESTION 5/*VRAAG 5*

5.1	$f(x) = \left(\frac{1}{2}\right)^x$ Answer ONLY: 2 marks SLEGS antwoord: 2 punte $x = \left(\frac{1}{2}\right)^y$ $y = log_{\frac{1}{2}}x$ or/of $y = -log_2 x$ or/of $y = \frac{-logx}{log2}$ or/of $y = \frac{logx}{log\frac{1}{2}}$	✓ swop x and y/ruil x en y om ✓ answer/antwoord (2)
5.2	$x > 0$	✓ answer/antwoord (1)
5.3	$4 \times f(x+1) = \sqrt{2}$ $4 \times \left(\frac{1}{2}\right)^{x+1} = \sqrt{2}$ $4 \times (2^{-1})^{x+1} = 2^{\frac{1}{2}}$ $2^2 \times 2^{-x-1} = 2^{\frac{1}{2}}$ $2 - x - 1 = \frac{1}{2}$ $-x = -2 + 1 + \frac{1}{2}$ $x = \frac{1}{2}$ Answer ONLY: 1 mark SLEGS antwoord: 1 punt OR/OF $4.f(x+1) = \sqrt{2}$ $4.\left(\frac{1}{2}\right)^{x+1} = \sqrt{2}$ $\left(\frac{1}{2}\right)^{x+1} = \frac{\sqrt{2}}{4}$ $= 2^{\frac{1}{2}-2}$ $2^{-x-1} = 2^{\frac{-3}{2}}$ $\therefore -x - 1 = \frac{-3}{2}$ $-x = \frac{-1}{2}$ $x = \frac{1}{2}$	✓ $4.\left(\frac{1}{2}\right)^{x+1} = \sqrt{2}$ ✓ $2^2.2^{-x-1} = 2^{\frac{1}{2}}$ ✓ answer/antwoord ✓ $4.\left(\frac{1}{2}\right)^{x+1} = \sqrt{2}$ ✓ $2^{-x-1} = 2^{\frac{-3}{2}}$ ✓ answer/antwoord (3)
5.4	$y = \left(\frac{1}{2}\right)^0$ $y = 1$ $\therefore A(0;1)$ $\therefore$ range/terrein $y \in \mathbf{R},\ y \neq 1$	✓ $y = 1$ ✓ $y \in \mathbf{R}, y \neq 1$ (2)
5.5	$y = x + 3$ $1 = x + 3$ $x = -2$ $B(-2;1)$	✓ $y = 1$ ✓ $x = -2$ (2)

5.6	$g(x) = \frac{a}{x+2} + 1$ $(0;0)$ $0 = \frac{a}{0+2} + 1$ $0 = a + 2$ $a = -2$ $g(x) = \frac{-2}{x+2} + 1$	✓ $p = 2$ ✓ $q = 1$ ✓ substitute/vervang $(0;0)$ ✓ $a = -2$ (4)
5.7	$x \in \mathbf{R}, x \neq -2$	✓ answer/antwoord (1) **[15]**

QUESTION 6/*VRAAG 6*

6.1	$(0\ ;\ -28)$	✓ answer/antwoord (1)
6.2	$f(x) = 2x^2 - 10x - 28$ $2x^2 - 10x - 28 = 0$ $x^2 - 5x - 14 = 0$ $(x-7)(x+2) = 0$ $x = 7$ or/of $x = -2$	✓ $f(x) = 0$ ✓ factors/faktore ✓ x-values/waardes (3)
6.3	$x = \frac{-b}{2a} = \frac{-(-10)}{2(2)} = \frac{5}{2}$ **OR/OF** $x = \frac{7+(-2)}{2} = \frac{5}{2}$ **OR/OF** $f'(x) = 4x - 10 = 0$ $x = \frac{5}{2}$ $y = f\left(\frac{5}{2}\right) = 2\left(\frac{5}{2}\right)^2 - 10\left(\frac{5}{2}\right) - 28 = -40\frac{1}{2}$ $\left(\frac{5}{2}; -40\frac{1}{2}\right)$	✓ $x = \frac{5}{2}$ ✓ $y = -40\frac{1}{2}$ (2)

6.4		✓ intercepts/asse ✓ turning point/draaipunt (2)
6.5	$f'(x)=4x-10$ $4x-10=6$ $4x=16$ $x=4$ $f(4)=2(4)^2-10(4)-28$ $=-36$ $P(4;-36)$	✓ $f'(x)$ ✓ $f'(x)=6$ ✓ $x=4$ ✓ $y=-36$ (4)
6.6	$B(-2;0)$ and/en $E(4;-36)$ $m_{BE}=\frac{-36-0}{4-(-2)}=\frac{-36}{6}=-6$ $y=-6x+c$ $(-2;0)$ or/of $(4;-36)$ $0=-6(-2)+c$ $-36=-6(4)+c$ $c=-12$ $c=-12$ $y=-6x-12$ **OR/OF** $y-y_1=m(x-x_{1)}$ $(-2;0)$ or/of $(4;-36)$ $y-0=-6(x-(-2))$ $y-(-36)=-6(x-4)$ $y=-6(x+2)$ $y+36=-6x+24$ $y=-6x-12$	✓ $m=-6$ ✓ substitution/substitusie $(-2;0)$ or/of $(4;-36)$ ✓ answer/antwoord (3)
6.7	f translates 2 units left and 3 down/ f transleer 2 eenhede links en 3 af $h(x)=2\left(x-\frac{1}{2}\right)^2-43\frac{1}{2}$	✓ $-\frac{1}{2}$ ✓ $-43\frac{1}{2}$ / $-\frac{87}{2}$ ✓ answer/antwoord (3)
		[18]

QUESTION 7/*VRAAG 7*

7.1	$f(x) = -5x^2$ $f(x+h) = -5(x+h)^2$ $= -5(x^2 + 2xh + h^2)$ $= -5x^2 - 10xh - 5h^2$ $f'(x) = \lim_{h\to 0} \frac{f(x+h) - f(x)}{h}$ $= \lim_{h\to 0} \frac{-5x^2 - 10xh - 5h^2 - (-5x^2)}{h}$ $= \lim_{h\to 0} \frac{-5x^2 - 10xh - 5h^2 + 5x^2}{h}$ $= \lim_{h\to 0} \frac{-10xh - 5h^2}{h}$ $= \lim_{h\to 0} \frac{h(-10x - 5h)}{h}$ $= \lim_{h\to 0} (-10x - 5h)$ $= -10x$ Penalise 1 mark for incorrect use of formula. Must show $f'(x)$. Penaliseer 1 punt vir verkeerde gebruik van formule. Moet $f'(x)$ toon. Answer ONLY: 0 marks SLEGS antwoord: 0 punte	✓ substitute/vervang $(x+h)$ ✓ formula/formule ✓ simplification/vereenvoudiging ✓ common factor/gemene faktor ✓ answer/antwoord (5)
7.2.1	$y = 8x^3$ $\frac{dy}{dx} = 24x^2$ Penalise 1 mark for incorrect notation in 7.2. Penaliseer 1 punt vir verkeerde notasie in 7.2.	✓ answer/antwoord (1)
7.2.2	$\sqrt{a} = y^{\frac{2}{3}}$ $a = y^{\frac{4}{3}}$ $\frac{da}{dy} = \frac{4}{3}y^{\frac{1}{3}}$	✓ $a = y^{\frac{4}{3}}$ ✓ answer/antwoord (2)
7.2.3	$a = y^{\frac{4}{3}} = (8x^3)^{\frac{4}{3}} = (2^3x^3)^{\frac{4}{3}} = 16x^4$ $\frac{da}{dx} = 64x^3$	✓ substitute/vervang $y = 8x^3$ ✓ $a = 16x^4$ ✓ answer/antwoord (3)
7.3	$g(x) = -8x + 3$ $f(5) = g(5) = -8(5) + 3 = -37$ $f'(5) = -8$ $f(5) - f'(5) = -37 - (-8) = -29$	✓ $f(5) = -37$ ✓ $f'(5) = -8$ ✓ answer/antwoord (3) **[14]**

QUESTION 8/*VRAAG 8*

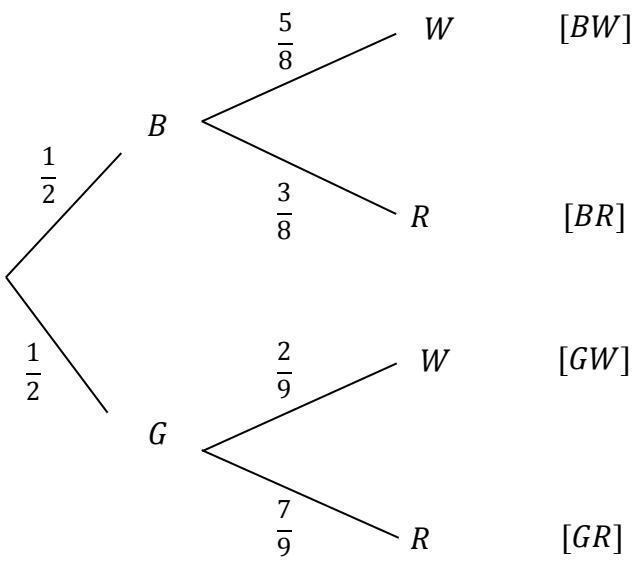
8.1	$f(x) = -x^3 + 10x^2 - 17x + d$ $d = (-1)(4)(7) = -28$	✓ answer/antwoord (1)
8.2	$f'(x) = -3x^2 + 20x - 17 = 0$ $3x^2 - 20x + 17 = 0$ $(3x - 17)(x - 1) = 0$ $x = \frac{17}{3}\left(5\frac{2}{3}\right)$ or/of $x = 1$ $f\left(\frac{17}{3}\right) = -\left(\frac{17}{3}\right)^3 + 10\left(\frac{17}{3}\right)^2 - 17\left(\frac{17}{3}\right) - 28$ $= 14\frac{22}{27}\left(\frac{400}{27}\right)$ $f(1) = -(1)^3 + 10(1)^2 - 17(1) - 28$ $= -36$ $A(1;-36)$ and/en $B\left(\frac{17}{3};14\frac{22}{27}\right)$	✓ $f'(x)$ ✓ $f'(x) = 0$ ✓ factors/faktore ✓ $A(1;-36)$ ✓ $B\left(\frac{17}{3};14\frac{22}{27}\right)$ (5)
8.3	$f''(x) = -6x + 20 = 0$ $-6x = -20$ $x = \frac{10}{3}$ or/of $3\frac{1}{3}$ or/of 3,33	✓ $f''(x) = 0$ ✓ answer/antwoord (2)
8.4	Maximum where/maksimum waar $f''(x) = 0$ ∴ at/by $x = \frac{10}{3}$ $f\left(\frac{10}{3}\right) = -\left(\frac{10}{3}\right)^3 + 10\left(\frac{10}{3}\right)^2 - 17\left(\frac{10}{3}\right) - 28$ $= -6\frac{16}{27}$ or/of $-10{,}59$ $\left(\frac{10}{3};-6\frac{16}{27}\right)$ or/of $\left(\frac{10}{3};-10{,}59\right)$	✓ $x = \frac{10}{3}$ ✓ $y = -10\frac{16}{27}$ or/of $-10{,}59$ (2)
8.5	$-1 \le x \le 1$ or/of $4 \le x \le \frac{17}{3}$ or/of $x \ge 7$	✓ $-1 \le x \le 1$ ✓ $4 \le x \le \frac{17}{3}$ ✓ $x \ge 7$ (3) **[13]**

QUESTION 9/*VRAAG 9*

9.1	$P(q;-2q^2)$	✓ answer/antwoord (1)
9.2	$A = 2q^2(6-q)$ $= 12q^2 - 2q^3$	✓ $l = 2q^2$ ✓ $b = 6-q$ and method/en metode (2)
9.3	$\frac{dA}{dq} = 24q - 8q^2 = 0$ $6q(4-q) = 0$ $q = 0$ or/of $q = 4$ $A = 12(4)^2 - 2(4)^3$ $= 64$ square units/vierkante eenhede	✓ $\frac{dA}{dq} = 0$ ✓ factors/faktore ✓ q-values/waardes ✓ area/oppervlakte (4) **[7]**

QUESTION 10/*VRAAG 10*

10.1.1	$P(A) = 1 - P(not/nie\ A)$ $P(A) = 1 - 0{,}45$ $P(A) = 0{,}55$	✓ answer/antwoord (1)
10.1.2	Mutually exclusive events/onderling uitsluitende gebeurtenisse: $P(A\ or/of\ B) = P(A) + P(B)$ $= 0{,}55 + 0{,}35$ $= 0{,}9$	✓ rule/reël ✓ answer/antwoord (2)
10.1.3	Independent events/onafhanklike gebeurtenisse: $P(A\ and/en\ B) = P(A) \times P(B)$ $= 0{,}55 \times 0{,}35$ $= 0{,}1925$ or/of 0,19	✓ rule/reël ✓ answer/antwoord (2)

10.2.1		✓ first branch/eerste vertakking ✓ second branch from B/tweede vertakking uit B ✓ second branch from G/tweede vertakking uit G ✓ outcomes/uitkomste If probabilities not listed, maximum 1 mark Indien waarskynlikhede nie gelys is nie, maksimum 1 punt (4)
10.2.2	$P(R) = P(BR) + P(GR)$ $= \left(\frac{1}{2}\right)\left(\frac{3}{8}\right) + \left(\frac{1}{2}\right)\left(\frac{7}{9}\right)$ $= \frac{3}{16} + \frac{7}{18}$ $= \frac{83}{144}$	✓ $\left(\frac{1}{2}\right)\left(\frac{3}{8}\right)$ ✓ $\left(\frac{1}{2}\right)\left(\frac{7}{9}\right)$ ✓ answer/antwoord (3) **[12]**

QUESTION 11/*VRAAG 11*

11.1	n(codes/kodes)= $20^4 \times 9^4$ $= 1\,049\,760\,000$	✓ 20^4 ✓ 9^4 ✓ answer/antwoord (3)
11.2	n(syfers ongelyke ewe getalle/digits unequal even numbers) $= 20^4 \times 4! = 3\,840\,000$ P(syfers ongelyke ewe getalle/digits unequal even numbers) $= \frac{3\,840\,000}{1\,049\,760\,000}$ or/of $\frac{8}{2\,187}$ **OR/OF** P(syfers ongelyke ewe getalle/ digits unequal even numbers) $= \frac{4!}{9^4} = \frac{24}{6561}$ or/of $\frac{8}{2\,187}$	✓ 3 840 000 ✓ answer/antwoord ✓ 24 ✓ answer/antwoord (2) **[5]**
		TOTAL/TOTAAL: 150