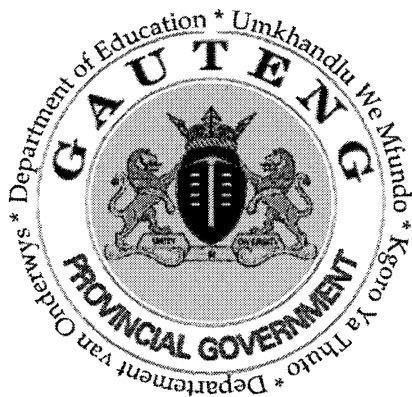


SENIOR CERTIFICATE EXAMINATION
SENIORSERTIFIKAAT-EKSAMEN



OCTOBER / NOVEMBER
OKTOBER / NOVEMBER

2004

MATHEMATICS

WISKUNDE

(First Paper: Algebra)
(Eerste Vraestel: Algebra)

LG

301-3/1 LS

10 pages
10 bladsye

MATHEMATICS LG: Paper 1



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GAUTENGSE DEPARTEMENT VAN ONDERWYS
SENIORSERTIFIKAAT-EKSAMEN**WISKUNDE LG**
(Eerste Vraestel: Algebra)**TYD: 3 uur****PUNTE: 150****INSTRUKSIES:**

- Beantwoord AL die vrae.
- Toon al die nodige berekeninge.
- Daar is 7 vrae wat op 8 bladsye getik is.
- Twee velle grafiekpapier sal voorsien word.
- Jy mag 'n sakrekenaar gebruik.
- Antwoorde moet tot twee desimale syfers afgerond word, tensy anders vermeld.

VRAAG 1
VERGELYKINGS1.1 Los op vir x in die volgende vergelykings deur van faktorisering gebruik te maak:

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

1.1.2 $x(x - 1) = 20$ (5)

1.1.3 $16x^2 - 25 = 0$ (5)

1.1.4 $\frac{x+2}{(x+1)} - \frac{3}{(x-2)} = \frac{1}{(x+1)}$ (7)

1.2 Los die volgende vergelyking op deur gebruik te maak van die formule (rond af tot twee desimale syfers):

$x^2 + 5x = 7$

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

(7)

[26]**b.o.**

GAUTENG DEPARTMENT OF EDUCATION
SENIOR CERTIFICATE EXAMINATION**MATHEMATICS LG**
(First Paper: Algebra)**TIME: 3 hours****MARKS: 150****INSTRUCTIONS:**

- Answer ALL the questions.
- Show all necessary calculations.
- There are 7 questions typed on 8 pages.
- Two sheets of graph paper will be supplied.
- You may use a calculator.
- All answers must be rounded off to two decimal digits, unless indicated otherwise.

QUESTION 1
EQUATIONS1.1 Solve for x in the following equations by making use of factorization:

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

1.1.2 $x(x - 1) = 20$ (5)

1.1.3 $16x^2 - 25 = 0$ (5)

1.1.4 $\frac{x+2}{(x+1)} - \frac{3}{(x-2)} = \frac{1}{(x+1)}$ (7)

1.2 Solve the following equation by using the formula (rounded off to two decimal digits):

$x^2 + 5x = 7$

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

(7)

[26]**P.T.O.**

VRAAG 2
GELYKTYDIGE VERGELYKINGS

Los op vir x en y in die volgende vergelykings:

$$y = x^2 - 3x + 2 \text{ en } y = -x + 10$$

[10]

VRAAG 3
FUNKSIES

3.1 Teken die volgende tabelle in jou antwoordboek en voltooi vir die volgende vergelykings:

3.1.1 $y = -2x - 1$

x	-2	0	2
y			

(3)

3.1.2 $y = -x^2 + 2x + 1$

x	-2	-1	0	1	2	3	4
y				2			

(3)

3.2 Gebruik die inligting van Vraag 3.1 om die grafieke van $y = -2x - 1$ en $y = -x^2 + 2x + 1$ op dieselfde assestelsel te skets.

(8)

3.3 Gebruik die grafiek om die volgende te beantwoord:

3.3.1 Gee die koördinate waar $-2x - 1 = -x^2 + 2x + 1$

(2)

3.3.2 As die reguit lyn deur die punt $(1 ; 2)$, gaan, ewewydig aan $y = -2x - 1$, wat sal die vergelyking van die lyn wees?

(2)

[18]

QUESTION 2
SIMULTANEOUS EQUATIONS

Solve for x and y in the following equations:

$$y = x^2 - 3x + 2 \text{ and } y = -x + 10$$

[10]

QUESTION 3
FUNCTIONS

3.1 Draw the following tables in your answer book and complete for the given functions:

3.1.1 $y = -2x - 1$

x	-2	0	2
y			

(3)

3.1.2 $y = -x^2 + 2x + 1$

x	-2	-1	0	1	2	3	4
y				2			

(3)

3.2 Use the information from Question 3.1 to draw the graphs of $y = -2x - 1$ and $y = -x^2 + 2x + 1$ on the same set of axes.

(8)

3.3 Use your graph to answer the following questions:

3.3.1 Give the co-ordinates where $-2x - 1 = -x^2 + 2x + 1$

(2)

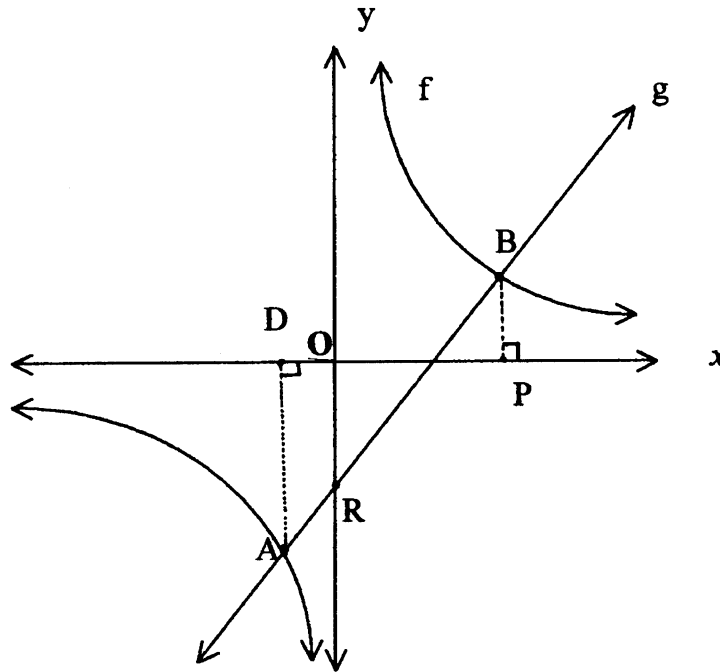
3.3.2 If the straight line goes through the point (1 ; 2), parallel to $y = -2x - 1$, what will the equation of this line be?

(2)

[18]

VRAAG 4

- 4.1 Die figuur verteenwoordig die grafiek van $y = 2x - 1$ en $y = \frac{6}{x}$
(Die figuur is nie volgens skaal nie.)

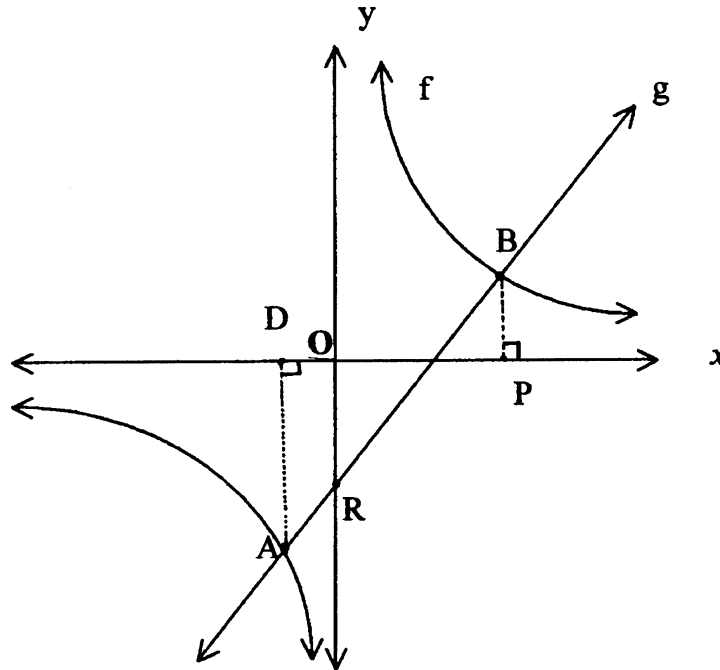


Sonder om die skets oor te teken, gebruik die gegewe inligting om die volgende te bepaal:

- 4.1.1 Die afstand OR (2)
- 4.1.2 Die afstand AD, as $OD = 1$ eenheid (3)
- 4.1.3 Die afstand BP as die koördinate van B $(2 ; y)$ is. (3)
- 4.1.4 Die afstand DP (2)
- 4.1.5 Skryf die koördinate van A en B neer. (2)

QUESTION 4

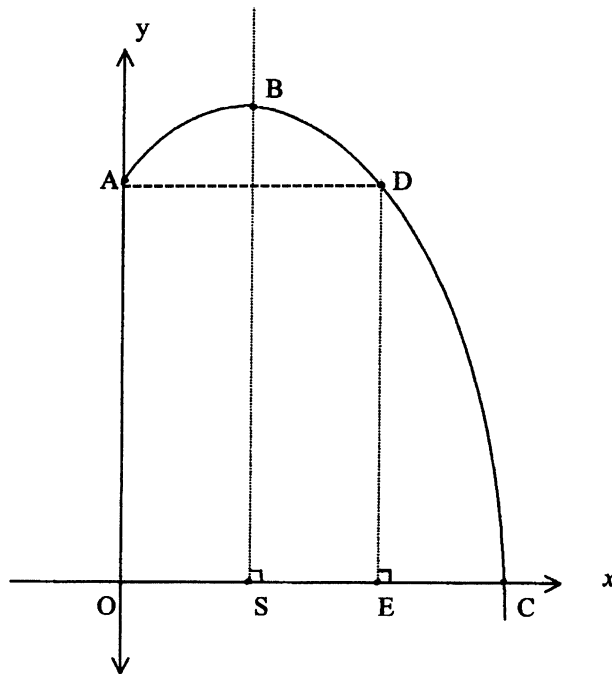
- 4.1 The figure represents the graph of $y = 2x - 1$ and $y = \frac{6}{x}$
(The figure is not according to scale.)



Without redrawing the sketch, use the given information to determine the following:

- 4.1.1 The distance OR (2)
- 4.1.2 The distance AD, if $OD = 1$ unit (3)
- 4.1.3 The distance BP if the co-ordinates of B are $(2 ; y)$. (3)
- 4.1.4 The distance DP (2)
- 4.1.5 Write down the co-ordinates of A and B. (2)

4.2 Die figuur verteenwoordig 'n gedeelte van die grafiek van $y = -x^2 + 4x + 12$



Gebruik die gegewe inligting om die volgende te bepaal:

4.2.1 Die afstand OA (2)

4.2.2 Die afstand OE (4)

4.2.3 Die lengte van SE, as $OS = 2$ eenhede (2)

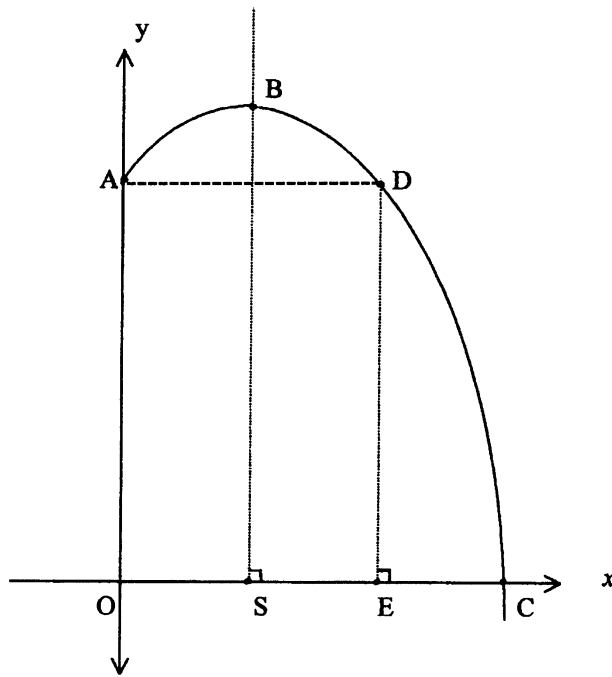
4.2.4 As die koördinate van C ($x ; 0$) is bepaal die waarde van x . (4)

4.2.5 Die afstand van BS deur gebruik te maak van die volgende formule:
(B is die draaipunt.) (5)

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

[29]

4.2 The figure represents part of the graph of $y = -x^2 + 4x + 12$



Use the given information to determine the following:

4.2.1 The distance OA (2)

4.2.2 The distance of OE (4)

4.2.3 The length of SE, if OS = 2 units (2)

4.2.4 If the co-ordinates for C are $(x ; 0)$ determine the value of x . (4)

4.2.5 The distance of BS by using the following formula:
(B is the turning point.) (5)

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

[29]

VRAAG 5
REKENKUNDIGE RYE EN REEKSE

Die volgende formules word gebruik in hierdie vraag:

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

en

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

- 5.1 Skryf die volgende rekenkundige ry oor en vul die ontbrekende terme in.
 -3; ; ; 3; ; 7 (3)
- 5.2 Gegee: Die rekenkundige ry - 20 ; - 17 ; - 14 ;
 Deur gebruik te maak van die formule $T_n = a + (n - 1)d$ bepaal
- 5.2.1 die 15de term. (4)
- 5.2.2 Watter term is gelyk aan 82? (6)
- 5.3 Gebruik die formule $S_n = \frac{n}{2} [2a + (n - 1)d]$ om die som van die eerste 50 terme in die volgende reeks te bepaal: 25 + 21 + 17 (6)
- 5.4 As die 3de term van 'n rekenkundige ry 12 en die 12de term -24 is, gebruik die formule $T_n = a + (n - 1)d$ om die volgende te bepaal:
- 5.4.1 Die konstante verskil (d) (4)
- 5.4.2 Die eerste 2 terme (3)
- 5.4.3 Die 30ste term (4)
- [30]**

QUESTION 5
ARITHMETIC SEQUENCE AND SERIES

The following formulae may be used in this question:

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

and

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

5.1 Rewrite the following arithmetic sequence and fill in the missing terms.

$-3; \dots ; \dots ; 3; \dots ; 7$ (3)

5.2 Given: The arithmetic sequence $-20 ; -17 ; -14 ; \dots$

By making use of the formula $T_n = a + (n - 1)d$ determine

5.2.1 the 15th term. (4)

5.2.2 Which term is equal to 82? (6)

5.3 Use the formula $S_n = \frac{n}{2} [2a + (n - 1)d]$ to determine the sum of the first 50 terms of the following series: $25 + 21 + 17 \dots$ (6)

5.4 If the 3rd term of an arithmetic sequence is 12 and the 12th term is -24 , use the formula $T_n = a + (n - 1)d$ to determine:

5.4.1 The constant difference (d) (4)

5.4.2 The first 2 terms (3)

5.4.3 The 30th term (4)

[30]

VRAAG 6
SAAMGESTELDE RENTE

6.1 R1 500 word belê teen 16% rente per jaar vir 5 jaar.

Bereken die volgende deur gebruik te maak van die formule:

$$A = P \left(1 + \frac{r}{100}\right)^n$$

6.1.1 Watter bedrag sal verkry word as die rente jaarliks bereken word? (4)

6.1.2 Watter bedrag sal verkry word as die rente elke 3 maande bereken word? (4)

6.1.3 Watter belegging is die beste? (1)

6.2 As ek 'n bedrag van R12 450 nodig in 4 jaar se tyd, hoeveel moet ek nou belê teen 'n rentekoers van 12% per jaar, rente jaarliks saamgestel? (4)

Gebruik die volgende formule:

$$A = P \left(1 + \frac{r}{100}\right)^n / P = \frac{A}{\left(1 + \frac{r}{100}\right)^n}$$

6.3 'n Man belê R14 500 vir 5 jaar. Rente word halfjaarliks saamgestel. Aan die einde van die 5de jaar, ontvang hy R20 000. Gebruik die volgende formule om die jaarlikse rentekoers te bereken. (6)

$$r = 100 \left(n \sqrt{\frac{A}{P}} - 1\right)$$

[19]

QUESTION 6
COMPOUND INTEREST

6.1 R1 500 is invested at 16% interest per annum for 5 years.

Calculate the following by using the formula:

$$A = P \left(1 + \frac{r}{100}\right)^n$$

6.1.1 What will the amount be if the interest is compounded yearly? (4)

6.1.2 What will the amount be if the interest is compounded every 3 months? (4)

6.1.3 Which is the better investment? (1)

6.2 If I need an amount of R12 450 in 4 years time, how much must I invest now, at an interest rate of 12% per annum, compounded yearly? (4)

Use the formula:

$$A = P \left(1 + \frac{r}{100}\right)^n / P = \frac{A}{\left(1 + \frac{r}{100}\right)^n}$$

6.3 A man invests R14 500 for 5 years. Interest is compounded half yearly. At the end of the 5 years, he receives R20 000. Determine the yearly interest rate by using the following formula: (6)

$$r = 100 \left(n \sqrt{\frac{A}{P}} - 1\right)$$

[19]

VRAAG 7
FORMULES

7.1 Gegee dat $v^2 = u^2 + 2as$

7.1.1 Bereken die waarde van v as $u = 5$, $a = 1$ en $s = 3$ (4)

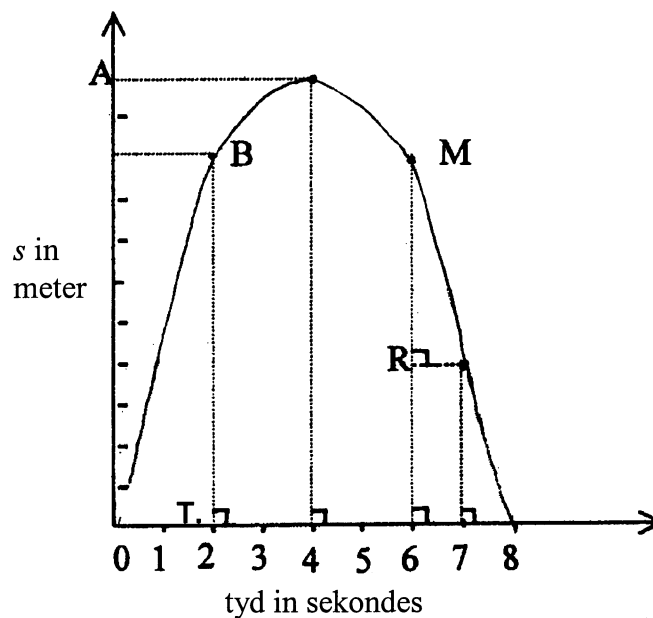
7.1.2 Bereken die waarde van s as $v = 20$ m; $u = 4$ en $a = 10$ (5)

7.2 Die formule $s = 40t - 5t^2$ word gegee, teken en voltooi die tabel in jou antwoordboek:

t	0	1	2	3	4	5	6	7	8
s	0								

(4)

7.3 Die grafiek verteenwoordig die inligting van die tabel in Vraag 7.2.



Gebruik die tabel en grafiek om die volgende te bepaal:

7.3.1 Wat is die maksimum waarde van “s”? (1)

7.3.2 Wat is die lengte van BT? (1)

7.3.3 Bepaal die lengte van MR. (2)

7.3.4 Hoe ver het die voorwerp in 3 sekondes beweeg? (1)

[18]

TOTAAL: 150

QUESTION 7
FORMULAE

7.1 Given that $v^2 = u^2 + 2as$

7.1.1 Calculate the value of v if $u = 5$, $a = 1$ and $s = 3$ (4)

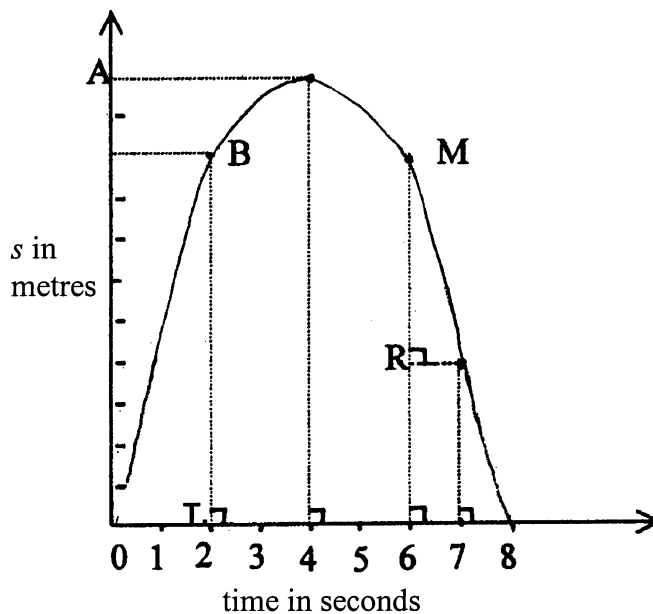
7.1.2 Calculate the value of s if $v = 20$ m; $u = 4$ and $a = 10$ (5)

7.2 The formula $s = 40t - 5t^2$ is given, copy and complete the following table in your answer book:

t	0	1	2	3	4	5	6	7	8
s	0								

(4)

7.3 The graph below represents the data from the table in Question 7.2.



Use the table and the graph to answer the following questions:

7.3.1 What is the maximum value of “s”? (1)

7.3.2 What is the length of BT? (1)

7.3.3 Determine the length of MR. (2)

7.3.4 How far did the object travel in 3 seconds? (1)

[18]

TOTAL: 150

