education

Department:
Education
North West Provincial Government
REPUBLIC OF SOUTH AFRICA

PROVINCIAL ASSESSMENT/
PROVINSIALE ASSESSERING

GRADE 11/*GRAAD* 11

MATHEMATICS P1/*WISKUNDE V1*

NOVEMBER 2024

MARKING GUIDELINES/*NASIENRIGLYNE*

MARKS/*PUNTE*: 150

These marking guidelines consist of 13 pages./
Hierdie nasienriglyne bestaan uit 13 bladsye.

NOTE:

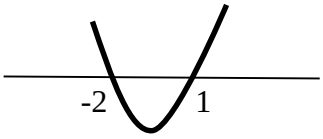
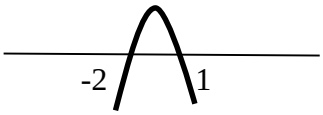
- If a candidate answered a question TWICE, only mark the FIRST attempt.
- Consistent accuracy applies in ALL aspects of the marking guideline.

NOTA:

- Indien 'n kandidaat 'n vraag TWEE KEER beantwoord het, merk slegs die EERSTE poging.
- Volgehoue akkuraatheid is DEURGAANS op alle aspekte van die nasienriglyne van toegepassing.

QUESTION/ VRAAG 1

1.1 1.1.1	$x^2 + x = 12$ $x^2 + x - 12 = 0$ $\therefore (x+4)(x-3) = 0$ $\therefore x = -4 \ or \mid of \ x = 3$	✓ std form/*stdvorm* ✓ factors/*faktore* ✓both answers/*beide antwe* (3)
1.1.2	$3x^2 - 2x - 6 = 0$ $\therefore x = \frac{-(-2) \pm \sqrt{(-2)^2 - 4(3)(-6)}}{2(3)}$ $\therefore x = 1{,}79 \ \ or \mid \ of \ \ x = -1{,}12$	✓ subst ✓✓ each answ/*elke antw* (3)
1.1.3	$\sqrt{x+7} - 1 = x$ $\therefore \sqrt{x+7} = x + 1$ $\therefore \left(\sqrt{x+7}\right)^2 = (x+1)^2$ $\therefore x + 7 = x^2 + 2x + 1$ $\therefore \ 0 = x^2 + x - 6$ $\therefore \ 0 = (x+3)(x-2)$ $\therefore x = -3 \ or \mid of \ \ x = 2$ TEST/TOETS: but/maar $x \neq -3$ (def $\sqrt{\ }$) $\therefore only \mid slegs \ x = 2$	✓ isol $\sqrt{\ }$ ✓ square/*kwadr* ✓ std form/*std vorm* ✓factors/*faktore* ✓ $x \neq -3$ ✓ $x = 2$ (6)

1.1.4	$2 - x > x^2$ $\therefore 0 > x^2 + x - 2$ $\therefore 0 > (x+2)(x-1)$  $\therefore \quad -2 < x < 1$ OR/OF $2 - x - x^2 > 0$ $\therefore (2+x)(1-x) > 0$  $\therefore \quad -2 < x < 1$	✓ std form/vorm ✓ critical values *kritiese waardes* ✓✓ answ/*antw* ✓ std form/vorm ✓ critical values *kritiese waardes* ✓✓ answ/ *antw* (4)
1.1.5	$x^{-\frac{3}{4}} = 8$ $\therefore \left(x^{-\frac{3}{4}}\right)^{-\frac{4}{3}} = (2^3)^{-\frac{4}{3}}$ $\therefore x = 2^{-4}$ $= \frac{1}{2^4}$ $= \frac{1}{16}$	✓ $8 = 2^3$ ✓ power/*mag* $-\frac{4}{3}$ ✓ $\frac{1}{16}$ (3)
1.1.6	$3^{x+2} + 3^{-x} = 10$ $3^x.3^2 + \frac{1}{3^x} = 10$ Let / *Laat* $3^x = k \quad \therefore \quad 9k + \frac{1}{k} = 10$ $\times k$: $9k^2 + 1 = 10k$ $\therefore 9k^2 - 10k + 1 = 0$ $\therefore (9k-1)(k-1) = 0$ $\therefore k = \frac{1}{9} \quad or \mid of \quad k = 1$ $\therefore \quad 3^x = \frac{1}{9} = 3^{-2} \; or \mid of \; 3^x = 1 = 3^0$ $\therefore \quad x = -2 \; or \mid of \quad x = 0$	✓ $\frac{1}{3^x}$ ✓ std form/*std vorm* ✓ factors/*faktore* ✓ both eq/*beide vgl* ✓ $x = -2$ ✓ $x = 0$ (6)

1.2	$y + 7 = 2x$..... ① $x^2 + xy + y^2 = 21$ .....② from / *uit* ①*:* $y = 2x - 7$ subst in ②: $\therefore\ x^2 + x(2x - 7) + (2x - 7)^2 = 21$ $\therefore\ x^2 + 2x^2 - 7x + 4x^2 - 28x + 49 - 21 = 0$ $\therefore\ 7x^2 - 35x + 28 = 0$ $\div 7$: $x^2 - 5x + 4 = 0$ $\therefore\ (x - 4)(x - 1) = 0$ $\therefore\ x = 4\ \ or\ \ \vert\ \ of\ \ x = 1$ if / *as* $x = 4 : y = 2(4) - 7 = 1$ if / *as* $x = 1 : y = 2(1) - 7 = -5$	✓ *y* subject/*onderwerp* ✓ subst ✓ std form/*std vorm* ✓ faktore/*factors* ✓ both *x*-values/*beide x-w* ✓ both *y*-values/*beide y-w* (6)
1.3 1.3.1	$x \in \mathbb{R}$	✓answ/*antw* (1)
1.3.2	no solution/*geen oplossing*	✓answ/*antw* (1)
1.3.3	$5x + 2 = 0$ $\therefore x = -\frac{2}{5}$	✓$-\frac{2}{5}$ (1)
1.3.4	$5x + 2 = 0\ \ of\ \ \vert or\ \ x^2 - 8 = 0$ $\therefore x = -\frac{2}{5}$ or ⎪ of $x = \pm\sqrt{8} = \pm 2\sqrt{2}$	✓$-\frac{2}{5}$ ✓ $\pm\sqrt{8}$ (2)
		[36]

QUESTION/VRAAG 2

2.1	$\frac{25^{x-1}}{5^{2x}} = \frac{(5^2)^{x-1}}{5^{2x}}$ $= \frac{5^{2x-2}}{5^{2x}}$ $= 5^{2x-2-2x}$ $= 5^{-2} = \frac{1}{25}$	✓ 5^{2x-2} ✓subt exp/*eksp aftrek* ✓ $\frac{1}{25}$ (3)
2.2	$\frac{x^2+2}{x-2} = \frac{(\sqrt{3}+2)^2+2}{\sqrt{3}+2-2}$ $= \frac{3+4\sqrt{3}+4+2}{\sqrt{3}}$ $= \frac{9+4\sqrt{3}}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}}$ $= \frac{9\sqrt{3}+12}{3} = \frac{3(3\sqrt{3}+4)}{3}$ $= 3\sqrt{3}+4$	✓ subst ✓ $3 + 4\sqrt{3} + 4$ ✓× $\frac{\sqrt{3}}{\sqrt{3}}$ ✓com factor/*gem faktor* ✓ answ/*antw* (5)
2.3	$\sqrt[5]{316,2} = (3,162 \times 100)^{\frac{1}{5}}$ $= \left(\sqrt{10} \times 10^2\right)^{\frac{1}{5}}$ $= \left(10^{\frac{1}{2}}.10^2\right)^{\frac{1}{5}}$ $= \left(10^{\frac{5}{2}}\right)^{\frac{1}{5}}$ $= 10^{\frac{1}{2}} = \sqrt{10} = 3,162$ OR/OF: $\sqrt{10} = 3,162$ $\therefore \sqrt{10} \times 10^2 = 3,162 \times 100$ $\therefore 10^{\frac{5}{2}} = 316,2$ $\therefore \left(10^{\frac{5}{2}}\right)^{\frac{1}{5}} = (316,2)^{\frac{1}{5}}$ $\therefore 10^{\frac{1}{2}} = \sqrt{10} = 3.162 = \sqrt[5]{316,2}$	✓$(3,162 \times 100)^{\frac{1}{5}}$ ✓$\sqrt{10} \times 10^2$ ✓ $10^{\frac{5}{2}}$ ✓ $\sqrt{10} = 3,162$ ✓$\sqrt{10} \times 10^2$ ✓ $10^{\frac{5}{2}}$ ✓$(\,)^{\frac{1}{5}}$ ✓ $\sqrt{10} = 3,162$ (4) **[12]**

QUESTION/VRAAG 3

3.1	8 ; 6 ; 4 ; 2 ; 0 ; −2 ∴ T_6 first negative term/eerste negatiewe term	✓ expand/*brei uit* ✓ T_6 (2)
3.2	$T_n = -2n + c$ $T_1 = -2(1) + c = 8$ $c = 10$ $T_n = -2n + 10$ OR/OF $T_n = a + (n-1)d$ $= 8 + (n-1)(-2)$ $= -2n + 10$	 ✓ $-2n$ ✓ $+10$ (2)
3.3	$-2n + 10 = -2008$ $\therefore -2n = -2018$ $\therefore \quad n = 1009$	✓ T_n = -2008 ✓ 1009 (2)
3.4	T_1 ; T_2 ; T_3 ; 58 ; ….. 1stD/1e V: 8 6 4 …… $T_3 = 58 - 4 = 54$ $T_2 = 54 - 6 = 48$ $T_1 = 48 - 8 = 40$	‘ ✓54 ✓48 ✓40 (3) **[9]**

QUESTION/VRAAG 4

4.1	75 ; 53 ; 35 ; 21 ; 11 1stD/1eV: -22 ; -18 ; -14 -10 2ndD/2eV: 4 4 4 $T_5 = 11$	✓ 11 (1)
4.2	$2a = 4$ $\therefore a = 2$ $3a + b = -22$ $\therefore 3(2) + b = -22$ $\therefore b = -22 - 6 = -28$ $a + b + c = 75$ $\therefore 2 - 28 + c = 75$ $\therefore c = 75 + 26 = 101$ $\therefore\ T_n = 2n^2 - 28n + 101$	✓ $a = 2$ ✓ $b = -28$ ✓ $c = 101$ ✓ T_n (4)
4.3	$T_n = 2n^2 - 28n + 101 = 131$ $\therefore \quad 2n^2 - 28n - 30 = 0$ $\div 2: \quad n^2 - 14n - 15 = 0$ $\therefore \quad (n - 15)(n + 1) = 0$ $n = 15 \qquad n \neq -1\ (n \in \mathbb{N})$	✓ $T_n = 131$ ✓ std form/*std vorm* ✓ factors/*faktore* ✓*slegs* $n = 15$ only (4)
4.4	75 ; 53 ; 35 ; 21 ; ... $\div(-5)$: -15 ; $-\frac{53}{5}$; -7 ; $-\frac{21}{5}$; .... $\therefore$ min $of \quad T_n = 2n^2 - 28n + 101 \quad when\ n = -\frac{b}{2a}$ $n = -\frac{-28}{2(2)} = 7$ $\therefore$ min = $T_7 = 2(7)^2 - 28(7) + 101 = 3$ $\therefore$ max $of\ new\ pattern = 3 \div (-5) = -\frac{3}{5}$ OR/OF $\therefore T_n = -\frac{2}{5}n^2 + \frac{28}{5}n - \frac{101}{5}$ max if $n = -\frac{b}{2a} = -\frac{\frac{28}{5}}{2\left(-\frac{2}{5}\right)} = 7$ $T_7 = -\frac{2}{5}(7)^2 + \frac{28}{5}(7) - \frac{101}{5} = -\frac{3}{5}$	✓old pattern $\div -5$ ✓$n = 7$ ✓calc/*berek* T_7 ✓ $max = -\frac{3}{5}$ ✓a&b ✓ T_n ✓max if *n=7* ✓ $max = -\frac{3}{5}$ (4) **[13]**

QUESTION/VRAAG 5

5.1	$A = P(1 - in)$ $\therefore 135\,000 = 300\,000(1 - i(5))$ $\therefore \frac{135\,000}{300\,000} = 1 - 5i$ $5i = 1 - \frac{9}{20}$ $\therefore i = 0{,}11 = 11\%$	✓ subst in correct form/ *subst in regte form* ✓ ÷ 300 000 ✓ answ/*antw* (3)
5.2.1	$3\,500\,000 - 2\,250\,000 = R1\,250\,000$	✓ answ/*antw* (1)
5.2.2	$A = P(1 + i)^n$ $\therefore A = 2\,250\,000(1 + 0{,}04)^6$ $= R2\,846\,967{,}79$	✓ subst in form ✓ answ/*ant* (2)
5.2.3	$A = P(1 - i)^n$ $\therefore A = 2\,250\,000(1 - 0{,}14)^6$ $= R910\,276{,}28$	✓form ✓subst ✓answ/*antw* (3)
5.2.4	T$_0$ T$_1$ T$_2$ T$_3$ T$_4$ T$_5$ T$_6$ 1 250 000 (100 000) 9% p.a. comp monthly 8,5% p.a. com quat Money from investment/ *Geld van belegging*: $A = 1\,250\,000\left(1 + \frac{0{,}09}{12}\right)^{48}\left(1 + \frac{0{,}085}{4}\right)^{8} - 100000\left(1 + \frac{0{,}085}{4}\right)^{4}$ $=$ R2 008 265,87 Required/ *Benodig*: $2\,846\,967{,}79 - 910\,276{,}28$ $= R1\,936\,691{,}51$ ∴ Money will be enough $\mid$ *Geld is genoeg* $(R71\,574{,}36\ more)$	✓$1\,250\,000\left(1 + \frac{0{,}09}{12}\right)^{48}$ ✓$\left(1 + \frac{0{,}085}{4}\right)^{8}$ ✓$-100000\left(1 + \frac{0{,}085}{4}\right)^{4}$ ✓ R2 008 265,87 ✓ $R1\,936\,691{,}51$ ✓ conclusion/*gevolgtrekking* (6) **[15]**

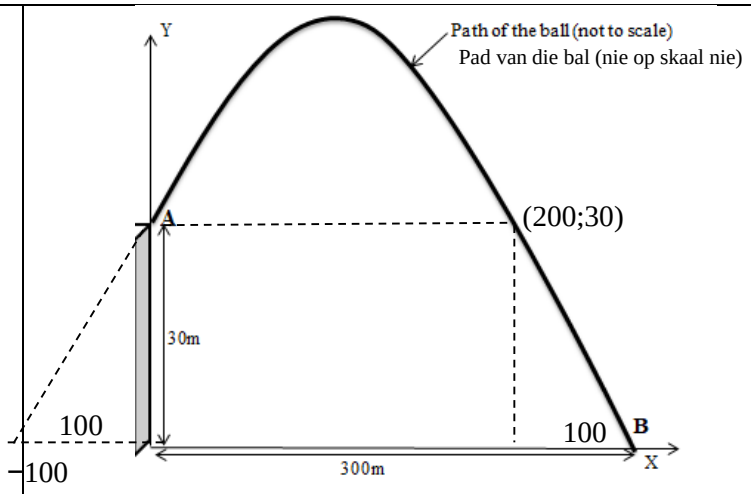
QUESTION/VRAAG 6

6.1	For A & B: $g(x) = -x^2 - 4x + 12 = 0$ $\therefore\ x^2 + 4x - 12 = 0$ $\therefore\ (x-2)(x+6) = 0$ $\therefore x = 2\ or \mid of\ x = -6$ $\therefore A(-6;0)\ \ \&\ \ B(2;0)\ \therefore AB = 8\ units \mid eenhede$	✓$g(x) = 0$ ✓ factors/*faktore* ✓ 2 & -6 ✓ 8 (4)
6.2	$E(0;12)\ and \mid en\ \ F(0;2)$ $12 - 2 = 10\ units \mid eenhede$	✓ E & F ✓ 10 (2)
6.3	$x = \frac{-b}{2a} = \frac{-(-4)}{2(-1)} = -2\ \ or\ \ x = \frac{2+(-6)}{2} = -2$ $g(-2) = -(-2)^2 - 4(-2) + 12$ $= 16 \qquad \therefore D(-2;16)$ OR/OF $g(x) = -(x^2 + 4x - 12) = -(x^2 + 4x + 4 - 4 - 12)$ $\therefore g(x) = -(x+2)^2 + 16$ $\therefore D(-2;16)$	✓ *x* = − *2* ✓ subst -2 / $g(-2)$ ✓$y = 16$ ✓ compl square/*kwdr voltooi* ✓ *x* = - 2 ✓$y = 16$ (3)
6.4	$y \leq 16\ ;\ y \in \mathbb{R}$ or/of $y \in (-\infty;16]$	✓answ/*antw* (1)
6.5	$D(-2;16)\ and \mid en\ \ B(2;0)$ $m_{DB} = \frac{16-0}{-2-2}$ $= -4$	✓ subst in form ✓ - 4 (2)
6.6	For Q : $g(x) = f(x)$ $\therefore -x^2 - 4x + 12 = -x + 2$ $\therefore x^2 + 3x - 10 = 0$ $\therefore (x+5)(x-2) = 0$ $\therefore x = -5\ \ or \mid of\ \ x = 2$ $for\ Q: f(-5) = -(-5) + 2 = 7\ \therefore Q(-5;7)$	✓ equating/*gelykstel* ✓ factors/*faktore* ✓ choose/*kies/subst x = -5* ✓*y = 7* (4)
6.7	$x < -5\ \ or \mid of\ \ x > 2$	✓ interval ✓ notation (2)
6.8	$k = 12 - 16 = -4$	✓ ✓ $x = -4$ (2)
6.9	$x \leq -6\ \ or \mid of\ \ x = 2$	✓ $x \leq -6$ ✓ $x = 2$ (2) **[22]**

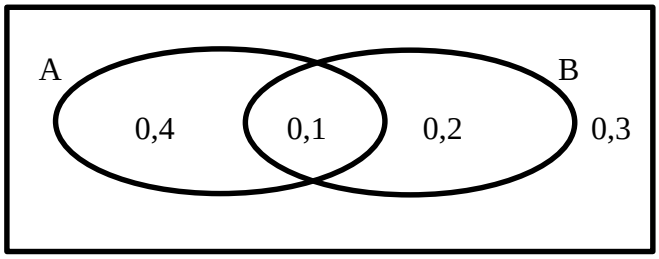
QUESTION/VRAAG 7

7.1.1	$f(x) = a^x$: *Subst* $Q(-2;9)$ *or* $\mid$ *of* $P(1;\frac{1}{3})$ $9 = a^{-2}$ *or* $\mid$ *of* $\frac{1}{3} = a^1$ $a = \frac{1}{3}$	✓ subst ✓ $\frac{1}{3}$ (2)
7.1.2	$g(x) = \frac{k}{x+2} + 1$ *Subst* $(0;0)$ *or* $\mid$ *of* $P(1;\frac{1}{3})$ $0 = \frac{k}{0+2} + 1$ *or* $\mid$ *of* $\frac{1}{3} = \frac{k}{1+2} + 1$ $-1 = \frac{k}{2}$ $-\frac{2}{3} = \frac{k}{3}$ $-2 = k$ $\therefore g(x) = \frac{-2}{x+2} + 1$	✓ +2 & +1 ✓ subst ✓ $k = -2$ ✓ eq / *vgl* (4)
7.1.3	$x \in \mathbb{R}$; $x \neq -2$	✓ $x \neq -2$ (1)
7.2	$k(x) = \left(\frac{1}{3}\right)^{-x} - 2$ *or* $\mid$ *of* $k(x) = 3^x - 2$	✓ $\left(\frac{1}{3}\right)^{-x}$ *or* $\mid$ *of* 3^x ✓ -2 (2)
7.3	$y > -2$; $y \in \mathbb{R}$	✓ $y > -2$ (1)
7.4	$y = -x + c$ $1 = -(-2) + c$ $-1 = c$ $y = -x - 1$	✓ $m = -1$ ✓ subst (-2 ;1) ✓eq/*vgl* (3)
7.5	$-2 < x \leq 1$ **OR/OF** $x \in (-2;1]$	✓ interval ✓ notation (2)
7.6	$1 \geq \frac{2}{x+2}$ $\therefore \frac{-2}{x+2} + 1 \geq 0$ $\therefore g(x) \geq 0$ $\therefore x < -2$ *or* $\mid$ *of* $x \geq 0$	✓ manipul. *g(x)* ✓ $x < -2$ ✓ $x \geq 0$ (3)
		[18]

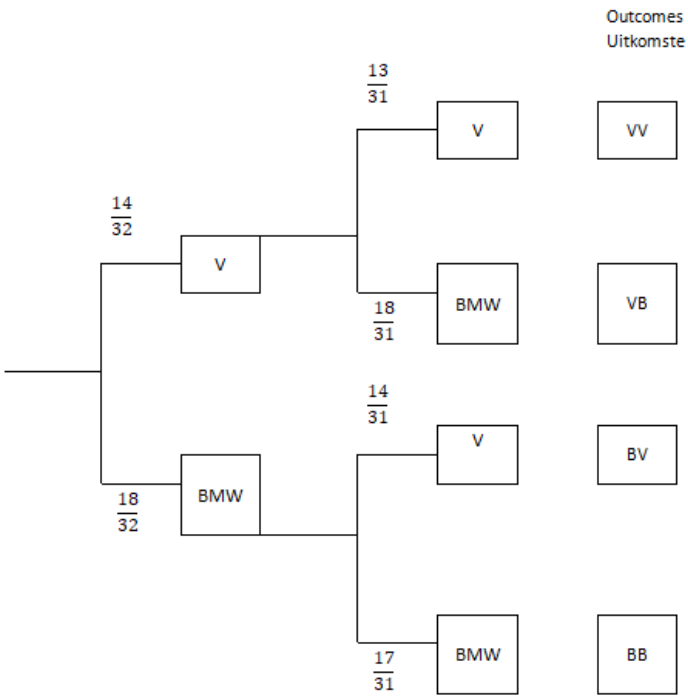
QUESTION/VRAAG 8

		
	$x-interc \mid afsn: (-100;0)$ & $(300;0)$ ….(sym) eq of parabola: $y=a(x-x_1)(x-x_2)$ vgl parabool $\therefore y = a(x+100)(x-300)$ $subst$ $(0;30)$: $\therefore 30 = a(0+100)(0-300)$ $\therefore 30 = -30\,000a$ $\therefore a = -\frac{1}{1000}$ eq: $y=-\frac{1}{1000}(x+100)(x+300)$ max at $x=100$ (symmetry) $\therefore$ max $= -\frac{1}{1000}(100+100)(100-300)$ $=40m$ **OR/OF** $y=ax^2+bx+30$ $subst$ $(300;0)$: $0=a(300)^2+b(300)+30$ ……1 $subst$ $(200;30)$: $30=a(200)^2+b(200)+30$ ……2 $\therefore eq\ parab$: $y=-\frac{1}{1000}x^2-\frac{1}{5}x+30$ max at $x=100$ max $= -\frac{1}{1000}(100)-\frac{1}{5}(100)+30=40m$	✓ -100 & 300 ✓ value a/*waarde a* ✓ eq / *vgl parab* ✓ max at /*by* $x=100$ ✓40 OR/OF ✓ $subst(300;0)$& 30 ✓ $subst$ $(200;30)$ ✓ eq / *vgl parab* ✓ max at /*by* $x=100$ ✓40 (5)
		[5]

QUESTION/VRAAG 9

9.1	$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$ $\therefore \quad 0{,}7 = 0{,}5 + 0{,}3 - P(A \text{ and } B)$ $\therefore P(A \text{ and } B) = 0{,}1$ A and B are NOT mutually exclusive/ *A en B is NIE onderling uitsluitend nie* ($P(A \text{ and } B) \neq 0$)	✓subst ✓0,1 ✓conclusion/*gevolgtrekking* (3)
9.2		✓ 0,4 ✓ 0,2 ✓0,3 (3)
9.3	$0{,}1 + 0{,}2 + 0{,}3 = 0{,}6$ OR/OF $P(A' \text{ or } B) = P(A') + P(B) - P(A' \text{ and } B)$ $= 0{,}5 + 0{,}3 - 0{,}2$ $= 0{,}6$ **OR/OF** $P(A' \text{ or } B) = 1 - P(A \text{ and } B')$ $= 1 - 0{,}4 = 0{,}6$	✓method/*metode* ✓0,6 (2)
9.4	$P(A) \times P(B) = 0{,}5 \times 0{,}3 = 0{,}15$ $P(A \text{ and } B) = 0{,}1$ (from/*uit* 9.1) $\therefore P(A \text{ and } B) \neq P(A) \times P(B)$ $\therefore$ *NOT* independent $\mid$ *NIE onafhanklik NIE*	✓product/*produk* ✓ 0,15 ✓ not equal/*ongelyk* ✓ conclusion/*gevolgtrekking* (4) **[12]**

QUESTION/VRAAG 10

10.1		✓first branch/*eerste vertakking* ✓second branch top/*tweede vertakking bo* ✓second branch bottom/*tweede vertakking onder* ✓outcomes/*uitkomste* (4)
10.2.1	$P(BB) = \frac{18}{32} \times \frac{17}{31}$ $= \frac{153}{496} = 0{,}3084 \ldots \approx 0{,}31$	✓ correct product *korrekte produk* ✓ answ/*antw* (2)
10.2.2	$P(\text{at least one } V) = 1 - P(BB)$ $= 1 - \frac{153}{496}$ $= \frac{343}{496} = 0{,}6915 \ldots \approx 0{,}69$ **OR/OF** $P(VV) + P(VB) + P(BV)$ $= \frac{14}{32} \times \frac{13}{31} + \frac{14}{32} \times \frac{18}{31} + \frac{18}{32} \times \frac{14}{31}$ $= \frac{343}{496} = 0{,}6915 \ldots \approx 0{,}69$	✓ method/*metode* ✓answ/*antw* (2) **[8]**
		GRAND TOTAL: 150 ***GROOTTOTAAL : 150***