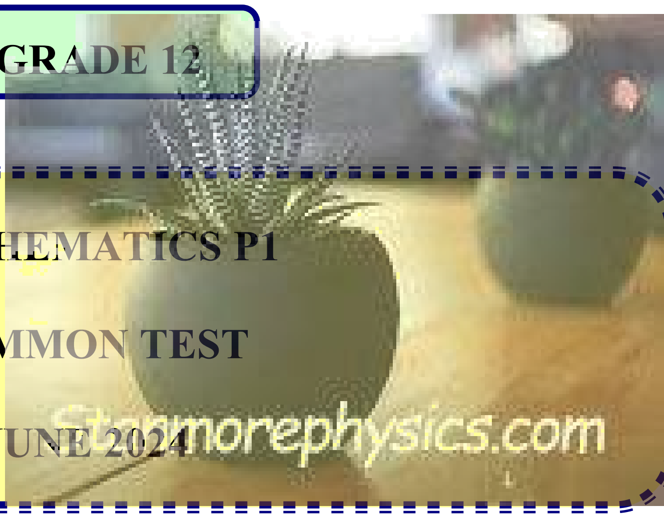
KWAZULU-NATAL PROVINCE

EDUCATION
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12



MATHEMATICS P1

COMMON TEST

JUNE 2024

MARKS: 150

TIME: 3 hours

This question 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 10 questions.

2. Answer ALL the questions.

3. Number the answers correctly according to the numbering system used in this question paper.

4. Clearly show ALL calculations, diagrams, graphs, etc. which you have used in determining your answers.

5. Answers only will NOT necessarily be awarded full marks.

6. You may use an approved scientific calculator (non-programmable and non-graphical), unless stated otherwise.

7. If necessary, round off answers correct to TWO decimal places, unless stated otherwise.

8. Write neatly and legibly.

QUESTION 1

1.1 Solve for x:

1.1.1 $5x(2x+7)(8-x)=0$ (3)

1.1.2 $x^2+13x+12=0$ (3)

1.1.3 $5x^2-7x+8=0$ (2)

1.1.4 $\sqrt{x-2}+2=x$ (5)

1.1.5 $x(x-1)<20$ (4)

1.1.6 $2^{1-2x}+7.2^{-x}-4=0$ (5)

1.2 The roots of a quadratic equation are $x=\dfrac{5\pm\sqrt{22-3m}}{2}$.

If m is an integer, determine the largest value of m for which these roots will be rational. (3)

1.3 Evaluate: $\dfrac{\sqrt{9^{2024}}}{\sqrt{9^{2023}}-\sqrt{9^{2025}}}$ (3)

1.4 Solve simultaneously for x and y:

$3+y-2x=0$ and $4x^2+y^2-2xy-7=0$ (6)

[34]

QUESTION 2

Given the quadratic sequence: $-5\ ;\ 12\ ;\ 27\ ....$

2.1 Determine the next two terms of the quadratic sequence. (2)

2.2 Determine the expression for the general term of the quadratic sequence. (4)

2.3 Which term(s) of the quadratic sequence has a value of 51? (3)

2.4 Calculate the value of $\sum_{n=3}^{10} T_n - \sum_{n=11}^{17} T_n$. (3)

[12]

QUESTION 3

3.1 Consider the arithmetic sequence: $-\frac{7}{2}\ ;\ -3\ ;\ -\frac{5}{2}\ldots$

3.1.1 Determine the general term of the sequence. (2)

3.1.2 The sum of the first n terms of this sequence is 675.
Calculate the value of n. (4)

3.1.3 A new sequence is formed by squaring each term of the given arithmetic sequence. Determine which term of the new sequence will have the smallest value. (3)

3.2 The first 3 terms of an infinite geometric series are given:
$(x+1)+2(x+1)^2+4(x+1)^3+\ldots..$

3.2.1 For which values of x will the series converge? (3)

3.2.2 If $x=-\frac{3}{4}$, determine the numerical value of the first term. (1)

3.2.3 Write the series in sigma notation. (3)

3.2.4 Calculate the sum to infinity of the series. (2)

[18]

QUESTION 4

It is given that the asymptotes of $f(x)=\frac{6}{x+p}+q$ intersect at $(4\ ;\ 3)$.

4.1 Write down the equation of f. (2)

4.2 Determine the intercepts of f with the axes. (3)

4.3 Sketch the graph of f, clearly showing all the intercepts with the axes and any asymptotes. (3)

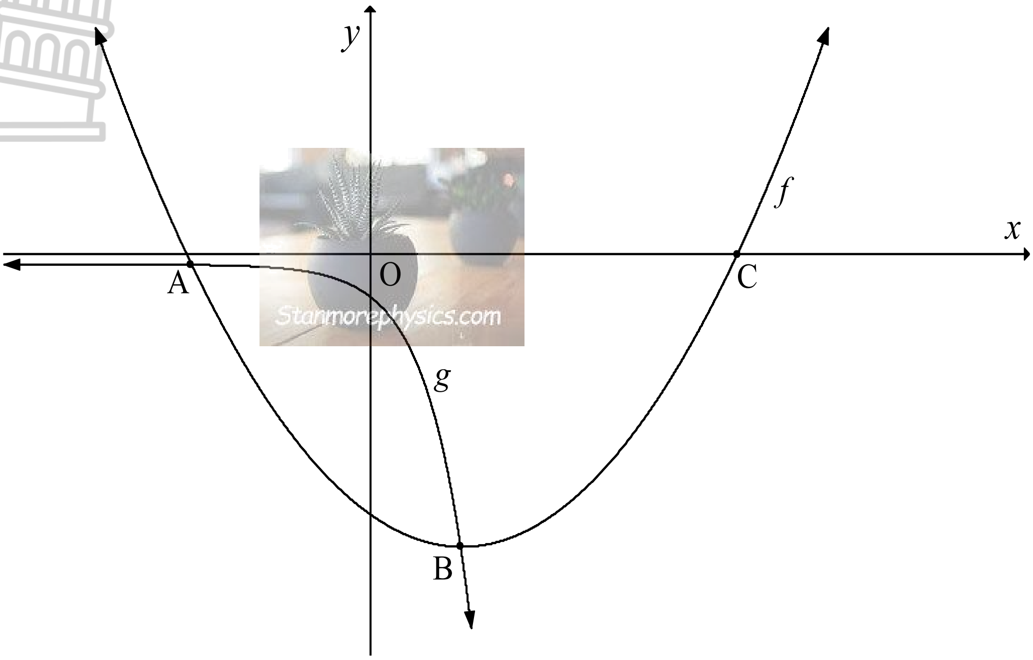
4.4 g is one of the axes of symmetry of f and it is a decreasing function. Determine the equation of g. (3)

4.5 $(-3\ ;\ 2)$ is a point on f. Determine the coordinates of the image of this point after reflection in g. (2)

[13]

QUESTION 5

The graphs of $f(x)=(x-1)^2-9$ and $g(x)=-a^x$ are drawn below. The graph of g cuts f at points A and B. B is the turning point of f.

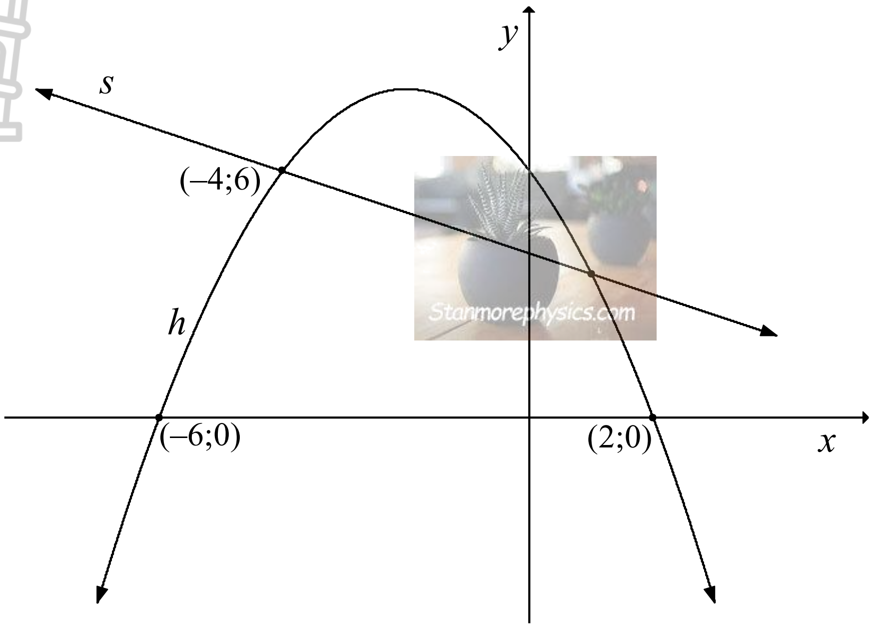


5.1	Write down the coordinates of B.	(2)
5.2	For which values of x are both graphs decreasing?	(1)
5.3	Determine the coordinates of the x-intercepts of f.	(3)
5.4	Show that $a=9$.	(1)
5.5	Determine the equation of g^{-1} in the form $y=.....$	(2)
5.6	Sketch the graph of g^{-1}, indicating any intercepts with the axes.	(2)
5.7	For which values of x is $g^{-1}(x)>2$?	(3)

[14]

QUESTION 6

The graphs of $h(x) = ax^2 + bx + c$ and $s(x) = mx + c$ are drawn below.
The x-intercepts of h are $(-6\ ;\ 0)$ and $(2\ ;\ 0)$.
$(-4\ ;\ 6)$ are the coordinates of one of the points of intersection between h and s.



6.1 Show that $a = -\frac{1}{2}$, $b = -2$ and $c = 6$. (4)

6.2 Determine the maximum value of $h(x)$. (3)

6.3 Determine the equation of s, if it is given that the gradient of s is equal to $-\frac{1}{2}$. (2)

6.4 For which values of k will $s(x) + k = h(x)$ have two real roots that are opposite in sign? (2)

6.5 Describe the translation that h will undergo to become p, where $p(x) = -\frac{1}{2}(x+2)^2$. (2)

[13]

QUESTION 7

7.1 Given: $f(x) = 2x^2 + 4$

7.1.1 Determine the derivative of f from first principles. (5)

7.1.2 A tangent to the graph of f has a gradient of -12. Determine the equation of the tangent. (4)

7.2 Determine the following:

7.2.1 $f^{/}(x)$ if $f(x) = \dfrac{2x^2 - 5x - 12}{x - 4}$ (3)

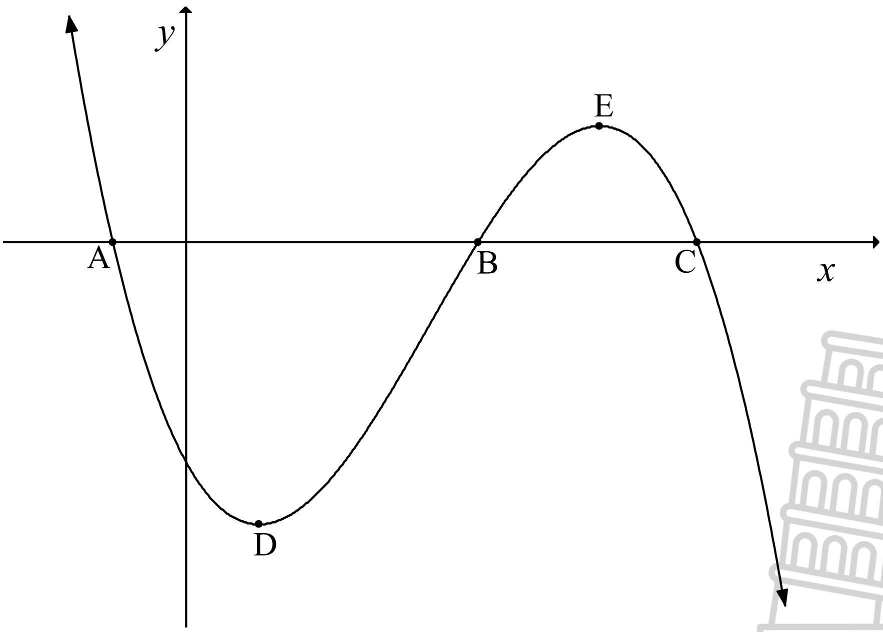
7.2.2 $D_x\left[\sqrt[5]{x^2} + x(x-9)\right]$ (4)

7.2.3 $\dfrac{dy}{dx}$ if $y = \dfrac{x}{6} - \dfrac{6}{x}$ (3)

[19]

QUESTION 8

The diagram shows the graph of $f(x) = -x^3 + 10x^2 - 17x - 28$.
A, B and C are the x-intercepts of the graph, and D and E the turning points.



8.1 Calculate the coordinates of A, B and C. (4)

8.2 Calculate the coordinates of D and E. (4)

8.3 Determine the values of x for which

8.3.1 the graph is concave down. (3)

8.3.2 $f^{/}(x)$ is increasing. (2)

[13]

QUESTION 9

Given: A cubic function f with the following properties.

- The x-intercepts of the graph of $f^{/}(x)$ are -2 and 4.
- $f^{//}(x) > 0$ for $x > 1$
- The graph of f has only one x-intercept.
- $f(0) > 0$

Use the given information to draw a sketch graph of f.

It is not necessary to indicate the values of the x- or y-intercepts of the graph, but only the x- coordinates of the turning points. (5)

[5]

QUESTION 10

The managers of a zoo are planning to build a fence around a crocodile enclosure.
The sketch below shows the shape of the enclosure.
The length of the straight sections will be x meters each, and the radius of the semi-circular end sections r meters each, as shown in the sketch.
The total area of the enclosure will be 400 m^2.

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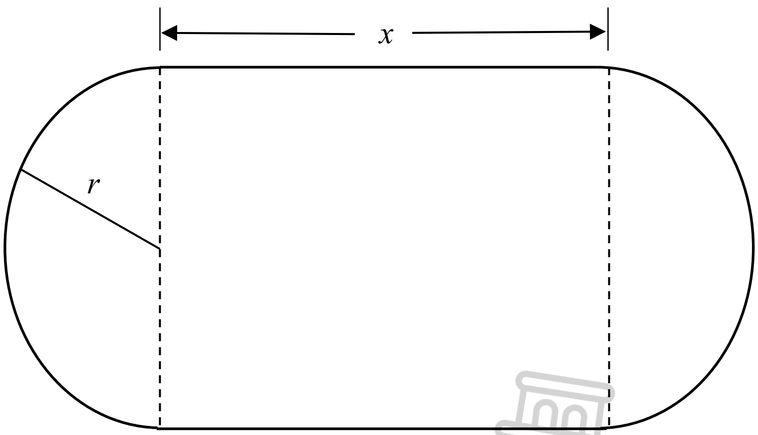

10.1 Show that $x = \dfrac{400 - \pi r^2}{2r}$ (2)

10.2 Show that the length of fencing required (L) can be expressed as $L(r) = \dfrac{400}{r} + \pi r$. (3)

10.3 Calculate the value of the radius that will ensure that the length of fencing required will be a minimum, so as to minimise the cost of building the fence. (4)

[9]

TOTAL: 150

INFORMATION SHEET: MATHEMATICS

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

$A = P(1+ni)$ $\quad$ $A = P(1-ni)$ $\quad$ $A = P(1-i)^n$ $\quad$ $A = P(1+i)^n$

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

$T_n = ar^{n-1}$ $\quad$ $S_n = \frac{a(r^n - 1)}{r-1}$; $r \neq 1$ $\quad$ $S_\infty = \frac{a}{1-r}$; $-1 < r < 1$

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

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

$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $\quad$ $\mathrm{M}\left(\frac{x_1 + x_2}{2} ; \frac{y_1 + y_2}{2}\right)$

$y = mx + c$ $\quad$ $y - y_1 = m(x - x_1)$ $\quad$ $m = \frac{y_2 - y_1}{x_2 - x_1}$ $\quad$ $m = \tan\theta$

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

InΔABC: $\quad$ $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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

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

$\sin(\alpha + \beta) = \sin\alpha.\cos\beta + \cos\alpha.\sin\beta$ $\quad$ $\sin(\alpha - \beta) = \sin\alpha.\cos\beta - \cos\alpha.\sin\beta$

$\cos(\alpha + \beta) = \cos\alpha.\cos\beta - \sin\alpha.\sin\beta$ $\quad$ $\cos(\alpha - \beta) = \cos\alpha.\cos\beta + \sin\alpha.\sin\beta$

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

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

$\mathrm{P(A)} = \frac{n(\mathrm{A})}{n(\mathrm{S})}$ $\quad$ P(A or B) = P(A) + P(B) – P(A and B)

$\hat{y} = a + bx$ $\quad$ $b = \frac{\sum(x - \bar{x})(y - \bar{y})}{\sum(x - \bar{x})^2}$

FINAL

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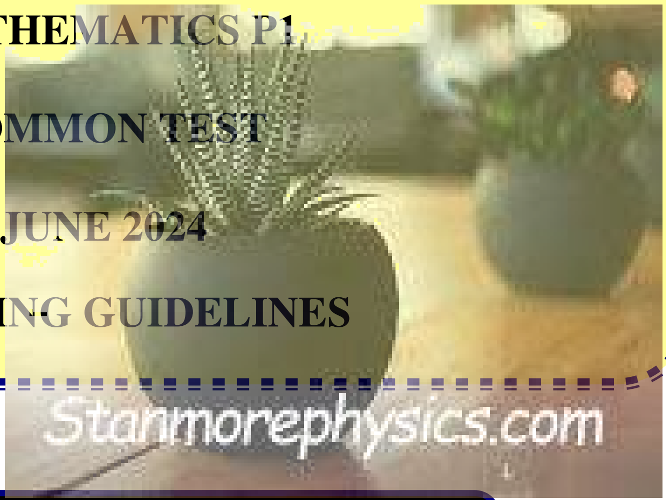
MATHEMATICS P1

COMMON TEST

JUNE 2024

MARKING GUIDELINES



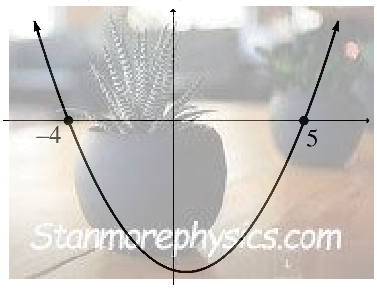
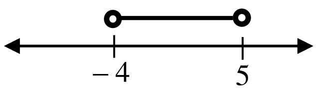
NATIONAL
SENIOR CERTIFICATE

GRADE 12

MARKS: 150

These marking guidelines consist of 13 pages.

QUESTION 1

1.1.1	$x=0$ or $-\frac{7}{2}$ or 8	✓ A answer ✓ A answer ✓A answer (3)
1.1.2	$(x+1)(x+12)=0$ $x=-1$ or $x=-12$	✓A factors ✓CA answer ✓CA answer (3)
1.1.3	$5x^2-7x+8=0$ $x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$ $x=\frac{7\pm\sqrt{(-7)^2-4(5)(8)}}{2(5)}$ $x=\frac{7\pm\sqrt{-111}}{10}$ No real values of x Accept: No solution	✓A substituting in formula ✓CA answer (2)
1.1.4	$\sqrt{x-2}+2=x$ $\left(\sqrt{x-2}\right)^2=(x-2)^2$ $x-2=x^2-4x+4$ $x^2-5x+6=0$ $(x-2)(x-3)=0$ $x=2$ or $x=3$ Answers only: 2 marks	✓A isolating $\sqrt{x-2}$ ✓CA squaring both sides ✓CA standard form ✓CA answer ✓CA answer (5)
1.1.5	$x^2-x-20<0$ $(x+4)(x-5)<0$  **OR**  $-4<x<5$ OR $x\in(-4\,;5)$ Penalty of 1 mark if one or both end points are included	✓A standard form ✓CA critical values CA✓ CA✓ answer (4)

1.1.6	$2^{1-2x}+7.2^{-x}-4=0$ $2.2^{-2x}+7.2^{-x}-4=0$ $(2.2^{-x}-1)(2^{-x}+4)=0$ $2^{-x}=\frac{1}{2}$ or $2^{-x}=-4$ $2^{-x}=2^{-1}$ no solution $x=1$ **OR** $2^{1-2x}+7.2^{-x}-4=0$ $2.2^{-2x}+7.2^{-x}-4=0$ Let $2^{-x}=k$ $(2k-1)(k+4)=0$ $k=\frac{1}{2}$ or $k=-4$ $2^{-x}=2^{-1}$ no solution $x=1$	✓A splitting exponents ✓A factor ✓A factor ✓A answer ✓A no solution (5) **OR** ✓A splitting exponents ✓A factor ✓A factor ✓A answer ✓A no solution (5)
1.2	$22-3m\geq 0$ $22\geq 3m$ $\frac{22}{3}\geq m$ $m=7$	✓A $22-3m\geq 0$ ✓CA $\frac{22}{3}\geq m$ ✓CA answer (3)
1.3	$\frac{\sqrt{9.9^{2023}}}{\sqrt{9^{2023}}-\sqrt{9^2.9^{2023}}}$ $=\frac{3\sqrt{9^{2023}}}{\sqrt{9^{2023}}(1-9)}$ $=-\frac{3}{8}$	✓A simplifying numerator ✓A simplifying denominator ✓CA answer (3)
1.4	$y=2x-3$ $4x^2+(2x-3)^2-2x(2x-3)-7=0$ $4x^2+4x^2-12x+9-4x^2+6x-7=0$ $4x^2-6x+2=0$ $2x^2-3x+1=0$ $(2x-1)(x-1)=0$ $x=\frac{1}{2}$ or $x=1$ $y=2\left(\frac{1}{2}\right)-3$ or $y=2(1)-3$ $y=-2$ $y=-1$	✓A making y the subject of the formula ✓CA substitution ✓CA standard form ✓CA factors ✓CA x-values ✓CA y-values

	OR $x=\dfrac{y+3}{2}$ $4\left(\dfrac{y+3}{2}\right)^2+y^2-2y\left(\dfrac{y+3}{2}\right)-7=0$ $y^2+3y+2=0$ $(y+1)(y+2)=0$ $y=-2$ or $y=-1$ $x=1$ or $x=\dfrac{1}{2}$	✓A making x the subject of the formula ✓CA substitution ✓CA standard form ✓CA factors ✓CA y-values ✓CA x-values (6)
		[34]

QUESTION 2

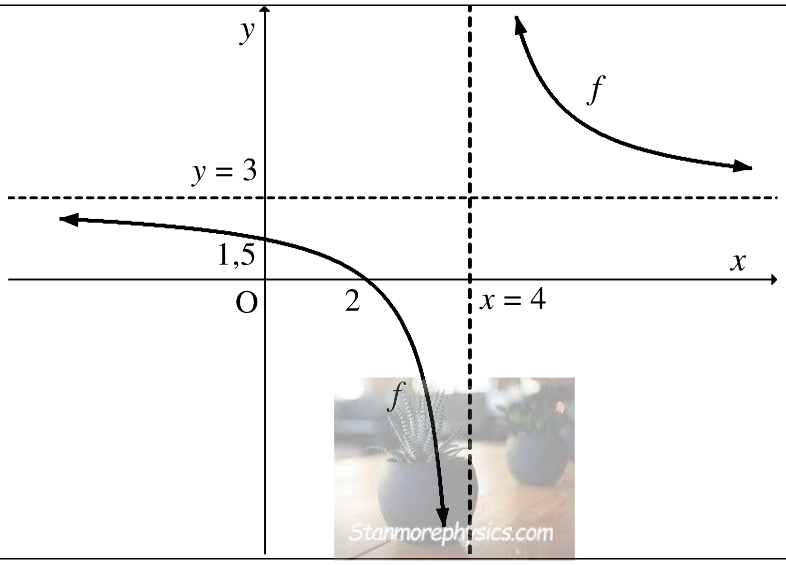
2.1	$-5 ; 12 ; 27 ; 40 ; 51. . . .$ $17 ; 15 ; 13 ; 11 ; . . .$ $-2 ; -2 ; -2 ; . . .$ The next two terms are 40 and 51	✓A ✓A answer (2)
2.2	$-5 ; 12 ; 27 ; 40 ; 51. . . .$ $17 ; 15 ; 13 ; 11 ; . . .$ $-2 ; -2 ; -2 ; . . .$ $2a = -2$ $a = -1$ $17 = 3a + b$ $17 = 3(-1) + b$ $b = 20$ $-5 = -1 + 20 + c$ $c = -24$ $T_n = -n^2 + 20n - 24$	✓ A $a = -1$ ✓CA value of b ✓CA value of c ✓CA answer (4)
2.3	$51 = -n^2 + 20n - 24$ $n^2 - 20n + 75 = 0$ $(n-5)(n-15) = 0$ $n = 5$ or $n = 15$ $\therefore T_5$ and T_{15} If stopping at values of n, still award the last mark	✓CA equating T_n to 51 ✓CA standard form ✓CA answers (3)
2.4	$\sum_{n=3}^{10} T_n - \sum_{n=11}^{17} T_n$ Using symmetry: $T_3 = T_{17}$; $T_4 = T_{16}$ $T_5 = T_{15}$; etc. $(T_3 - T_{17}) + (T_4 - T_{16}) + (T_5 - T_{15}) + (T_6 - T_{14}) +$ $(T_7 - T_{13}) + (T_8 - T_{12}) + (T_9 - T_{11}) + T_{10}$ $= 0 + 0 + 0 + 0 + 0 + 0 + 0 + 76$ $= 76$ **OR** Listing all the terms from $\sum_{n=3}^{10} T_n$. Listing all the terms from $\sum_{n=11}^{17} T_n$ $\sum_{n=3}^{10} T_n - \sum_{n=11}^{17} T_n = 76$	✓CA✓CA = terms, using symmetry ✓CA answer (3) **OR** ✓CA Listing all the terms from $\sum_{n=3}^{10} T_n$ ✓CA Listing all the terms from $\sum_{n=11}^{17} T_n$ ✓CA answer (3)
		[12]

QUESTION 3

3.1.1	$-\frac{7}{2}\ ;\ -3\ ;\ -\frac{5}{2}\ ;\ \ldots$ $a=-\frac{7}{2}$ $d=\frac{1}{2}$ $T_n=a+(n-1)d$ $T_n=-\frac{7}{2}+(n-1)\frac{1}{2}$ $T_n=-\frac{7}{2}+\frac{1}{2}n-\frac{1}{2}$ $T_n=\frac{1}{2}n-4$	✓A value of d ✓CA answer (2)
3.1.2	$S_n=\frac{n}{2}[2a+(n-1)d]$ $675=\frac{n}{2}\left[2\left(\frac{-7}{2}\right)+(n-1)\frac{1}{2}\right]$ $1350=n\left(-7+(n-1)\frac{1}{2}\right)$ $2700=-14n+n^2-n$ $0=n^2-15n-2700$ $(n-60)(n+45)=0$ $n=60$ or $n=-45$ $\therefore n=60$ only	✓CA substitute into formula ✓CA factors ✓CA values of n ✓CA answer (4)
3.1.3	$T_n=\left(\frac{1}{2}n-4\right)^2$ $T_n=\frac{1}{4}n^2-4n+16$ $n=-\frac{b}{2a}$ $n=-\frac{-4}{2\left(\frac{1}{4}\right)}$ $n=8$ The 8th term is the smallest **OR** Smallest value of $\left(\frac{1}{2}n-4\right)^2=0$ $\frac{1}{2}n-4=0$ $n=8$ The 8th term is the smallest If stopping at values of n, still award the last mark	✓CA squaring T_n ✓CA substituting in $n=-\frac{b}{2a}$ ✓CA answer (3) **OR** ✓CA squaring T_n ✓CA equating T_n to 0 ✓CA answer (3)

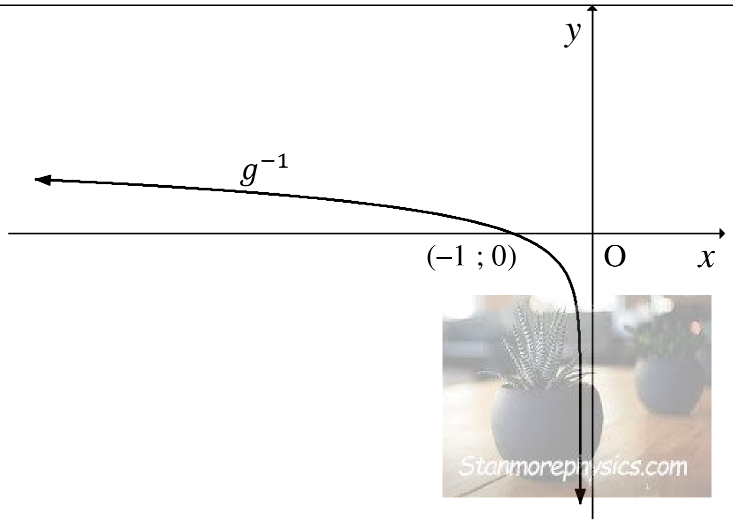
3.2.1	$r = 2(x+1)$ $-1 < r < 1$ $-1 < 2(x+1) < 1$ $-\frac{1}{2} < x+1 < \frac{1}{2}$ $-\frac{3}{2} < x < -\frac{1}{2}$		✓A $r = 2(x+1)$ ✓A $-1 < r < 1$ ✓CA answer (3)
3.2.2	$a = \frac{-3}{4} + 1$ $a = \frac{1}{4}$		✓A answer (1)
3.2.3	$r = \frac{1}{2}$ $a = \frac{1}{4}$ $T_n = ar^{n-1}$ $T_n = \frac{1}{4}\left(\frac{1}{2}\right)^{n-1}$ $\sum_{n=1}^{\infty} \frac{1}{4}\left(\frac{1}{2}\right)^{n-1}$	Answer only: Full marks	✓CA value of r. ✓CA expression of T_n ✓CA answer (3)
3.2.4	$S_\infty = \frac{a}{1-r}$ $= \frac{\frac{1}{4}}{1-\frac{1}{2}}$ $= \frac{1}{2}$		✓CA substitute in S_∞ formula ✓CA answer (2)
			[18]

QUESTION 4

4.1	$f(x)=\dfrac{6}{x-4}+3$	✓A $\dfrac{6}{x-4}$ ✓A $+3$ (2)
4.2	For x-intercept: $0=\dfrac{6}{x-4}+3$ $-3=\dfrac{6}{x-4}$ $-3x+12=6$ $-3x=-6$ $x=2$ For y-intercept: $y=\dfrac{6}{0-4}+3$ $=\dfrac{3}{2}$	✓ CA equating to zero ✓ CA x-intercept ✓ CA y-intercept (3)
4.3		✓A shape ✓A asymptotes ✓CA intercepts (3)
4.4	$y=-x+c$ $3=-4+c$ $c=7$ $y=-x+7$ Answer only: Full marks	✓A substituting $m=-1$ ✓A substituting $(4\ ;\ 3)$ ✓CA answer (3)
4.5	(5;10)	✓CA ✓CA answer (2)
		[13]

QUESTION 5

DO NOT MARK QUESTIONS 5.5, 5.6 AND 5.7.

5.1	B$(1\,;-9)$	A✓ x-coordinate A✓ y-coordinate (2)
5.2	$x<1$	A✓ answer (1)
5.3	$(x-1)^2-9=0$ $(x-1)^2=9$ $(x-1)=\pm 3$ $x=1\pm 3$ $x=4$ or $x=-2$ $(4\,;0)$ or $(-2\,;0)$ **OR** $(x-1)^2-9=0$ $x^2-2x+1-9=0$ $x^2-2x-8=0$ $(x-4)(x+2)=0$ $x=4$ or $x=-2$ $(4\,;0)$ or $(-2\,;0)$	✓A equating to zero ✓A taking square root on both sides ✓CA answers (3) **OR** ✓A equating to zero ✓A factors ✓CA answer (3)
5.4	$y=-a^x$ $-9=-a^1$ $a=9$	✓A substituting $(1\,;-9)$ (1)
5.5	$g: y=-9^x$ $g^{-1}: x=-9^y$ $-x=9^y$ $\therefore y=\log_9(-x)$	✓A swapping x and y ✓A answer
5.6	 	✓CA shape ✓CA x-intercept

5.7	$y=\log_9(-x)$ $2=\log_9(-x)$ $-x=9^2$ $x=-81$ $\therefore x<-81$	✓CA $2=\log_9(-x)$ ✓CA value of x ✓CA answer
		[7]

QUESTION 6

6.1	$y=a(x+6)(x-2)$ Substitute $(-4\,;6)$: $6=a(-4+6)(-4-2)$ $6=-12a$ $a=-\frac{1}{2}$ $\therefore y=-\frac{1}{2}(x+6)(x-2)$ $y=-\frac{1}{2}x^2-2x+6$ $\therefore b=-2$ and $c=6$	A✓ $y=a(x+6)(x-2)$ A✓ substitute $(-4\,;6)$ A✓ $6=-12a$ A✓ substitute back $a=-\frac{1}{2}$ (4)
6.2	$x=-\frac{b}{2a}$ $=-\frac{(-2)}{2\left(-\frac{1}{2}\right)}$ $=-2$ **OR** $x=\frac{-6+2}{2}$ $=-2$ Maximum value = $h(-2)=-\frac{1}{2}(-2)^2-2(-2)+6=8$	A ✓ substitution A✓ x-value of TP CA✓ answer (3)
6.3	$y=-\frac{1}{2}x+c$ Substitute $(-4\,;6)$: $6=-\frac{1}{2}(-4)+c$ $c=4$ $\therefore y=-\frac{1}{2}x+4$ **OR** $s(x)=-\frac{1}{2}x+4$	✓A substitution ✓CA answer (2)
6.4	$k<2$	✓✓CA CA answer (2)
6.5	Translated downwards by 8 units	✓✓CA CA answer (2)
		[13]

QUESTION 7

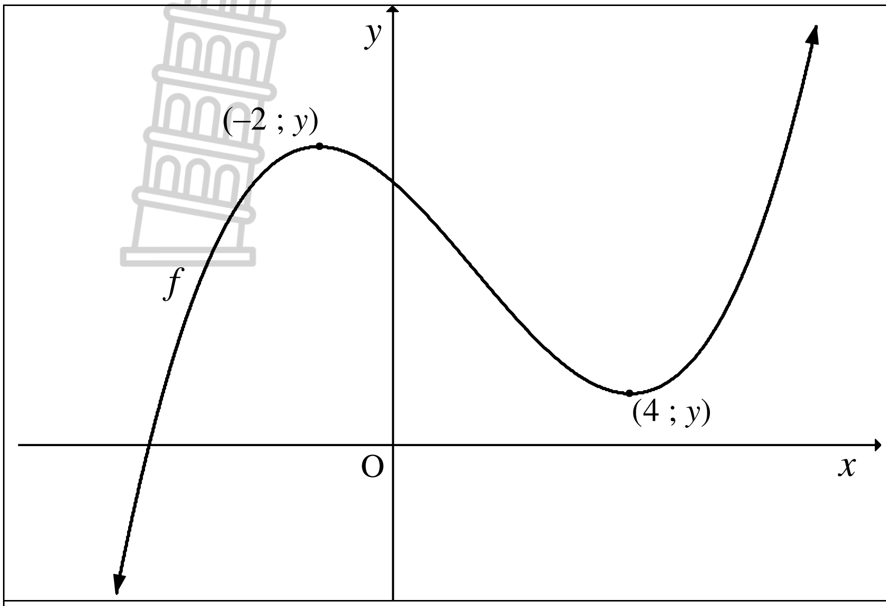
Penalise once only for incorrect notation in Question 7.1.1

7.1.1	$f(x)=2x^2+4$ $f(x+h)=2(x+h)^2+4=2x^2+4xh+2h^2+4$ $f'(x)=\lim\limits_{h\to0}\dfrac{f(x+h)-f(x)}{h}$ $f'(x)=\lim\limits_{h\to0}\dfrac{2x^2+4xh+2h^2+4-2x^2-4}{h}$ $f'(x)=\lim\limits_{h\to0}\dfrac{4xh+2h^2}{h}$ $f'(x)=\lim\limits_{h\to0}\dfrac{h(4x+2h)}{h}$ $f'(x)=\lim\limits_{h\to0}(4x+2h)$ $f'(x)=4x$	✓A value of $f(x+h)$ ✓CA substitution into formula ✓CA simplifying ✓CA factors ✓CA answer (5)
7.1.2	$f'(x)=m_{\text{tangent}}$ $\therefore 4x=-12$ $x=-3$ $y=2(-3)^2+4=22$ The tangent is at $(-3\,;\,22)$ $y=-12x+c$ $22=-12(-3)+c$ $c=-14$ $y=-12x-14$	✓CA $4x=-12$ ✓CA coordinates of contact point ✓CA substitution of point and gradient ✓CA answer (4)
7.2.1	$f(x)=\dfrac{2x^2-5x-12}{x-4}$ $=\dfrac{(2x+3)(x-4)}{x-4}$ $=2x+3$ $f'(x)=2$	✓A factors ✓CA answer ✓CA answer (3)
7.2.2	$D_x\left[x^{\frac{2}{5}}+x^2-9x\right]$ $=\dfrac{2}{5}x^{\frac{-3}{5}}+2x-9$	✓A $x^{\frac{2}{5}}$ ✓CA $\dfrac{2}{5}x^{\frac{-3}{5}}$ ✓A $+2x$ ✓A -9 (4)
7.2.3	$y=\dfrac{x}{6}-\dfrac{6}{x}$ $=\dfrac{x}{6}-6x^{-1}$ $\dfrac{dy}{dx}=\dfrac{1}{6}+6x^{-2}$	✓A $-6x^{-1}$ ✓A $\dfrac{1}{6}$ ✓CA $+6x^{-2}$ (3)
		[19]

QUESTION 8

8.1	For x-intercepts: $-x^3+10x^2-17x-28=0$ $\therefore x^3-10x^2+17x+28=0$ $(x+1)(x^2-11x+28)=0$ $(x+1)(x-4)(x-7)=0$ $\therefore x=-1$ or $x=4$ or $x=7$ $A(-1\,;0)$; $B(4\,;0)$; $C(7\,;0)$ Answer only: 3 marks	✓A $(x+1)$ ✓CA trinomial ✓CA factors ✓CA answer (4)
8.2	For the turning points: $f'(x)=-3x^2+20x-17=0$ $3x^2-20x+17=0$ $(3x-17)(x-1)=0$ $x=\frac{17}{3}$ or $x=1$ $y=\frac{400}{27}$ or $y=-36$ $D(1\,;-36)$; $E\left(\frac{17}{3}\,;\frac{400}{27}\right)$	✓A $f'(x)=-3x^2+20x-17$ ✓CA $f'(x)=0$ ✓CA coordinates of D ✓CA coordinates of E (4)
8.3.1	x-coordinate of point of inflection $=\dfrac{1+\frac{17}{3}}{2}$ $=\dfrac{1+\frac{17}{3}}{2}$ $=\frac{10}{3}$ **OR** At point of inflection: $f''(x)=-6x+20=0$ $\therefore 6x=20$ $x=\frac{10}{3}$ Therefore: The graph is concave down for $x>\frac{10}{3}$	✓CA method to calculate x-value of point of inflection ✓CA x-value ✓CA answer (3)
8.3.2	$x<\frac{10}{3}$	✓✓ CA CA answer (2)
		[13]

QUESTION 9

	✓A shape ✓A turning point at $x = -2$ ✓A turning point at $x = 4$ ✓A one x-intercept ✓A y-intercept above x-axis (5)
	[5]

QUESTION 10

10.1	Total area $= 2\left(\frac{1}{2}\pi r^2\right) + (x \times 2r)$ $400 = \pi r^2 + 2xr$ $2xr = 400 - \pi r^2$ $x = \frac{400 - \pi r^2}{2r}$	✓A formula for area ✓A equating to 400 (2)
10.2	Length $= 2(\pi r) + 2x$ $L(r) = 2(\pi r) + 2\left(\frac{400 - \pi r^2}{2r}\right)$ $= 2\pi r + \frac{400 - \pi r^2}{r}$ $= \frac{2\pi r^2 + 400 - \pi r^2}{r}$ $= \frac{400}{r} + \pi r$	✓A formula for perimeter ✓A substitution ✓A simplification (3)

10.3	$L(r) = 400r^{-1} + \pi r$	
	$\frac{dL}{dr} = -400r^{-2} + \pi$	✓A derivative
	For a minimum: $\frac{dL}{dr} = -400r^{-2} + \pi = 0$	✓CA equating to zero
	$\frac{1}{r^2} = \frac{\pi}{400}$	
	$r^2 = \frac{400}{\pi}$	✓CA r^2 subject of formula
	$r = \sqrt{\frac{400}{\pi}}$	
	$= 11,28\,m$	✓CA answer
		(4)
		[9]

TOTAL: 143

KWAZULU-NATAL PROVINCE

EDUCATION
REPUBLIC OF SOUTH AFRICA

ADDENDUM TO THE PROVINCIAL COMMON TEST FOR GRADE 12 MATHEMATICS PAPER 1 JUNE 2024

1. This question paper will be marked out of 143, instead of 150.
2. The following sub-questions are outside of the scope of CAPS for Gr. 12 Mathematics and are therefore nullified:

No.	Sub-question number	Marks
1.	5.5	2
2.	5.6	2
3.	5.7	3
	TOTAL	7

3. Each learner's total mark for this question paper should then be converted to a mark out of 150, and this converted mark should then be recorded on SA-SAMS.

4. For this purpose a conversion table is attached.

N.R Mthembu: Provincial Coordinator

04/06/2024
Date

CONVERSION TABLE FOR KZN JUNE 2024 MATHEMATICS PAPER 1					
Mark Obtained out of 143	**Mark to enter on SASAMS out of 150**	*Mark Obtained out of 143*	**Mark to enter on SASAMS out of 150**	*Mark Obtained out of 143*	**Mark to enter on SASAMS out of 150**
1	1	49	51	97	102
2	2	50	52	98	103
3	3	51	53	99	104
4	4	52	55	100	105
5	5	53	56	101	106
6	6	54	57	102	107
7	7	55	58	103	108
8	8	56	59	104	109
9	9	57	60	105	110
10	10	58	61	106	111
11	12	59	62	107	112
12	13	60	63	108	113
13	14	61	64	109	114
14	15	62	65	110	115
15	16	63	66	111	116
16	17	64	67	112	117
17	18	65	68	113	119
18	19	66	69	114	120
19	20	67	70	115	121
20	21	68	71	116	122
21	22	69	72	117	123
22	23	70	73	118	124
23	24	71	74	119	125
24	25	72	76	120	126
25	26	73	77	121	127
26	27	74	78	122	128
27	28	75	79	123	129
28	29	76	80	124	130
29	30	77	81	125	131
30	31	78	82	126	132
31	33	79	83	127	133
32	34	80	84	128	134
33	35	81	85	129	135
34	36	82	86	130	136
35	37	83	87	131	137
36	38	84	88	132	138
37	39	85	89	133	140
38	40	86	90	134	141
39	41	87	91	135	142
40	42	88	92	136	143
41	43	89	93	137	144
42	44	90	94	138	145
43	45	91	95	139	146
44	46	92	97	140	147
45	47	93	98	141	148
46	48	94	99	142	149
47	49	95	100	143	150
48	50	96	101		