education

Department:
Education
PROVINCE OF KWAZULU-NATAL

MATHEMATICS

JUNE CONTROL TEST

2020

NATIONAL
SENIOR CERTIFICATE

GRADE 12

MARKS: 150

TIME: 3 hours

N.B. 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 12 questions.

2. Answer **ALL** questions.

3. Clearly show **ALL** calculations, diagrams, graphs, et cetera that you have used in determining your answers.

4. Answers only will not necessarily be awarded full marks.

5. An approved scientific calculator (non-programmable and non-graphical) may be used, unless stated otherwise.

6. If necessary, answers should be rounded off to TWO decimal places, unless stated otherwise.

7. Diagrams are NOT necessarily drawn to scale.

8. Number the answers correctly according to the numbering system used in this question paper. Write neatly and legibly.

QUESTION 1

1.1 Solve for x:

1.1.1 $(x-4)\left(\frac{x}{2}-5\right)=0$ (2)

1.1.2 $x^2-8x=6$, correct to TWO decimal places. (4)

1.1.3 $3^{x+2}+3^{2-x}=82$ (5)

1.1.4 $\sqrt{7x+2}+2x=0$ (4)

1.2 Solve for x and y simultaneously given $3^{y-x}=9$ and $x^2+2xy-4=0$. (6)

1.3 Determine the values of x for which $\sqrt{x(x-3)-10}$ will be a real number. (4)

[25]

QUESTION 2

The first four terms of a quadratic sequence are $8; 11; 16; 23; \ldots$

2.1 Write down the next two terms of the quadratic sequence. (1)

2.2 Calculate the n^{th} of the quadratic sequence. (4)

2.3 Determine the position of the term 2311 in the sequence. (3)

[8]

QUESTION 3

$3; 7; 11; 15; \ldots$ are the first four terms of an arithmetic sequence.

3.1 If the last term of the sequence is 671, calculate the value of *n*. (2)

3.2 Given the last term is 671, determine the sum of the terms that are not divisible by 3. (6)

[8]

QUESTION 4

$T_n=\frac{1}{2}(r)^{n-1}$ is the general term of a geometric sequence.

4.1 Calculate the value of the common ratio if the fifth term is 40,5. (3)

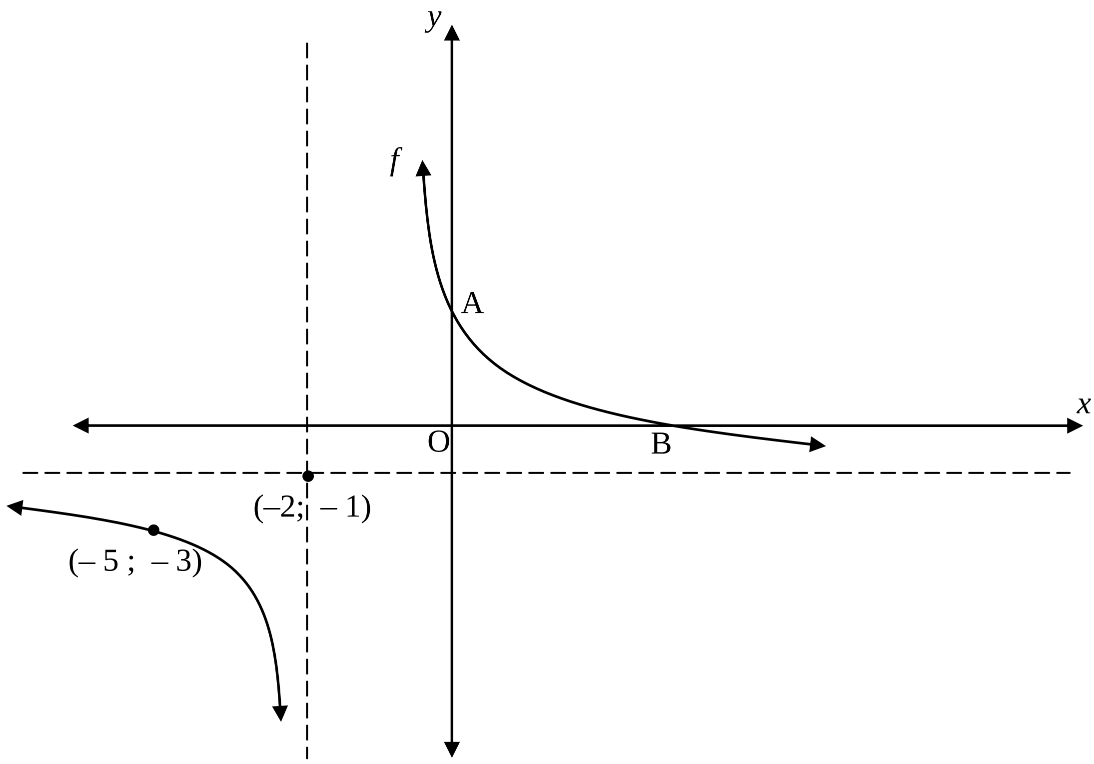
4.2 Determine the position of the term in the sequence that has a value of $\frac{59049}{2}$? (3)

4.3 The first term is 8 for the arithmetic and geometric sequences having positive terms. The common difference and the common ratio are the same. The fifth term of the geometric sequence is 2048. Calculate the sum of the first three terms of the arithmetic sequence. (5)

[11]

QUESTION 5

$Given\ f(x) = \frac{a}{x+p} + q$; $T(-5;-3)$ is a point on the graph of f. The asymptotes to the graph intersects at $(-2\ ;\ -1)$. The graph intersects the y – axis at A and the x – axis at B.

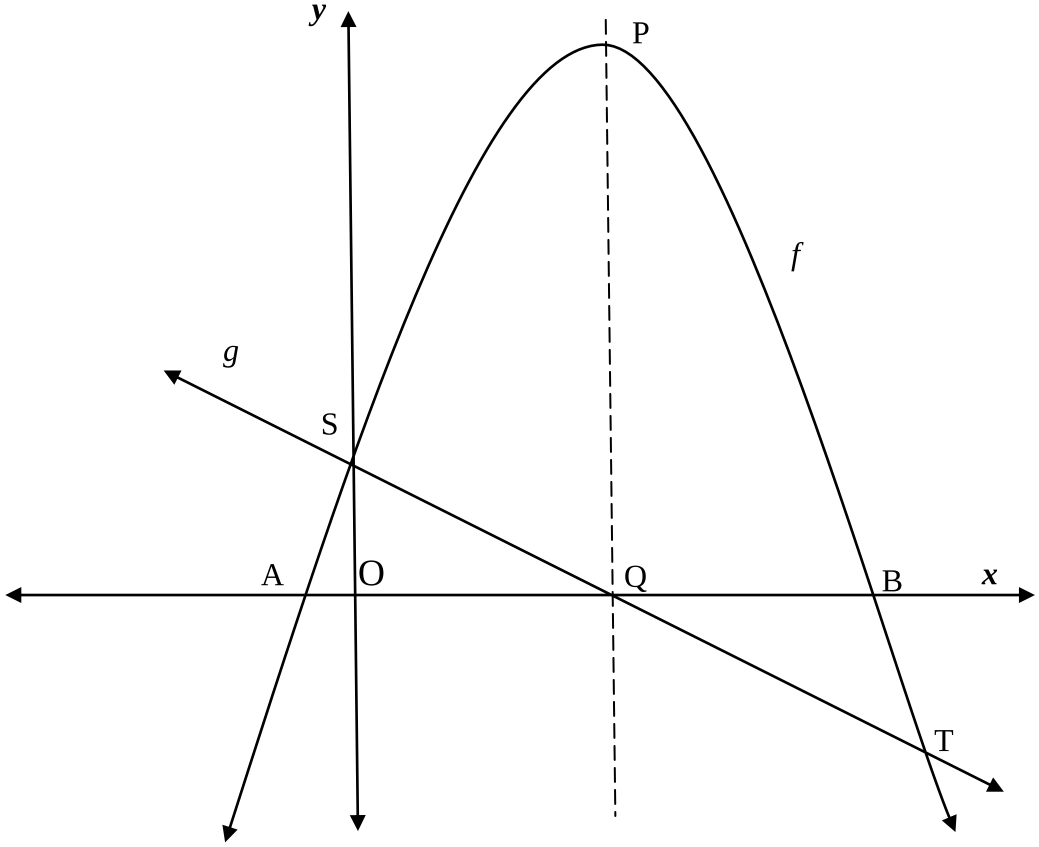


5.1	Write down the equations of the vertical and horizontal asymptotes of f.	(2)
5.2	Determine the value of a.	(3)
5.3	Calculate the coordinates of B.	(3)
5.4	Determine the equation of g if $g(x) = -f(x) + 2$.	(2)

[10]

QUESTION 6

$f(x) = a(x-2)^2 + 4; a \neq 0$ and $g(x) = mx + k$ are sketched below. f intersects the axes at A, B and C. The graph of g intersects the graph of f at S and the x – axis at Q. OS is equal to half the length of OQ.



6.1	Write down the coordinates of P.	(1)
6.2	Write down the range of *f*.	(1)
6.3	Show that $a = -\frac{3}{4}$.	(3)
6.4	Determine the turning point of *h* if $h(x) = f(2x)$.	(4)
6.5	Write down the equation of *g*.	(2)
6.6	If the graph of g intersects *f* at S and T, calculate the value of *x* for which PQ will be at a maximum between S and T.	(4)

[15]

QUESTION 7

Given □$(x) = -log_4 x$.

7.1	Write down the domain of *h*.	(1)
7.2	Write down the equation of □$^{-1}$, the inverse of *h*, in the form *y* = …	(2)
7.3	Determine the values of *x* for which □$(x) \geq -2$.	(3)
7.4	Sketch □ and □$^{-1}$ in the same system of axes.	(4)

[10]

QUESTION 8

8.1 Melissa invests a fixed amount of money at an interest rate of 9,45 % p.a. compounded monthly which grew to R800 000 at the end of 5 years. Determine the amount invested with the fund. (Answer correct to two decimal places) (3)

8.2 Mr Vubo is a Quantum Car owner. He bought his first Quantum Car for R700 000. The value of the Quantum Car depreciates at a rate of 6 % p.a. on a reducing balance. He wants to replace the Quantum Car in 5 years' time. The price of the new Quantum Car appreciates in value at a rate of 8 % p.a.

8.2.1 Calculate the scrap value of the Quantum Car after 5 years. (3)

8.2.2 Determine the cost of the new Quantum Car in 5 years' time. (3)

8.2.3 The old Quantum Car after 5 years will be used as a trade in value. To make up for the shortfall, he decides to create a sinking fund.
He makes an investment immediately into a fund that earns 9 % p.a compounded monthly.
Determine the amount of the investment into the fund that will cater for his shortfall. (3)

[12]

QUESTION 9

9.1 Determine the derivative of f, using first principle, if $f(x) = x^2 - 8x$. (5)

9.2 Differentiate:

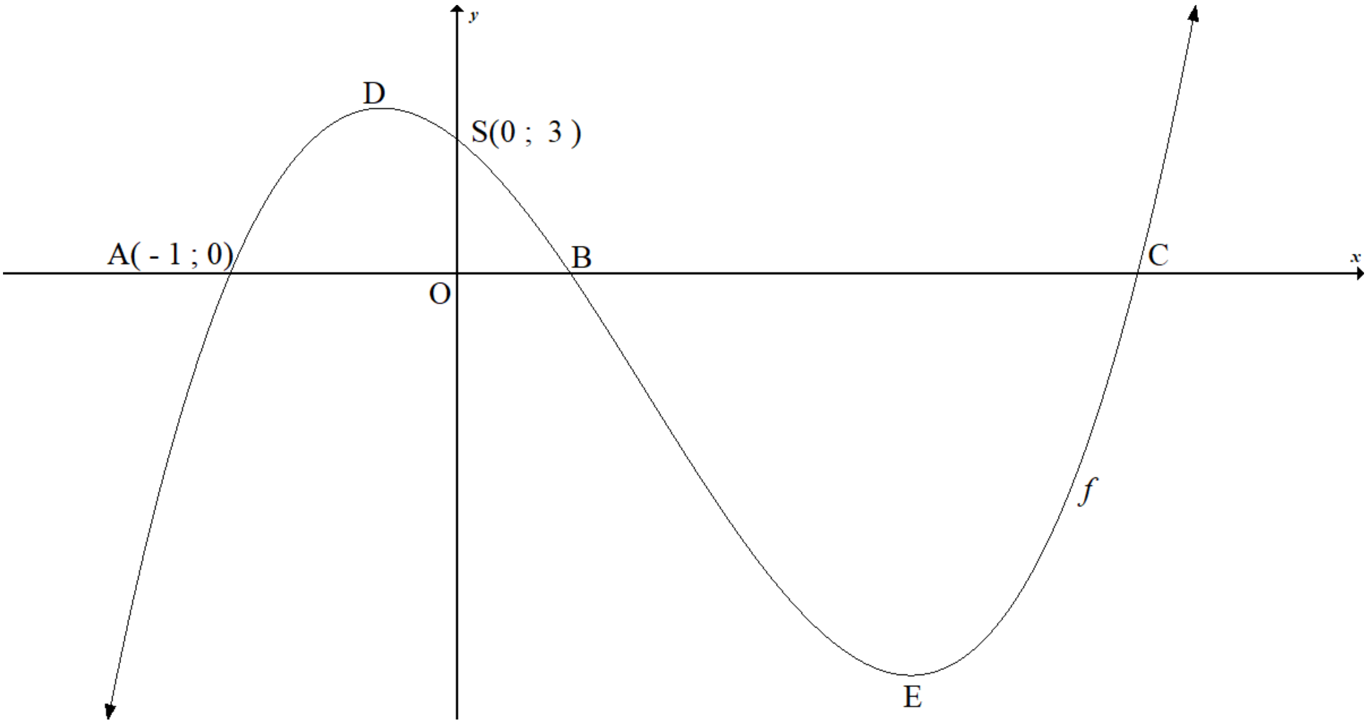
9.2.1 $g(x) = \left(5 - \sqrt{x}\right)^2$ (3)

9.2.2 $D_x\left[\dfrac{x^2 - 4x}{\sqrt[3]{x}}\right]$ (4)

[12]

QUESTION 10

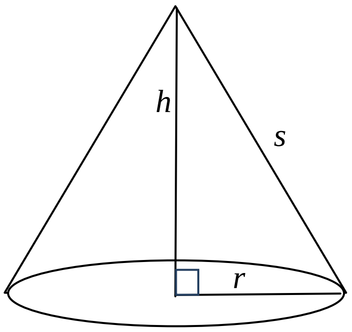
Given : $f(x) = px^3 - 5x^2 - 4x + q$ is a cubic function. A(– 1 ; 0), B and C are the *x*- intercepts . D and E are the turning points of the graph. S(0 ; 3) is the *y* – intercept of the graph.



10.1	Write down the value of *q*.	(1)
10.2	Show that the value of $p = 2$.	(3)
10.3	Calculate the coordinates of D and E.	(4)
10.4	For which values of *k* will $f(x) = k$, have two positive unequal roots.	(2)
10.5	Write down the values of *x* for which the graph of *f* is concave down.	(2)
10.6	If $g(x) = f(-x)$, write down the coordinates of D/, the image of D.	(2)
10.7	Calculate the values of *x* where $y = -8x + t$ is a tangent to the graph.	(4)
		[18]

QUESTION 11

A right circular cone has a slant height(*s*) of 12 cm as shown in the figure below.



11.1 Write down the radius, *r*, in terms of *h*, the perpendicular height of the cone. (2)
11.2 Express the volume of the cone(V), in terms of *h*. (2)
11.3 Determine the value of *h* for which the volume of the cone will be at a maximum. (3)
11.4 Calculate the maximum volume. (2)
[9]

QUESTION 12

At a school, 240 grade 11 learners data are represented below:

- 122 boys play rugby – R
- 58 boys play basketball – B
- 96 boys play cricket – C
- 16 boys play all three sports
- 22 boys play rugby and basketball
- 26 boys play cricket and basketball
- 26 boys do not play any of these sports

Let the number of boys who play rugby and cricket only, be x.

12.1 Draw a Venn Diagram to represent the above data. (4)

12.2 Determine the number of boys who play rugby and cricket only. (3)

12.3 Determine the probability that a learner selected at random:

a) Only plays basketball. (2)

b) Does not play cricket. (2)

c) Participates in at least two of these sports. (1)

[12]

Total Marks : 150

INFORMATION SHEET: MATHEMATICS

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

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

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

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

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

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

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

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

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

In ΔABC: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$ $\quad a^2 = b^2 + c^2 - 2bc.\cos A$ $\quad area\ \Delta ABC = \frac{1}{2}ab.\sin C$

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

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

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

$\sin 2\alpha = 2\sin\alpha.\cos\alpha$

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

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

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

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MATHEMATICS

JUNE CONTROL TEST

MARKING GUIDELINE

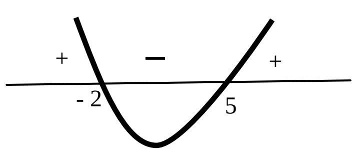
MARKS: 150

TIME: 3 hours

This marking guideline consists of 11 pages.

QUESTION 1

1.1.1	$x = 4 \quad or \quad x = 10$	A✓ 4 A✓ 10	(2)
1.1.2	$x^2 - 8x - 6 = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $x = \frac{-(-8) \pm \sqrt{(-8)^2 - 4(1)(-6)}}{2(1)}$ $x = 8{,}69 \quad or \quad x = -0{,}69$	A✓standard form CA✓substitution in correct formula CACA✓✓answers (penalize 1 mark if rounding off is incorrect-once for whole paper)	(4)
1.1.3	$3^{x+2} + 3^{2-x} = 82$ $9.3^x + \frac{9}{3^x} = 82$ $9.3^{2x} - 82.3^x + 9 = 0$ $(9.3^x - 1)(3^x - 9) = 0$ $3^x = \frac{1}{9} = 3^{-2} \quad or \quad 3^x = 9 = 3^2$ $3^x = 3^{-2} \quad or \quad 3^x = 3^2$ $x = -2 \quad or \quad x = 2$	A✓standard form CA✓factors CA✓$3^x = \frac{1}{9} \quad and \quad 3^x = 9$ CA✓Exponential forms CA✓answers	(5)
1.1.4	$\sqrt{7x+2} + 2x = 0$ $\sqrt{7x+2} = -2x$ $7x + 2 = 4x^2$ $4x^2 - 7x - 2 = 0$ $(4x+1)(x-2) = 0$ $x = -\frac{1}{4} \quad or \quad x = 2$ n/a	A✓Isolating surd and squaring CA✓standard form CA✓factors CA✓x – values and rejecting	(4)

1.2	$3^{y-x} = 9 \quad \rightarrow (1)$ $x^2 + 2xy - 4 = 0 \quad \rightarrow (2)$ From (1): $3^{y-x} = 3^2 \quad \therefore y = x + 2 \quad \rightarrow (3)$ Substituting (3) into (2): $x^2 + 2x(x + 2) - 4 = 0$ $x^2 + 2x^2 + 4x - 4 = 0$ $3x^2 + 4x - 4 = 0$ $(3x - 2)(x + 2) = 0$ $x = \frac{2}{3} \quad or \quad x = -2$ $y = 2\frac{2}{3} \quad or \quad y = 0$	A✓making *x*/*y* the subject CA✓substitution into equation (2) CA✓standard form CA✓factors CA✓*y*/*x* values CA✓*x*/*y* values	(6)
1.3	$x(x - 3) - 10 \geq 0$ $x^2 - 3x - 10 \geq 0$ $(x + 2)(x - 5) \geq 0$ $x \leq -2 \quad or \quad x \geq 5$ **OR** $x(x - 3) - 10 \geq 0$ $x^2 - 3x - 10 \geq 0$ $(x + 2)(x - 5) \geq 0$  $x \leq -2 \quad or \quad x \geq 5$	A✓standard form CA✓factors CACA✓✓ answer **OR** A✓standard form CA✓factors A✓ graph with signs and critical values CA✓ answer	(4) (4)
			[25]

QUESTION 2

2.1	**32 ; 43**	A✓answers	(1)
2.2	**8 11 16 23** **1D 3 5 7** **2D 2 2** $2a = 2 \quad \therefore a = 1$ $3a + b = 3 \quad \therefore b = 0$ $a + b + c = 8 \quad \therefore c = 7$ $T_n = n^2 + 7$	A✓ a value CA✓b value CA✓ c value CA✓answer	(4)
2.2	$T_n = n^2 + 7 = 2311$ $n^2 = 2311 - 7 = 2304$ $n = \sqrt{2304} = 48$	A✓equating n^{th} term to 2311 CA✓making n^2 the subject CA✓ answer	(3)
			[8]

QUESTION 3

3.1	$4n - 1 = 671$ $4n = 672$ $n = 168$	CA✓equating n^{th} term to 671 ✓answer	(2)
3.2	Pattern : 3 ; 15 ; 27 ; 39 ; ... ; 663 $12n - 9 = 663$ $n = 56$ $S_{56} = \frac{56}{2}[3 + 663] = 18648$ $S_{168} = \frac{168}{2}[3 + 671] = 56616$ Terms not divisible by 3 = 56616 – 18648 = 37968	A✓ setting up and equating A✓ equating n^{th} term to 663 CA✓n – value CA✓18648 CA✓56616 CA✓answer	(6)
			[8]

QUESTION 4

4.1	$\frac{1}{2}r^4 = 40{,}5$ $r^4 = 81 = 3^4$ $r = 3$	A✓$\frac{1}{2}r^4 = 40{,}5$ CA✓$r^4 = 3^4$ CA✓answer	(3)
4.2	$\frac{1}{2}(3)^{n-1} = \frac{59049}{2}$ $(3)^{n-1} = 59040$ $3^{n-1} = 3^{10}$ $n = 11$	A✓equating nth term to $\frac{59049}{2}$ CA✓exponential form CA✓answer	(3)
4.3	AS: 8 ; (8+d) ; (8+2d) ; … GS: 8 ; 8r ; 8r^2; …. $T_5 = 8r^4 = 2048$ $r^4 = 256 = 4^4$ $r = 4$ Sum = 8+12+16 = 36	A✓forming both sequences A✓$8r^4 = 2048$ CA✓$r^4 = 256$ CA✓r – value CA✓answer	(5)
			[11]

QUESTION 5

5.1	$x = -2$ *and* $y = -1$	AA✓✓both asymptote equations	(2)
5.2	$y = \frac{a}{x+p} + q$ $y = \frac{a}{x+2} - 1$ $(-5;-3)$: $-3 = \frac{a}{-5+2} - 1$ $a = 6$	CA✓substitution of p and q values CA✓substitution of point (– 5 ; – 3) CA✓a – value	(3)

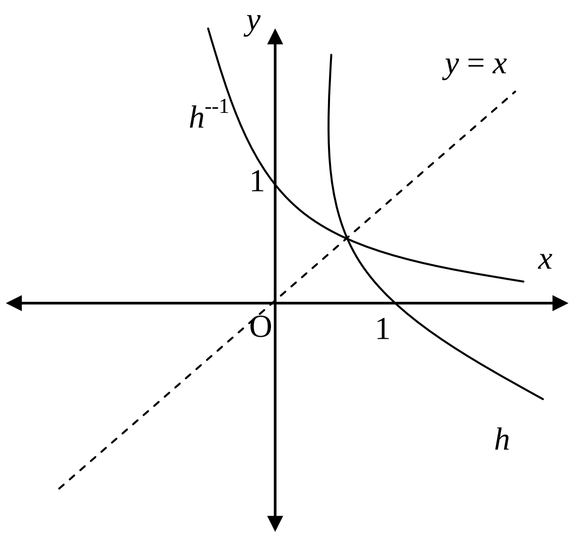
5.3	$y = \frac{6}{x+2} - 1 = 0$ $\frac{6}{x+2} = 1$ $x = 4$	A✓Equating to 0 CA✓transposing 1 to RHS CA✓answer	(3)
5.4	$g(x) = -\left(\frac{6}{x+2} - 1\right) + 2$ $g(x) = -\frac{6}{x+2} + 3$	CACA✓✓answer	(2)
			[10]

QUESTION 6

6.1	(2 ; 4)	A✓answer	(1)
6.2	$y \leq 4$ **OR** $y \in (-\infty; 4]$	CA✓answer **OR** CA✓answer	(1) (1)
6.3	$S(0\,;1\,)$ $1 = a(0-2)^2 + 4$ $-3 = 4a$ $a = -\frac{3}{4}$	A✓coordinates of S A✓substitution of the point S A✓$-3 = 4a$	(3)
6.4	$f(x) = -\frac{3}{4}(x-2)^2 + 4$ $f(2x) = -\frac{3}{4}(2x-2)^2 + 4$ $f(2x) = -3(x-1)^2 + 4$ T.P. (1 ; 4)	A✓substitution of $2x$ CA✓$f(x) = -3(x-1)^2 + 4$ CA✓x – value CA✓y – value	(4)
6.5	$y = -\frac{1}{2}x + 1$	CA✓gradient CA✓y - intercept	(2)

6.6	$L = \left(-\frac{3}{4}(x-2)^2+4\right) - \left(-\frac{1}{2}x+1\right)$ $L = -\frac{3}{4}x^2 + \frac{7}{2}x$ $L^{/} = -\frac{3}{2}x + \frac{7}{2} = 0$ $-3x = 7$ $x = \frac{7}{3}$	A✓subtraction of equations of both graphs A✓simplified expression for length CA✓derivative and equal to 0 CA✓answer	(4)
			[15]

QUESTION 7

7.1	$x > 0$	A✓ answer	(1)
7.2	$y = \left(\frac{1}{4}\right)^x$	AA✓✓answer	(2)
7.3	$-\log_4 x \geq -2$ $\log_4 x \leq 2$ $x \leq 16$ $0 < x \leq 16$	A✓change of inequality when multiplying by – 1 CA✓value of 16 CA✓answer	(3)
7.4		Exponential: A✓shape A✓ y – intercept Log graph: A✓shape A✓ x – intercept	(4)
			[10]

QUESTION 8

8.1	$A = P(1+i)^n$ $800\ 000 = P\left(1+\frac{9{,}45\ \%}{12}\right)^{60}$ $P = \frac{800\ 000}{\left(1+\frac{9{,}45\ \%}{12}\right)^{60}}$ $P = R499\ 677{,}30$	A✓substitution into formula CA✓making *P* the subject CA✓answer	(3)
8.2.1	$A = P(1-i)^n$ $A = 700\ 000(1-6\%)^5$ R513 732,82	A✓formula A✓substitution of P and *i* CA✓answer	(3)
8.2.2	$A = P(1+i)^n$ $A = 700\ 000(1+8\%)^5$ R1 028 529,65	A✓formula A✓substitution of P and *i* CA✓answer	(3)
8.2.3	$F = P(1+i)^n$ $514\ 796{,}83 = P\left(1+\frac{9\%}{12}\right)^{60}$ $P =$ R328 800,58	A✓F – value and *n* value A✓*i* – value CA✓answer	(3)
			[12]

QUESTION 9 (penalize 1 mark once for incorrect notation in this question)

9.1	$f^{/}(x) = \lim_{n\to 0}\frac{f(x+h)-f(x)}{h}$ $f^{/}(x) = \lim_{n\to 0}\frac{(x+h)^2-8(x+h)-(x^2-8x)}{h}$ $f^{/}(x) = \lim_{n\to 0}\frac{x^2+2xh+h^2-8x-8h-x^2+8x}{h}$ $f^{/}(x) = \lim_{n\to 0}\frac{2xh+h^2-8h}{h}$ $f^{/}(x) = \lim_{n\to 0}\frac{h(2x+h-8)}{h}$ $f^{/}(x) = 2x-8$ **OR** $f(x+h) = (x+h)^2-8(x+h)$ $= x^2+2xh+h^2-8x-8h$ $f(x+h)-f(x) = 2xh+h^2-8h$ $\frac{f(x+h)-f(x)}{h} = \frac{h(2x+h-8)}{h} = (2x+h-8)$ $f^{/}(x) = \lim_{n\to 0}(2x+h-8)$ $f^{/}(x) = 2x-8$	A✓formula A✓substitution CA✓ simplification of numerator CA✓factorization CA✓answer **OR** A✓ $f(x+h)$ value CA✓ $f(x+h)-f(x)$ value CA✓ $\frac{f(x+h)}{h}$ value A✓formula CA✓answer	(5) (5)
9.2.1	$g(x) = \left(5-\sqrt{x}\right)^2$ $g(x) = 25-10x^{\frac{1}{2}}+x$ $g^{/}(x) = -5x^{-\frac{1}{2}}+1$ **OR** Chain Rule: $g(x) = \left(5-\sqrt{x}\right)^2$ $g^{/}(x) = 2\left(5-\sqrt{x}\right).-\frac{1}{2}x^{-\frac{1}{2}}$	A✓squaring CACA✓✓ derivatives **OR** A✓2 A✓$\left(5-\sqrt{x}\right)$ CA✓$-\frac{1}{2}x^{-\frac{1}{2}}$	(3) (3)

9.2.2	$D_x\left[\frac{x^2-4x}{\sqrt[3]{x}}\right]$ $=D_x\left[x^{\frac{5}{3}}-4x^{\frac{2}{3}}\right]$ $=\frac{5}{3}x^{\frac{2}{3}}-\frac{8}{3}x^{-\frac{1}{3}}$	AA✓✓writing in exponential form CACA✓✓each derivative	(4)
			[12]

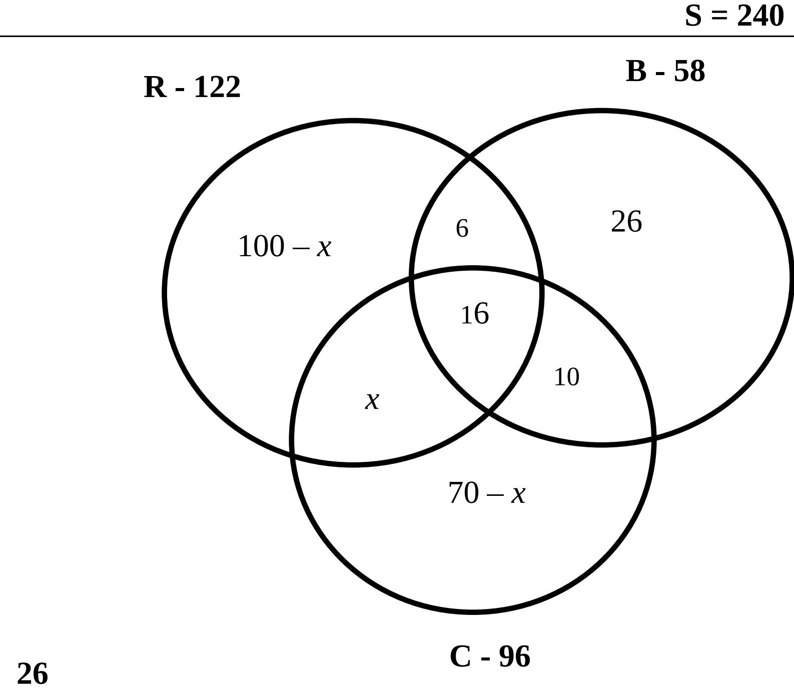
QUESTION 10

10.1	$q=3$	A✓answer	(1)
10.2	$f(x)=px^3-5x^2-4x+q$ $0=p(-1)^3-5(-1)^2-4(-1)+3$ $0=-p-5+4+3$ $p=-5+4+3=2$	A✓substitution of $q = 3$ A✓substitution of $(-1;0)$ A✓simplification	(3)
10.3	$f(x)=2x^3-5x^2-4x+3$ $f'(x)=6x^2-10x-4=0$ $3x^2-5x-2=0$ $(3x+1)(x-2)=0$ $x=-\frac{1}{3}$ or $x=2$ $y=\frac{100}{27}$ or $3,7$ or $y=-9$	CA✓derivative and equal to 0 CA✓substitution into formula CA✓ x– values CA✓ y– values	(4)
10.4	$-9<k<3$	CA✓end points A✓interval	(2)
10.5	$f''(x)=12x-10>0$ $x>\frac{5}{6}$	CA✓derivative and greater than 0 CA✓answer	(2)
10.6	$D'\left(\frac{1}{3}\,;\,3,7\right)$	CA✓ x – value CA✓y – value	(2)
10.7	$f'(x)=6x^2-10x-4=-8$ $3x^2-5x+2=0$ $(3x-2)(x-1)=0$ $x=\frac{2}{3}$ or $x=1$	A✓derivative equal to – 8 CA✓factors CACA✓✓each x- value	(4)
			[18]

QUESTION 11

11.1	$r^2 + \square^2 = 12^2$ $r = \sqrt{144 - \square^2}$	A✓T.O.P CA✓answer	(2)
11.2	$V = \frac{1}{3}\pi r^2 h$ $V = \frac{1}{3}\pi (144 - h^2)\, h$ $V = 48\pi h - \frac{1}{3}\pi h^3$	A✓formula CA✓expression in *h*	(2)
11.3	$V = 48\pi h - \frac{1}{3}\pi h^3$ $V^{/} = 48\pi - \pi h^2 = 0$ $48 - h^2 = 0$ $\square = \sqrt{48} = 4\sqrt{3} = 6{,}93\ cm$	CA✓derivative A✓derivative equal to 0 CA✓answer	(3)
11.4	$V = 48\pi h - \frac{1}{3}\pi h^3$ $V = 48\pi (6{,}93) - \frac{1}{3}\pi (6{,}93)^2$ $V = 696{,}5\ cm^3$	CA✓substitution of 6,93 or $4\sqrt{3}$ CA✓answer	(2)
			[9]

QUESTION 12

12.1		AAA✓✓✓ each set ✓26	(4)
12.2	122 + 36 + 70 – x + 26 = 240 254 – x = 240 x = 14	✓equation ✓simplifying ✓answer	(3)
12.3			
a)	$\frac{26}{240} = 0.1083 = 10.83\%$	✓answer	(2)
b)	$\frac{144}{240} = 0.6 = 60\%$	✓answer	(2)
c)	$\frac{46}{240} = 0.1917 = 19.17\%$	✓answer	(1)
			[12]

Total Marks : 150