



ST MARY'S DSG, KLOOF
NOVEMBER EXAMINATIONS
2015

GRADE: 11

TIME: 2,5 HOURS

EXAMINER: J. Kinsey

TOTAL: 125 MARKS

MATHEMATICS PAPER 1

NAME: _____

1. Read all the instructions before you begin.
2. All questions must be answered.
3. A non-programmable, non-graphical scientific calculator may be used unless otherwise stated.
4. All working details must be clearly shown.
5. Round off all answers to 2 decimal digits unless otherwise stated.
6. Number the questions as they are on the question paper.
7. This paper consists of 4 sections. Each section must be answered separately.
8. Your examination number and grade must appear on the answer sheets.
9. Page 10 & 11 is a detachable answer sheet, please hand this in with section B
10. The diagrams have not been drawn to scale. Do not redraw the diagrams.
11. A formula sheet has been provided.

SECTION A

[34]

Please make sure you start this section on a new answer sheet. Put your examination number and your maths teachers name on your answer

Question 1

Solve for x

a. $x^2 - 7x + 12 = 0$ (2)

b. $6x - 7 = \frac{4}{x}$ (4)

c. $x^2 - 3x - 40 \geq 0$ (3)

d. Wendy asked a number of people in a shopping mall to fill in a questionnaire. $\frac{1}{3}$ of the people were women, $\frac{1}{4}$ of the people were girls, $\frac{1}{6}$ were men and 6 were boys. Determine the number of people that Wendy interviewed. (4)

[13]

Question 2

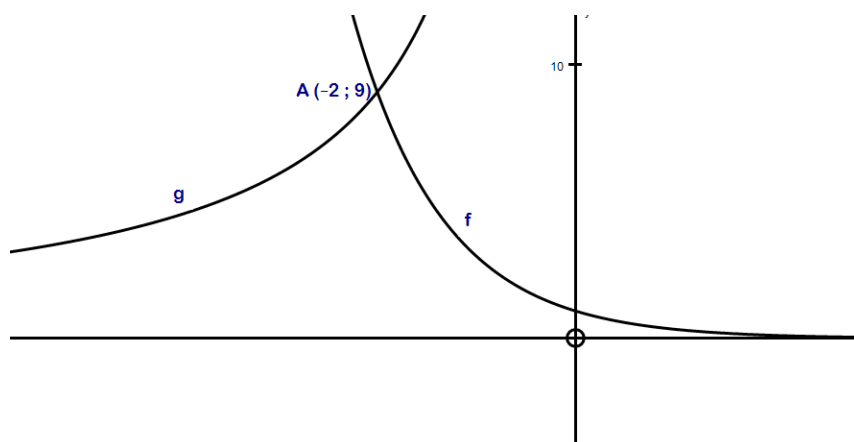
a. Simplify the following without using a calculator.

i) $\frac{9^x \cdot 10^{x-2}}{6^{x-1} \cdot 15^x}$ (4)

ii) $(\sqrt{2} + 2)^2 - 2\sqrt{8}$ (3)

b. Solve for x: $27^{x^2+x} = 3^{3x^2} \times 9$ (3)

[10]

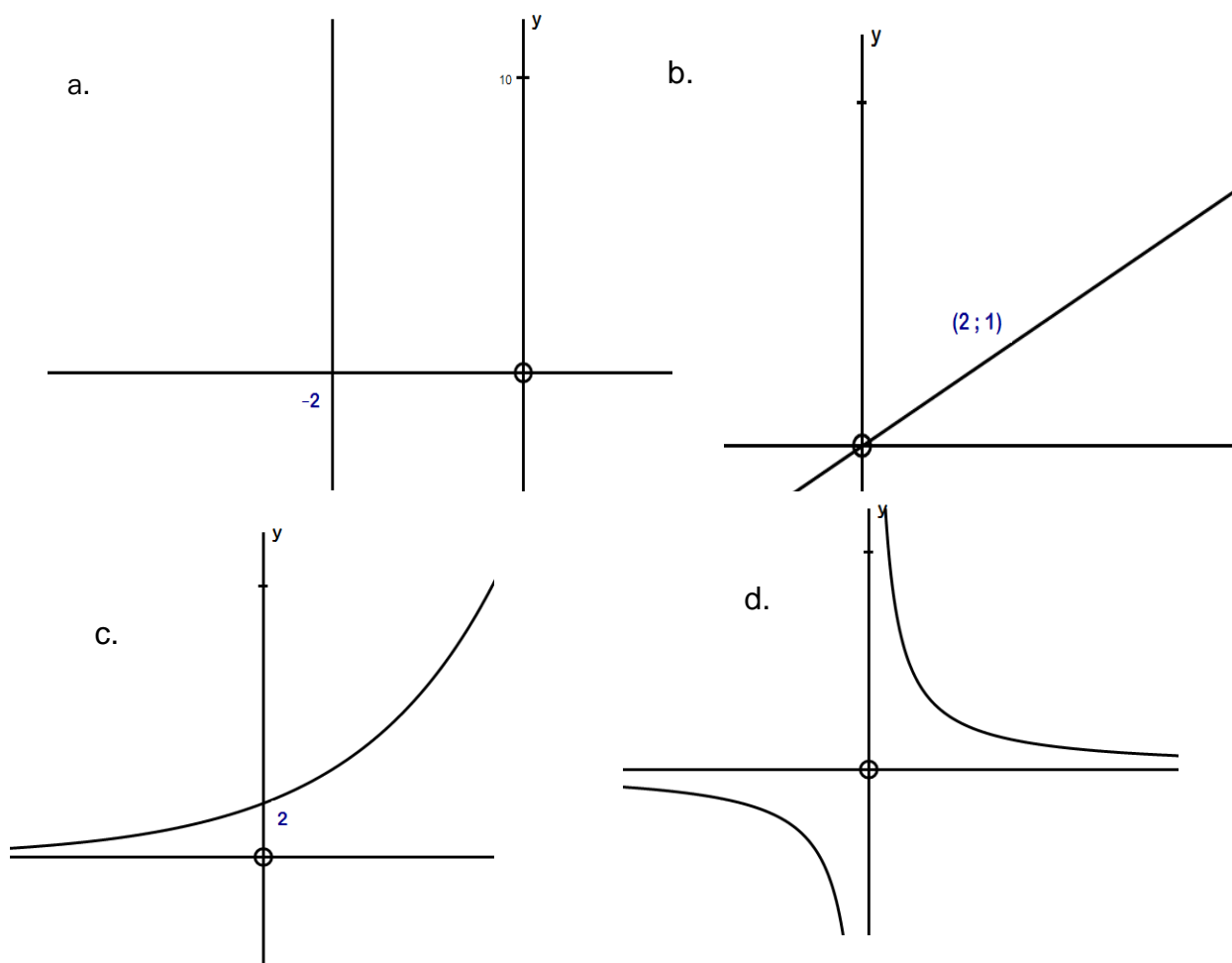
Question 3

$f(x) = a^x$ $g(x) = \frac{k}{x}$ $x < 0$ (4)

If point A(-2 ; 9) is the point of intersection of $f(x)$ and $g(x)$, determine the values of a and k . (4)

Question 4

Four graphs are sketched below.



Match the graphs a - d, with the equations below:

i) $xy = 2$

iii) $xy = -2$

v) $y = -2$

vii) $x = -2$

ix) $y = x(x + 1)$

ii) $y = 2^{x-1}$

iv) $y = 2^{x+1}$

vi) $y = \frac{x}{2}$

viii) $y = 2x$

(4)

[4]

Question 5

Given $3x(4x + 1)(x^2 - 7) = 0$. Solve for x if:

a. x is an integer

(1)

b. x is a rational number

(1)

c. x is a real number

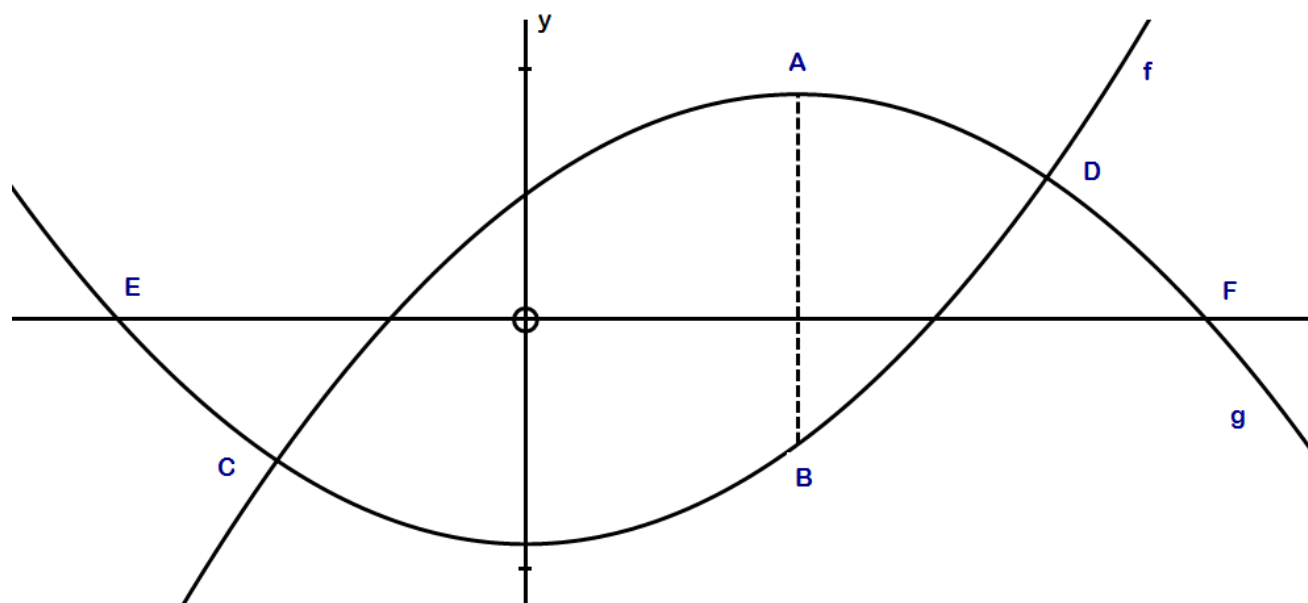
(1)

[3]

[27]

SECTION B

Please make sure you start this section on a new answer sheet. Put your examination number and your maths teachers name on your answer

Question 6

Sketched above are the graphs of $f(x) = x^2 - 9$ and $g(x) = -x^2 + 4x + 5$

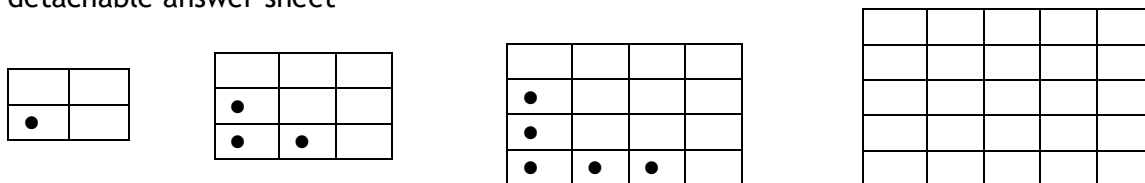
- Determine the co-ordinates of A, the turning point of g. (3)
- AB is parallel to the y-axis, with B on $f(x)$. Calculate the length of AB. (3)
- Calculate the length of EF (4)
- Determine the values of x such that $f(x) \cdot g(x) < 0$ (3)

[13]

Question 7 : ANSWER THESE NEXT TWO QUESTIONS ON THE DETACHABLE ANSWER SHEET ON PAGE 10 & 11

PLEASE HAND IN THIS ANSWER SHEET WITH SECTION B

- a. Study the dotted -tiled pattern shown below and answer the following questions on the detachable answer sheet



- i) Complete the 4th pattern in the diagram on your answer sheet. (2)

- ii) Complete the table below on the answer sheet: (1)

Pattern number	1	2	3	4	5	10
Blank tiles	3	6	11			

- iii) Write a formula for finding the number of blank tiles T_n (3)

[6]

Question 8

- a. Determine the value(s) of p so that $x^2 + 4 - 21 + p^2 = 0$ will have equal roots? (3)

- b. Given $m + \frac{1}{m} = 3$

- i) Determine the value of $m^2 - 1 + \frac{1}{m^2}$ (3)

- ii) Hence determine the value of : $m^3 + \frac{1}{m^3}$ (2)

[8]

SECTION C

[30]

Please make sure you start this section on a new answer sheet. Put your examination number and your maths teachers name on your answer

Question 9

The n th term of a number pattern is as follows:

$$T_n = -5n - 4 \text{ if } n \text{ is an even number}$$

$$T_n = -n^2 + 6 \text{ if } n \text{ is an uneven number}$$

- a. Determine the value of $T_6 + T_7$ (3)
 - b. Show that -219 cannot be the value of an even term. (2)
 - c. Determine the value of k if $T_k = -219$ (3)
- [8]

Question 10

A survey was conducted amongst 180 pupils about their preferences for Coca Cola, Fanta and Sparletta cooldrinks. The findings were:

72 drink Coca Cola

55 drink Fanta

80 Drink Sparletta

10 drink all three types

17 drink Sparletta and Fanta

12 drink Coca Cola and Sparletta

18 do not drink any cooldrinks at all.

x prefer Coca Cola and Fanta but not Sparletta

- a. Draw a Venn diagram to summarise the information (5)
- b. How many pupils prefer ONLY Coca Cola? (3)
- c. What is the probability that if a pupil is randomly selected, she would like exactly two types of cooldrinks? (2)

[10]

Question 11

a. The probability that a hockey team has all its players fit to play is 70%. The probability that they will win if all the players are fit is 90%. When they are not fit, the probability of them winning becomes 45%.

- i) Draw a tree diagram (3)
- ii) Calculate the probability of the hockey team winning their next game. (3)

b. The following data was obtained from the financial office at a certain university.

	Receiving Financial Aid	Not receiving Financial Aid	TOTAL
Under Graduates	4222	3898	8120
Post Graduates	1879	731	2610
Total	6101	4629	10730

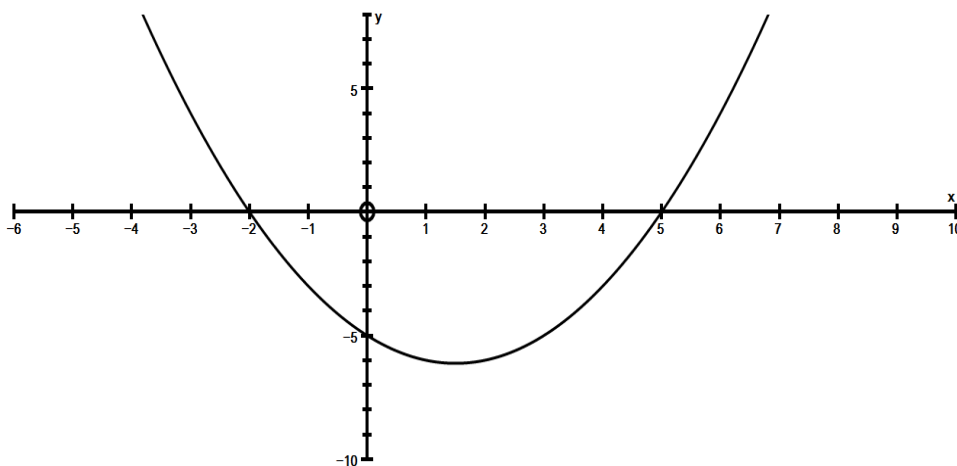
- i) Determine the probability that a student selected at random is receiving financial aid. (2)
- ii) Determine the probability that a student selected at random is a postgraduate and not receiving financial aid. (2)
- iii) Given that a student is an undergraduate, what is the probability that he/she will be receiving financial aid? (2)

[12]

SECTION D

[34]

Please make sure you start this section on a new answer sheet. Put your examination number and your maths teachers name on your answer

Question 12

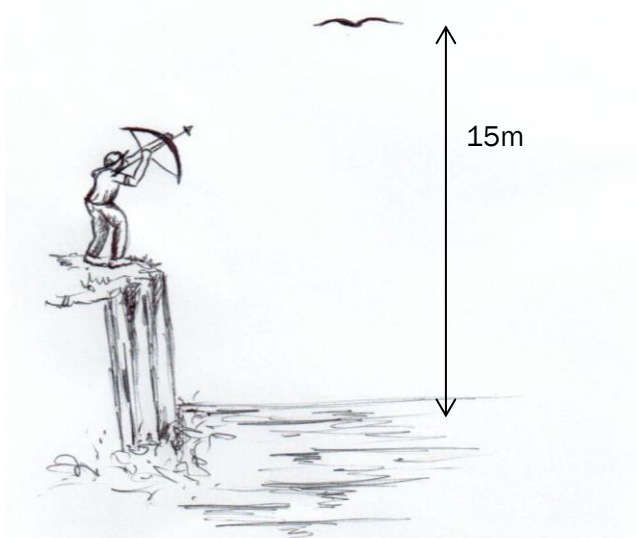
- a. Given the above diagram, with x intercepts of (-2 ; 0) and (5 ; 0) and y intercept of (0; -5), find the equation of the graph of $f(x)$ (4)
- b. If the graph f is given as $f(x) = \frac{1}{2}x^2 - \frac{3}{2}x - 5$ and it is shifted 3 units to the right. What is the equation of the new graph? (4)

[8]

Question 13

A hunter is standing on a 6m high cliff. He shoots an arrow at a bird flying 15m above the ground. The path of the arrow is given by the equation

$$h = -5t^2 + 13t + 6 \text{ where } t = \text{seconds and } h = \text{metres.}$$



Is it possible to hit the bird? Show all your working.

[4]

Question 14

- a. Emma's investment grows from R7000 to R9304,60 in a period of 3 years. Interest is compounded quarterly. Calculate the nominal interest rate on her investment. (3)
- b. Calculate the effective annual interest rate on her investment. (3)

[6]

Question 15

Keren will need R6260 at the end of ten years. She makes two deposits in order to save this money.

- x Rand
- R3000 at the end of 6 years.

Interest is calculated at 10% p.a. compounded annually for the first 4 years and then at 12% p.a. compounded quarterly thereafter.

Calculate the value of x, if the accumulated amount is exactly the amount she needs. (6)

[6]

Question 16

- a. If $f(x) = 3x$. Simplify $f\left(\frac{1}{x}\right) + \frac{6}{f(x)}$ (4)

b.



A rectangular frame with two cross bars is to be made with 80 metres of metal. The height of the frame is x metres and the total area inside the frame is 150m^2 .

- i) Show that x must satisfy the equation $x^2 - 20x + 75 = 0$ (2)
- ii) Find the values of x that satisfy this equation. (2)
- iii) Find the dimensions of the frame. (2)

[10]

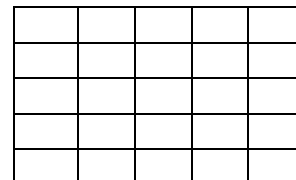
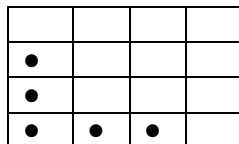
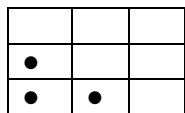
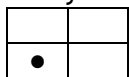
ANSWER SHEET:

EXAMINATION NUMBER: _____: TEACHERS NAME: _____

Question 7

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ii) Complete the table below on the answer sheet: (1)

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[8]