Mathematics Paper 1
Grade 11
Mid-year Examination
2017

DURATION:	**3 hours**	**EXAMINER:**	**R. Obermeyer**
MARKS:	**144 marks**	**MODERATOR:**	**A. Janisch**
Date:	**12 June 2017**	**External Moderator:**	**I. Atteridge**

INSTRUCTIONS:

- **See overleaf for Instructions.**
- **This paper consists of 7 pages (including cover page) and an answer sheet for Question 4.**

NAME: _____

ASSESSMENT					
Question	**Level Tested**	**Topic**	**Suggested Time Allocation**	**Possible mark**	**Mark Obtained**
SECTION A					
1	1 – 4	Equations	25 mins	**21**	
2	1 – 4	Exponents & Nature of Roots	20 mins	**17**	
3	1 – 4	Patterns	23 mins	**19**	
4	1 – 4	Functions	22 mins	**18**	
5	1 – 4	Financial Mathematics	19 mins	**14**	
6	1 – 4	Probability	10 mins	**8**	
SECTION B					
7	1 – 4	Probability	7 mins	**4**	
8	1 – 4	Functions	23 mins	**19**	
9	1 – 4	Equations	9 mins	**7**	
10	1 – 4	Patterns & Functions	14 mins	**12**	
11	1 – 4	Equations	8 mins	**5**	
			TOTAL:	**144**	
			PERCENTAGE:		

Teacher's Signature: _____

Controller's Signature: _____

Moderator's Signature: _____

Instructions

PLEASE READ THE FOLLOWING INSTRUCTIONS CAREFULLY

1. This question paper consists of 7 pages. Please check that your paper is complete.
2. Read the questions carefully.
3. Answer all the questions on folio paper.
4. Number your answers exactly as the questions are numbered.
5. You may use an approved non-programmable and non-graphical calculator, unless otherwise stated.
6. All the necessary working details must be clearly shown.
7. It is in your own interest to write legibly and to present your work neatly.
8. Please hand in this question paper.
9. **Answer all questions underneath each other.**
10. **Start each new question on a new page.**
11. **Use both sides of the folio page.**
12. No tipex or correction fluid may be used.

SECTION A

Question 1

a. Solve for x:
   1. $(x+2)^2 = 1$ (3)
   2. $2x^2 - 11x - 4 = 0$ (4)
   3. $x^2 > \frac{1}{4}$ and $x < 0$ (4)
   4. $x + 5 = \sqrt{3 - 3x}$ (4)

b. Given: $y^2 - 9x^2$
   1. Factorise $y^2 - 9x^2$ (1)
   2. Hence or otherwise, solve the following equations simultaneously:
      $y + 3x = 2$ and $y^2 - 9x^2 = 16$ (5)

[21]

Question 2

a. Simplify:
   1. $\left(\frac{a^3}{2}\right)^2$ (1)
   2. $\frac{2^{x-3} - 3.2^{x-1}}{2^{x-2}}$ (4)

b. Solve for x: $2^x = 0{,}125$ (2)

c. For which value(s) of m will the equation $2x(x+1) + m = x$ have non-real roots? (5)

d. Given: $f(x) = \frac{\sqrt{x+2}}{5-x^2}$. For which value(s) of x will $f(x)$ not be defined? (5)

[17]

Question 3

a. Given the sequence: 7; 12; 17; ……
   1. Write down the next two terms of the sequence. (2)
   2. Determine the general term of the sequence in the form of $T_n = an + b$. (2)
   3. Determine if 12^5 will be a term in the sequence. (3)
   4. Explain why any positive number ending with a 2 will form part of the sequence. (2)

b. Given the sequence: 3; 9; 17; 27; ……

1. Write down the value of the next term in the sequence. (1)

2. Determine an expression for the n^{th} term of the sequence. (5)

3. Calculate the value of the first term that is greater than 269. (4)

[19]

Question 4 (Answer on the answer sheet in your booklet)

Given: $f(x) = \frac{8}{x-8} + 4$

a. Write down the equations of the asymptotes of f. (2)

b. Write down the domain and range of f. (2)

c. Sketch the graph of f showing all intercepts and asymptotes on the grid provided in your answer book. (4)

d. Use your graph to solve for x:

1. $\frac{8}{x-8} \geq -4$ (3)

2. $f(x) \leq 3$ (3)

e. Determine the equation of the axis of symmetry of f which has a positive slope. (2)

f. Determine the equation of g if $g(x-2) - 2$. (2)

[18]

Question 5

a. The table below shows the rand equivalent of one British pound and one US dollar as on 10 October 2016.

Country	Currency	Rate of Exchange of the Rand
Britain (United Kingdom)	Pound (£)	21,41
United States of America	Dollar ($)	13,45

A South African nurse works in the United States of America.

1. The nurse saves the equivalent of R4 800 per month. Calculate the amount, in US (American) dollars that she saves per month. (2)

2. She ordered a book from Britain (United Kingdom) and paid $85 for it. Calculate the price of the book in pounds (£). (3)

b. Some Eastern Cape schools are experiencing a problem in submitting documents to their relevant district offices on time. The lack of suitable transport to suit the road conditions seems to be a big problem. The price of a new car, to suit the road conditions, is R 315 000. The value of a car depreciates at 7% p.a. compound interest every year.

1. If the Eastern Cape government were to provide all of its schools with cars and replace them after three years, what would the value of the car be after 3 years? (3)

2. Suppose the government may need to pay an interest (SI) of R 39 500 in 3 years' time. Work out the interest rate of the car that is sold for R 315 000. (3)

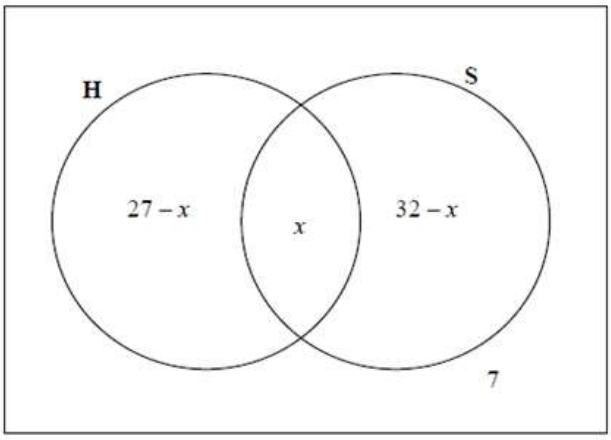
c. A sum of money doubles in 5 years when the interest is compounded annually. Calculate the rate of interest. (3)

[14]

Question 6

a. In a certain class of 42 boys:
- 27 play hockey (H)
- 32 play soccer (S)
- 7 do not play hockey or soccer
- An unknown number (x) play both hockey and soccer

The information is represented in the Venn diagram below.



1. Calculate the value of x. (2)

2. If a boy from the class is chosen at random, calculate the probability that he:
   i. Does not play hockey or soccer. (1)

   ii. Plays only soccer. (2)

b. A bag contains 3 blue balls and x yellow balls.
1. Write down the total number of balls in the bag. (1)

2. If a ball is drawn from the bag, write down the probability that it is blue. (2)

[8]

SECTION B

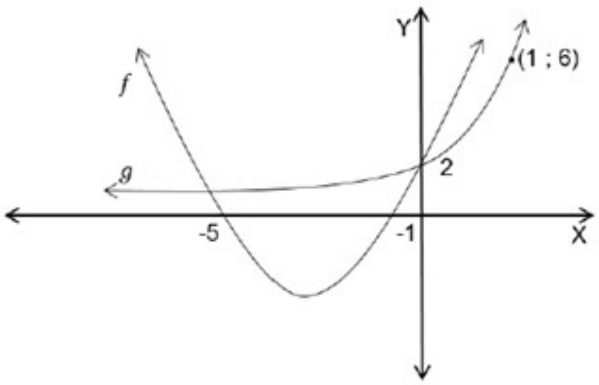
Question 7

a. Complete the following statement:
If A and B are two mutually exclusive events, then P(A and B) = …… (1)

b. Given that A and B are mutually exclusive events. The probability that event A occurs is 0,55. The probability that event B does not occur is 0,7.
Calculate P(A or B). (3)
[4]

Question 8

Sketched below are the graphs of $f(x) = ax^2 + bx + c$ and $g(x) = k.m^x$.
The parabola has intercepts $(-5; 0)$; $(-1; 0)$ and $(0; 2)$.
The exponential graph passes through the points $(0; 2)$ and $(1; 6)$.



a. Determine the equation of the parabola in the form of $y = ax^2 + bx + c$. (4)

b. Determine the values of m and k. (3)

c. Write down the equation of the asymptote of the exponential curve. (1)

d. Determine the value(s) of x for which:
1. $f(x)$ is decreasing. (2)

2. $2 \leq g(x) \leq 6$ (2)

3. $g(x) \leq 2$ (2)

4. $f(x).g(x) < 0$ (2)

e. Determine the average gradient between $(-5; 0)$ and the y −intercept of g. (3)
[19]

Question 9

Answers only will be awarded one mark only. Working/explanations are essential

a. Find the value of 10^{x+3} if $10^x = 1{,}5$ (2)

b. Solve for x: $0{,}5^x . \sqrt{1 + \frac{9}{16}} = 10$. (5)

[7]

Question 10

a. A quadratic pattern has a second term equal to 6, a third term equal to 2 and a fifth term equal to – 18.
   1. Calculate the second difference of the pattern. (4)
   2. Calculate the first term. (3)

b. The graph of $y = b^x$ is shifted 2 units to the right and 4 units upwards. The shifted graph passes through the point $(4; 8)$.
   1. Calculate the value of b. (4)
   2. Hence, write down the equation of the shifted graph. (1)

[12]

Question 11

If $\frac{17}{22} = \frac{1}{1+\frac{1}{a+\frac{b}{c}}}$, determine the values of a, b and c. (5)

[5]