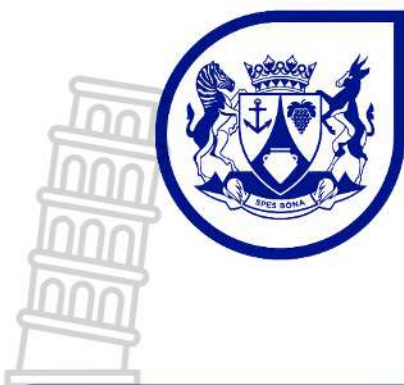




**Western Cape
Government**

FOR YOU

Education

EDUCATION DISTRICT

**MATHEMATICS
GRADE 12**

**PAPER 1
MAY/JUNE 2026**

MARKS: 150

TIME: 3 hours

This paper consists of 8 pages and an information sheet

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

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



QUESTION 1

1.1 Solve for x :

$$1.1.1 \quad 3x^2 - 2x = 0 \quad (3)$$

$$1.1.2 \quad x^2 - 7x = -3 \quad (\text{Correct to TWO decimal places}) \quad (4)$$

$$1.1.3 \quad (x - 1)(x - 4) \geq 10 \quad (4)$$

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

1.2 Imizamo Yethu Secondary School sells two types of tickets for a talent show:

- Adult tickets (x) cost R30
- Children's tickets (y) cost R10

The total amount collected from ticket sales is R220 on the first day. The number of children's tickets sold is four more than the square of the number of adult tickets.

Calculate the number of adult and children's tickets sold on day one? (6)

1.3 If it is given that $P_k^{\frac{2}{3}} = 3$; $P_y^{\frac{4}{3}} = 2$ and $P_x^{\frac{2}{3}} = 12$.

Prove that $x = \frac{ky}{4k + y}$. (4)

[25]

QUESTION 2

2.1 The first four terms of a quadratic pattern are: $-1 ; 4 ; 13 ; 26$.

2.1.1 Determine the next term of the quadratic pattern. (1)

2.1.2 Determine the general term of the quadratic pattern in the form $T_n = an^2 + bn + c$. (4)

2.1.3 Which term in the pattern has a value of 2413? (3)

2.2 The given sequence below has four terms, such that the first three terms, $T_1 ; T_2$ and T_3 form an arithmetic sequence and the last three terms $T_2 ; T_3$ and T_4 form a geometric sequence:

$$6 ; a ; b ; 16$$

Calculate the values of a and b . (5)

[13]

QUESTION 3

3.1 Given the geometric sequence: $-\frac{1}{9} ; p ; -1 ; \dots$

3.1.1 Calculate the possible values of p . (3)

3.1.2 If $p = \frac{1}{3}$, calculate the 11th term of the sequence. (3)

3.1.3 Write the sum of the first 16 positive terms of the sequence in sigma notation. (3)

3.1.4 Is the geometric series formed in QUESTION 3.1.3 convergent? Give reasons for your answer. (2)

3.2 In a certain geometric series, the constant ratio is 3, the first term is 1 and $T_n = t$.

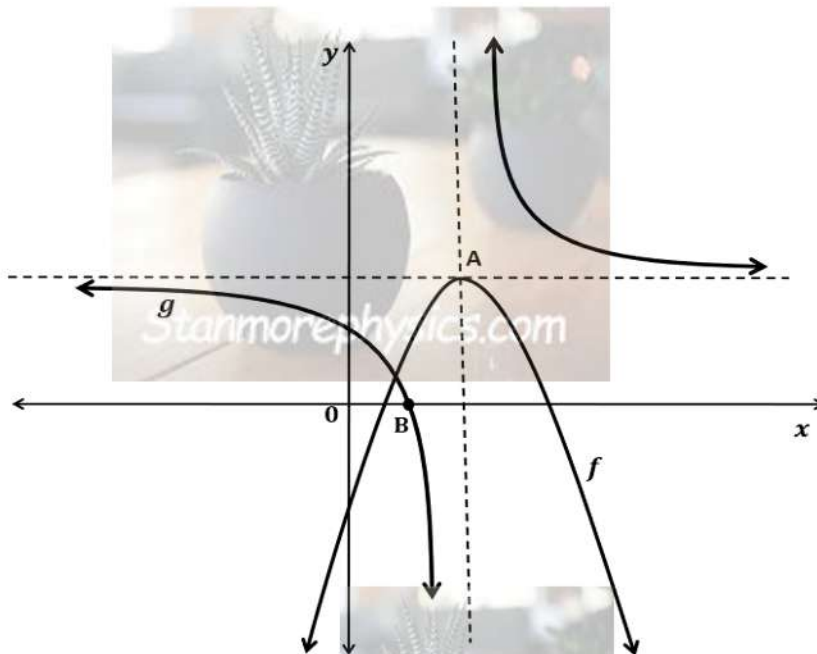
Express S_n in terms of t . (4)

[15]

QUESTION 4

- 4.1 Sketched below is the parabola f , with equation $f(x) = -x^2 + 6x - 5$ and a hyperbola g , with equation $(y - k)(x - m) = 4$.

- A, the turning point of f , lies at the point of intersection of the asymptotes of g .
- B(2 ; 0) is the x - intercept of g .

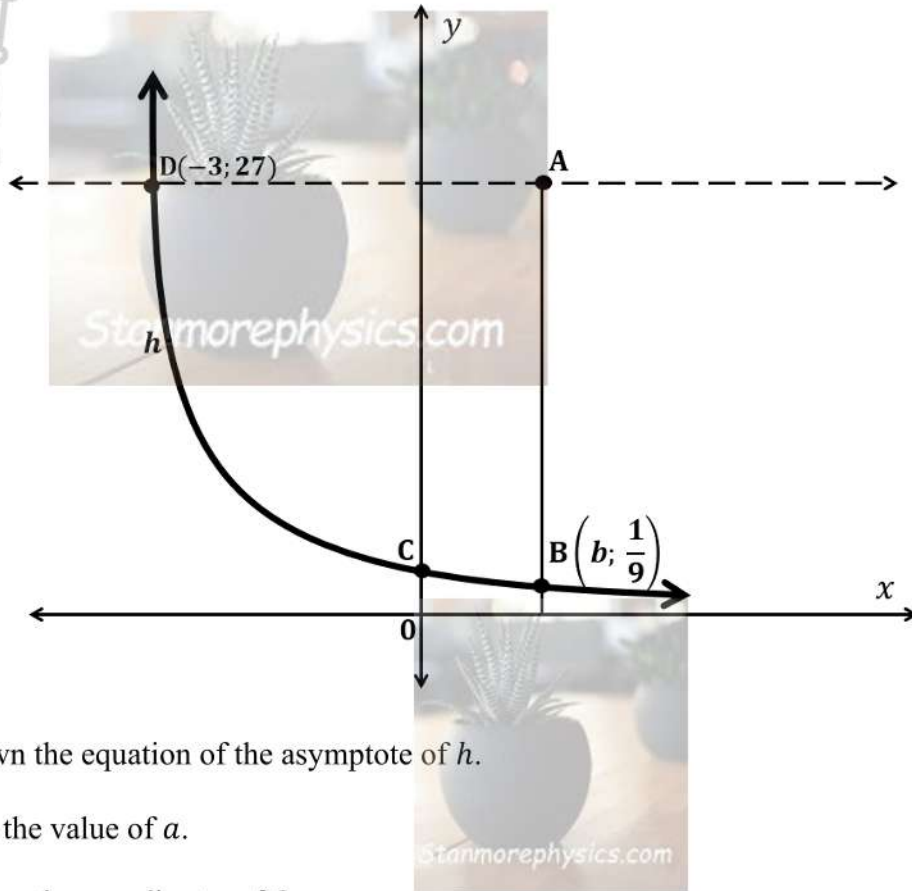


- 4.1.1 Show that the coordinates of A are (3 ; 4). (2)
- 4.1.2 Write down the range of f . (1)
- 4.1.3 Determine the values of k and m . (3)
- 4.1.4 Determine the equation of the vertical asymptote of the graph of h if $h(x) = g(x + 3)$. (1)
- 4.1.5 Determine the equation of the tangent to f at $x = 1$, in the form $y = mx + c$. (4)
- 4.1.6 For which value(s) of p will $f(x) = p$ have roots of opposite signs? (2)
- 4.1.7 Write down the values of x for which $f(x) \cdot g'(x) \leq 0$. (3)
- 4.1.8 Determine the minimum value of $t(x) = 3^{-f(x)+3}$. (2)
- 4.2 Draw a sketch graph of $y = ax^2 + bx + c$, where $a < 0$, $b < 0$, $c < 0$ and $ax^2 + bx + c = 0$ has two solutions that are equal. (4)

[22]

QUESTION 5

Sketched below is the graph of $h(x) = a^x$, $a > 0$. The point C is the y -intercept of h . The points D(-3; 27) and B(b ; $\frac{1}{9}$) lie on h .



- 5.1 Write down the equation of the asymptote of h . (1)
- 5.2 Calculate the value of a . (2)
- 5.3 Write down the coordinates of C. (1)
- 5.4 Determine the equation of h^{-1} in the form $y = \dots$ (2)
- 5.5 Write down the domain of h^{-1} . (1)
- 5.6 Determine the range of $p(x)$ if $p(x) = -h(x) + 3$. (2)
- 5.7 A is a point such that $AB \parallel y$ -axis and $AD \parallel x$ -axis. Calculate the size of $\widehat{ADB}$. (5)

[14]

QUESTION 6

- 6.1 Mahle's VW Polo costs R269 000 in 2020. Calculate the book value of the VW Polo after 4 years if it depreciates at 11% p.a. according to the straight-line method. (2)
- 6.2 At what annual percentage interest rate, compounded monthly, should a lump sum be invested in order for it to double in 6 years? (4)
- 6.3 Kabelo invests R30 000 in a Bitcoin savings account offering an interest rate of 14.5% p.a, compounded quarterly. The platform charges a 3% withdrawal fee on the final amount when he withdraws after 18 months. (4)
- 6.3.1 Calculate the investment amount Kabelo received after 18 months. (4)
- 6.3.2 Calculate the effective annual interest rate of the nominal rate offered. (2)
- 6.4 Mandy made an initial deposit of R25 000 into an investment account with an interest rate of 6,3% p.a compounded quarterly. After 2 years the interest rate changes to 6,9% p.a, compounded monthly. Four years after her initial deposit, Mandy withdrew R4 000 from her investment. How much will her investment be worth after 7 years? (4)

[16]**QUESTION 7**

- 7.1 Determine $f'(x)$ from first principles if $f(x) = -2x^2 + 6$ (5)
- 7.2 Determine:
- 7.2.1 $D_x[x^3 + 3x^2 - 6x + 5]$ (3)
- 7.2.2 $m'(x)$ if $m(x) = \frac{1}{x} + \frac{3x}{4}$ (3)
- 7.2.3 $f'(x)$ if $f(x) = \frac{x^3 - 27}{x^2 - 3x}$ (4)
- 7.2.4 $\frac{dx}{dy}$ if: $\sqrt[3]{y} \cdot x = 2y^2 + 3$ (5)
- 7.3 Given: $g(x) = bx^2, x > 0$ (5)
- Determine the value of b if it is given that $g'(3) = g^{-1}\left(\frac{9}{2}\right)$. (5)

[25]

QUESTION 8

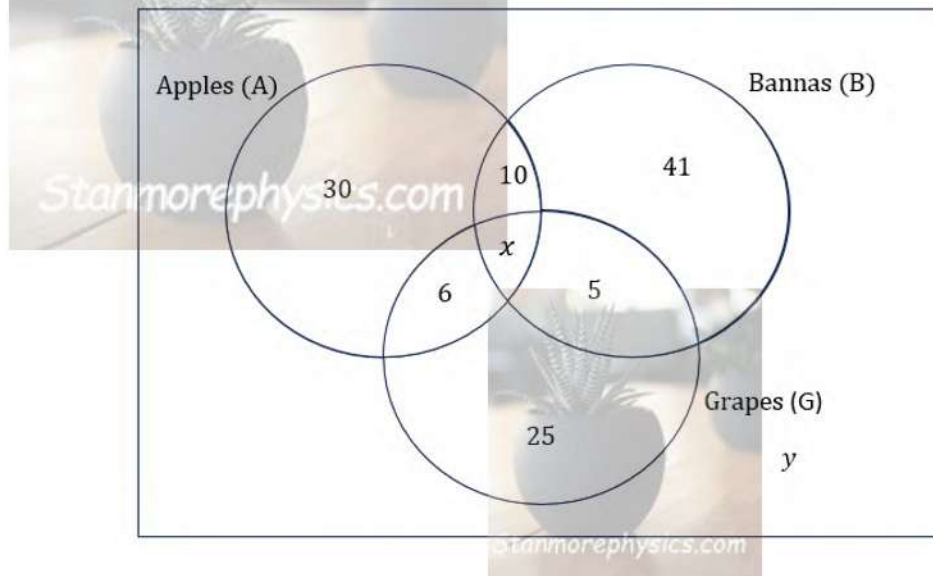
8.1 Two events A and B are such that:

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

Determine $P(B)$ if A and B are mutually exclusive.

(3)

8.2 A survey was conducted among 130 Grade 12 learners to establish which fruit they prefer to eat while they are studying for Mathematics examination. The results were summarised in the Venn diagram below. However, some information is missing.



8.2.1 If 29 learners prefer at least two types of fruits, calculate the value of x and y .

(4)

8.2.2 Determine the probability that a learner who does not eat grapes will either have another fruit or no fruit while studying for their Mathematics examination.

(3)

8.3 Events D and C are independent such that $P(D) = P(C) = x$ and $P(D \text{ or } C) = 0,84$. Determine the numerical value of x .

(5)

8.4 A bag contains only two colours of tennis balls, blue and yellow, in the ratio 1: 3. Two balls are picked at random, one after the other, without replacement. Calculate the number of balls in the bag given that the probability of picking first a blue ball and second a yellow ball is equal to $\frac{1}{5}$.

(5)

[20]**TOTAL: 150**

INFORMATION SHEET

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

$$y = mx + c$$

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

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

$$m = \tan \theta$$

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

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

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

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



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

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

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

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

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

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

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

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

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

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



**Western Cape
Government**

METRO NORTH EDUCATION DISTRICT

SCHOOL-BASED ASSESSMENT

JUNE DISTRICT COMMON EXAMINATION

MATHEMATICS P1 / Wiskunde V1
MARKING GUIDELINE FINAL / Nasienriglyne
FINAAL

JUNE 2026

Stanmorephysics.com

This Marking Guideline consists of 13 pages

GENERAL GUIDELINES FOR MARKING

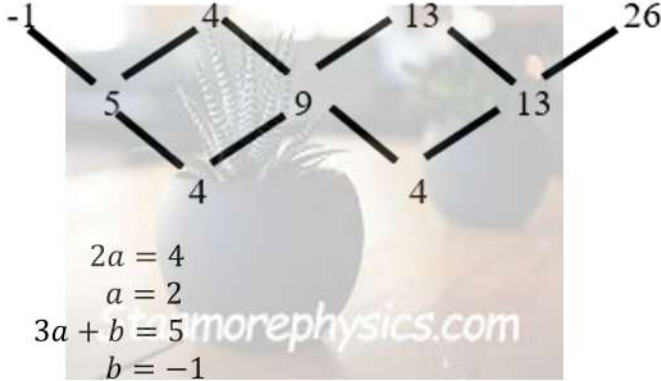
- If a learner makes more than one attempt at answering a question and does not cancel any of them out, only the first attempt will be marked irrespective of which of the attempt(s) may be the correct answer.
- Consistent Accuracy (CA) marking regarding calculations will be followed in the following cases:
 - Sub-question to sub-question: When a certain variable is incorrectly calculated in one sub-question and needs to be substituted into another sub-question full marks can be awarded for the subsequent sub-questions provided the methods used are correct and the calculations are correct.
- Assuming values/answers in order to solve a problem is unacceptable.

QUESTION/VRAAG 1

1.1.1	$x(3x - 2) = 0$ $x = 0$ or $x = \frac{2}{3}$	✓ factors/formula ✓✓ both answers (3)
1.1.2	$x^2 - 7x + 3 = 0$ $x = \frac{-(-7) \pm \sqrt{(-7)^2 - 4(1)(3)}}{2(1)}$ $x = 6,54$ or $x = 0,46$	✓ standard form ✓ substitution into correct formula ✓✓ answers (4)
1.1.3	$x^2 - 5x + 4 - 10 \geq 0$ $x^2 - 5x - 6 \geq 0$ $(x - 6)(x + 1) \geq 0$ $x \leq -1$ or $x \geq 6$	✓ standard form ✓ critical values ✓✓ answer (4)
1.1.4	$x - 1 = \sqrt{x + 5}$ $(x - 1)^2 = (\sqrt{x + 5})^2$ $x^2 - 2x + 1 = x + 5$ $x^2 - 3x - 4 = 0$ $(x - 4)(x + 1) = 0$ $x = 4$ or $x \neq -1$	✓ isolating surd ✓ squaring both sides ✓ standard form ✓ answer with selection (4)

1.2	$30x + 10y = 220$ $3x + y = 22$ $y = 22 - 3x \dots\dots\dots (1)$ $y = x^2 + 4 \dots\dots\dots (2)$ $x^2 + 4 = 22 - 3x$ $x^2 + 3x - 18 = 0$ $(x + 6)(x - 3) = 0$ $x \neq -6$ or $x = 3$ $y = 22 - 3(3)$ $\therefore y = 13$ 3 Adult tickets and 13 child tickets	$\checkmark 30x + 10y = 220$ $\checkmark y = x^2 + 4$ $\checkmark$ substitution/equating $\checkmark$ standard form $\checkmark$ selecting $x = 3$ $\checkmark y = 13$
1.3	$P_x^{\frac{2}{x}} = 3 \times 2^2$ $P_x^{\frac{2}{x}} = P_k^{\frac{2}{k}} \times P_y^{\frac{8}{y}}$ $\frac{2}{x} = \frac{2}{k} + \frac{8}{y}$ $\frac{2}{x} = \frac{2y + 8k}{ky}$ $x = \frac{ky}{4k + y}$	$\checkmark P_x^{\frac{2}{x}} = 3 \times 2^2$ $\checkmark$ substitution $\checkmark$ exponent rules $\checkmark$ simplification
		[25]

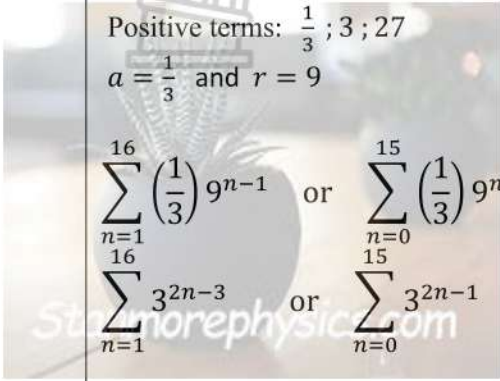
QUESTION/VRAAG 2

2.1.1	43	$\checkmark$ answer
2.1.2	 $2a = 4$ $a = 2$ $3a + b = 5$ $b = -1$ $a + b + c = -1$ $c = -2$ $T_n = 2n^2 - n - 2$	$\checkmark a = 2$ $\checkmark b = -1$ $\checkmark c = -2$ $\checkmark T_n = 2n^2 - n - 2$
		(4)

2.1.3	$2n^2 - n - 2 = 2413$ $2n^2 - n - 2415 = 0$ $(n - 35)(2n + 69) = 0$ $n = 35$ or $n \neq -\frac{69}{2}$	$\checkmark T_n = 2413$ $\checkmark$ standard form $\checkmark$ answer with selection (3)
2.2	For AP: $T_2 - T_1 = T_3 - T_2$ $a - 6 = b - a$ $2a - 6 = b \dots \dots \dots (1)$ For GP: $\frac{T_2}{T_1} = \frac{T_3}{T_2}$ $\frac{b}{a} = \frac{16}{b}$ $b^2 = 16a \dots \dots \dots (2)$ $(2a - 6)^2 = 16a$ $4a^2 - 24a + 36 - 16a = 0$ $4a^2 - 40a + 36 = 0$ $a^2 - 10a + 9 = 0$ $(a - 1)(a - 9) = 0$ $a = 1$ or $a = 9$ $b = 2(9) - 6 = 12$ Or $b = 2(1) - 6 = -4$	$\checkmark$ equation 1 $\checkmark$ equation 2 $\checkmark$ standard form $\checkmark$ both a values $\checkmark$ both b values (5)
		[13]

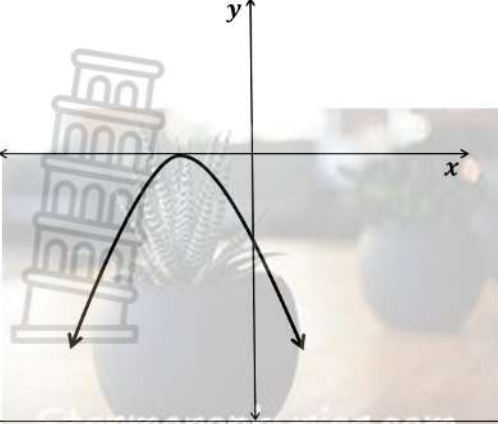
QUESTION/VRAAG 3

3.1.1.	$\frac{p}{-\frac{1}{9}} = \frac{-1}{p}$ $p^2 = \frac{1}{9}$ $p = \pm \frac{1}{3}$ OR GM: $p = \pm \sqrt{\left(-\frac{1}{9}\right)(-1)}$ $= \pm \frac{1}{3}$	$\checkmark$ ratio $\checkmark \checkmark$ answer (3)
		$\checkmark = \pm \sqrt{\left(-\frac{1}{9}\right)(-1)}$ $\checkmark \checkmark$ answer (3)

3.1.2	$-\frac{1}{9} : \frac{1}{3} ; -1$ $r = -3$ $T_n = ar^{n-1}$ $T_n = \left(-\frac{1}{9}\right)(-3)^{10}$ $T_n = -3^8 \text{ or } -6561$	✓ r ✓ substitute into correct formula ✓ answer (3)
3.1.3	 Positive terms: $\frac{1}{3} ; 3 ; 27$ $a = \frac{1}{3}$ and $r = 9$ $\sum_{n=1}^{16} \left(\frac{1}{3}\right) 9^{n-1} \text{ or } \sum_{n=0}^{15} \left(\frac{1}{3}\right) 9^n$ $\sum_{n=1}^{16} 3^{2n-3} \text{ or } \sum_{n=0}^{15} 3^{2n-1}$	✓ sequence ✓ a and r ✓ answer (3)
3.1.4	No, the series is not convergent $r = 9$ and for convergence $-1 < r < 1$	✓ No ✓ reason (2)
3.2	$r = 3$ $a = 1$ $T_n = 3^{n-1}$ But, $T_n = t$ $3^{n-1} = t$ $3^n = 3t$ $S_n = \frac{1(3^n - 1)}{3 - 1}$ $S_n = \frac{3t - 1}{2}$	✓ $T_n = 3^{n-1}$ ✓ $3^n = 3t$ ✓ substitution into correct formula ✓ answer (4)
		[15]

QUESTION/VRAAG 4

4.1.1	$f(x) = -x^2 + 6x - 5$ $x = \frac{6}{2(-1)}$ $x = 3$ OR $f'(x) = 0$ $-2x + 6 = 0$ $x = 3$ $y = -(3)^2 + 6(3) - 5$ $y = 4$ $A(3; 4)$	✓ method for determining x ✓ method for determining y (2)
4.1.2	Range: $y \leq 4$ Or $y \in (-\infty; 4]$	✓ answer (1)
4.1.3	$(y - k)(x - m) = 4$ $(y - k) = \frac{4}{(x - m)}$ $y = \frac{4}{(x - m)} + k$ $m = 3$ $k = 4$	 ✓ $y = \frac{4}{(x - m)} + k$ ✓ $m = 3$ ✓ $k = 4$ (3)
4.1.4	$\therefore x = 0$	✓ answer (1)
4.1.5	$f'(x) = -2x + 6$ $f'(1) = 4$ $y - 0 = 4(x - 1)$ $\therefore y = 4x - 4$	✓ derivative ✓ gradient ✓ substitution ✓ answer (4)
4.1.6	$p < -5$	✓ ✓ answer (2)
4.1.7	$-x^2 + 6x - 5 = 0$ $x^2 - 6x + 5 = 0$ $(x - 1)(x - 5) = 0$ $x = 1$ or $x = 5$ $1 \leq x \leq 5$ $x \neq 3$	✓ critical values ✓ $1 \leq x \leq 5$ ✓ $x \neq 3$ (3)
4.1.8	$= 3^{-4+3}$ $= \frac{1}{3}$	✓ ✓ answer (2)

4.2		✓ shape ✓ A/S is negative ✓ turning point on x-axis ✓ negative y-intercept (4) [22]
-----	---	---

QUESTION/VRAAG 5

5.1.	$y = 0$	$\checkmark y = 0$	(1)
5.2	$y = a^x$ $27 = a^{-3}$ at D(-3; 27) $3^3 = a^{-3}$ $\left(\frac{1}{3}\right)^{-3} = a^{-3}$ $a = \frac{1}{3}$ or $27 = a^{-3}$ $3^3 = a^{-3}$ or $27 = \frac{1}{a^3}$ or $3^3 = (a^{-1})^3$ $\left(\frac{1}{3}\right)^{-3} = a^{-3}$ $a^3 = \frac{1}{27}$ $3 = a^{-1}$ $a = \frac{1}{3}$ $a = \sqrt[3]{\frac{1}{27}}$ $a = \frac{1}{3}$	 $\checkmark$ substitute D(-3; 27) $\checkmark a = \frac{1}{3}$	(2)
5.3	C(0; 1)	$\checkmark C(0; 1)$	(1)
5.4	$y = \left(\frac{1}{3}\right)^x$ $x = \left(\frac{1}{3}\right)^y$ $y = \log_{\frac{1}{3}} x$ OR $y = \left(\frac{1}{3}\right)^x$ $x = \log_{\frac{1}{3}} y$ $y = \log_{\frac{1}{3}} x$	$\checkmark$ swop x and y $\checkmark$ log form $\checkmark$ log form $\checkmark$ swop x and y	(2) (2)

	OR $y = -\log_3 x$ OR $y = \log_3 x^{-1}$	
5.5	$x > 0$	✓ answer (1)
5.6	$y < 3$ Or $(-\infty; 3)$	✓ ✓ answer (2)
5.7	$B\left(b; \frac{1}{9}\right)$ $y = \left(\frac{1}{3}\right)^x$ $\frac{1}{9} = \left(\frac{1}{3}\right)^b$ substitute $B\left(b; \frac{1}{9}\right)$ $\left(\frac{1}{3}\right)^2 = \left(\frac{1}{3}\right)^b$ $b = 2$ $AD = 2 + 3 = 5$ $AB = 27 - \frac{1}{9} = \frac{242}{9} = 26,89$ $\tan \widehat{ADB} = \frac{26,89}{5}$ $\widehat{ADB} = 79,47^\circ$ OR $B\left(b; \frac{1}{9}\right)$ $y = \left(\frac{1}{3}\right)^x$ $\frac{1}{9} = \left(\frac{1}{3}\right)^b$ substitute $B\left(b; \frac{1}{9}\right)$ $\left(\frac{1}{3}\right)^2 = \left(\frac{1}{3}\right)^b$ $b = 2$ $AD = 2 + 3 = 5$ $DB = \sqrt{(2+3)^2 + \left(\frac{1}{9} - 27\right)^2}$ $DB = 27,35$ $\cos \widehat{ADB} = \frac{5}{27,35}$ $\widehat{ADB} = 79,47^\circ$	$\checkmark \frac{1}{9} = 3^b$ substitution $\checkmark b = 2$ $\checkmark AB = 26,89$ $\checkmark$ correct trig ratio $\checkmark$ answer (5) $\checkmark \frac{1}{9} = 3^b$ substitution $\checkmark b = 2$ $\checkmark DB = 27,35$ $\checkmark$ correct trig ratio $\checkmark$ answer (5)
		[14]

QUESTION/VRAAG 6

6.1	$A = 269\,000(1 - 0,11 \times 4)$ $A = R150\,640$	✓ subst into correct formula ✓ answer (2)
6.2	$A = P(1 + i)^n$ $2x = x \left(1 + \frac{r}{1200}\right)^{72}$ $\left(1 + \frac{r}{1200}\right)^{72} = 2$ $1 + \frac{r}{1200} = \sqrt[72]{2}$ $\frac{r}{1200} = 0,0096735$ $\therefore r = 11,61\%$	✓ $n = 72$ ✓ substitution ✓ ✓ answer (4)
6.3.1	$A = P(1 + i)^n$ $= R30\,000 \left(1 + \frac{14,5}{400}\right)^6 \times \frac{97}{100}$ $= R36\,031,33$	✓ i and n ✓ subst into correct formula ✓ $\times 0,97$ ✓ answer (4)
6.3.2	$1 + \frac{r}{100} = \left(1 + \frac{0,145}{4}\right)^4$ $\frac{r}{100} = \left(1 + \frac{0,145}{4}\right)^4 - 1$ $= 0,1530766$ $r = 15,31\%$	✓ subst into correct formula ✓ answer (2)
6.4	$A = 25000 \left(1 + \frac{0,063}{4}\right)^8 \left(1 + \frac{0,069}{12}\right)^{24}$ $- 4000 \left(1 + \frac{0,069}{12}\right)^{36}$ $= R35\,044,06$	✓ $25000 \left(1 + \frac{0,063}{4}\right)^8$ ✓ $\left(1 + \frac{0,069}{12}\right)^{60}$ ✓ $4000 \left(1 + \frac{0,069}{12}\right)^{36}$ ✓ answer (4)
		[16]

QUESTION/VRAAG 7

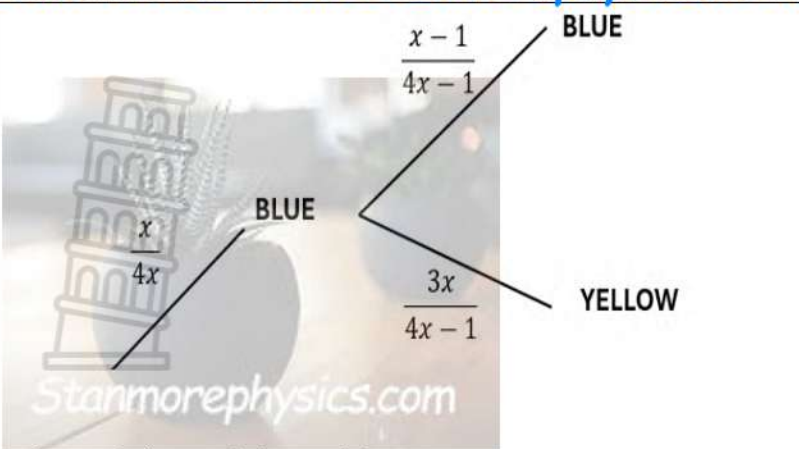
7.1	$f(x+h) = -2(x+h)^2 + 6$ $= -2x^2 - 4xh - 2h^2 + 6$ $f(x+h) - f(x) = -2x^2 - 4xh - 2h^2 + 6 - 2x^2 - 6$ $= -4xh - 2h^2$ $f'(x) = \lim_{h \rightarrow 0} \frac{-4xh - 2h^2}{h}$ $= \lim_{h \rightarrow 0} \frac{h(-4x - 2h)}{h}$ $= \lim_{h \rightarrow 0} (-4x - 2h)$ $= -4x$ OR $f'(x) = \lim_{h \rightarrow 0} \frac{-2x^2 - 4xh - 2h^2 + 6 - (-2x^2 + 6)}{h}$ $f'(x) = \lim_{h \rightarrow 0} \frac{-4xh - 2h^2}{h}$ $= \lim_{h \rightarrow 0} \frac{h(-4x - 2h)}{h}$ $= \lim_{h \rightarrow 0} (-4x - 2h)$ $= -4x$	✓ $f(x+h)$ ✓ simplify ✓ substitution ✓ factor of h ✓ answer ✓ $f(x+h)$ ✓ substitution ✓ simplify ✓ factor of h ✓ answer (5)
7.2.1	$= D_x[x^3 + 3x^2 - 6x + 5]$ $= 3x^2 + 6x - 6$	✓ $3x^2$ ✓ $6x$ ✓ -6 (3)
7.2.2	$m'(x) \text{ if } m(x) = \frac{1}{x} + \frac{3x}{4}$ $m(x) = x^{-1} + \frac{3x}{4}$ $m'(x) = -x^{-2} + \frac{3}{4}$	✓ x^{-1} ✓ $-x^{-2}$ ✓ $\frac{3}{4}$ (3)
7.2.3	$f(x) = \frac{x^3 - 27}{x^2 - 3x}$ $f(x) = \frac{(x-3)(x^2 + 3x + 9)}{x(x-3)}$ $f(x) = \frac{x^2 + 3x + 9}{x}$ $f(x) = x + 3 + 9x^{-1}$ $f'(x) = 1 - 9x^{-2}$	✓ factorising ✓ simplify ✓✓ answer (4)

7.2.4	$x = \frac{2y^2}{\sqrt[3]{y}} + \frac{3}{\sqrt[3]{y}}$ $= \frac{2y^2}{y^{\frac{1}{3}}} + \frac{3}{y^{\frac{1}{3}}}$ $= 2y^{\frac{5}{3}} + 3y^{-\frac{1}{3}}$ $\frac{dx}{dy} = \frac{10}{3}y^{\frac{2}{3}} - y^{-\frac{4}{3}}$	✓ x subject of formula ✓✓ simplify ✓✓ answer (5)
7.3	$g(x) = bx^2, x > 0$ $g'(x) = 2bx$ $g'(3) = 6b$ $g^{-1}: x = by^2, y > 0$ $y = \sqrt{\frac{x}{b}}$ $g^{-1}\left(\frac{9}{2}\right) = \sqrt{\frac{9}{2b}}$ $6b = \sqrt{\frac{9}{2b}}$ $36b^2 = \frac{9}{2b}$ $36b^3 = \frac{9}{2}$ $b^3 = \frac{1}{8}$ $b = \frac{1}{2}$	✓ $g^1(3) = 6b$ ✓ inverse of g ✓ $g^{-1}\left(\frac{9}{2}\right) = \sqrt{\frac{9}{2b}}$ ✓ equating $g' = g^{-1}$ ✓ answer (5)
		[25]

QUESTION/VRAAG 8

8.1	$P(A \text{ or } B) = P(A) + P(B)$ $0.75 = 0,35 + P(B)$ $\therefore P(B) = 0,40$	✓ $P(A \text{ and } B) = 0$ ✓ substitution ✓ answer (3)
8.2.1	$x + 10 + 6 + 5 = 29$ $x = 8$ $30 + 10 + 8 + 6 + 5 + 41 + 25 + y = 130$ $125 + y = 130$ $y = 5$	✓ method for x ✓ value of x ✓ method for y ✓ value of y (4)
8.2.2	$P(\text{no grapes or no fruit}) = \frac{41 + 10 + 30}{130} + \frac{5}{130}$ $= \frac{86}{130} \quad \text{or} \quad \frac{43}{65}$	✓ $41 + 10 + 30$ ✓ adding 5 ✓ answer (3)
8.3	$P(D \text{ or } C) = P(D) + P(C) - P(D).P(C)$ $0,84 = x + x - x.x$ $x^2 - 2x + 0,84 = 0$ $x = \frac{-(-2) \pm \sqrt{(-2)^2 - 4(1)(0,84)}}{2(1)}$ $x = 1,4 \text{ or } 0,6$ $\therefore x = 0,6$	✓ independence/ $P(D).P(C)$ $P(D \text{ and } C) = P(D).P(C)$ ✓ substitution ✓ standard form ✓ answers ✓ selection (5)

8.4



$$P(B \text{ and } Y) = P(B) \times P(Y)$$

$$\frac{1}{5} = \frac{x}{4x-1} \times \frac{3x}{4x-1}$$

$$\frac{1}{5} = \frac{3x^2}{16x^2 - 4x}$$

$$16x^2 - 4x = 15x^2$$

$$x^2 - 4x = 0$$

$$x(x - 4) = 0$$

$$x = 4$$

Number of balls = 16

OR

$$\frac{1}{5} = \frac{x}{4x-1} \times \frac{3x}{4x-1}$$

$$\frac{1}{5} = \frac{3x}{16x - 4}$$

$$16x - 4 = 15x$$

$$x = 4$$

Number of balls = 16



$$\checkmark \frac{x}{4x-1} \quad \checkmark \frac{3x}{4x-1}$$

✓ equating product to $\frac{1}{5}$ or 0,2

✓ x value

✓ answer

$$\checkmark \frac{x}{4x-1} \quad \checkmark \frac{3x}{4x-1}$$

✓ equating product to $\frac{1}{5}$ or 0,2

✓ x value

✓ answer

(5)

[20]

150