basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

MATHEMATICS P1

NOVEMBER 2016

NATIONAL
SENIOR CERTIFICATE

GRADE 11

MARKS: 150

TIME: 3 hours

This question paper consists of 9 pages.

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 et cetera that 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 to TWO decimal places, unless stated otherwise.

8.   Diagrams are NOT necessarily drawn to scale.

9.   Write neatly and legibly.

KWAZULU-NATAL

QUESTION 1

1.1   Solve for x in each of the following:

1.1.1 $3x^2 - 5x - 1 = 0$ (leave your answer correct to TWO decimal places)   (3)

1.1.2 $x^2 - 6x + 8 = 0$ (3)

1.1.3 $4x - 2x^2 < 0$ (4)

1.1.4 $2^{3x+1} + 2^{3x} = 12$ (4)

1.1.5 $\sqrt{x-1} + 3 = x - 4$ (6)

1.2   Solve for x and y simultaneously:

$3x - y + 2 = 0$ and $y = -x^2 + 2x + 8$ (6)

1.3   Show that the roots of $3x^2 + (k+2)x = 1 - k$ are real and rational for all values of k.   (4)

[30]

QUESTION 2

2.1   Simplify fully, WITHOUT using a calculator:

2.1.1 $\dfrac{5^{a-2} . 2^{a+2}}{10^a - 10^{a-1} . 2}$ (5)

2.1.2 $\dfrac{\sqrt{27m^6} - \sqrt{48m^6}}{\sqrt{12m^6}}$ (3)

2.2   WITHOUT using a calculator, show that $\dfrac{2}{1+\sqrt{2}} - \dfrac{8}{\sqrt{8}} = -2$ (4)

[12]

KWAZULU-NATAL

QUESTION 3

Consider the quadratic pattern: $-9; -6; 1; 12; x; \ldots$

3.1 Determine the value of x. (1)

3.2 Determine a formula for the nth term of the pattern. (4)

3.3 A new pattern, P_n, is formed by adding 3 to each term in the given quadratic pattern. Write down the general term of P_n in the form $P_n = an^2 + bn + c$. (1)

3.4 Which term of the sequence found in QUESTION 3.3 has a value of 400? (4)

[10]

QUESTION 4

4.1 Given the linear pattern: $18; 14; 10; \ldots$

    4.1.1 Write down the fourth term. (1)

    4.1.2 Determine a formula for the general term of the pattern. (2)

    4.1.3 Which term of the pattern will have a value of -70? (2)

    4.1.4 If this linear pattern forms the first differences of a quadratic pattern, Q_n, determine the first difference between Q_{509} and Q_{510}. (2)

4.2 A quadratic pattern has a constant second difference of 2 and $T_5 = T_{17} = 29$.

    4.2.1 Does this pattern have a minimum or maximum value? Justify the answer. (3)

    4.2.2 Determine an expression for the nth term in the form $T_n = an^2 + bn + c$. (5)

[15]

QUESTION 5

Given: $f(x) = -2x^2 + x + 6$

5.1	Calculate the coordinates of the turning point of f.	(4)
5.2	Determine the y-intercept of f.	(1)
5.3	Determine the x-intercepts of f.	(4)
5.4	Sketch the graph of f showing clearly all intercepts with the axes and turning point.	(3)
5.5	Determine the values of k such that $f(x) = k$ has equal roots.	(2)
5.6	If the graph of f is shifted two units to the right and one unit upwards to form h, determine the equation h in the form $y = a(x + p)^2 + q$.	(3)

[17]

KWAZULU-NATAL

QUESTION 6

The diagram below shows the graph of $f(x) = \dfrac{1}{x+3} - 1$ and $g(x) = \dfrac{1}{2}x$.

The graph of f intersects the x-axis at A and the y-axis at B.
The graph of f and g intersect at points C and D.
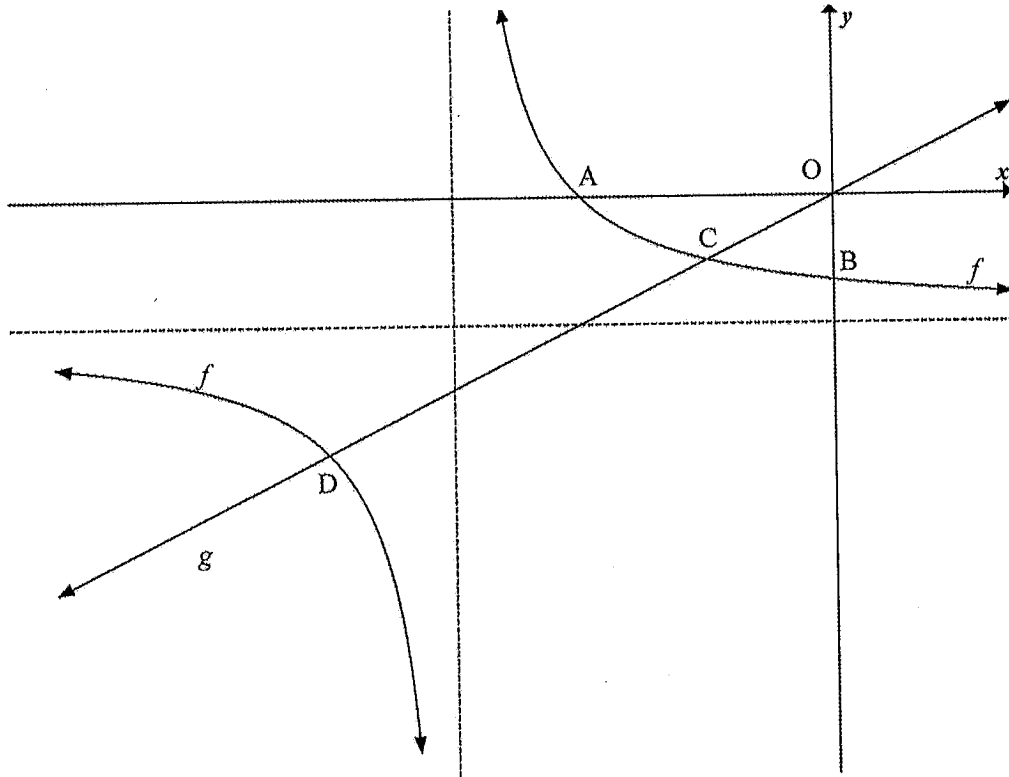
6.1	Write down the equations of the asymptotes of f.	(2)
6.2	Determine the domain of f.	(2)
6.3	Calculate the length of:	
6.3.1	OB	(2)
6.3.2	OA	(3)
6.4	Determine the coordinates of C and D.	(6)
6.5	Use the graphs to obtain the solution to: $\dfrac{1}{x+3} \geq \dfrac{x+2}{2}$	(4)

[19]

QUESTION 7

The sketch below is the graph of $f(x) = 2.b^{x+1} + q$.
The graph of f passes through the points A(1 ; 20) and B (–1 ; y).
The line $y = 2$ is an asymptote of f.
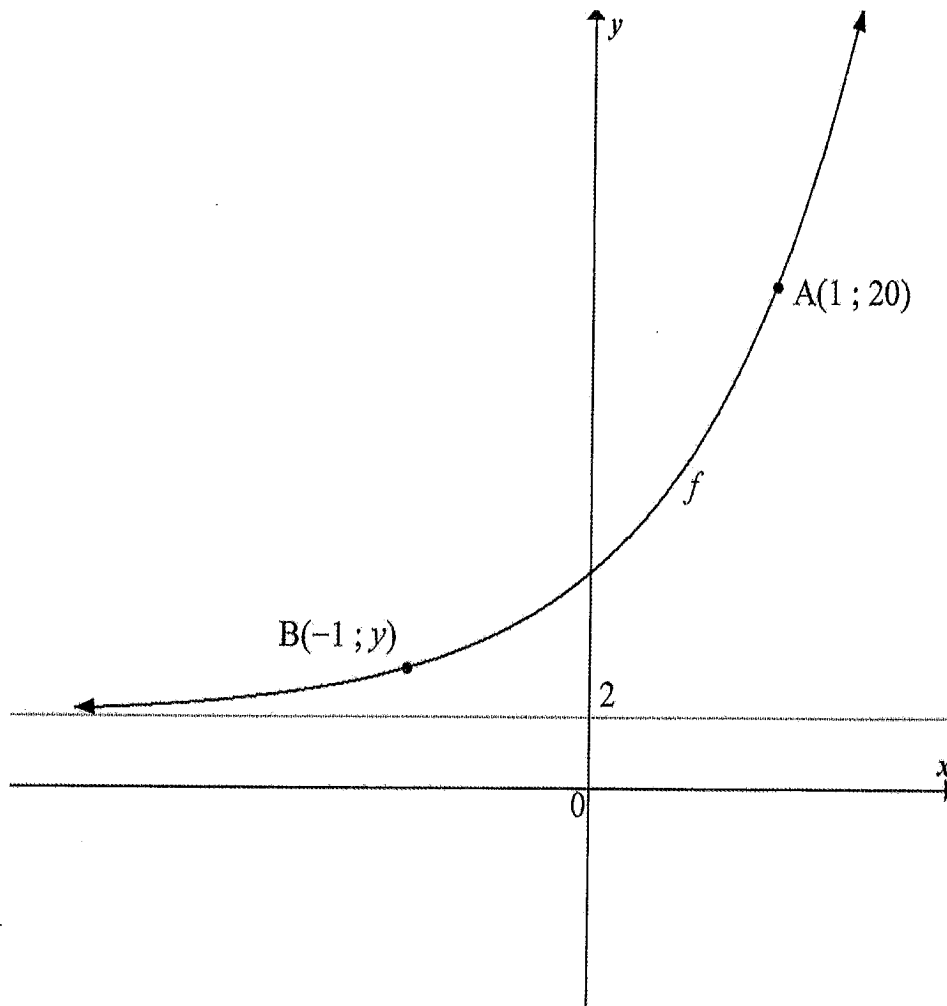
7.1   Show that the equation of f is $f(x) = 2(3)^{x+1} + 2$ (3)

7.2   Calculate the y-coordinate of the point B.   (1)

7.3   Determine the average gradient of the curve between the points A and B.   (2)

7.4   A new function h is obtained when f is reflected about its asymptote.
Determine the equation of h.   (2)

7.5   Write down the range of h.   (1)
    [9]

QUESTION 8

8.1   A machine costs R25 000 in 2016. Calculate the book value of the machine after 4 years if it depreciates at 9% p.a. according to the reducing balance method.   (3)

8.2   The nominal interest rate of an investment is 12,35% p.a., compounded monthly. Calculate the effective interest rate.   (4)

8.3   The value of a property increased from R145 000 to R221 292,32 over 6 years. Calculate the average annual rate of increase of the property over 6 years.   (4)

8.4   Tebogo made an initial deposit of R15 000 into an account that paid interest at 9,6% p.a., compounded quarterly. Six months later she withdrew R5 000 from the account. Two years after the initial deposit she deposited another R3 500 into this account. How much does she have in the account 3 years after her initial deposit?   (5)

[16]

QUESTION 9

9.1   Given: P(A) = 0,2
                     P(B) = 0,5
                     P (A or B) = 0, 6   where A and B are two different events

    9.1.1   Calculate P(A and B).   (2)

    9.1.2   Are the events A and B independent ? Show your calculations.   (3)

9.2   A survey was conducted amongst 100 learners at a school to establish their involvement in three codes of sport, soccer, netball and volleyball. The results are shown below.

- 55 learners play soccer (S)
- 21 learners play netball (N)
- 7 learners play volleyball (V)
- 3 learners play netball only
- 2 learners play soccer and volleyball
- 1 learner plays all 3 sports

The Venn diagram below shows the information above.
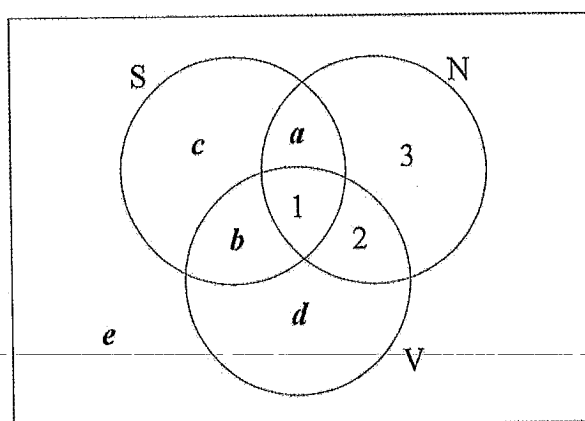
    9.2.1   Determine the values of a, b, c, d and e.   (5)

    9.2.2   What is the probability that one of the learners chosen at random from this group plays netball or volleyball?   (2)

9.3   The probability that the first answer in a maths quiz competition will be correct is 0,4. If the first answer is correct, the probability of getting the next answer correct rises to 0,5. However, if the first answer is wrong, the probability of getting the next answer correct is only 0,3.

        9.3.1   Represent the information on a tree diagram. Show the probabilities associated with each branch as well as the possible outcomes.   (3)

        9.3.2   Calculate the probability of getting the second answer correct.   (3)
                                                                                                       [18]

QUESTION 10

Bongani wants to start a small vegetable garden at his house. He wants to use an existing wall and 14 m of fencing to enclose a rectangular area for the garden. Calculate the dimensions of the largest rectangular area that he can enclose.   **[4]**
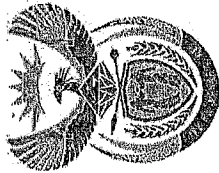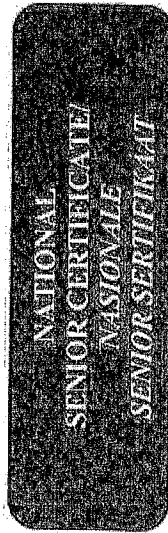
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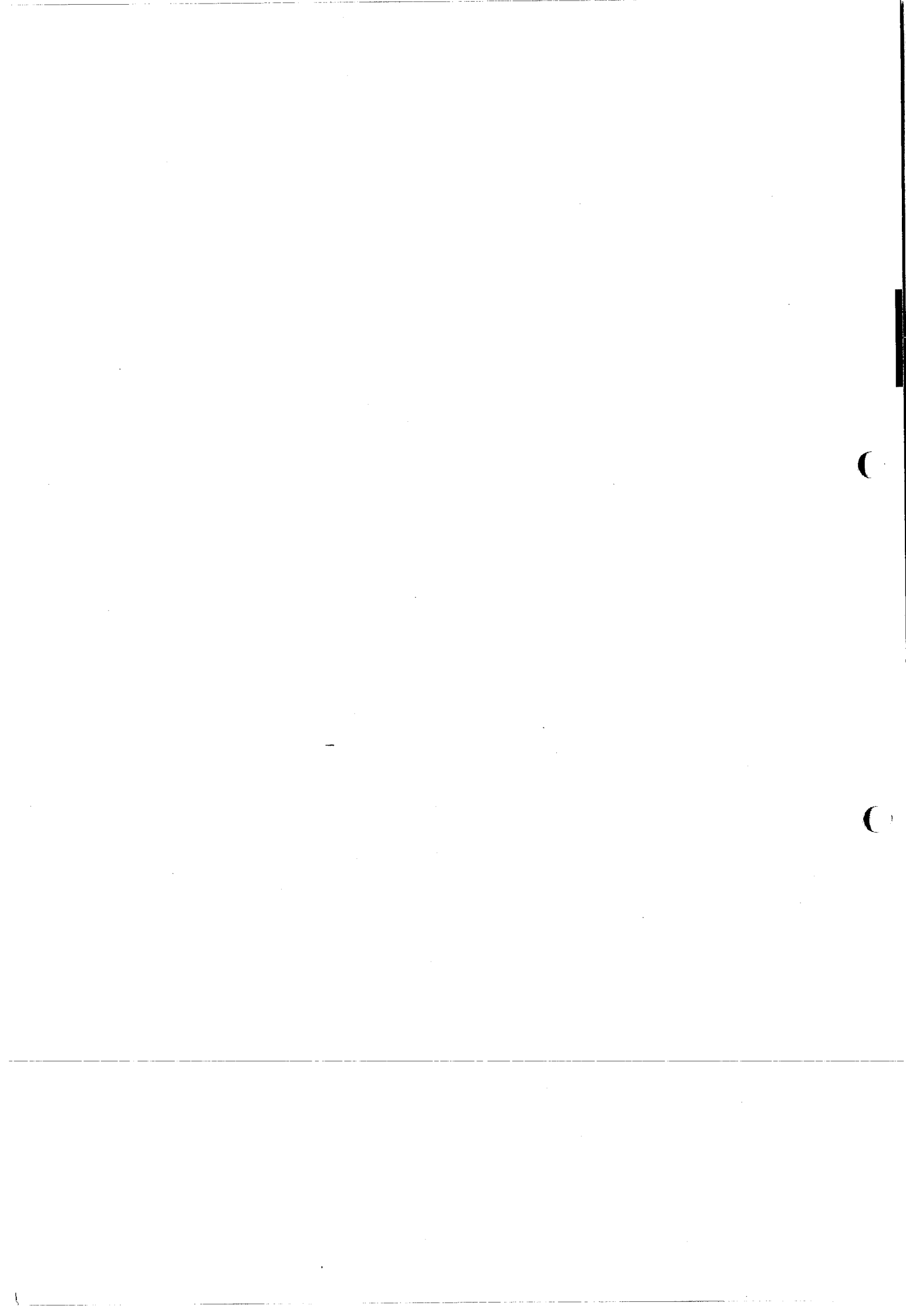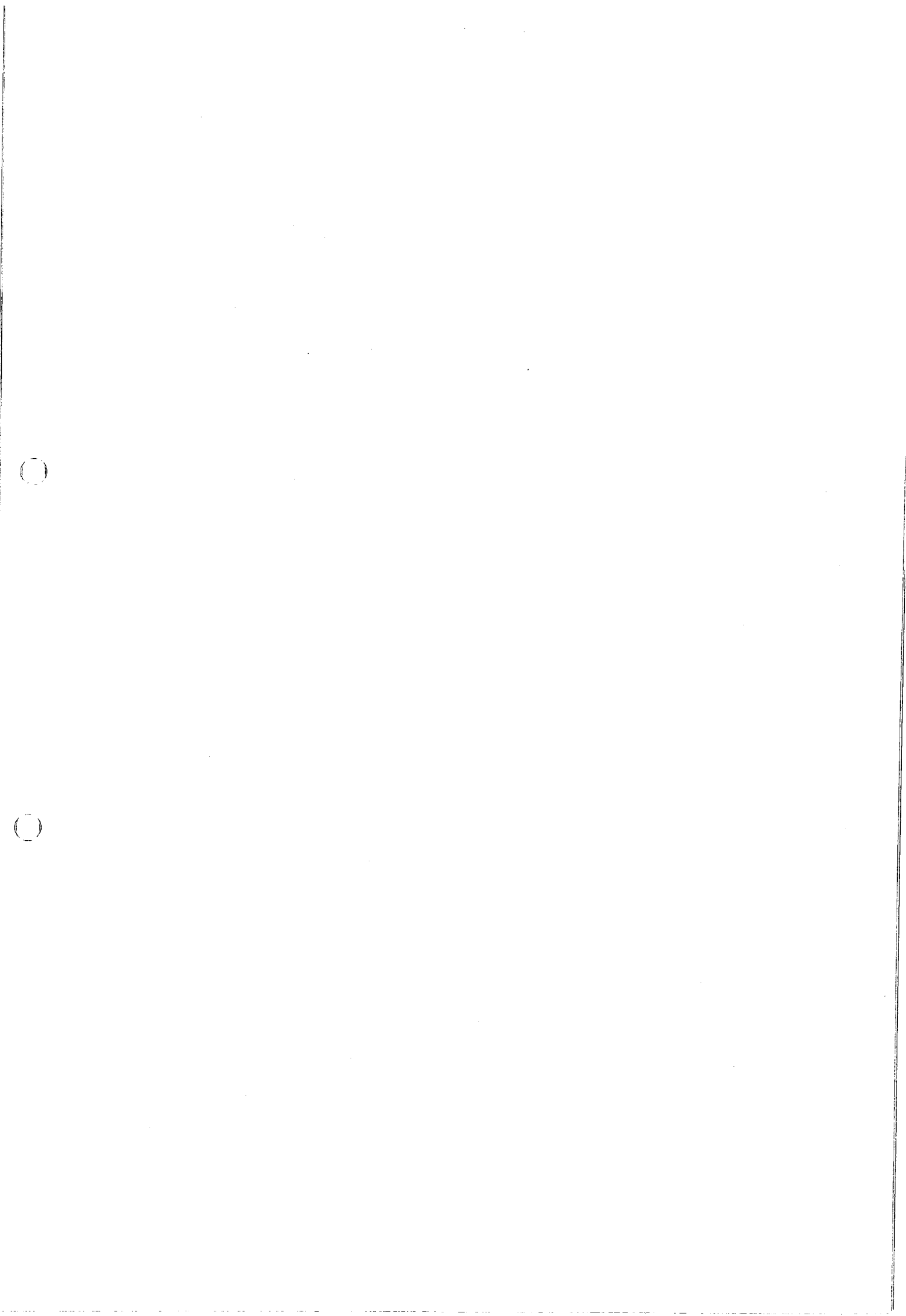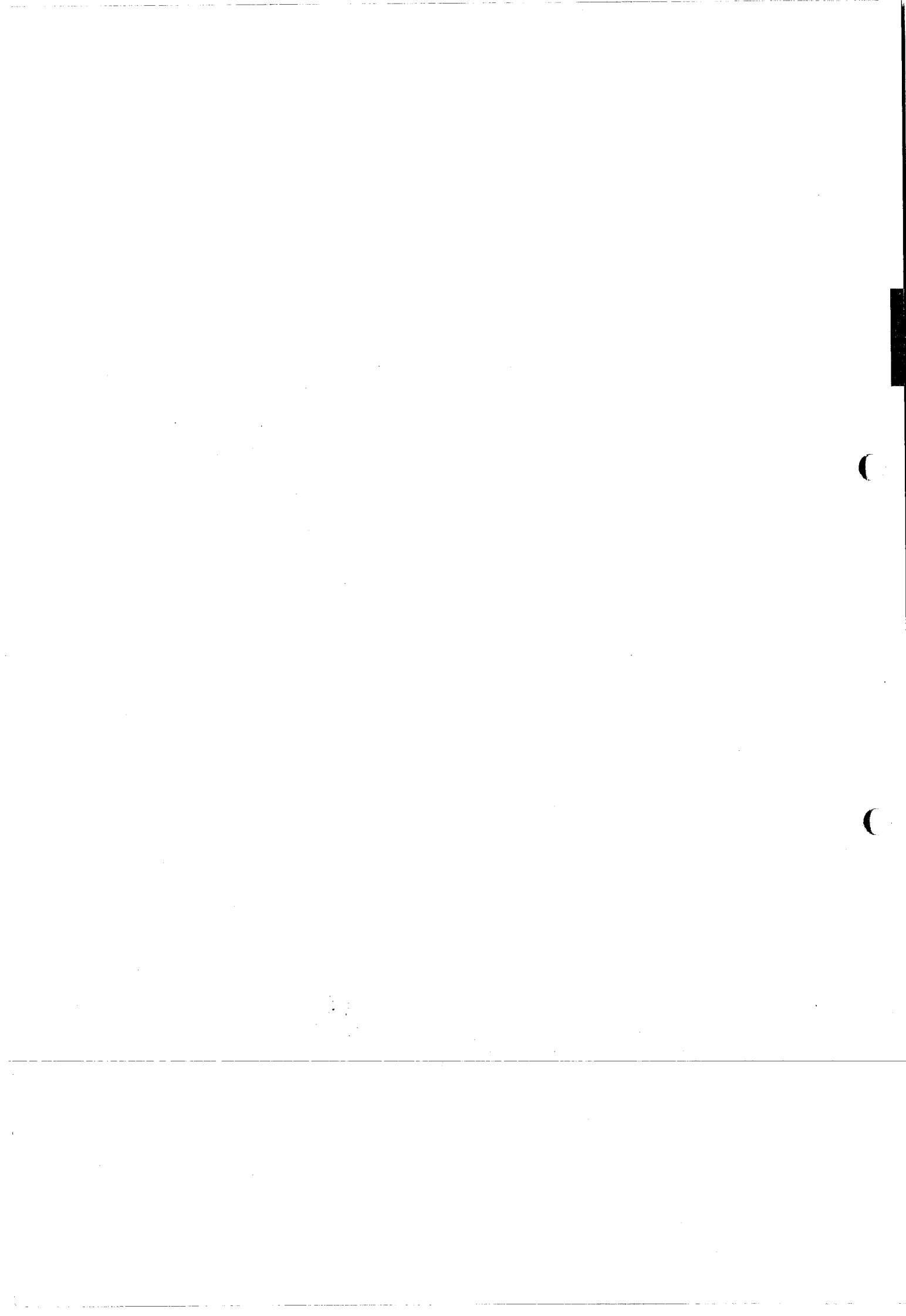
NOTE:

- If a candidate answered a question TWICE, mark only the FIRST attempt.
- If a candidate crossed out an answer and did not redo it, mark the crossed-out answer.
- Consistent accuracy applies to ALL aspects of the marking memorandum(If a learner makes a mistake, the mistake has to be follwed up. Stop marking the question if the learner commits the second mistake)
- It is unacceptable to assume values/answers in order to solve a problem.
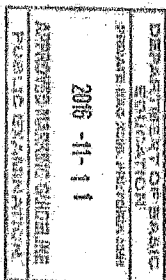- Penalise once for incorrect rounding off.

LET WEL:

- *As 'n kandidaat 'n vraag TWEE keer beantwoord het, sien slegs die EERSTE poging na.*
- *As 'n kandidaat 'n antwoord deurgehaal en nie oorgedoen het nie, sien die deurgehaalde antwoord na.*
- *Volgehoue akkuraatheid is op ALLE aspekte van die memorandum van toepassing(as 'n leerder 'n fout gemaak het, moet die fout opgevolg word. Hou op om die vraag na te sien as die leerder 'n tweede fout maak)*
- *Dit is onaanvaarbaar om waardes/antwoorde te veronderstel om 'n probleem op te los.*
- *Penaliseer een keer vir inkorrekte afronding*

QUESTION/VRAAG 1

1.1.1	$3x^2 - 5x - 1 = 0$	
	$x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$	
	$= \dfrac{-(-5) \pm \sqrt{(-5)^2 - 4(3)(-1)}}{2(3)}$	✓ substitution in the correct quadratic formula /*vervanging in die korrekte formule*
	$= \dfrac{5 \pm \sqrt{37}}{6}$	
	$x = 1{,}85$ or $x = -0{,}18$	✓ answer/*antwoord* ✓ answer/*antwoord* (3)
		Incorrect rounding off, max $\dfrac{2}{3}$ marks
1.1.2	$x^2 - 6x + 8 = 0$	✓ factors/*faktore*
	$(x - 4)(x - 2) = 0$	*OR* Substitution in the correct quadratic formula/ *vervanging in die korrekte kwadratiese formule*
	$x = 4$ or $x = 2$	✓ $x = 4$ ✓ $x = 2$ (3)

D-r)

1.1.3	**Option/Opsie 1** **OR/OF** **Option/Opsie 2**	
	$4x - 2x^2 < 0$ $4x - 2x^2 < 0$	
	$-2x^2 < 0$ $-2x^2 + 4x < 0$	✓ factors/faktore
	$2x(2-x) < 0$ $2x^2 - 4x > 0$	✓ method/metode
	$x < 0$ or $x > 2$ $x(2x-4) > 0$	✓✓ $x < 0$ or $x > 2$
	$x < 0$ or $x > 2$	
		Maximum $\frac{3}{4}$ for incorrect notation
	OR	Maksimum $\frac{3}{4}$ vir verkeerde notasie
		(4)

1.1.4	$2^{3x-1}\left[2^1+1\right]=12$	✓ common/gemene factor
	$2^{3x}\left[2^1+1\right]=12$	✓ simplification/vereenv.
	$2^{3x}.3 = 12$	
	$2^{3x} = 4$	✓ equating/gelykstel exponents
	$2^{3x} = 2^2$	
	$3x = 2$	
	$\therefore x = \dfrac{2}{3}$	✓ answer/antw. (4)

1.1.5	$\sqrt{x-1}+3=x-4$	✓ isolate/isoleer ✓ sign/teken
	$\sqrt{x-1}=x-7$	
	$x-1=(x-7)^2$	✓ squaring/kwadr both sides
	$x-1 = x^2 - 14x + 49$	
	$x^2 - 15x + 50 = 0$	✓ std vorm/stand vorm
	$(x-5)(x-10) = 0$	✓ factors/fakt
	$x = 5$ or $x = 10$	✓ $x=5$ ✗ $x=10$

1.2	$3x - y + 2 = 0$ and $y = -x^2 + 2x + 8$	✓ $y = 3x+2$
	$\therefore y = 3x + 2$ **OR**	
	$3x + 2 = -x^2 + 2x + 8$ $3x - (-x^2 + 2x + 8) + 2 = 0$	✓ substitution/vervanging
	$x^2 + x - 6 = 0$	✓ std form/stand vorm
	$(x+3)(x-2) = 0$	✓ factors/faktore
	$x = -3$ or $x = 2$	✓ x-values/x-waardes
	$y = 3(-3) + 2$ or $y = 3(2) + 2$	
	$= -7$ or $y = 8$	✓ y-values/y-waardes (6)

1.3	$3x^2 + (k+2)x = 1 - k$	✓ $\Delta = b^2 - 4ac$
	$3x^2 + (k+2)x - 1 + k = 0$	
	$\Delta = b^2 - 4ac$	
	$= (k+2)^2 - 4(3)(-1+k)$	✓ substitution /vervanging
	$= k^2 + 4k + 4 + 12 - 12k$	✓ $k^2 - 8k + 16$
	$= k^2 - 8k + 16$	
	$= (k-4)^2$	✓ $(k-4)^2$
	$\therefore b^2 - 4ac$ is a perfect square.	
	Roots are real and rational.	(4)

                                                   [30]

QUESTION/VRAAG 2

2.1.1	$$\frac{5^a.5^{-2}.2^a.2^2}{10^a - 10^a.10^{-1}.2}$$ $$= \frac{(5.2)^a.5^{-2}.2^2}{10^a\left[1 - \frac{2}{10}\right]}$$ $$= \frac{10^a.\dfrac{4}{25}}{10^a.\dfrac{8}{10}}$$ $$= \frac{4}{25} \times \frac{10}{8}$$ $$= \frac{1}{5}$$	✓writing as separate bases/ *skryf as priembasisse* ✓multiplication of bases with same exponents/*vermenigv. van basisse met dies. eksp.* ✓common factor in the denominator/*gemene faktor in die noemer* ✓simplification/*vereenv.* ✓answer/*antw.* (5)
2.1.2	$$\frac{\sqrt{27m^6} - \sqrt{48m^6}}{\sqrt{12m^6}}$$ $$= \frac{3\sqrt{3}\,m^3 - 4\sqrt{3}\,m^3}{2\sqrt{3m^6}}$$ $$= \frac{\sqrt{3m^6}(3-4)}{2\sqrt{3}\,m^3}$$ $$= \frac{-\sqrt{3}\,m^3}{2\sqrt{3}\,m^3}$$ $$= -\frac{1}{2}$$ **OR/OF** $$= \frac{3\sqrt{3m^6} - 4\sqrt{3m^6}}{2\sqrt{3m^6}}$$ $$= \frac{\sqrt{3m^6}(3-4)}{2\sqrt{3m^6}}$$ $$= \frac{3-4}{2}$$ $$= -\frac{1}{2}$$	✓simplification of all surds/*vereenv. van alle wortevorme* ✓simplification numerator/*vereenv. van teller* ✓answer/*antw.* (3) ✓simplification of all surds/*vereenv. van alle wortevorme* ✓simplification of numerator/*vereenv. van teller* ✓answer/*antw.* (3)

2.2	$$LHS = \frac{4\sqrt{2} - 8(1+\sqrt{2})}{2\sqrt{2}(1+\sqrt{2})}$$ $$= \frac{-4\sqrt{2} - 8}{2\sqrt{2}(1+\sqrt{2})}$$ $$= \frac{-4(\sqrt{2}+2)}{2(\sqrt{2}+2)}$$ $$= -2$$ $$= RHS$$ **OR/OF** $$LHS = \frac{2}{1+\sqrt{2}} \times \frac{1-\sqrt{2}}{1-\sqrt{2}} - \frac{8\times\sqrt{8}}{\sqrt{8}\times\sqrt{8}}$$ $$= \frac{2-2\sqrt{2}}{1-2} - \sqrt{8}$$ $$= -2+2\sqrt{2} - 2\sqrt{2}$$ $$= -2$$ $$= RHS$$	✓LCD/*KGV* ✓numerator/*teller* ✓simplification/*vereenv.* ✓common factor/*gemene faktor* (4) ✓✓rationalise the denominator of both fractions/*rasionaliseer die noemer van beide breuke* ✓$-2+2\sqrt{2}$ ✓$-2\sqrt{2}$ (4) **[12]**

QUESTION/VRAAG 3

3.1

3 — 6 — 7 — 11 — 12 — $x-23$ — $x-12$ — x

(differences) 3, 4, 4, 4, 4 ...

$x - 23 = 4$

$x = 27$

✓ answer/antw.   (1)

3.2

$2a = 4$

$a = 2$ ✓ $a = 2$

$3a + b = 3$

$6 + b = 3$

$b = -3$ ✓ $b = -3$

$a + b + c = -9$

$2 - 3 + c = -9$

$c = -8$ ✓ $c = -8$

$T_n = 2n^2 - 3n - 8$ ✓ $T_n = 2n^2 - 3n - 8$ (4)

3.3

$T_n = 2n^2 - 3n - 8 + 3$

$= 2n^2 - 3n - 5$ CA from 3.2   ✓ answer/antw.   (1)

3.4

$T_n = 400$ CA from 3.3

$2n^2 - 3n - 5 = 400$ ✓ equating/verg.

$2n^2 - 3n - 405 = 0$ ✓ std form/stand vorm

$(n - 15)(2n + 27) = 0$ ✓ factorisation/fakt.

$n = 15$ or $n \neq -\dfrac{27}{2}$ ✓ $n = 15$

OR

$2n^2 - 3n - 5 = 400$

$2n^2 - 3n - 8 = 397$

$2n^2 - 3n - 405 = 0$

$(n - 15)(2n + 27) = 0$

$n = 15$ or $n \neq -\dfrac{27}{2}$ ✓ only/slegs $n = 15$ (4)

   [10]

QUESTION/VRAAG 4

4.1.1

18 — 14 — 10

(differences) -4, -4

$T_4 = 6$ ✓ answer/antw.   (1)

4.1.2

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

$= 18 + (n-1)(-4)$

$= -4n + 22$

✓ substitution/verv.   ✓ answer/antw.

Answer only, full marks / slegs antwoord volpunte   (2)

4.1.3

$T_n = 22 - 4n$

$-70 = 22 - 4n$

$-92 = -4n$

$n = 23$ ✓ answer/antw.   (2)

4.1.4

$Q_{510} - Q_{509} = T_{509}$ of the linear sequence

$= 22 - 4 \times 509$

$= -2014$ ✓ making association/ass.   ✓ answer/antw.   (2)

4.2.1

$2a = 2$

$\therefore a = 1$

$\therefore a > 0$ $\boxed{T_n = an^2 + bn + c}$

∴ this pattern has a minimum value/hierdie patroon het 'n minimum waarde

The shape of the graph will be concave up / die vorm van die grafiek is konkaaf na bo

✓ value/wrde of a ✓ $a > 0$ ✓ minimum value/wrde   (3)

4.2.2

$T_5 = 29$

$\therefore 1(5)^2 + 5b + c = 29$

ie $5b + c = 4 \ldots$ (1)

and $T_{17} = 29$

$\therefore 1(17)^2 + 17b + c = 29$

ie $17b + c = -260 \ldots$ (2)

solve the equations simultaneously

$-12b = 264$

$\therefore b = -22$

substitute in (1)

$5(-22) + c = 4$

$-110 + c = 4$

$\therefore c = 114$

$\therefore T_n = n^2 - 22n + 114$

OR/OF

✓✓ equations/verg. (1) & (2)

✓ value of/waarde van b

✓ value of/waarde van c

✓ answer/antwoord.   (5)

QUESTION 5

5.1

$$x = -\frac{b}{2a}$$

$$= -\frac{1}{2(-2)}$$

$$= \frac{1}{4}$$

$$\therefore y = -2\left(\frac{1}{4}\right)^2 + \left(\frac{1}{4}\right) + 6$$

$$y = \frac{49}{8}$$

OR

$$f(x) = -2x^2 + x + 6$$

$$-2x^2 + x + 6 = 0$$

$$(2x+3)(x-2) = 0$$

$$x = \frac{-3}{2} \; or$$

$$x = 2$$

x-value of the axis of symmetry

$$x = \frac{-\frac{3}{2}+2}{2} = \left(\frac{1}{4}\right)$$

$$f\left(\frac{1}{4}\right) = -2\left(\frac{1}{4}\right)^2 + \frac{1}{4} + 6$$

$$= \frac{49}{8}$$

OR

$$f(x) = -2\left(x^2 - \frac{x}{2}\right) + 6$$

$$= -2\left(x^2 - \frac{x}{2} + \left(-\frac{1}{4}\right)^2\right) + 6 - 2(-2)\left(\frac{1}{4}\right)^2$$

$$= -2\left(x - \frac{1}{4}\right)^2 + \frac{49}{9}$$

$$TP = \left(\frac{1}{4}; \frac{49}{8}\right)$$

✓ substitution/verv.

✓ x-value/waarde

✓ substitution/verv.

✓ y-value/waarde

(4)

5.2

$$y = -2(0)^2 + 0 + 6$$

$$\therefore y \text{ intercept} (0;6)$$

✓ y-value/waarde

(1)

$$T_n = 1[(n+p)]^2 + q$$

$$\text{A.O.S} = \frac{5+17}{2}$$

$$p = 11$$

$$\therefore T_n = 1(n-11)^2 + q$$

$$29 = 1(17-11)^2 + q$$

$$\therefore q = -7$$

$$\therefore T_n = (n-11)^2 - 7$$

$$T_n = n^2 - 22n + 114$$

✓ axis of symmetry/simm. as

✓ value of/waarde van p

✓ substitution/verv. (17;29) or/of (5; 29)

✓ value of/waarde van q

✓ answer/antw.

[15]

5.3	x intercepts $0 = -2x^2 + x + 6$ $0 = 2x^2 - x - 6$ $0 = (2x + 3)(x - 2)$ $\therefore x = 2$ or/of $x = -\dfrac{3}{2}$ $(2;0)$ and $\left(-\dfrac{3}{2};0\right)$	✓ $y = 0$ ✓ factorisation/faktorisering ✓✓ x-values/waardes (4)
5.4		✓ shape/vorm ✓✓ x-intercepts/x-afsnitte ✓ turning point/draaipunt (4)
5.5	$k = \dfrac{49}{8}$	✓✓ answer/antwoorde (2)
5.6	New/Nuwe turning point/drapn.t $\left(\dfrac{9}{4}; \dfrac{57}{8}\right)$ Equation/verg. of h $y = -2\left(x - \dfrac{9}{4}\right)^2 + \dfrac{57}{8}$	✓✓ turning points/draaipunt ✓ equation/verg. **OR/OF** (3) ✓✓✓ answer only (3) **[17]**

QUESTION/VRAAG 6

6.1	$x = -3$ and $y = -1$	✓ $x = -3$ ✓ $y = -1$ (2)
6.2	$x \in R ; x \neq -3$ OR $x \in (-\infty;-3) \cup (-3;\infty)$	✓✓ answer/antwoord (2)

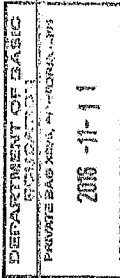| 6.3.1	At B, $x = 0$ $\therefore y = \dfrac{1}{0+3} - 1$ $y = -\dfrac{2}{3}$ $\therefore OB = \dfrac{2}{3}$ units	✓ substitution/vervanging. ✓ answer/antwoord. (2)
6.3.2	At A, $y = 0$ $0 = \dfrac{1}{x+3} - 1$ $1 = \dfrac{1}{x+3}$ $x + 3 = 1$ $x = -2$ $\therefore OA = 2$ units/eenhede	✓ substitution/vervanging ✓ simplification/vereenv. ✓ answer/antwoorde. (3)
6.4	$\dfrac{1}{x+3} - 1 = \dfrac{1}{2}x$ $2 - 2(x+3) = x(x+3)$ $x^2 + 3x - 2 + 2x + 6 = 0$ $x^2 + 5x + 4 = 0$ $(x+4)(x+1) = 0$ $x = -4$ or/of $x = -1$ when/wanneer $x = -1; y = -\dfrac{1}{2}$ when/wanneer $x = -4; y = -2$ $\therefore C\left(-1; -\dfrac{1}{2}\right)$ and D$(-4;-2)$	✓ equating the two equations/ verg. van 2 vergelykings ✓ standard form/std vorm ✓ factors/faktore ✓ x-values/waardes ✓ co-ordinates/koördinate C ✓ co-ordinates/koördinate D (6)

QUESTION/VRAAG 8

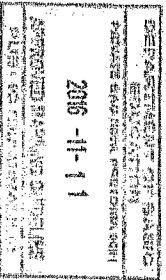|		
8.1	$A = P(1-i)^n$ $= R25000(1-0,09)^4$ $= R17\,143,74$	✓ $A = P(1-i)^n$ ✓ substitution/verv. ✓ answer/antw. (3)
8.2	$1 + i_{eff} = \left(1 + \dfrac{i_{nom}}{m}\right)^m$ $1 + i_{eff} = \left(1 + \dfrac{0,1235}{12}\right)^{12}$ $i_{eff} = \left(1 + \dfrac{0,1235}{12}\right)^{12} - 1$ ∴ Rate = 0,13073×100 = 13,07% The effective interest rate/Die effektiewe rentekoers is 13.07%	✓ formula/formule. ✓ substitution/vervanging. ✓ simplification/vereenv. ✓ answer/antwoord. (4)
8.3	$A = P(1+i)^n$ $R221\,292,32 = R145\,000\left(1+\dfrac{r}{100}\right)^6$ $\sqrt[6]{\dfrac{R221\,292,32}{145\,000}} = 1 + \dfrac{r}{100}$ $\dfrac{r}{100} = 0,07300000324$ $r = 7,3\%$	✓ correct substitution into correct formula/korrekte vervanging in korrekte formule ✓ $n=6$ ✓ ✓ $\sqrt[6]{\dfrac{R221\,292,32}{145\,000}} = 1 + \dfrac{r}{100}$ ✓ answer/antw. (4)
8.4	$A = 15\,000\left(1+\dfrac{0,096}{4}\right)^{12} - 5\,000\left(1+\dfrac{0,096}{4}\right)^{10} + 3\,500\left(1+\dfrac{0,096}{4}\right)^4$ $= R17\,448,46$	✓ $\dfrac{0,096}{4}$ ✓ $15\,000\left(1+\dfrac{0,096}{4}\right)^{12}$ ✓ $-5\,000\left(1+\dfrac{0,096}{4}\right)^{10}$ ✓ $3\,500\left(1+\dfrac{0,096}{4}\right)^4$ ✓ answer/antw. (5)

6.5	$\dfrac{1}{x+3} \geq \dfrac{x+2}{2}$ $\dfrac{1}{x+3} - 1 \geq \dfrac{x}{2} + 1$ ∴ $f(x) \geq g(x)$ ∴ $x \leq -4$ or $-3 < x \leq -1$	✓ simplification/vereenvoudig ✓ $f(x) \geq g(x)$ ✓ $x \leq -4$ ✓ $-3 < x \leq -1$ (4) **[19]**

> Answer only, full marks/ slegs antwoord volpunte

QUESTION/VRAAG 7

7.1	$q = 2$ $f(x) = 2.b^{x+1} + 2$ $20 = 2b^{1+1} + 2$ $18 = 2.b^2$ $9 = b^2$ $b = 3$ $f(x) = 2.3^{x+1} + 2$	✓ substitution of/ vervanging van $q = 2$ ✓ substitution of/ vervanging van (1;20) ✓ $b^2 = 9$ (3)
7.2	$y = 2.3^{-1+1} + 2$ $y = 2.1 + 2$ $y = 4$	✓ answer/antwoord. (1)
7.3	$m = \dfrac{y_2 - y_1}{x_2 - x_1}$ $= \dfrac{20-4}{1-(-1)}$ $= 8$	✓ substitution/vervanging. ✓ answer/antwoord (2)
7.4	$h(x) = -2.3^{x+1} + 2$ **OR/OF** Reflected about the x-axis/ refleksie om die x-as $= -2.3^{x+1} - 2$ ∴ Reflected about the asymptote $h(x) = -2.3^{x+1} - 2 + 4$ $= -2.3^{x+1} + 2$	✓✓ answer/antwoord **OR/OF** ✓ reflection about x-axis/ refleksie om die x-as ✓ answer/antwoord. (2)
7.5	$y < 2$	✓ answer/antwoord. (1) **[9]**

OR

T_0 to $T_{1\frac{1}{2}}$,

$A = 15000\left(1 + \dfrac{0,069}{4}\right)^{4\times\frac{1}{2}}$ ✓ $\dfrac{0,096}{4}$

$= R15728,64$

A at $T_{1\frac{1}{2}} = R15728,64 - R5000$

$= R\,10728,64$ ✓ R10728,64

$T_{1\frac{1}{2}}$ to T_2,

$A = R10728,64\left(1 + \dfrac{0,096}{4}\right)^{\frac{3}{2}\times4}$ ✓ R10728,64

$= R12369,28$

A at $T_2 = R12369,28 + R3500$

$= R15869,28$ ✓ R12369,28

T_2 to $T_3 = R15869,28\left(1 + \dfrac{0,096}{4}\right)^{4\times1}$ ✓ R15869,28

$= R\,17448,46$ ✓ R 17448,46   (5)

[16]

QUESTION/VRAAG 9

9.1 Given/Gegee: $P(A) = 0,2$
$P(B) = 0,5$
$P(A \text{ or } B) = 0,6$

9.1.1 $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$ ✓ $0,6 = 0,2 + 0,5 - P(A \text{ and } B)$

$0,6 = 0,2 + 0,5 - P(A \text{ and } B)$

$P(A \text{ and } B) = 0,1$ ✓ $P(A \text{ and } B) = 0,1$ (2)

9.1.2 $P(A \text{ and } B) = 0,1$

$P(A) \times P(B) = 0,2 \times 0,5$ ✓ $P(A) \times P(B) = 0,1$

$= 0,1$

$\therefore P(A \text{ and } B) = P(A) \times P(B)$ ✓ $P(A \text{ and } B) = P(A)\times P(B)$

$\therefore$ A and B are independent/ A en B is onafhanklik   ✓ conclusion/gevolgtrekking   (3)

9.2.1 $a = 15$ ✓ $a = 15$

$b = 1$ ✓ $b = 1$

$c = 38$ ✓ $c = 38$

$d = 3$ ✓ $d = 3$

$e = 37$ ✓ $e = 37$ (5)

> CA must be applied if the values of a and b are calculated incorrectly / CA moet toegepas word as die waardes van a en b verkeerd bereken is

9.2.2 P(one learner plays netball or volleyball) $= \dfrac{25}{100} = \dfrac{1}{4}$ ✓25 ✓answer/antwoord   (2)

9.3.1

```
              0,7  W   (W ; W)
      0,6  W
              0,3  C   (W ; C)

              0,5  W   (C ; W)
      0,4  C
              0,5  C   (C ; C)
```

✓ branch at first level with probabilities/ eerste vertakking met waarskynlikhede

✓ branches at second level with probabilities/ tweede vertakkings met waarskynlikhede

✓ outcomes/uitkomste   (3)

| 9.3.2 | P (second answer correct) = P(C and C)+P(W and C)
$= (0,4 \times 0,5) + (0,6 \times 0,3)$
$= 0,38$ | ✓ addition of probabilities/
som van waarskynlikhede
✓ substitution/*vervanging*
✓ answer/*antwoord*.
(3)
[18] |

QUESTION/VRAAG 10

10	

Let one of the equal sides = x / *Laat een van die sye = x*

the other side $= 14 - 2x$ / *die ander sy $= 14 - 2x$*

Area $= (14 - 2x)x$
$= -2x^2 + 14x$
$x = \dfrac{-14}{2(-2)}$
$= \dfrac{7}{2}m$
$y = 7m$

✓ area formula/*oppervl.for.*

✓ $x = \dfrac{-14}{2(-2)}$

✓ answer for/*antwoord van x*

✓ answer for / *antwoord van y* (4)

OR/OF

∴ the other side $= 14 - 2x$ / *die ander sy $= 14 - 2x$*

∴ Area $= (14 - 2x)x$
$= -2(x^2 - 7x)$
$= -2\left(x^2 - 7x + \dfrac{49}{4} - \dfrac{49}{4}\right)$
$= -2\left[\left(x - \dfrac{7}{2}\right)^2 - \dfrac{49}{4}\right]$
$= -2\left(x - \dfrac{7}{2}\right)^2 + \dfrac{49}{2}$

∴ when $x = \dfrac{7}{2}$ metres it will have a maximum area

✓ area formula/*oppervl.for.*

✓ completing the square/*voltooiing van vierkant*

✓ answer for/*antwoord van x*

✓ answer for / *antwoord van y* (4)

∴ the other side $= 14 - 2\left(\dfrac{7}{2}\right)$

$= 7$ metres

OR/OF

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Please turn over/*Blaai om asseblief*

Let the length be y

Width be $\dfrac{14 - y}{2}$

Area $= y\left(7 - \dfrac{1}{2}y\right)$

$= -\dfrac{1}{2}y^2 + 7y$

$y = \dfrac{-7}{2\left(-\dfrac{1}{2}\right)}$

$= 7m$

width $= 3,5m$

✓ area formula/*oppervl.for.*

✓ $y = \dfrac{-7}{2\left(-\dfrac{1}{2}\right)}$

✓ answer for y

✓ answer for width/*antwoord van breedte* (4)

OR

Area $= y\left(7 - \dfrac{1}{2}y\right)$

$= -\dfrac{1}{2}y^2 + 7y$

$= -\dfrac{1}{2}(y^2 - 14y)$

$= -\dfrac{1}{2}(y - 7)^2 + \dfrac{49}{2}$

lenght $= 7m$

width $= 3,5m$

✓ area formula/*oppervl.for.*

✓ completing the square/*voltooiing van die vierkant*

✓ answer for /*antwoord van y*

✓ answer for width/*antwoord van breedte* (4)
[4]

TOTAL/TOTAAL: 150

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