



# education

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Department:  
Education  
**REPUBLIC OF SOUTH AFRICA**

**NATIONAL  
SENIOR CERTIFICATE**

**GRADE 10**

**MATHEMATICS P1**

**2007**

**MARKS: 100**

**TIME: 2 hours**

**This question paper consists of 8 pages.**

**INSTRUCTIONS AND INFORMATION**

Read the following instructions carefully before answering the questions:

1. This question paper consists of 9 questions. Answer ALL the questions.
2. Show clearly ALL calculations, diagrams, graphs, et cetera. which you have used in determining the answers.
3. An approved scientific calculator (non-programmable and non-graphical) may be used, unless stated otherwise.
4. If necessary, answers should be rounded off to TWO decimal places, unless stated otherwise.
5. Number the answers correctly according to the numbering system used in this question paper.
6. Diagrams are NOT necessarily drawn to scale.
7. It is in your own interest to write legibly and to present the work neatly.

**QUESTION 1**

1.1 Simplify:

1.1.1  $(2x+1)(7x^2-3x-4)$  (3)

1.1.2  $\frac{(2^{x+1})^3}{\sqrt{64^x}}$  (4)

1.2 Factorise:

1.2.1  $x^2 + 7x - 8$  (2)

1.2.2  $ax - 2bx - ay + 2by$  (3)  
**[12]**

**QUESTION 2**2.1 Solve for  $x$ :

2.1.1  $x(2x-3) = 2$  (4)

2.1.2  $3^x = 25$  (2)

2.1.3 (a)  $-5 < \frac{3x-1}{2} \leq 10$  for  $x \in \mathbb{Z}$  (3)

(b) Represent your answer graphically. (2)

2.2 A rabbit moves at 7 m/s and a tortoise at 0,05 m/s. They are 90 m apart when they start to move towards each other. How far has the tortoise moved when they meet? (5)  
**[16]****QUESTION 3**

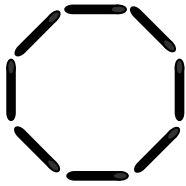
The local municipality organised a youth sports day where people were allowed to register for either volleyball or tennis lessons. The registration fees was R20 for volleyball and R30 for tennis. A total of 250 people registered for the sports day. Let the number of people who registered for volleyball be  $x$  and the number of people who registered for tennis be  $y$ .

3.1 Write down an algebraic equation for the total number of people who registered. (1)

3.2 Write down an algebraic expression in terms of  $x$  and  $y$  for the registration fees income. (1)3.2 Determine how many people registered for volleyball and how many people registered for tennis if R5 500 were collected in total for registration fees. (5)  
**[7]**

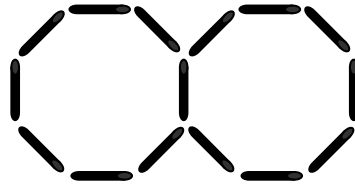
**QUESTION 4**

Study the following patterns made up of sticks.



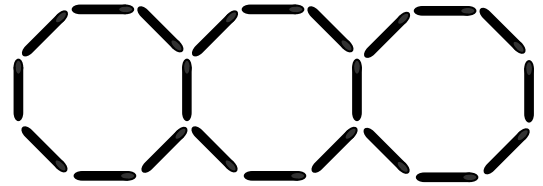
Pattern 1

8 sticks



Pattern 2

15 sticks



Pattern 3

22 sticks

- 4.1 How many sticks will the fourth (4<sup>th</sup>) pattern have? (1)
- 4.2 Write down a conjecture that describes the relationship between the pattern number and the number of sticks required for the pattern. (2)
- 4.3 Write down an algebraic formula for the number of sticks in the  $n^{\text{th}}$  pattern. (2)
- 4.4 Which pattern will use 351 sticks to build? (2)
- [7]

**QUESTION 5**

Katlego was revising for her examination and came across the following sequence of numbers: 2 ; 4 ; 8 ; 16 ; ...

- 5.1 Write down the next two terms in the sequence. (2)
- 5.2 Write down an algebraic formula for the  $n^{\text{th}}$  term of the sequence. (3)
- 5.3 Calculate the value of the 20<sup>th</sup> term in the sequence. (2)
- [7]

**QUESTION 6**

- 6.1 Koketso invested R5 600 in a savings account offering 3,8% interest compounded annually.
- 6.1.1 How much money does Koketso have in the savings account after 3 years? (4)
- 6.1.2 Koketso deposits a further R2 100 into the account at the end of the third year. What is the total amount of money in the account at the end of the fifth year, assuming Koketso has made no withdrawals from the account? (4)
- 6.2 Jihan is booked for a business trip to France. The exchange rate is 1 euro = R9,5970 at the time Jihan needs to exchange money.
- 6.2.1 How many euros can Jihan buy for R4 500? (2)
- 6.2.2 Jihan also has to travel to London where he will need pounds. He has 105 euros left from France. Calculate how many pounds he can buy if 1 euro = £ 0,658. (2)
- 6.3 Jetsetters Airways increased their tariffs by 10% in September 2007. Dharma wanted to travel from Johannesburg to Durban in October 2007. She booked a ticket two weeks before departure and qualified for a 15% discount. Calculate the cost of Dharma's ticket if the normal cost of a ticket was R684 in August 2007. (4)
- [16]**

**QUESTION 7**

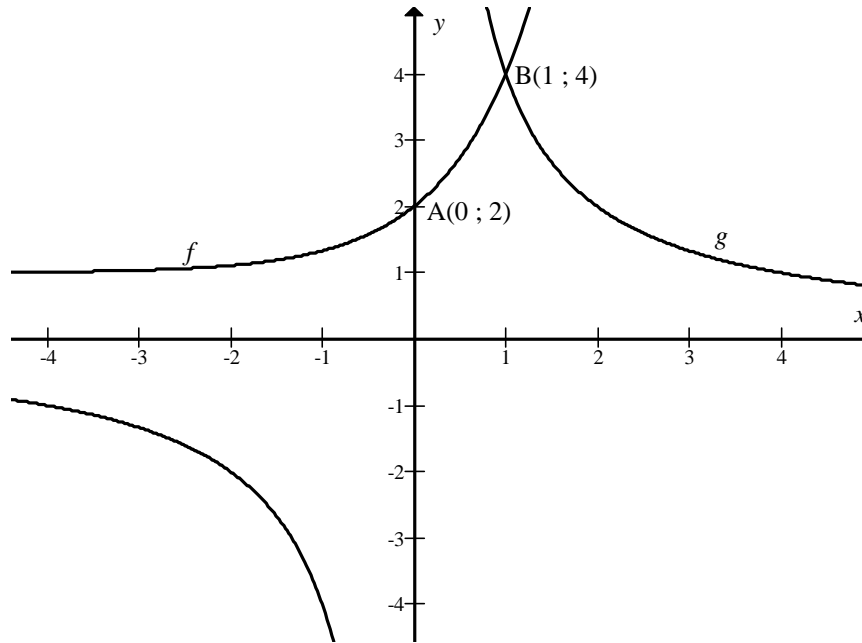
Given:  $f(x) = x^2 - 4$  and  $g(x) = -2x - 4$

- 7.1 Sketch the graphs of  $f$  and  $g$  on the same system of axes, showing ALL intercepts with the axes and relevant turning points. (6)
- 7.2 Use your graphs to determine the values of  $x$  if:
- 7.2.1  $f(x) = g(x)$  (2)
- 7.2.2  $f(x) < 0$  (2)
- 7.3 How can you use the graph of  $g$  to obtain the graph of  $k(x) = -2x + 3$ ? (2)
- [12]**

**QUESTION 8**

Sketched below are the graphs of  $f(x) = a^x + 1$  and  $g(x) = \frac{k}{x}$ .

A is the y-intercept of  $f$  and the point B(1 ; 4) is the point of intersection of both  $f$  and  $g$ .

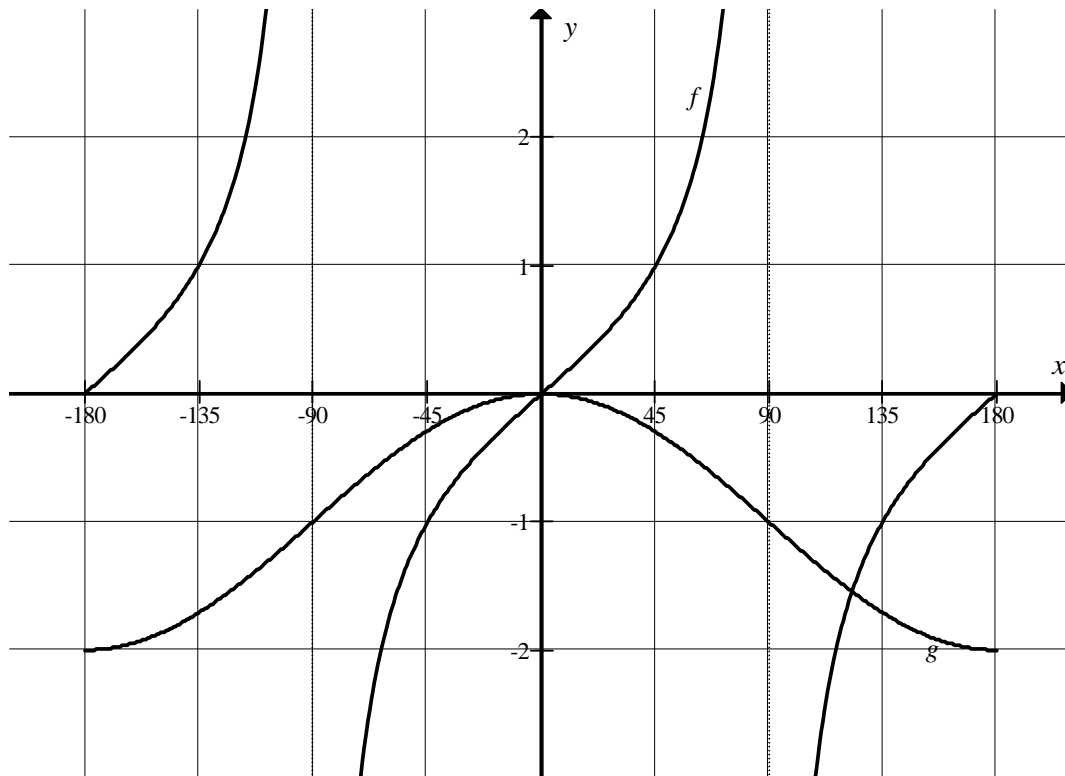


- 8.1 Write down the equation of the asymptote of  $f$ . (1)
- 8.2 What is the range of  $f$ ? (2)
- 8.3 Write down the domain of  $g$ . (1)
- 8.4 Calculate the value of  $a$ . (3)
- 8.5 Determine the value of  $k$ . (1)
- 8.6 Write down the equation of  $h$  if  $h$  is the reflection of  $g$  in the y-axis. (2)

**[10]**

**QUESTION 9**

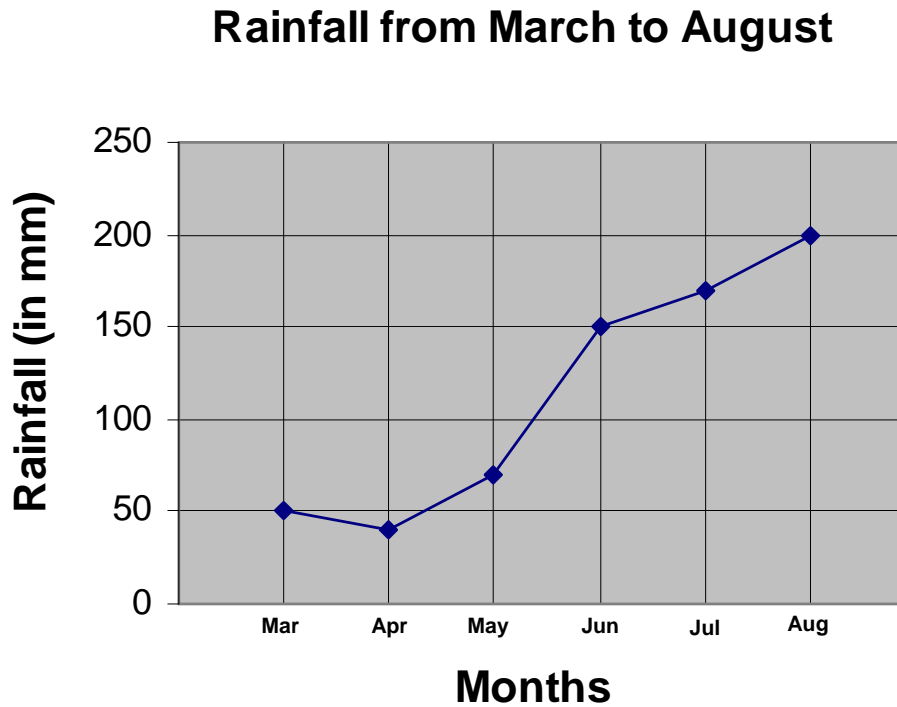
Sketched below are the graphs of  $f(x) = a \tan x$  and  $g(x) = \cos x + q$ .



- 9.1 Write down the period of  $f$ . (2)
  - 9.2 Determine the value of  $q$ . (1)
  - 9.3 Write down the value of  $a$ . (1)
  - 9.4 What is the range of  $g$ ? (2)
  - 9.5 Determine the  $x$  values for which  $g(x) \geq f(x)$  for  $x \in [-180^\circ ; 0^\circ]$  (2)
- [8]**

**QUESTION 10**

The graph below represents the monthly rainfall, in millimetres, for a region from March to August.



- 10.1 During which period was there a decrease in the rainfall? (1)
- 10.2 During which period was the rate of increase in the rainfall the highest? (1)
- 10.3 Determine the average rate of change of the rainfall from March to August. (3)
- [5]**

**TOTAL: 100**