



**NATIONAL
SENIOR CERTIFICATE**

GRADE 11

NOVEMBER 2022

MATHEMATICS P1

MARKS: 150

TIME: 3 hours



This question paper consists of 8 pages.

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. This question paper consists of TEN questions. Answer ALL the questions.
2. Clearly show ALL calculations, diagrams, graphs, et cetera that you have used in determining your answers.
3. You may use an approved scientific calculator (non-programmable and non-graphical), unless stated otherwise.
4. Answers only will not necessarily be awarded full marks.
5. If necessary, round off answers to TWO decimal places, unless stated otherwise.
6. Diagrams are NOT necessarily drawn to scale.
7. Number the answers correctly according to the numbering system used in this question paper.
8. Write neatly and legibly.



QUESTION 1

1.1 Solve for x :

1.1.1 $x^2 + 5x - 6 = 0$ (3)

1.1.2 $5x^2 + x - 3 = 0$ (correct to 2 decimal places) (3)

1.1.3 $(2x - 1)(x + 3) \geq -3$ (5)

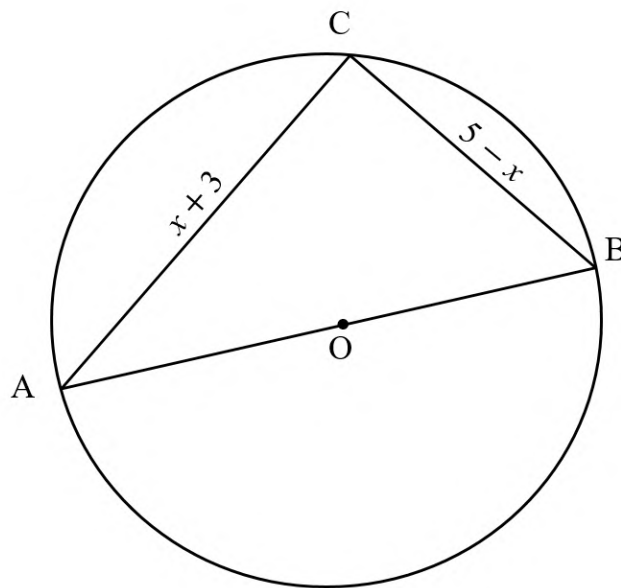
1.1.4 $\sqrt{x} - \sqrt{x - 5} = 1$ (4)

1.2 Solve for x and y simultaneously if:

$2x - y = 1$ and $y^2 - xy = x + 7$ (6)

1.3 The diagram below shows a circle with centre O , that passes through the vertices of ΔABC .

AB is the diameter, $AC = (x + 3)$ units and $BC = (5 - x)$ units.



Calculate the value of x that will make AB , the diameter, a minimum length. (5)

[26]

QUESTION 2

2.1 Simplify:

$$\frac{2^{2x} - 4^{x+1}}{4^x + 2^{2x-1}} \quad (4)$$

2.2 Solve for x :

2.2.1 $3x^{\frac{3}{2}} = 81$ (5)

2.2.2 $2^x + 5 = 3 \cdot 2^{1-x}$ (5)

2.3 Given: $\frac{1 + \sqrt{2}}{3 + 2\sqrt{2}} = \sqrt{a} + b$.

Determine the values of a and b , WITHOUT using a calculator. (5)
[17]**QUESTION 3**3.1 Given the linear pattern: $-2 ; 3 ; 8 ; \dots$ 3.1.1 Determine the formula for the n^{th} term of the pattern. (2)3.1.2 Calculate the value of T_{18} . (2)

3.1.3 Which term in the pattern has a value of 473? (2)

3.2 In a linear pattern, $T_{11} = -19$ and $T_{23} = 65$. Determine the number of negative terms in the pattern. (5)

[11]

QUESTION 4Given the quadratic pattern: $204 ; 176 ; 150 ; 126 ; \dots$

4.1 Determine the next two terms of the pattern. (2)

4.2 Determine T_n , the general term of the pattern, in the form $T_n = an^2 + bn + c$. (4)4.3 Determine the value(s) of n if $T_n = 36$. (4)

4.4 Calculate ALL the negative terms in the pattern. (5)

[15]

QUESTION 5

Given: $f(x) = \frac{-2}{x-1} + 3.$

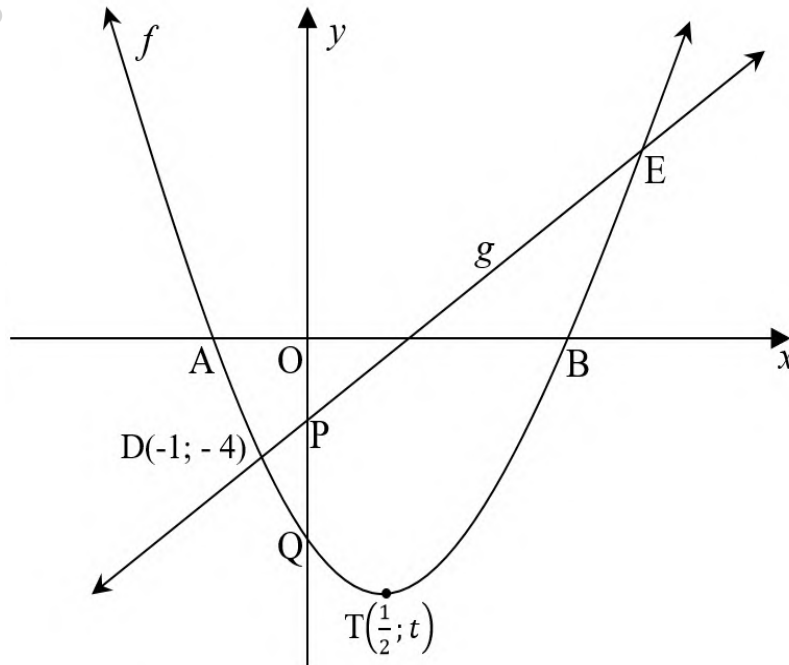
- 5.1 Write down the equations of the asymptotes of f . (2)
- 5.2 Determine the coordinates of the x - and y -intercepts of f . (3)
- 5.3 Draw a neat sketch of f , clearly indicating all intercepts with the axes and any asymptotes. (4)
- 5.4 Write down the equation of the axis of symmetry of f that has a negative gradient. (2)
- 5.5 The graph of $g(x) = ax + b$ is drawn parallel to the line of symmetry of f with a negative gradient. Determine the values of a and b given that g passes through the point $(5; -2)$. (3)
- 5.6 Determine the distance between the points of intersection of f and g . Leave your answer in surd form. (5)
- 5.7 Determine the equation of h , if $h(x) = -f(x+3)$. (2)

[21]



QUESTION 6

The diagram below shows the graphs of $f(x) = ax^2 + bx + c$ and $g(x) = 2x - 2$. The graphs intersect at $D(-1; -4)$ and E . f cuts the x -axis at A and B , the y -axis at Q and has a turning point at $T(\frac{1}{2}; t)$. g cuts the y -axis at P .



- 6.1 Given that $PQ = 4$ units, show that $a = 1$, $b = -1$ and $c = -6$. (5)
- 6.2 Determine the value of t . (3)
- 6.3 Determine the coordinates of A and B . (3)
- 6.4 Determine the coordinates of E , the other point of intersection of f and g . (4)
- 6.5 Write down the range of f . (2)
- 6.6 Determine the values of x for which $f(x) \cdot g(x) \leq 0$. (2)

[19]**QUESTION 7**

The point $R(-3; 9)$ lies on the graph of $f(x) = a^x + 1$.

- 7.1 Determine the value of a . (3)
- 7.2 A new function g is obtained when f is reflected about its asymptote. Write down the equation of g . (2)

[5]

QUESTION 8

- 8.1 The interest rate on an investment is x % per annum compounded monthly. Calculate the value of x given that the corresponding effective interest rate is 9,92%. (3)
- 8.2 A printer's value depreciates according to the reducing balance method, over a period of 7 years at a rate of 12% p.a., to R28 607,30. Calculate, to the nearest rand, the original price for the printer. (3)
- 8.3 Pratham made an initial deposit of R32 000 into an investment account that paid interest at 8,6% p.a. compounded monthly. Another deposit of R23 000 was made 3 years later. The interest rate changed to 10,5% p.a. compounded quarterly 4 years after the initial deposit.
- 8.3.1 How much was in Pratham's investment account at the end of 4 years? (5)
- 8.3.2 At the end of 6 years since he started his investment, Pratham decided to use all his balance as a deposit for a car that cost R220 000 and borrow the rest from a bank.
- How much did he need to borrow? (4)

[15]



QUESTION 9

9.1 Two events A and B are such that:

- $P(A) = 0,35$
- $P(A \text{ or } B) = 0,75$

Determine $P(B)$ if:

9.1.1 A and B are mutually exclusive (3)

9.1.2 A and B are independent (4)

9.2 130 learners were asked about their favourite social media platforms. They chose from Facebook (F), WhatsApp (W) and Instagram (I). The results are shown below:

- 63 learners like Facebook
- 81 learners like WhatsApp
- 37 learners like Instagram
- 18 learners like Facebook and WhatsApp but not Instagram
- 12 learners like WhatsApp and Instagram but not Facebook
- x learners like Instagram and Facebook but not WhatsApp
- x learners like Instagram only
- y learners like WhatsApp only
- 11 learners like all three
- 8 learners did not like any of the social media platforms

9.2.1 Represent the above information on a Venn diagram. (4)

9.2.2 Determine the values of x and y . (3)

9.2.3 Calculate the probability that a learner chosen at random likes only ONE social medium platform from the three mentioned above. (2)

[16]

QUESTION 10

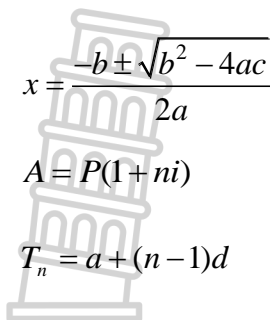
The probability that Lwandi chooses to do Mathematics in Grade 10 is 65%. If he does not choose Mathematics, the probability that he attains a distinction in Accounting is 20% but if he chooses Mathematics, the probability of achieving a distinction in Accounting is 60%.

Calculate the probability that Lwandi attains a distinction in Accounting.

[5]

TOTAL: 150

INFORMATION SHEET: MATHEMATICS



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

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

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

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

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

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

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

$$y = mx + c$$

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

In ΔABC : $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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

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

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

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

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

$$\bar{x} = \frac{\sum x}{n}$$

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

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

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

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

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

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

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

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

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

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

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

$$m = \tan \theta$$

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

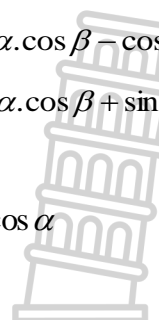
$$\cos(\alpha - \beta) = \cos \alpha \cdot \cos \beta + \sin \alpha \cdot \sin \beta$$

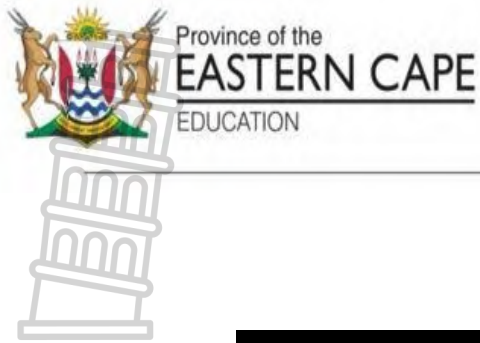
$$\sin 2\alpha = 2 \sin \alpha \cdot \cos \alpha$$

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

$$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$$

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





**NATIONAL
SENIOR CERTIFICATE/
NASIONALE
SENIOR SERTIFIKAAT**

GRADE/GRAAD 11

NOVEMBER 2022

**MATHEMATICS P1/WISKUNDE V1
MARKING GUIDELINE/NASIENRIGLYN**

MARKS/PUNTE: 150

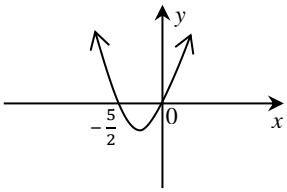


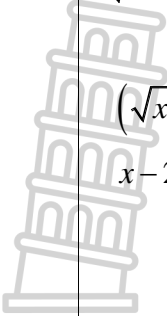

This marking guideline consists of 18 pages./
Hierdie nasienriglyn bestaan uit 18 bladsye.

NOTE/LET WEL:

- If a candidate answers a question TWICE, mark the FIRST attempt ONLY.
Indien 'n kandidaat 'n vraag TWEE keer beantwoord, merk SLEGS die EERSTE poging.
- Consistent accuracy applies in ALL aspects of the marking guideline.
Volgehoue akkuraatheid geld deurgaans in ALLE aspekte van die nasienriglyn.
- 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	$x^2 + 5x - 6 = 0$ $(x + 6)(x - 1) = 0$ $\therefore x = -6$ or / of $x = 1$	✓ factors / faktore ✓ ✓ answers / antwoorde (3)
1.1.2	$5x^2 + x - 3 = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $= \frac{-1 \pm \sqrt{1^2 - 4(5)(-3)}}{2(5)}$ $= \frac{-1 \pm \sqrt{61}}{10}$ $= 0,68$ or / of $-0,88$	✓ substitution / vervanging ✓ ✓ answers / antwoorde (3)
1.1.3	$(2x - 1)(x + 3) \geq -3$ $2x^2 + 5x - 3 \geq -3$ $2x^2 + 5x \geq 0$ $x(2x + 5) \geq 0$ $\therefore x \leq -\frac{5}{2}$ or / of $x \geq 0$	 ✓ $2x^2 + 5x - 3$ ✓ standard form / standaardvorm ✓ factors / faktore ✓ ✓ answers / antwoorde (5)

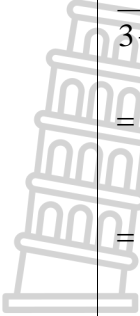
<p>1.1.4</p> 	$\sqrt{x} - \sqrt{x-5} = 1$ $\sqrt{x} - 1 = \sqrt{x-5}$ $(\sqrt{x} - 1)^2 = (\sqrt{x-5})^2$ $x - 2\sqrt{x} + 1 = x - 5$ $6 = 2\sqrt{x}$ $(6)^2 = (2\sqrt{x})^2$ $\therefore 4x = 36$ $x = 9$	<p>✓ $\sqrt{x} - 1 = \sqrt{x-5}$</p> <p>✓ squaring both sides <i>kwadreer beide kante</i></p> <p>✓ $x - 5 = x - 2\sqrt{x} + 1$</p> <p>✓ answer / <i>antwoord</i></p> <p style="text-align: right;">(4)</p>
<p>1.2</p>	$2x - y = 1 \quad (1)$ $y^2 - xy = x + 7 \quad (2)$ $y = 2x - 1 \quad (3)$ <p>Subst.(3) into 2 / <i>Verv.(3) in (2)</i></p> $(2x - 1)^2 - x(2x - 1) = x + 7$ $4x^2 - 4x + 1 - 2x^2 + x - x - 7 = 0$ $2x^2 - 4x - 6 = 0$ $x^2 - 2x - 3 = 0$ $(x - 3)(x + 1) = 0$ <p>$\therefore x = 3$ or / <i>of</i> $x = -1$</p> <p>$y = 2(3) - 1$ or / <i>of</i> $y = 2(-1) - 1$</p> <p>$\therefore y = 5$ or / <i>of</i> $y = -3$</p> <p style="text-align: center;">OR/OF</p> $2x - y = 1 \quad (1)$ $y^2 - xy = x + 7 \quad (2)$ $x = \frac{1+y}{2} \quad (3)$ <p>Subst.(3) into 2 / <i>Verv.(3) in (2)</i></p> $y^2 - y\left(\frac{1+y}{2}\right) = \left(\frac{1+y}{2}\right) + 7$ $2y^2 - y(1+y) = (1+y) + 14$ $2y^2 - y - y^2 = 1 + y + 14$ $y^2 - 2y - 15 = 0$ $(y - 5)(y + 3) = 0$ <p>$\therefore y = 5$ or / <i>of</i> $y = -3$</p> <p>$x = \frac{1+5}{2}$ or / <i>of</i> $x = \frac{1-3}{2}$</p> <p>$\therefore x = 3$ or / <i>of</i> $x = -1$</p>	<p>✓ $y = 2x - 1$</p> <p>✓ substitution / <i>vervanging</i></p> <p>✓ standard form / <i>standaardvorm</i></p> <p>✓ factors / <i>faktore</i></p> <p>✓ both x-values / <i>beide x-waardes</i></p> <p>✓ both y-values / <i>beide y-waardes</i></p> <p>✓ $x = \frac{1+y}{2}$</p>  <p>✓ substitution / <i>vervanging</i></p> <p>✓ standard form / <i>standaardvorm</i></p> <p>✓ factors / <i>faktore</i></p> <p>✓ both y-values / <i>beide y-waardes</i></p> <p>✓ both x-values / <i>beide x-waardes</i></p> <p style="text-align: right;">(6)</p>

<p>1.3</p> <p>$\hat{C} = 90^\circ$ (angle in a semi-circle) (hoek in halwe sirkel) \therefore By Pythagoras's Theorem <i>Stelling van Pythagoras:</i> $AB^2 = AC^2 + BC^2$ $= (x+3)^2 + (5-x)^2$ $= x^2 + 6x + 9 + 25 - 10x + x^2$ $= 2x^2 - 4x + 34$ $= 2(x^2 - 2x + 17)$ $= 2(x^2 - 2x + 1 - 1 + 17)$ $= 2(x-1)^2 + 32$ $\therefore x = 1$</p> <p style="text-align: center;">OR/OF</p> <p>AB is minimum when AB^2 is minimum $AB^2 = (x+3)^2 + (5-x)^2$ $= x^2 + 6x + 9 + 25 - 10x + x^2$ $= 2x^2 - 4x + 34$</p> <p>AB^2 is minimum at / AB^2 is 'n minimum by: $x = -\frac{b}{2a}$ $= \frac{-(-4)}{2(2)}$ $= 1$</p>	<p>✓ $\hat{C} = 90^\circ$</p> <p>✓ substitution / <i>vervanging</i></p> <p>✓ $2x^2 - 4x + 34$</p> <p>✓ completing the square <i>vierkantsvoltooiing</i></p> <p>✓ answer / <i>antwoord</i></p> <p>✓ statement / <i>stelling</i></p> <p>✓ substitution / <i>vervanging</i></p> <p>✓ $2x^2 - 4x + 34$</p> <p>✓ $x = -\frac{b}{2a}$</p> <p>✓ answer / <i>antwoord</i></p>
	<p>(5) [26]</p>



QUESTION 2/VRAAG 2

<p>2.1</p>	$\frac{2^{2x} - 4^{x+1}}{4^x + 2^{2x-1}}$ $= \frac{2^{2x} - 2^{2x+2}}{2^{2x} + 2^{2x-1}}$ $= \frac{2^{2x} - 2^{2x} \cdot 2^2}{2^{2x} + 2^{2x} \cdot 2^{-1}}$ $= \frac{2^{2x}(1 - 2^2)}{2^{2x}(1 + 2^{-1})} \text{ or / of } \frac{2^{2x}(1 - 4)}{2^{2x}(1 + \frac{1}{2})}$ $= \frac{-3}{\frac{3}{2}}$ $= -2$	<p>✓ 2^{2x+2} and/en 2^{2x}</p> <p>✓ inverse of exp. law <i>omgekeerde van eksp. wet</i></p> <p>✓ factorisation of numerator <i>faktorisering van teller</i></p> <p>✓ answer / <i>antwoord</i></p> <p style="text-align: right;">(4)</p>
<p>2.2.1</p>	$3x^{\frac{3}{2}} = 81$ $x^{\frac{3}{2}} = 27$ $\left(x^{\frac{3}{2}}\right)^{\frac{2}{3}} = (27)^{\frac{2}{3}}$ $\therefore x = 9$	<p>✓ $x^{\frac{3}{2}} = 27$</p> <p>✓ $\left(x^{\frac{3}{2}}\right)^{\frac{2}{3}} = (27)^{\frac{2}{3}}$</p> <p>✓ answer / <i>antwoord</i></p> <p style="text-align: right;">(3)</p>
<p>2.2.2</p>	$2^x + 5 = 3 \cdot 2^{1-x}$ $2^x + 5 = 3 \cdot 2 \cdot 2^{-x}$ $2^x + 5 = \frac{3 \cdot 2}{2^x}$ $(2^x)^2 + 5 \cdot 2^x - 6 = 0$ $(2^x + 6)(2^x - 1) = 0$ $\therefore 2^x \neq -6 \quad \text{or / of} \quad 2^x = 1$ $2^x = 2^0$ $\therefore x = 0$	<p>✓ inverse of exp. law <i>omgekeerde van eksp. wet</i></p> <p>✓ multiplying by 2^x <i>maal met 2^x</i></p> <p>✓ factors / <i>faktore</i></p> <p>✓ both answers/<i>beide antwoorde</i></p> <p>✓ selection / <i>keuse</i></p> <p style="text-align: right;">(5)</p>

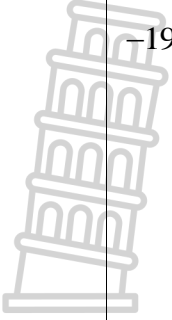

2.3	 $\frac{1+\sqrt{2}}{3+2\sqrt{2}}$ $= \frac{(1+\sqrt{2})(3-2\sqrt{2})}{(3+2\sqrt{2})(3-2\sqrt{2})}$ $= \frac{3-2\sqrt{2}+3\sqrt{2}-2.2}{3^2-(2\sqrt{2})^2}$ $= \frac{\sqrt{2}-1}{9-8}$ $= \sqrt{2}-1$ $\therefore a=2, \quad b=-1$	<p>✓ rationalising the denominator <i>rasionalisering van die noemer</i></p> <p>✓ simplification / <i>vereenvoudiging</i></p> <p>✓ $\sqrt{2}-1$ ✓ $a=2$ ✓ $b=-1$</p> <p>(5)</p>
		[17]



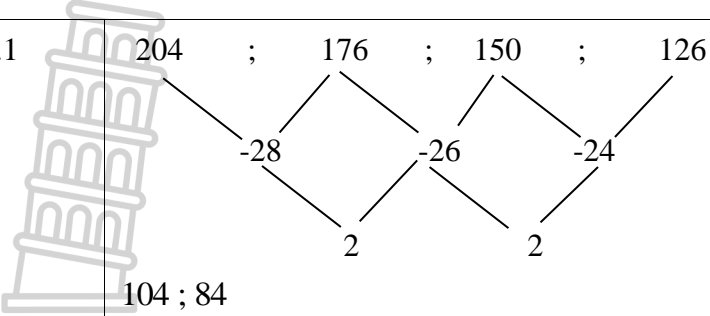
QUESTION 3/VRAAG 3

3.1.1	$-2 ; 3 ; 8 ; \dots$ $T_n = 5n - 7$	$\checkmark 5n \quad \checkmark -7$ (2)
3.1.2	$T_n = 5n - 7$ $T_{18} = 5(18) - 7$ $= 83$	\checkmark substitution / <i>vervanging</i> $\checkmark 83$ (2)
3.1.3	$T_n = 5n - 7$ $473 = 5n - 7$ $480 = 5n$ $\therefore n = 96$	\checkmark substitution / <i>vervanging</i> \checkmark answer / <i>antwoord</i> (2)

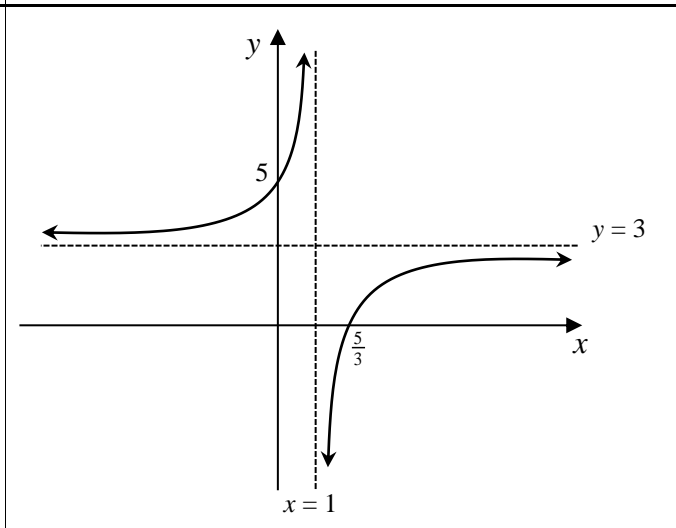




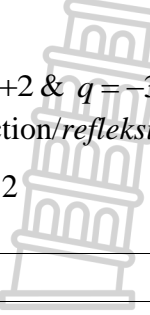
<p>3.2</p> 	<p> $T_{11} = -19$ $T_{23} = 65$ $-19 ; a ; b ; c ; e ; \dots ; 65$ $a - (-19) = b - a = c - b = \dots = d$ \therefore There are 12 common differences / <i>Daar is 12 gemeenskaplike verskille</i> $\therefore 12d = 65 - (-19)$ $12d = 84$ $\therefore d = 7$ $\therefore T_n = 7n + b$ $-19 = 7(11) + b$ or / of $65 = 7(23) + b$ $\therefore b = -96$ $\therefore T_n = 7n - 96$ For negative terms : $T_n < 0$ <i>Vir negatiewe terme :</i> $\therefore 7n - 96 < 0$ $7n < 96$ $\therefore n < 13,71$ \therefore Number of negative terms = 13 <i>Aantal negatiewe terme</i> <p style="text-align: center;">OR/OF</p> $12d = 65 - (-19)$ $d = \frac{84}{12}$ $= 7$ But / <i>Maar</i> : T_1 to T_{11} are all negative / <i>almal negatief</i> $T_{12} = -19 + 7 = -12$ $T_{13} = -12 + 7 = -5$ $T_{14} = -5 + 7 = 2$ \therefore There are 13 negative terms <i>Daar is 13 negatiewe terme</i> </p>	<p> $\checkmark 12d = 65 - (-19)$ $\checkmark d = 7$ $\checkmark T_n = 7n - 96$ $\checkmark 7n - 96 < 0$ $\checkmark n = 13$ <p style="text-align: center;">OR/OF</p> $\checkmark 12d = 65 - (-19)$ $\checkmark d = 7$ $\checkmark T_1$ to T_{11} are all negative / <i>is almal negatief</i> $\checkmark T_{12} = -12$ & $T_{13} = -5$ \checkmark answer / <i>antwoord</i> (5) </p> 
		[11]

QUESTION 4/VRAAG 4

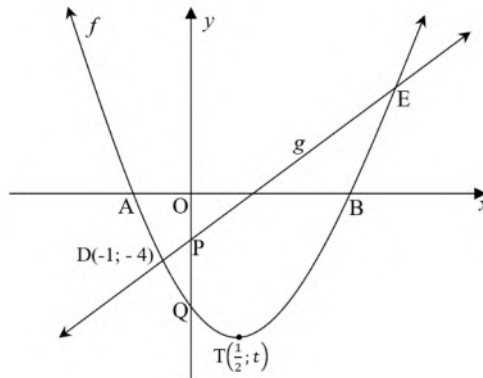
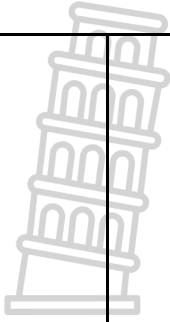
<p>4.1</p>  <p>104 ; 84</p>		<p>✓ 104 ✓ 84</p> <p>(2)</p>
<p>4.2</p>	$2a = 2 \quad 3a + b = -28 \quad a + b + c = -12$ $\therefore a = 1 \quad 3(1) + b = -28 \quad 1 - 31 + c = 204$ $b = -31 \quad c = 234$ $\therefore T_n = n^2 - 31n + 234$	<p>✓ $a = 1$</p> <p>✓ $b = -31$</p> <p>✓ $c = 234$</p> <p>✓ $T_n = n^2 - 31n + 234$</p> <p>(4)</p>
<p>4.3</p>	$n^2 - 31n + 234 = 36$ $n^2 - 31n + 198 = 0$ $n = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \quad \text{or / of } (n-9)(n-22) = 0$ $= \frac{-(-31) \pm \sqrt{(-31)^2 - 4(1)(198)}}{2(1)}$ $= \frac{31 \pm \sqrt{169}}{2}$ $\therefore n = 9 \quad \text{or / of } n = 22$	<p>✓ $n^2 - 31n + 234 = 36$</p> <p>✓ subst. into formule / factors verv. in formule / faktore</p> <p>✓ $n = 9$ ✓ $n = 22$</p> <p>(4)</p>
<p>4.4</p>	$n^2 - 31n + 234 = 0 \quad \text{or / of } (n-13)(n-18) = 0$ $n = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $= \frac{-(-31) \pm \sqrt{(-31)^2 - 4(1)(234)}}{2(1)}$ $= \frac{31 \pm \sqrt{25}}{2}$ $\therefore n = 13 \quad \text{or / of } n = 18$ $\therefore T_{14} \text{ \& } T_{17} = -4$ $T_{15} \text{ \& } T_{16} = -6$	<p>✓ $T_n = 0$</p> <p>✓ method / metode subst. into formule / factors verv. in formule / faktore</p> <p>✓ $n = 13$ and / en $n = 18$</p> <p>✓ -4</p> <p>✓ -6</p> <p>(5)</p>
		<p>[15]</p>

QUESTION 5/VRAAG 5

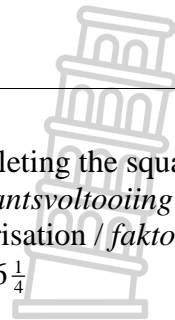
5.1	$x=1$ $y=3$	✓ $x=1$ ✓ $y=3$ (2)
5.2	$0 = \frac{-2}{x-1} + 3$ $\frac{2}{x-1} = 3$ $3(x-1) = 2$ $x = \frac{5}{3}$ $y = \frac{-2}{x-1} + 3$ $= \frac{-2}{0-1} + 3$ $= 5$ <p>∴ Intercepts are at / Afsnitte is by: $(\frac{5}{3}; 0)$ and / en $(0; 5)$</p>	✓ $y=0$ ✓ $x = \frac{5}{3}$ ✓ $y=5$ (3)
5.3		✓ x -intercept / x -afsnit ✓ y -intercept / y -afsnit ✓ asymptotes / <i>asimptote</i> ✓ shape & quadrants <i>vorm & kwadrante</i> (4)
5.4	$y = -(x-1) + 3$ $= -x + 4$	✓✓ $y = -x + 4$ (2)

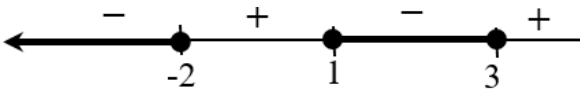
<p>5.5</p> 	$g(x) = -x + b$ $-2 = -(5) + b \quad \text{OR/OF}$ $\therefore b = 3$ $g(x) = -x + 3$ $y - y_1 = m(x - x_1)$ $y + 2 = -1(x - 5)$ $\therefore y = g(x) = -x + 3$	<p>✓ $a = -1$</p> <p>✓ substitution / <i>vervang</i></p> <p>✓ $b = 3$</p> <p>(3)</p>
<p>5.6</p> 	$f(x) = g(x)$ $\frac{-2}{x-1} + 3 = -x + 3$ $\frac{-2}{x-1} = -x$ $-x(x-1) = -2$ $-x^2 + x + 2 = 0$ $x^2 - x - 2 = 0$ $(x+1)(x-2) = 0$ $\therefore x = -1 \text{ or / of } x = 2$ $\therefore y = -(-1) + 3 \text{ or / of } y = -(2) + 3$ $= 4 \qquad \qquad \qquad = 1$ <p>Points of intersection / <i>Snypte by</i> :</p> <p>$(-1; 4)$ and / <i>en</i> $(2; 1)$</p> $\therefore d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $= \sqrt{(2 - (-1))^2 + (1 - 4)^2}$ $= \sqrt{18} = 3\sqrt{2}$	<p>✓ equating/<i>gelykstel</i>: $f(x) = g(x)$</p> <p>✓ standard form / <i>standaardvorm</i></p> <p>✓ both sets of coordinates <i>beide pare van koördinate</i></p> <p>✓ substitution into correct formula / <i>vervang in die korrekte formule</i></p> <p>✓ answer / <i>antwoord</i></p> <p>(5)</p>
<p>5.7</p>	$h(x) = -f(x+3)$ $= \frac{2}{(x+3)-1} - 3$ $= \frac{2}{x+2} - 3$	 <p>✓ $a = +2$ & $q = -3$ (reflection/<i>refleksie</i>)</p> <p>✓ $x + 2$</p> <p>(2)</p>
		<p>[21]</p>

QUESTION 6/VRAAG 6



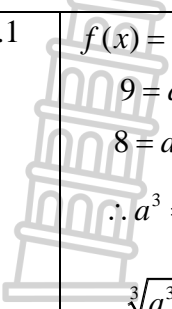
<p>6.1</p>	<p>$f(x) = ax^2 + bx + c$ P is at/by: $(0; -2)$ Q is at/by: $(0; -6)$ $\therefore f(x) = ax^2 + bx - 6$ $-4 = (-1)^2 a + (-1)b - 6$ $2 = a - b \dots \dots \dots (1)$ At TP/By DP: $x = \frac{-b}{2a}$ $\frac{1}{2} = \frac{-b}{2a}$ $\therefore 2a = -2b$ $a = -b \dots \dots \dots (2)$ $\therefore 2 = -b - b$ $2 = -2b$ $b = -1$ $\therefore a = -(-1)$ $= 1$</p>	<p>✓ $c = -6$ ✓ $a - b = 2$ ✓ substitute for x / <i>vervang vir x</i> ✓ $a = -b$ ✓ values of a and b. <i>waardes van a en b</i></p> <p style="text-align: right;">(5)</p>
<p>6.2</p>	<p>$f(x) = x^2 - x - 6$ $= x^2 - x + \frac{1}{4} - \frac{1}{4} - 6$ $= (x - \frac{1}{2})^2 - 6\frac{1}{4}$ $t = -6\frac{1}{4}$</p> <p style="text-align: center;">OR/OF</p> <p>$f(x) = x^2 - x - 6$ $\therefore y = (\frac{1}{2})^2 - (\frac{1}{2}) - 6$ $= -6\frac{1}{4}$ $\therefore t = -6\frac{1}{4}$</p>	<p>✓ completing the square <i>vierkantsvoltooiing</i> ✓ factorisation / <i>faktorisering</i> ✓ $t = -6\frac{1}{4}$</p> <p style="text-align: center;">OR/OF</p> <p>✓ $f(\frac{1}{2})$ ✓ $y = -6\frac{1}{4}$ ✓ $t = -6\frac{1}{4}$</p> <p style="text-align: right;">(3)</p>



<p>6.3</p>	$f(x) = x^2 - x - 6$ $0 = (x-3)(x+2)$ $\therefore x = 3$ or / of $x = -2$ $\therefore A(-2;0)$ and/en $B(3;0)$	<p>✓ factors / <i>faktore</i></p> <p>✓ $A(-2;0)$ ✓ $B(3;0)$</p> <p>(3)</p>
<p>6.4</p>	$f(x) = g(x)$ $x^2 - x - 6 = 2x - 2$ $x^2 - 3x - 4 = 0$ $(x-4)(x+1) = 0$ $\therefore x = 4$ or / of $x = -1$ $y = 2(4) - 2$ $= 6$ $\therefore E(4;6)$	<p>✓ equating $f(x)$ and $g(x)$ <i>gelykstel van $f(x)$ en $g(x)$</i></p> <p>✓ standard form / <i>standaardvorm</i></p> <p>✓ x-values / x-waardes</p> <p>✓ coordinates of E <i>koördinate van E</i></p> <p>(4)</p>
<p>6.5</p>	$y \geq -6\frac{1}{4}$ or / of $y \geq t$ $y \in [-6\frac{1}{4}; \infty)$ or / of $y \in [t; \infty)$	<p>✓ ✓ answer / <i>antwoord</i></p> <p>(2)</p>
<p>6.6</p>	$g(x) = 2x - 2$ $\therefore 0 = 2x - 2$ $\therefore x = 1$ $x \leq -2$ or / of $1 \leq x \leq 3$ <p style="text-align: center;">OR/OF</p>  <p>$\therefore x \leq -2$ or / of $1 \leq x \leq 3$</p>	<p>✓ $x \leq -2$ ✓ $1 \leq x \leq 3$</p> <p>✓ $x \leq -2$ ✓ $1 \leq x \leq 3$</p> <p>(2)</p>
		<p>[19]</p>

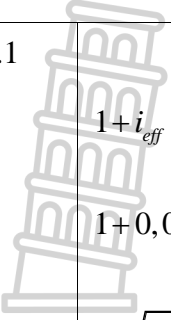


QUESTION 7/VRAAG 7

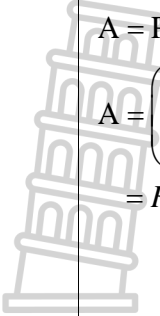
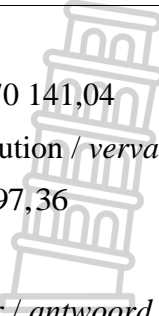
7.1	 $f(x) = a^x + 1$ $9 = a^{-3} + 1$ $8 = a^{-3}$ $\therefore a^3 = \frac{1}{8}$ $\sqrt[3]{a^3} = \sqrt[3]{\frac{1}{8}}$ $\therefore a = \frac{1}{2}$	✓ substitution / <i>vervanging</i> ✓ $a^3 = \frac{1}{8}$ ✓ answer / <i>antwoord</i> (3)
7.2	$g(x) = -\left(\frac{1}{2}\right)^x + 1$	✓ $-\left(\frac{1}{2}\right)^x$ ✓ +1 (2)
		[5]



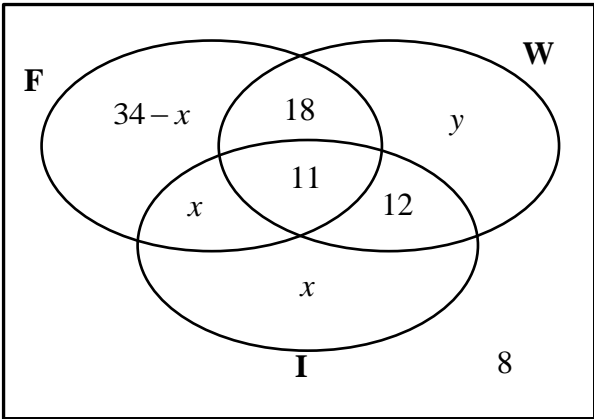
QUESTION 8/VRAAG 8

<p>8.1</p>	 $1 + i_{eff} = \left(1 + \frac{i_{nom}}{12}\right)^{12}$ $1 + 0,0992 = \left(1 + \frac{x}{12}\right)^{12}$ $\therefore \sqrt[12]{1,0992} = \sqrt[12]{\left(1 + \frac{x}{12}\right)^{12}}$ $\therefore x = \left(\sqrt[12]{1,0992} - 1\right) \times 12$ $= 0,0950$ <p>\therefore The rate is 9,5% p.a. compounded monthly. Die koers is 9,5% p.j. maandeliks saamgestel.</p>	<p>✓ substitution / <i>vervanging</i></p> <p>✓ simplification / <i>vereenvoudiging</i></p> <p>✓ answer / <i>antwoord</i></p> <p style="text-align: right;">(3)</p>
<p>8.2</p>	$A = P(1 - i)^n$ $28607,30 = P(1 - 12\%)^7$ $P = \frac{A}{(1 - i)^n}$ $= \frac{28607,30}{(1 - 12\%)^7}$ $= R70000,00$	<p>✓ correct formula <i>korrekte formule</i></p> <p>✓ substitution / <i>vervanging</i></p> <p>✓ answer / <i>antwoord</i></p> <p style="text-align: right;">(3)</p>



8.3.1	 $A = P(1+i)^n$ $A = \left(\left(32000 \left(1 + \frac{0,086}{12} \right)^{36} \right) + 23000 \right) \left(1 + \frac{0,086}{12} \right)^{12}$ $= R70141,04$ <p style="text-align: center;">OR/OF</p> $A = P(1+i)^n$ $= 32000 \left(1 + \frac{0,086}{12} \right)^{48} + 23000 \left(1 + \frac{0,086}{12} \right)^{12}$ $= R70141,04$	$\checkmark i = \frac{0,082}{12}$ $\checkmark \left(32000 \left(1 + \frac{0,086}{12} \right)^{36} \right)$ $\checkmark +23000$ $\checkmark \times \left(1 + \frac{0,086}{12} \right)^{12}$ $\checkmark \text{ answer / antwoord}$ $\checkmark i = \frac{0,082}{12}$ $\checkmark \left(32000 \left(1 + \frac{0,086}{12} \right)^{48} \right)$ $\checkmark 23000 \left(1 + \frac{0,086}{12} \right)^{12}$ $\checkmark \text{ adding / optelling}$ $\checkmark \text{ answer / antwoord}$ <p style="text-align: right;">(5)</p>
8.3.2	$A = P(1+i)^n$ $= 70141,04 \left(1 + \frac{0,105}{4} \right)^8$ $= R86297,36$ <p>\therefore Loan / Lening : $R220000 - R86297,36$</p> $= R133702,64$	 $\checkmark P = R70\ 141,04$ $\checkmark \text{ substitution / vervanging}$ $\checkmark R86\ 297,36$ $\checkmark \text{ answer / antwoord}$ <p style="text-align: right;">(4)</p>
[15]		

QUESTION 9/VRAAG 9

<p>9.1.1</p>	<p>$P(A \text{ and/en } B) = 0$ $\therefore P(A \text{ or / of } B) = P(A) + P(B)$ $0,75 = 0,35 + P(B)$ $\therefore P(B) = 0,75 - 0,35$ $= 0,4 \text{ or / of } \frac{2}{5}$</p>	<p>✓ correct formula / <i>korrekte formule</i> ✓ substitution / <i>vervanging</i></p> <p>✓ answer / <i>antwoord</i></p> <p>(3)</p>
<p>9.1.2</p>	<p>$P(A \text{ and / en } B) = P(A) \times P(B)$ $\therefore P(A \text{ or/of } B) = P(A) + P(B) - P(A).P(B)$ $0,75 = 0,35 + P(B) - 0,35P(B)$ $0,4 = 0,65P(B)$ $\therefore P(B) = \frac{0,4}{0,65}$ $= \frac{8}{13}$</p>	<p>✓ correct formula / <i>korrekte formule</i> ✓ substitution / <i>vervanging</i></p> <p>✓ simplification / <i>vereenvoudiging</i> ✓ answer / <i>antwoord</i></p> <p>(4)</p>
<p>9.2.1</p>		<p>✓ 18, 12 and/en x (intersections) ✓ $34 - x$ ✓ x and/en y ✓ 8 and/en 11</p> <p>(4)</p>
<p>9.2.2</p>	<p>$y + 12 + 11 + 18 = 81$ $y = 40$ $x + x + 11 + 12 + y + 18 + 34 - x + 8 = 130$ $x + 83 + 40 = 130$ $\therefore x = 7$</p>	<p>✓ y-value / y-waarde ✓ equation / <i>vergelyking</i></p> <p>✓ x-value / x-waarde</p> <p>(3)</p>
<p>9.2.3</p>	<p>$P(\text{only one/slegs een}) = \frac{34-x}{130} + \frac{x}{130} + \frac{y}{130}$ $= \frac{27}{130} + \frac{7}{130} + \frac{40}{130}$ $= \frac{74}{130} = \frac{37}{65} \approx 0,57$</p>	<p>✓ method / <i>metode</i></p> <p>✓ answer / <i>antwoord</i></p> <p>(2)</p>
		<p>[16]</p>

QUESTION 10/VRAAG 10

10.	<p>$P(A) = P(MA) + P(\bar{M}A)$ $= (65\% \times 60\%) + (35\% \times 20\%)$ $= 46\%$ $= \frac{23}{50}$</p>	<p>✓ $P(A) = P(MA) + P(\bar{M}A)$ ✓ substitution / <i>vervanging</i> ✓ answer / <i>antwoord</i></p> <p>(5) [5]</p>
-----	--	---

TOTAL / TOTAAL: 150

