

Vertroulik



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

SENIORSERTIKAAT-EKSAMEN/ NASIONALE SENIORSERTIFIKAAT-EKSAMEN

WISKUNDE V1

MEI/JUNIE 2024

PUNTE: 150

TYD: 3 uur

Hierdie vraestel bestaan uit 11 bladsye en 1 inligtingsblad.

INSTRUKSIES EN INLIGTING

Lees die volgende instruksies noukeurig deur voordat jy die vrae beantwoord.

1. Hierdie vraestel bestaan uit 11 vrae.
2. Beantwoord AL die vrae.
3. Nommer die antwoorde korrek volgens die nommeringstelsel wat in hierdie vraestel gebruik is.
4. Dui ALLE berekeninge, diagramme, grafieke, ens. wat jy gebruik het om jou antwoorde te bepaal, duidelik aan.
5. Volpunte sal NIE noodwendig aan slegs antwoorde toegeken word NIE.
6. Jy mag 'n goedgekeurde, wetenskaplike sakrekenaar (nieprogrammeerbaar en niegrafies) gebruik, tensy anders vermeld.
7. Indien nodig, rond antwoorde tot TWEE desimale plekke af, tensy anders vermeld.
8. Diagramme is NIE noodwendig volgens skaal geteken NIE.
9. 'n Inligtingsblad met formules is aan die einde van die vraestel ingesluit.
10. Skryf netjies en leesbaar.

VRAAG 11.1 Los op vir x :

1.1.1 $3x^2 + 5x = 0$ (2)

1.1.2 $4x^2 + 3x - 5 = 0$ (antwoorde korrek tot TWEE desimale plekke) (3)

1.1.3 $(x-1)^2 - 9 \geq 0$ (4)

1.1.4 $5^{2x} - 5^x = 0$ (4)

1.1.5 $\frac{x}{\sqrt{20-x}} = 1$ (5)

1.2 Los gelyktydig vir x en y op:

$x + y = 9$ en $2x^2 - y^2 = 7$ (5)

1.3 Gegee: $P = (1-a)$ en $T = (1+a)(1+a^2)(1+a^4)\dots(1+a^{512})$ Bepaal die waarde van $P \times T$ in terme van a . (3)
[26]**VRAAG 2**2.1 Beskou die meetkundige reeks: $4 + 2 + 1 + \frac{1}{2} + \dots$

2.1.1 Konvergeer die reeks? Motiveer jou antwoord. (2)

2.1.2 Bereken S_{∞} . (2)2.2 Gegee: $\sum_{p=k}^{10} 3^{p-1} = 29\,520$. Bereken die waarde van k . (5)
[9]

VRAAG 3

3.1 Beskou die kwadratiese getalpatroon: 3 ; 7 ; 12 ; ...

3.1.1 Dui aan dat die algemene term van hierdie getalpatroon gegee word deur

$$T_n = \frac{1}{2}n^2 + \frac{5}{2}n. \quad (3)$$

3.1.2 Watter getal moet by T_{n-1} getel word sodat $T_n = 13\,527$? (4)

3.2 Gegee 'n rekenkundige reeks met $T_1 = 8$ en $T_2 = 11$.

3.2.1 Bereken die waarde van n indien $T_n = 41$. (3)

3.2.2 'n Nuwe rekenkundige reeks P word gevorm deur die termposisie en die termwaarde van die gegewe rekenkundige reeks te gebruik.

$P_8 = 1$, $P_{11} = 2$ vir die nuwe reeks, en so aan.

(a) Skryf die waarde van P_{41} neer. (1)

(b) Bereken die waarde van die eerste term van die nuwe rekenkundige reeks. (4)
[15]

VRAAG 4

Gegee: $g(x) = \frac{1}{x-1} + 2$

4.1 Skryf die vergelyking van die asimptote van g neer. (2)

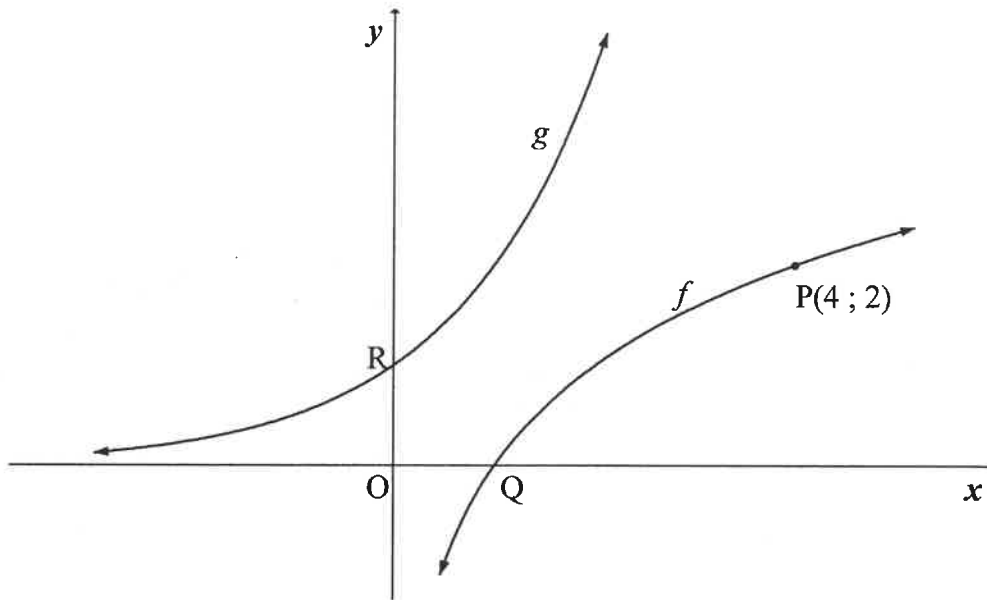
4.2 Teken 'n grafiek van g en dui enige afsnitte met die asse en asimptote aan. (4)

4.3 Bepaal die waardes van x waarvoor $g(x) > 0$. (2)

4.4 Bepaal die vergelyking van die simmetrie-as van g wat 'n negatiewe gradiënt het. (2)
[10]

VRAAG 5

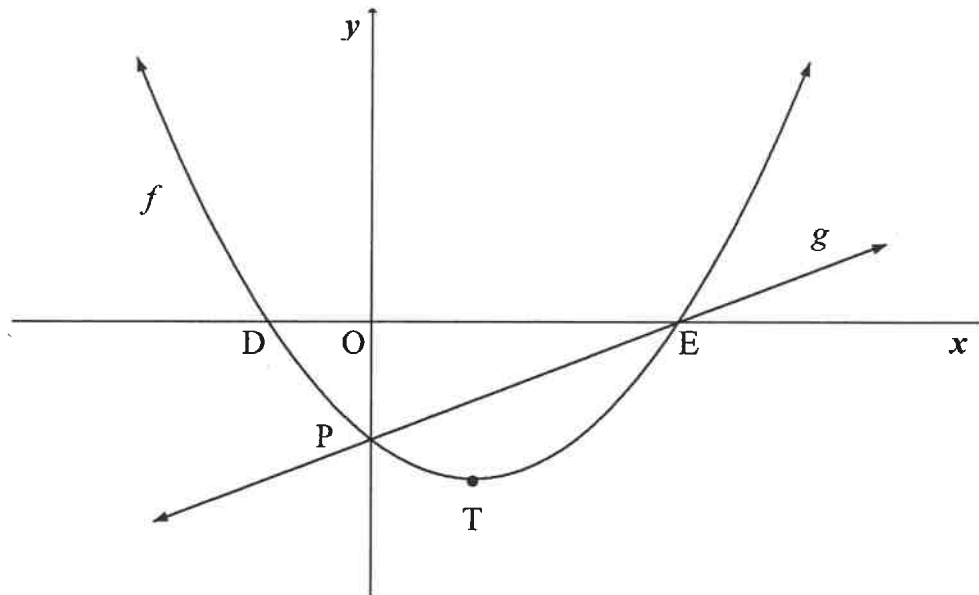
In die diagram is die grafieke van $f(x) = \log_a x$ en g geskets. Grafiek g is die refleksie van f in die lyn $y = x$. Grafiek f gaan deur die punt $P(4; 2)$. Q is die x -afsnit van f en R is die y -afsnit van g .



- 5.1 Skryf die koördinate van P' , die beeld van P op g , neer. (2)
- 5.2 Toon dat $a = 2$. (2)
- 5.3 Skryf die vergelyking van g in die vorm $y = \dots$ neer. (1)
- 5.4 T is 'n punt op f in die eerste kwadrant, met TR ewewydig aan die x -as. Bereken die oppervlakte van $\Delta RTP'$. (4)
- [9]

VRAAG 6

Die grafieke van $f(x) = x^2 - 2x - 3$ en $g(x) = mx + c$ is hieronder geskets. D en E is die x -afsnitte en P is die y -afsnit van f . Die draaipunt van f is $T(1; -4)$. Die grafieke van f en g sny mekaar by P en E.



- 6.1 Skryf die waardeversameling van f neer. (1)
- 6.2 Bereken die koördinate van D en E. (3)
- 6.3 Bepaal die vergelyking van g . (2)
- 6.4 Skryf die waardes van x neer waarvoor $f(x) - g(x) > 0$. (2)
- 6.5 Bepaal die maksimum vertikale afstand tussen h en g indien $h(x) = -f(x)$ vir $x \in [-2; 3]$. (5)
- 6.6 Gegee: $k(x) = g(x) - n$.
Bepaal n indien k 'n raaklyn aan f is. (5)
- [18]**

VRAAG 7

- 7.1 Thabo het ses jaar gelede 'n foon vir R13 000 gekoop. Die waarde van die foon het jaarliks volgens die verminderdesaldo-metode verminder. Die waarde van die foon is nou R8 337,75. Bereken die jaarlikse depresiasiekoers. (3)
- 7.2 Eric en Thandi moet elkeen R80 000 spaar om aan die einde van Desember 2027 met vakansie te gaan.
- Thandi besluit dat sy teen die einde van Januarie 2025 sal begin spaar. Sy sal 36 maandelikse deposito's in 'n spaarrekening maak, wat teen 8,6% p.j. rente betaal, maandeliks saamgestel. Die deposito sal aan die einde van elke maand gemaak word.
 - Eric bereken dat as hy aan die einde van Januarie 2024 begin en 48 deposito's van R1 402,31 maak, hy genoeg geld sal hê om met vakansie te gaan. Hy sal sy deposito's aan die einde van elke maand in 'n spaarrekening maak. Die spaarrekening betaal rente teen 8,6% p.j., maandeliks saamgestel.
- Bereken die verskil tussen die totale bedrag geld wat Eric en Thandi oor die gegewe tydperk in hulle onderskeie spaarrekenings sal deponeer. (4)
- 7.3 'n Lening van R225 000 is aan Lesibana toegestaan. Die rentekoers van die lening is 9% p.j., maandeliks saamgestel. Lesibana sal maandelikse betalings van R5 500 maak, met die eerste betaling presies vier maande nadat die lening toegestaan is. Hoeveel betalings sal Lesibana maak om die lening te vereffen? (6)

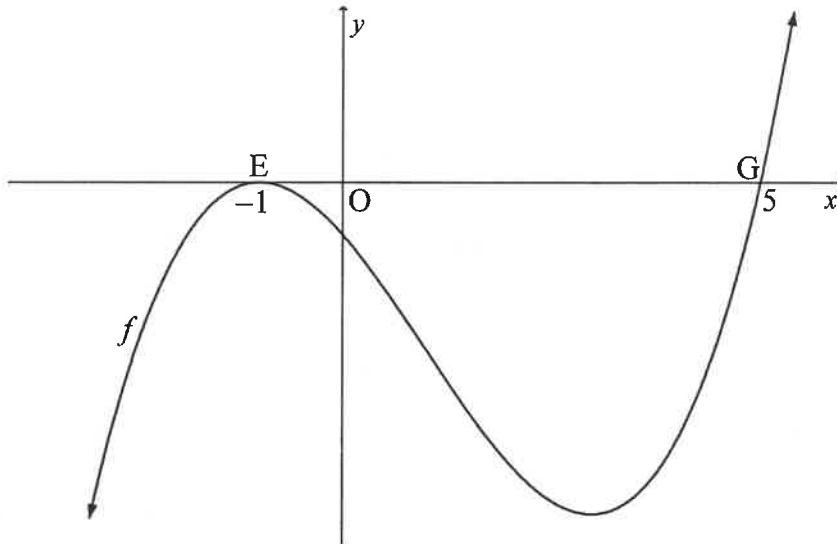
[13]**VRAAG 8**

- 8.1 Bepaal $f'(x)$ vanuit eerste beginsels indien $f(x) = \frac{1}{x}$. (5)
- 8.2 Bepaal:
- 8.2.1 $\frac{d}{dx}(\sqrt{4x^6} + \sqrt{2} \cdot x^2)$ (3)
- 8.2.2 $g'(x)$ indien $g(x) = \frac{3x^4 - 4x^2 + 6}{x^2}$ (3)
- 8.3 Die vergelyking van die raaklyn aan $f(x) = 3x^2 + bx + c$ by $x = 1$ word gegee deur $y = 9x - 9$. Bepaal die waardes van b en c . (4)

[15]

VRAAG 9

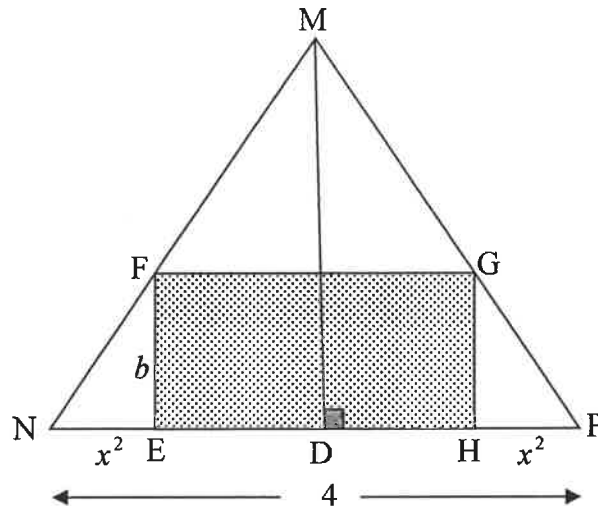
Die grafiek van $f(x) = ax^3 + bx^2 + cx - 5$ is hieronder geskets. $E(-1; 0)$ en $G(5; 0)$ is die x -afsnitte van f .



- 9.1 Toon dat $a = 1$, $b = -3$ en $c = -9$. (3)
- 9.2 Bereken die waarde van x waarvoor f 'n lokale minimum waarde het. (4)
- 9.3 Gebruik die grafiek om die waardes van x te bepaal waarvoor $f''(x) \cdot f(x) > 0$. (3)
- 9.4 Vir watter waardes van t sal die grafiek van $p(x) = f(x) + t$ twee verskillende positiewe wortels en een negatiewe wortel hê? (3)
- [13]**

VRAAG 10

EHGF is 'n reghoek. HE word x^2 cm verleng na N en EH word x^2 cm verleng na P. NF verleng, sny PG verleng by M om 'n gelykbenige driehoek MNP met $NM = MP$ te vorm. D is 'n punt op NP waar $MD \perp NP$. $NP = 4$ cm en $MD = 3$ cm.



- 10.1 Toon dat die area van EFGH deur $A(x) = 6x^2 - 3x^4$ gegee word. (4)
- 10.2 Bereken die maksimum oppervlakte van reghoek EFGH. (4)
- [8]

VRAAG 11

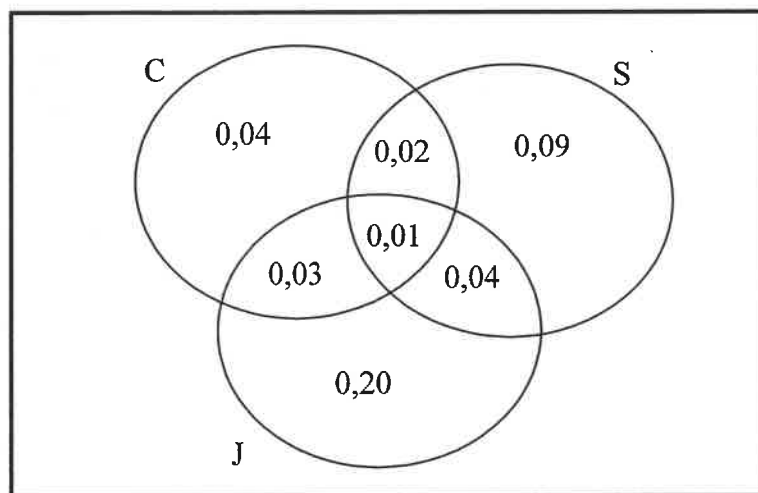
11.1 Twee gebeurtenisse, A en B, is sodanig dat:

- $P(A) = 0,4$
- $P(A \text{ of } B) = 0,52$
- A en B is onderling uitsluitend

Bepaal $P(B)$.

(2)

11.2 Die items wat 'n leerder oor 'n sekere tydperk by 'n snoepwinkel gekoop het, is aangeteken. Die waarskynlikheid dat die leerder 'n toebroodjie (S), 'n sjokolade (C) en 'n vrugtesap (J) koop, word in die Venn-diagram hieronder voorgestel.



11.2.1 Wat is die waarskynlikheid dat die leerder 'n toebroodjie sal koop?

(1)

11.2.2 Bereken die waarskynlikheid dat die leerder ten minste twee van die drie items sal koop.

(2)

11.2.3 Bereken die waarskynlikheid dat die leerder NIE een van die drie items sal koop NIE.

(2)

- 11.3 Sewe kitaarspelers, elkeen met 'n ander naam, neem aan 'n konsert deel.
- 11.3.1 Op hoeveel verskillende maniere kan die name van die kitaarspelers onder mekaar in die program gelys word? (1)
- 11.3.2 Na die vertoning wag die kitaarspelers agter die verhoog. Daar is 'n bankie met plek vir slegs vier om op te sit.
- Wat sal die waarskynlikheid wees dat die vier kitaarspelers in alfabetiese volgorde, van links na regs, sal sit? (3)
- 11.3.3 Gedurende die vertoning sit die sewe kitaarspelers in 'n ry op die verhoog. Vier kitaarspelers is vroulik en drie is manlik.
- Op hoeveel verskillende maniere kan die spelers sit indien die mans nie langs mekaar mag sit nie? (3)
- [14]
- TOTAAL: 150**

INLIGTINGSBLAD

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$A = P(1 + ni)$$

$$A = P(1 - ni)$$

$$A = P(1 - i)^n$$

$$A = P(1 + i)^n$$

$$T_n = a + (n - 1)d$$

$$S_n = \frac{n}{2} [2a + (n - 1)d]$$

$$T_n = ar^{n-1}$$

$$S_n = \frac{a(r^n - 1)}{r - 1}; r \neq 1$$

$$S_\infty = \frac{a}{1 - r}; -1 < r < 1$$

$$F = \frac{x[(1 + i)^n - 1]}{i}$$

$$P = \frac{x[1 - (1 + i)^{-n}]}{i}$$

$$f'(x) = \lim_{h \rightarrow 0} \frac{f(x + h) - f(x)}{h}$$

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$M\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

$$y = mx + c$$

$$y - y_1 = m(x - x_1)$$

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$m = \tan \theta$$

$$(x - a)^2 + (y - b)^2 = r^2$$

$$\text{In } \triangle ABC: \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$a^2 = b^2 + c^2 - 2bc \cdot \cos A$$

$$\text{area } \triangle ABC = \frac{1}{2} ab \cdot \sin C$$

$$\sin(\alpha + \beta) = \sin \alpha \cdot \cos \beta + \cos \alpha \cdot \sin \beta$$

$$\sin(\alpha - \beta) = \sin \alpha \cdot \cos \beta - \cos \alpha \cdot \sin \beta$$

$$\cos(\alpha + \beta) = \cos \alpha \cdot \cos \beta - \sin \alpha \cdot \sin \beta$$

$$\cos(\alpha - \beta) = \cos \alpha \cdot \cos \beta + \sin \alpha \cdot \sin \beta$$

$$\cos 2\alpha = \begin{cases} \cos^2 \alpha - \sin^2 \alpha \\ 1 - 2\sin^2 \alpha \\ 2\cos^2 \alpha - 1 \end{cases}$$

$$\sin 2\alpha = 2 \sin \alpha \cdot \cos \alpha$$

$$\bar{x} = \frac{\sum_{i=1}^n x_i}{n}$$

$$\sigma^2 = \frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n}$$

$$P(A) = \frac{n(A)}{n(S)}$$

$$P(A \text{ of } B) = P(A) + P(B) - P(A \text{ en } B)$$

$$\hat{y} = a + bx$$

$$b = \frac{\sum (x - \bar{x})(y - \bar{y})}{\sum (x - \bar{x})^2}$$



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SENIORSERTIFIKAAT-EKSAMEN
NATIONAL SENIOR CERTIFICATE EXAMINATIONS/
NASIONALE SENIORSERTIFIKAAT-EKSAMEN**

MATHEMATICS P1/WISKUNDE V1

MARKING GUIDELINES/NASIENRIGLYNE

MAY/JUNE/MEI/JUNIE 2024

**MARKS: 150
PUNTE: 150**

**These marking guidelines consist of 16 pages./
Hierdie nasienriglyne bestaan uit 16 bladsye.**

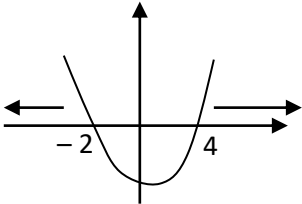
NOTE:

- If a candidate answers a question TWICE, only mark the FIRST attempt.
- Consistent Accuracy applies in all aspects of the marking memorandum.

LET WEL:

- Indien 'n kandidaat 'n vraag TWEE keer beantwoord, merk slegs die EERSTE poging.
- Volgehoue akkuraatheid is DEURGAANS op ALLE aspekte van die nasienriglyne van toepassing.

QUESTION 1/VRAAG 1

<p>1.1.1</p>	$3x^2 + 5x = 0$ $x(3x + 5) = 0$ $x = 0 \text{ or } x = -\frac{5}{3}$	<p>✓ $x = 0$</p> <p>✓ $x = -\frac{5}{3}$</p> <p>(2)</p>
<p>1.1.2</p>	$4x^2 + 3x - 5 = 0$ $x = \frac{-(3) \pm \sqrt{(3)^2 - 4(4)(-5)}}{2(4)}$ $x = 0,80 \text{ or } x = -1,55$	<p>✓ correct substitution into correct formula</p> <p>✓ answer</p> <p>✓ answer</p> <p>(3)</p>
<p>1.1.3</p>	$(x-1)^2 - 9 \geq 0$ $x^2 - 2x - 8 \geq 0$ $(x-4)(x+2) \geq 0$ $x = 4 \text{ or } x = -2$ $x \leq -2 \text{ or } x \geq 4$	 <p>✓ standard form</p> <p>✓ critical values</p> <p>✓✓ $x \leq -2 \text{ or } x \geq 4$</p> <p>(4)</p>
<p>1.1.4</p>	$5^{2x} - 5^x = 0$ $5^x(5^x - 1) = 0$ $5^x \neq 0 \text{ or } 5^x = 1$ $x = 0$ <p>OR/OF</p> $5^{2x} = 5^x$ $2x = x$ $2x - x = 0$ $x = 0$	<p>✓ common factor</p> <p>✓ $5^x \neq 0$</p> <p>✓ $5^x = 1$</p> <p>✓ $x = 0$</p> <p>(4)</p> <p>OR/OF</p> <p>✓ $5^{2x} = 5^x$</p> <p>✓ $2x = x$</p> <p>✓ $2x - x = 0$</p> <p>✓ $x = 0$</p> <p>(4)</p>

<p>1.1.5</p>	$\frac{x}{\sqrt{20-x}} = 1$ $x = \sqrt{20-x}$ $x^2 = 20-x$ $x^2 + x - 20 = 0$ $(x+5)(x-4) = 0$ $x = 4 \text{ or } x \neq -5$	<ul style="list-style-type: none"> ✓ isolating the surd ✓ squaring both sides ✓ standard form ✓ answers ✓ selection <p style="text-align: right;">(5)</p>
<p>1.2</p>	$2x^2 - y^2 = 7 \quad \dots (1)$ $x + y = 9 \quad \dots (2)$ $y = 9 - x$ $2x^2 - (9 - x)^2 = 7$ $2x^2 - 81 + 18x - x^2 = 7$ $x^2 + 18x - 88 = 0$ $(x + 22)(x - 4) = 0$ $x = -22 \text{ or } x = 4$ $y = 31 \text{ or } y = 5$ <p>OR/OF</p> $2x^2 - y^2 = 7 \quad \dots (1)$ $x + y = 9 \quad \dots (2)$ $x = 9 - y$ $2(9 - y)^2 - y^2 = 7$ $2(81 - 18y + y^2) - y^2 - 7 = 0$ $162 - 36y + 2y^2 - y^2 - 7 = 0$ $y^2 - 36y + 155 = 0$ $(y - 31)(y - 5) = 0$ $y = 31 \text{ or } y = 5$ $x = -22 \text{ or } x = 4$	<ul style="list-style-type: none"> ✓ $y = 9 - x$ ✓ substitution ✓ standard form ✓ x-values ✓ y-values <p style="text-align: right;">(5)</p> <p>OR/OF</p> <ul style="list-style-type: none"> ✓ $x = 9 - y$ ✓ substitution ✓ standard form ✓ y-values ✓ x-values <p style="text-align: right;">(5)</p>
<p>1.3</p>	$P \times T = (1-a)(1+a)(1+a^2)(1+a^4) \dots (1+a^{512})$ $P \times T = (1-a^2)(1+a^2)(1+a^4) \dots (1+a^{512})$ $P \times T = (1-a^4)(1+a^4) \dots (1+a^{512})$ $P \times T = (1-a^8) \dots (1+a^{512})$ $P \times T = (1-a^{512})(1+a^{512})$ $= 1 - a^{1024}$	<ul style="list-style-type: none"> ✓ $(1 - a^4)$ ✓ $(1 - a^{512})$ ✓ $1 - a^{1024}$ <p style="text-align: right;">(3)</p>
<p>[26]</p>		

QUESTION 2/VRAAG 2

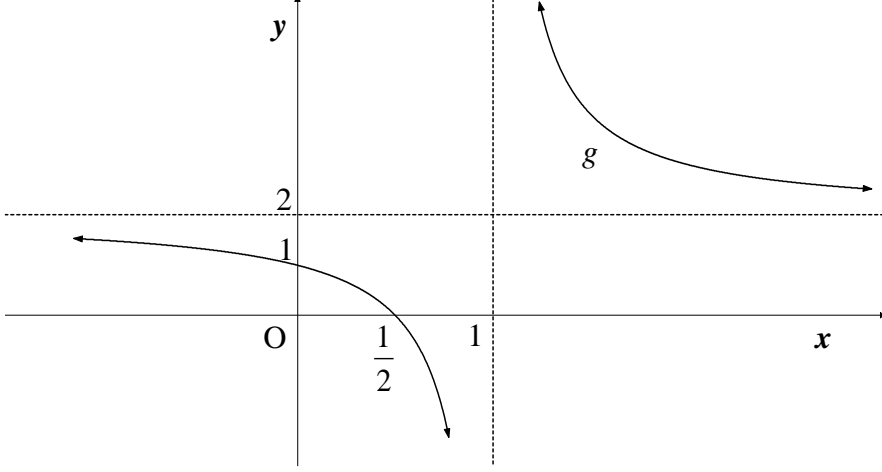
2.1.1	$r = \frac{1}{2}$ <p>Yes, because $-1 < \frac{1}{2} < 1$</p>	$\checkmark r = \frac{1}{2}$ $\checkmark \text{ answer with reason}$ <p style="text-align: right;">(2)</p>
2.1.2	$S_{\infty} = \frac{a}{1-r}$ $S_{\infty} = \frac{4}{1-\frac{1}{2}}$ $\therefore S_{\infty} = 8$	$\checkmark \text{ substitution}$ $\checkmark \text{ answer}$ <p style="text-align: right;">(2)</p>
2.2	$\sum_{p=k}^{10} 3^{p-1} = 3^{k-1} + 3^{k+1-1} + 3^{k+2-1} + \dots + 3^9$ $= 3^{k-1} + 3^k + 3^{k+1} + \dots + 3^9$ $S_n = \frac{a(r^n - 1)}{r - 1}$ $29\,520 = \frac{3^{k-1}(3^{11-k} - 1)}{3 - 1}$ $3^{10} - 3^{k-1} = 59\,040$ $3^{k-1} = 9$ $k - 1 = 2$ $\therefore k = 3$	$\checkmark a = 3^{k-1}$ $\checkmark r = 3$ $\checkmark n = 11 - k$ $\checkmark \text{ substitution}$ $\checkmark \text{ answer}$ <p style="text-align: right;">(5)</p>
		[9]

QUESTION 3/VRAAG 3

<p>3.1.1</p>	$3 ; 7 ; 12 ; 18$ $\quad \vee \quad \vee \quad \vee$ <p>First diff: $4 ; 5 ; 6$</p> $\quad \quad \vee \quad \vee$ <p>Second diff: $1 ; 1$</p> $2a = 1$ $a = \frac{1}{2}$ $3a + b = 4$ $3\left(\frac{1}{2}\right) + b = 4$ $b = \frac{5}{2}$ $a + b + c = 3$ $\frac{1}{2} + \frac{5}{2} + c = 3$ $c = 0$ $T_n = \frac{1}{2}n^2 + \frac{5}{2}n$	$\checkmark 2a = 1$ $\checkmark 3\left(\frac{1}{2}\right) + b = 4$ $\checkmark \frac{1}{2} + \frac{5}{2} + c = 3$ <p style="text-align: right;">(3)</p>
<p>3.1.2</p>	$13\ 527 = \frac{1}{2}n^2 + \frac{5}{2}n$ $n^2 + 5n - 27\ 054 = 0$ $(n - 162)(n + 167) = 0$ $n = 162 \text{ or } n = -167$ $T_{161} = 13\ 363$ $\therefore T_{161} + 164 = 13\ 527$ <p>164 must be added.</p> <p>OR/OF</p> $T_n = 3 + \text{sum of 1}^{\text{st}} \text{ differences}$ $13527 = 3 + 4 + 5 + \dots + n$ $\frac{n - 3 + 1}{2}[3 + n] = 13527$ $n^2 + n - 27060 = 0$ $(n + 165)(n - 167) = 0$ $n = 164$	$\checkmark 13\ 527 = \frac{1}{2}n^2 + \frac{5}{2}n$ $\checkmark \text{standard form}$ $\checkmark \text{answers for } n$ $\checkmark 164$ <p style="text-align: right;">(4)</p> <p>OR/OF</p> $\checkmark 13527 = 3 + 4 + 5 + \dots + n$ $\checkmark n^2 + n - 27060 = 0$ $\checkmark \text{answers for } n$ $\checkmark 164$ <p style="text-align: right;">(4)</p>

3.2.1	$T_n = 8 + (n-1)(3)$ $T_n = 3n + 5$ $41 = 3n + 5$ $36 = 3n$ $n = 12$	✓ $T_n = 3n + 5$ ✓ $T_n = 41$ ✓ answer (3)
3.2.2a	$P_{41} = 12$	✓ answer (1)
3.2.2b	$P_8 = a + 7d = 1$ $P_{11} = a + 10d = 2$ $3d = 1$ $d = \frac{1}{3}$ $a + 7\left(\frac{1}{3}\right) = 1$ $a = -\frac{4}{3}$	✓ $a + 7d = 1$ ✓ $a + 10d = 2$ ✓ value of d ✓ value of a (4)
		[15]

QUESTION 4/VRAAG 4

4.1	$x = 1$ $y = 2$	✓ $x = 1$ ✓ $y = 2$ (2)
4.2		✓ x-intercept ✓ y-intercept ✓ asymptotes ✓ shape (4)
4.3	$x < \frac{1}{2}$ or $x > 1$	✓ $x < \frac{1}{2}$ ✓ $x > 1$ (2)
4.4	$y = -(x-1) + 2$ $y = -x + 3$ OR/OF $y - 2 = -(x-1)$ $y = -x + 3$ OR/OF $y = -x + c$ $2 = -(1) + c$ $c = 3$ $\therefore y = -x + 3$	✓ substitution of (1 ; 2) ✓ answer (2) OR/OF ✓ substitution of (1 ; 2) ✓ answer (2) OR/OF ✓ substitution of (1 ; 2) ✓ answer (2)
		[10]

QUESTION5/VRAAG 5

5.1	$P'(2;4)$	✓ $x = 2$ ✓ $y = 4$ (2)
5.2	$f(x) = \log_a x$ $2 = \log_a 4$ $a^2 = 4$ $a = 2$	✓ substitute (4 ; 2) ✓ $a^2 = 4$ (2)
5.3	$y = 2^x$	✓ $y = 2^x$ (1)
5.4	$1 = \log_2 x$ $\therefore x = 2$ T(2 ; 1) RT = 2 units P'T = 3 units Area of $\Delta RTP' = \frac{1}{2} \cdot RT \cdot TP'$ $= \frac{1}{2} \times 2 \times 3 = 3 \text{ units}^2$	✓ $x = 2$ ✓ RT = 2 units ✓ P'T = 3 units ✓ answer (4)
		[9]

QUESTION 6/VRAAG 6

6.1	$y \geq -4$ or $y \in [-4; \infty)$	✓ answer (1)
6.2	$x^2 - 2x - 3 = 0$ $(x - 3)(x + 1) = 0$ $x = 3$ or $x = -1$ $\therefore E(3; 0)$ and $D(-1; 0)$	✓ = 0 ✓ both x -values ✓ correct identification of coordinates (3)
6.3	$P(0; -3)$ $\therefore m_{PE} = 1$ $\therefore g(x) = x - 3$	✓ $m_{PE} = 1$ ✓ $g(x) = x - 3$ (2)
6.4	$f(x) > g(x)$ $x < 0$ or $x > 3$	✓ $x < 0$ ✓ $x > 3$ (2)
6.5	Distance $= -x^2 + 2x + 3 - x + 3 = -x^2 + x + 6$ $D' = -2x + 1 = 0$ or/of $x = -\frac{b}{2a}$ $\therefore x = \frac{1}{2}$ $\therefore x = \frac{1}{2}$ $D\left(\frac{1}{2}\right) = -\left(\frac{1}{2}\right)^2 + \frac{1}{2} + 6$ $= \frac{25}{4} = 6,25$	✓ $D = -x^2 + x + 6$ ✓ method ✓ $x = \frac{1}{2}$ ✓ substitution ✓ answer (5)
6.6	$f'(x) = m$ $1 = 2x - 2$ $x = \frac{3}{2}$ Point on $f: \left(\frac{3}{2}; \frac{-15}{4}\right)$ $-\frac{15}{4} = \left(\frac{3}{2} - 3\right) - n$ $\therefore n = 2\frac{1}{4} = \frac{9}{4} = 2,25$ OR/OF $f(x) = k(x)$ $x^2 - 2x - 3 = x - 3 - n$ $x^2 - 3x + n = 0$ $\Delta = b^2 - 4ac$ $= (-3)^2 - 4(1)(n)$ To touch: $\Delta = 0$ $0 = 9 - 4n$ $4n = 9$ $n = \frac{9}{4}$	✓ $1 = 2x - 2$ ✓ $x = \frac{3}{2}$ ✓ $-\frac{15}{4}$ ✓ $-\frac{15}{4} = \left(\frac{3}{2} - 3\right) - n$ ✓ answer (5) OR/OF ✓ equating ✓ standard form ✓ substitution into Δ ✓ $\Delta = 0$ ✓ answer (5)
		[18]

QUESTION 7/VRAAG 7

<p>7.1</p>	$A = P(1-i)^n$ $8\,337,75 = 13\,000(1-i)^6$ $i = 7,14\%$	<p>✓ substitution in correct formula ✓✓ answer</p> <p style="text-align: right;">(3)</p>
<p>7.2</p>	$F = \frac{x[(1+i)^n - 1]}{i}$ $80\,000 = \frac{x \left[\left(1 + \frac{8,6}{1200}\right)^{36} - 1 \right]}{\frac{8,6}{1200}}$ $x = R1\,955,78$ <p>Thandi's total = $1955,78 \times 36 = R\,70\,408,08$ Eric's total = $1402,31 \times 48 = R\,67\,310,88$ Difference = $70\,409,08 - 67\,310,88$ $= R3\,097,20$</p>	<p>✓ i</p> <p>✓ substitution into correct formula</p> <p>✓ answer</p> <p>✓ answer</p> <p style="text-align: right;">(4)</p>
<p>7.3</p>	$A = P(1+i)^n$ $A = 225\,000 \left(1 + \frac{0,09}{12}\right)^3$ $A = R\,230\,100,5637\dots$ $225\,000 \left(1 + \frac{0,09}{12}\right)^3 = \frac{5\,500 \left[1 - \left(1 + \frac{0,09}{12}\right)^{-n}\right]}{\frac{0,09}{12}}$ $0,3137734959\dots = 1 - \left(1 + \frac{0,09}{12}\right)^{-n}$ $\left(1 + \frac{0,09}{12}\right)^{-n} = 0,6862265041\dots$ $-n = \log_{\left(1 + \frac{0,09}{12}\right)} 0,6862265041\dots$ $n = 50,394375\dots$ $n = 51$	<p>✓ substitution in correct formula ✓ answer</p> <p>✓ substitution</p> <p>✓ simplification</p> <p>✓ use of logs</p> <p>✓ answer</p> <p style="text-align: right;">(6)</p>
		<p>[13]</p>

QUESTION8/VRAAG 8

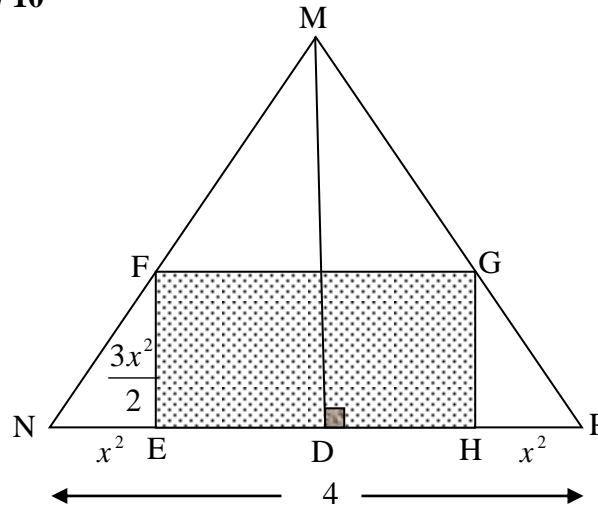
<p>8.1</p>	$f(x) = \frac{1}{x}$ $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ $f'(x) = \lim_{h \rightarrow 0} \frac{\frac{1}{(x+h)} - \frac{1}{x}}{h}$ $f'(x) = \lim_{h \rightarrow 0} \frac{x - (x+h)}{x(x+h)} \times \frac{1}{h}$ $f'(x) = \lim_{h \rightarrow 0} \frac{-h}{x(x+h)} \times \frac{1}{h}$ $f'(x) = \lim_{h \rightarrow 0} \frac{-1}{x(x+h)}$ $f'(x) = -\frac{1}{x^2}$ <p>OR/OF</p> $f(x) = \frac{1}{x}$ $f(x+h) = \frac{1}{x+h}$ $f(x+h) - f(x) = -\frac{h}{x(x+h)}$ $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ $f'(x) = \lim_{h \rightarrow 0} \frac{-h}{x(x+h)} \times \frac{1}{h}$ $f'(x) = \lim_{h \rightarrow 0} \frac{-1}{x(x+h)}$ $f'(x) = -\frac{1}{x^2}$	$\checkmark f(x+h) = \frac{1}{x+h}$ $\checkmark \frac{x - (x+h)}{x(x+h)} \times \frac{1}{h}$ $\checkmark \frac{-h}{x(x+h)} \times \frac{1}{h}$ $\checkmark \frac{-1}{x(x+h)}$ <p>✓ answer</p> <p style="text-align: right;">(5)</p> <p>OR/OF</p> $\checkmark f(x+h) = \frac{1}{x+h}$ $\checkmark f(x+h) - f(x) = -\frac{h}{x(x+h)}$ $\checkmark \frac{-h}{x(x+h)} \times \frac{1}{h}$ $\checkmark \frac{-1}{x(x+h)}$ <p>✓ answer</p> <p style="text-align: right;">(5)</p>
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8.2.1	$\frac{d}{dx}(\sqrt{4x^6} + \sqrt{2} \cdot x^2)$ $= \frac{d}{dx}(2x^3 + \sqrt{2} \cdot x^2)$ $= 6x^2 + 2\sqrt{2}x$	$\checkmark 2x^3$ $\checkmark 6x^2$ $\checkmark 2\sqrt{2}x$ <p style="text-align: right;">(3)</p>
8.2.2	$g(x) = \frac{3x^4 - 4x^2 + 6}{x^2}$ $g(x) = 3x^2 - 4 + 6x^{-2}$ $g'(x) = 6x - 12x^{-3}$	$\checkmark 3x^2 - 4 + 6x^{-2}$ $\checkmark 6x$ $\checkmark -12x^{-3}$ <p style="text-align: right;">(3)</p>
8.3	$f(x) = 3x^2 + bx + c$ $f'(x) = 6x + b$ $f'(1) = 6 + b = 9$ $\therefore b = 3$ $f(1) = 3 + 3 + c = 0$ $c = -6$ $\therefore f(x) = 3x^2 + 3x - 6$	$\checkmark f'(1) = 6 + b = 9$ $\checkmark b = 3$ $\checkmark f(1) = 3 + 3 + c = 0$ $\checkmark c = -6$ <p style="text-align: right;">(4)</p>
		[15]

QUESTION9/VRAAG 9

<p>9.1</p>	$f(x) = ax^3 + bx^2 + cx - 5$ $-5 = a(0+1)^2(0-5)$ $-5 = -5a$ $a = 1$ $f(x) = (x+1)(x+1)(x-5)$ $f(x) = (x^2 + 2x + 1)(x-5)$ $f(x) = x^3 - 3x^2 - 9x - 5$ $\therefore b = -3 \text{ and } c = -9$	<p>✓ substitution of x-intercepts ✓ simplification</p> <p>✓ simplification</p> <p style="text-align: right;">(3)</p>
<p>9.2</p>	$f(x) = x^3 - 3x^2 - 9x - 5$ $f'(x) = 3x^2 - 6x - 9$ $x^2 - 2x - 3 = 0$ $(x-3)(x+1) = 0$ $x = 3 \text{ or } x = -1$ <p>Minimum value at $x = 3$</p>	<p>✓ $f'(x) = 3x^2 - 6x - 9$ ✓ $f'(x) = 0$ ✓ factors</p> <p>✓ $x = 3$</p> <p style="text-align: right;">(4)</p>
<p>9.3</p>	$f''(x) \cdot f(x) > 0$ <p>Point of inflection: $x = 1$ $x < 1 ; x \neq -1$ or $x > 5$</p>	<p>✓ $x = 1$ ✓ $x < 1 ; x \neq -1$ ✓ $x > 5$</p> <p style="text-align: right;">(3)</p>
<p>9.4</p>	$-32 < -t < -5$ $5 < t < 32$ <p style="text-align: center;">OR/OF</p> <p>Shift up more than 5 units and less than 32 units $\therefore 5 < t < 32$</p>	<p>✓ -32 ✓ $-32 < -t < -5$ ✓ $5 < t < 32$ (3)</p> <p style="text-align: center;">OR/OF</p> <p>✓ more than 5 units ✓ less than 32 units ✓ $5 < t < 32$ (3)</p>
<p>[13]</p>		

QUESTION 10/VRAAG 10



<p>10.1</p>	$\frac{NE}{EF} = \frac{2}{3} = \frac{x^2}{b}$ $3x^2 = 2b$ $\therefore b = \frac{3x^2}{2}$ $EH = 4 - 2x^2$ $\text{Area EFGH} = (4 - 2x^2) \left(\frac{3x^2}{2} \right)$ $A(x) = 6x^2 - 3x^4$ <p>OR/OF</p> <p>In $\triangle DMP$: $\tan P = \frac{3}{2}$</p> <p>In $\triangle HGP$: $\tan P = \frac{GH}{x^2}$</p> $\frac{GH}{x^2} = \frac{3}{2}$ $\therefore b = \frac{3x^2}{2}$ $EH = 4 - 2x^2$ $\text{Area EFGH} = (4 - 2x^2) \left(\frac{3x^2}{2} \right)$ $A(x) = 6x^2 - 3x^4$	$\checkmark \frac{NE}{EF} = \frac{2}{3} = \frac{x^2}{b}$ $\checkmark \therefore b = \frac{3x^2}{2}$ $\checkmark EH = 4 - 2x^2$ $\checkmark (4 - 2x^2) \left(\frac{3x^2}{2} \right)$ <p style="text-align: right;">(4)</p> <p>OR/OF</p> $\checkmark \frac{GH}{x^2} = \frac{3}{2}$ $\checkmark \therefore b = \frac{3x^2}{2}$ $\checkmark EH = 4 - 2x^2$ $\checkmark (4 - 2x^2) \left(\frac{3x^2}{2} \right)$ <p style="text-align: right;">(4)</p>
<p>10.2</p>	$A(x) = 6x^2 - 3x^4$ $A'(x) = 12x - 12x^3 = 0$ $12x(1 - x^2) = 0$ $\therefore x \neq 0 \text{ or } x = -1 \text{ or } x = 1$ $\therefore \text{max area: } A(1) = 6(1)^2 - 3(1)^4 = 3 \text{ cm}^2$	$\checkmark 12x - 12x^3 = 0$ $\checkmark \text{ values of } x$ $\checkmark \text{ correct substitution}$ $\checkmark \text{ answer}$ <p style="text-align: right;">(4)</p>
		[8]

QUESTION 11/VRAAG 11

11.1	$P(A) + P(B) = 0,52$ $0,4 + P(B) = 0,52$ $P(B) = 0,12$	✓ substitution ✓ answer (2)
11.2.1	$P(\text{sandwich}) = \frac{4}{25}$ OR/OF $0,02 + 0,01 + 0,04 + 0,09 = \frac{4}{25} = 0,16$	✓ answer (1) OR/OF ✓ answer (1)
11.2.2	$P(\text{at least two events}) = 0,02 + 0,01 + 0,03 + 0,04$ $= 0,1$	✓ $0,02 + 0,01 + 0,03 + 0,04$ ✓ answer (2)
11.2.3	$P(\text{not any}) = 1 - (0,1 + 0,04 + 0,09 + 0,2)$ $= 0,57$	✓ $1 - (0,1 + 0,04 + 0,09 + 0,2)$ ✓ answer (2)
11.3.1	$7! = 5040$	✓ $7!$ (1)
11.3.2	$P(4 \text{ players alphabetically}) = \frac{1}{7 \times 6 \times 5 \times 4} = \frac{1}{840}$	✓ 1 ✓ 840 ✓ $\frac{1}{840}$ (3)

<p>11.3.3</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 12.5%;"></td> <td style="width: 12.5%; text-align: center;">F</td> <td style="width: 12.5%;"></td> <td style="width: 12.5%; text-align: center;">F</td> <td style="width: 12.5%;"></td> <td style="width: 12.5%; text-align: center;">F</td> <td style="width: 12.5%;"></td> <td style="width: 12.5%; text-align: center;">F</td> <td style="width: 12.5%;"></td> </tr> </table> <p>F arrangements: 4! M arrangements: 5 options with 3 males = $5 \times 4 \times 3$</p> <p>$4! \times 5 \times 4 \times 3$ = 1 440</p> <p>OR/OF</p> <p>10 Options: F M F M F M F M F M F M F F F F M F M F M F M F M F F M M F M F F M F M F M F F F M F M F F M F M M F F M F F M M F F M F M F M F F F M F M</p> <p>Hence $10 \times 4! \times 3! = 1440$</p>		F		F		F		F		<p>✓4! ✓$5 \times 4 \times 3$ ✓1 440</p> <p style="text-align: right;">(3)</p> <p>OR/OF</p> <p>✓$4! \times 3!$ ✓$\times 10$ ✓1 440</p> <p style="text-align: right;">(3)</p>
	F		F		F		F				
		[14]									
	TOTAL/TOTAAL: 150										