GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

GAUTENG DEPARTMENT OF EDUCATION

PROVINCIAL EXAMINATION

JUNE 2017

GRADE 11

MATHEMATICS

PAPER 1

TIME: 2 hours

MARKS: 100

6 pages + 1 answer sheet

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(Paper 1)

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INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. This question paper consists of **SEVEN** questions. Answer ALL questions.
2. Number your answers according to the numbering system used in this question paper.
3. Use an approved scientific calculator (non-programmable and non-graphical), unless stated otherwise.
4. Round-off the final answer correct to TWO decimal places, unless instructed otherwise.
5. Show ALL calculations, diagrams, graphs etc. that you have used in determining the answers.
6. Answers only will not necessarily be awarded full marks.
7. Diagrams are NOT necessarily drawn to scale.
8. It is in your interest to write legibly (in blue ink) and present all answers neatly and logically.

QUESTION 1 **[19]**

1.1 Solve for *x*:

1.1.1 $x^2 - 2x = 15$ (3)

1.1.2 $4x^2 - x - 5 < 0$ (3)

1.1.3 $\sqrt{2x-1} + 2 = x$ (5)

1.1.4 $2x^{\frac{2}{3}} - 8 = 0$ (3)

1.2 If $ax^2 + bx + c = 0$ and $a + b + c = 0$, calculate ONE numerical value of x. (5)

QUESTION 2 **[15]**

2.1 Solve simultaneously for *x* and *y*

$$3y + x = 2$$
$$y^2 + x = xy + y$$ (6)

2.2 Prove that

$$\sqrt{b\sqrt{a} - b}\,.\sqrt{b\sqrt{a} + b} = b\sqrt{a-1}.$$ (4)

2.3 If $3^a = 21^b$ and $7^c = 21^b$, show that

$$b = \frac{ac}{a+c} \quad \text{where } a + c \neq 0.$$ (5)

QUESTION 3 **[18]**

3.1 Given the sequence $-3 ; 1 ; 5 ; ...$

3.1.1 Write down the 5^{th} term of the sequence. (1)

3.1.2 Determine the general term of this sequence. (2)

3.1.3 Show that 394 is NOT a term in the sequence. (3)

3.2 The quadratic sequence $0 ; 5 ; 12 ; ...$ has the general term, $T_n = n^2 + 2n + c$.

3.2.1 Show that $c = -3$. (2)

3.2.2 Calculate the 10^{th} term of the sequence. (2)

3.2.3 Determine which term in the sequence has a value greater than 360. (4)

3.3 The table below represents the total number of handshakes exchanged between random people.
Each person shakes the hand of another person only once.

Number of people	2	3	5	100
Number of handshakes	1	3	*a*	*b*

3.3.1 Determine the value of *a*. (1)

3.3.2 Determine the value of *b*. (3)

QUESTION 4 **[6]**

Given: $k = 2 + \frac{\sqrt{x-2}}{4}$

4.1 For what value(s) of x is k real? (2)

4.2 Determine the minimum value of k. (1)

4.3 If $x = 3$, calculate $g(k)$ if $g(a) = a^2 - 1$. (3)

QUESTION 5 **[12]**

Given: $h(x) = 3^x - 1$

5.1 Determine the x and y-intercepts of h. (3)

5.2 Sketch the graph of h on the ANSWER SHEET provided on page 7. Clearly indicate the points of intersection with the axes as well as the asymptote of the graph. (3)

5.3 Write down the range of h. (1)

5.4 Given: $p(x) = h(x+2)$

5.4.1 Determine the x-intercept of p. (1)

5.4.2 Determine for which value(s) of x is $p(x) > 2$. (1)

5.5 Determine the x coordinate of a point J on h if

$3h(x) = 726$. (3)

QUESTION 6 **[10]**

Given the function $f(x) = \frac{3}{x-1} - 2$.

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

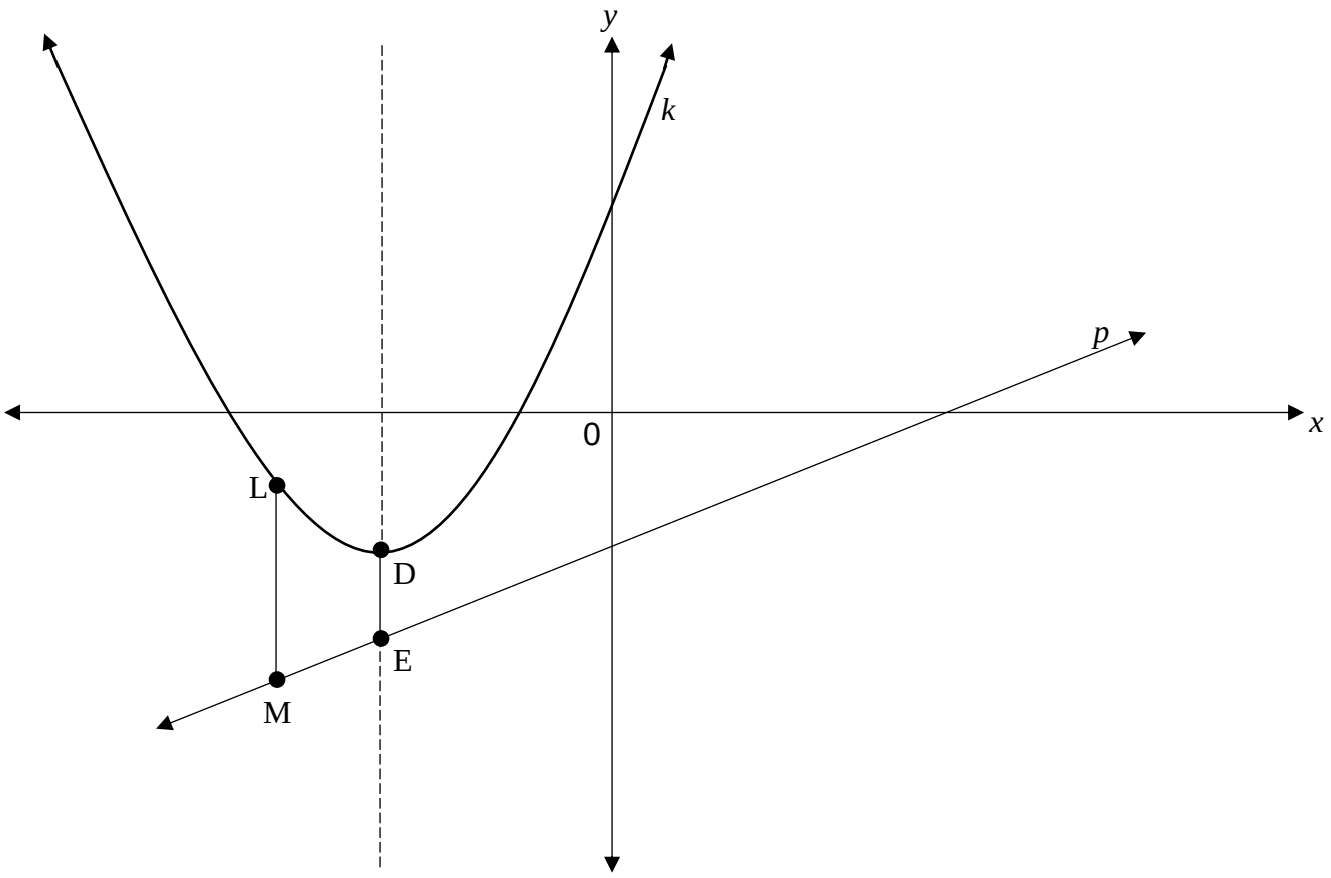
6.2 Calculate the x and y-intercepts of the graph with the axes. (3)

6.3 Sketch the graph of f on the answer sheet provided on page 7, clearly illustrating the asymptotes and the intercepts of the graph with the axes. (3)

6.4 Describe, in words, the transformation of f to g if $g(x) = \frac{-3}{x+1} - 2$. (2)

QUESTION 7 **[20]**

The graphs of $k(x) = 2x^2 + 8x + 3$ and $p(x) = 2x - 4$ are sketched below.



7.1 Determine

7.1.1 the coordinates of point D, the turning point of k. (3)

7.1.2 for which values of x is $k(x) \geq 3$. (2)

7.1.3 the minimum length of LM, where LM is parallel to the y- axis, with points L on k and M on p respectively. (4)

7.1.4 the average gradient between $k(-2)$ and $k(3)$. (3)

7.1.5 the value of t such that the straight line, $y = 2x + t$, touches the graph of $k(x) = 2x^2 + 8x + 3$ only ONCE. (5)

7.2 A quadratic function f has $f(1\frac{1}{2}) = 0$, $f(-4) = 0$ and $f(1) = -5$.
Draw a sketch graph of f in your ANSWER BOOK. (3)

TOTAL: 100

END

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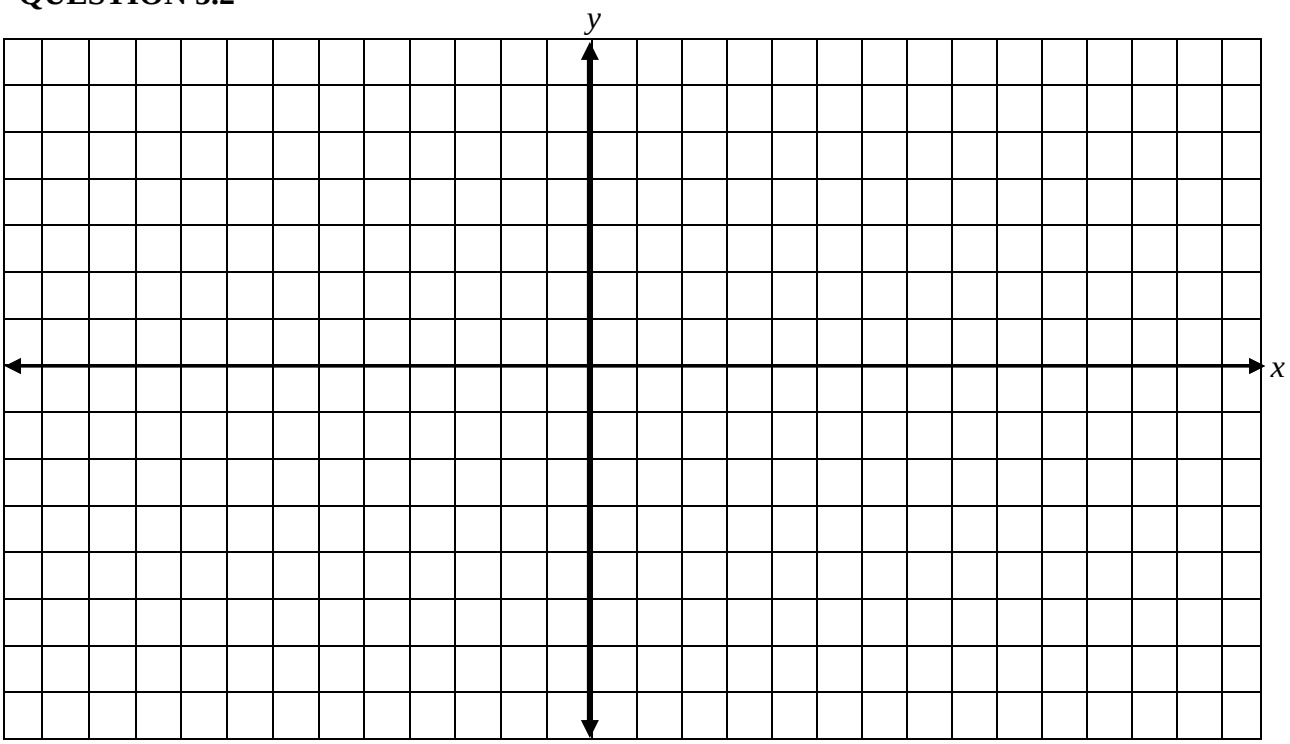
ANSWER SHEET

Please detach and place in your ANSWER BOOK.

Name:_____ Grade: 11____

QUESTION 5.2



QUESTION 6.3