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Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

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Herzlia High	Rondebosch Boys'	St Mary's DSG Kloof	Wynberg Secondary

Grade 10 Mathematics July Examination Paper 1

Time: 2 hours

Total: 100

Date: 24 July 2012

Session: 1

Name:

Maths Teacher:

	A					B			
Question	1	2	3	4	5	6	7	8	TOTAL
L O's	1	1	1	1	2	1	2	2	
Cog Level	1;2	1;2	2;3	2;3	2;3	3;4	1;2;3	2;3;4	
Score									
Mark	15	10	22	11	9	11	9	13	100

INSTRUCTIONS:

- This test consists of thirteen pages and eight questions.
- Work neatly and show all calculations.
- Unless stated, give answers to **TWO decimal places**.
- Only non-programmable, non-graphical calculators are permitted.



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SECTION A

QUESTION 1

1.1 Consider the following list of numbers, and then answer the questions that follow:

$$\sqrt{\frac{60}{15}} ; \sqrt{-27} ; \sqrt{12} ; \sqrt[3]{-8} ; 3,\dot{4} ; -\frac{4}{3} ; -1,4$$

1.1.1 Write down any non-real number in the list. (1)

1.1.2 Between which two rational numbers does the irrational number lie? Show all relevant working in order to obtain full marks. (3)

1.1.3 Convert the recurring decimal to a rational fraction in the form $\frac{a}{b}$; $b \neq 0$. (4)

1.1.4 Add the two real numbers closest to each other, but NOT EQUAL to each other. (2)

1.2 A set of numbers is represented on the number line below:



1.2.1 Use inequalities to describe the set of numbers. (2)

1.2.2 What is the smallest integer in this set of numbers? (1)

1.2.3 Express in interval notation. (2)

[15]

QUESTION 2

Factorise the following fully:

2.1 $3x^3 - 12x$ (2)

2.2 $2x^2 - 5x - 3$ (2)

2.3 $5xy - 3y + 10x - 6$ (3)

2.4 $8x^3 - 27y^6$ (3)

[10]**QUESTION 3**

3.1 Simplify the following:

3.1.1 $\frac{3x+7}{5} - \frac{x-2}{3}$ (4)

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3.1.2 $\frac{x^2-x-2}{x^2-9} \div \frac{x^2-4}{x^2+3x} \times \frac{x^2+4x+4}{x^2+x}$ (8)

3.2 Simplify without using a calculator, writing all answers with positive exponents. (10)

$(2x)^0$	
$2x^0$	
$(2x)^{-1}$	
$2x^{-1}$	
$\left(\frac{2}{x}\right)^{-1}$	
$\left(\frac{-2}{x}\right)^2$	
$(2^x)^x$	

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$2 \cdot 2^x$	
$2^x + 2^x$	
$2^x + 3^x$	

[22]

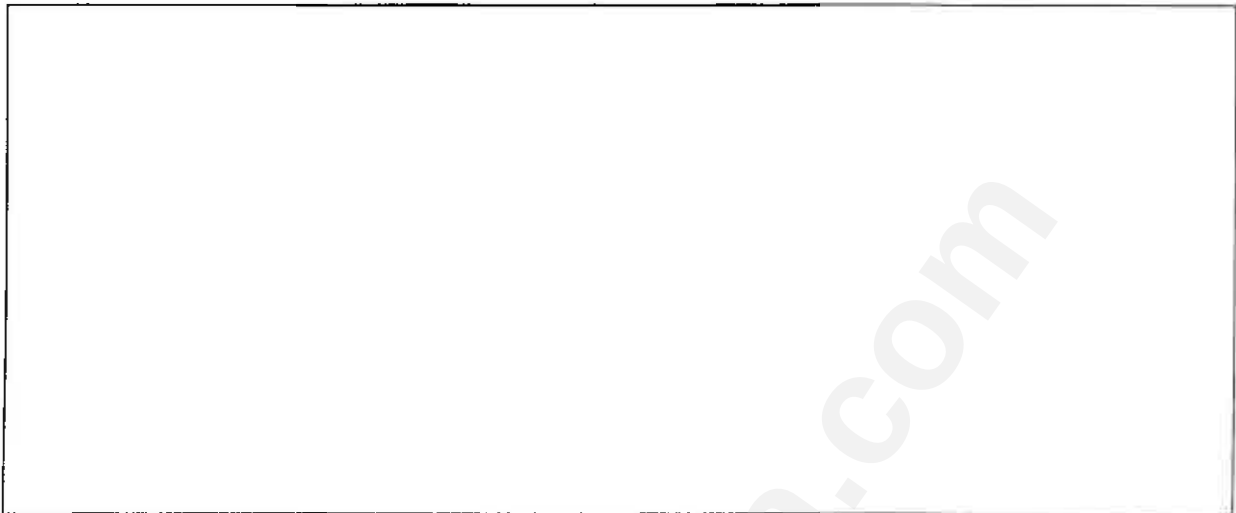
QUESTION 4

Solve the following equations:

4.1 $(x - 7) - 3(x - 1) = 3 - x$ (2)

4.2 $(x - 3)(x - 2) = 6$ (4)

- 4.3 $-5 < 2x - 3 \leq 7$. Illustrate your answer graphically. (5)



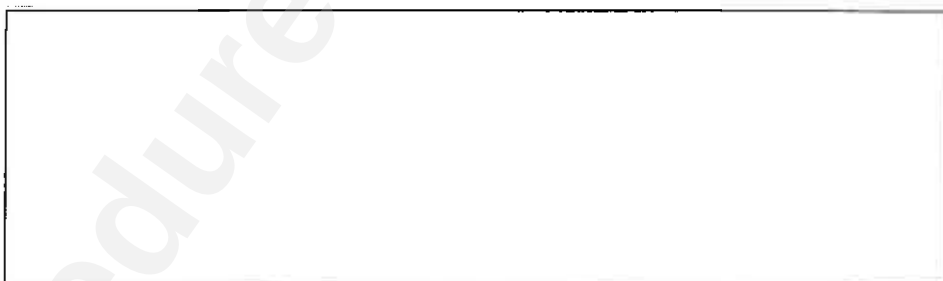
[11]

QUESTION 5

- 5.1 Express $3y + 2x = 12$ in standard form (i.e. $y = mx + c$) (1)



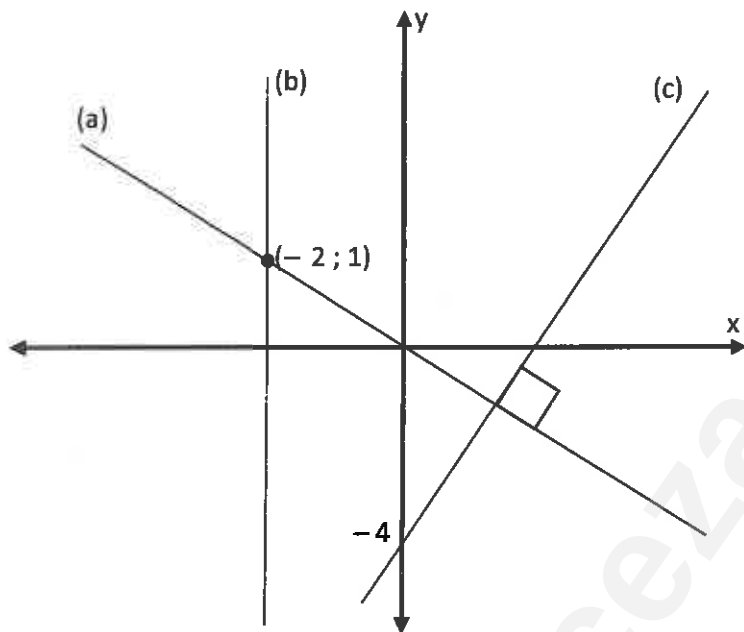
- 5.2 Now determine the equation of a line **parallel** to the line in 5.1, but passing through $(3 ; -4)$. (2)



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- 5.3 Determine the equations of the lines (a), (b) and (c).
 (b) is parallel to the y-axis

(6)



SECTION B

QUESTION 6

Given: $P = \frac{9^{x-1} \cdot 8^x \cdot 2^{x-4}}{12^{2x-3}}$ and $Q = \frac{2^x + 2^{x+1}}{2^{x-1}}$

6.1 Simplify P (7)

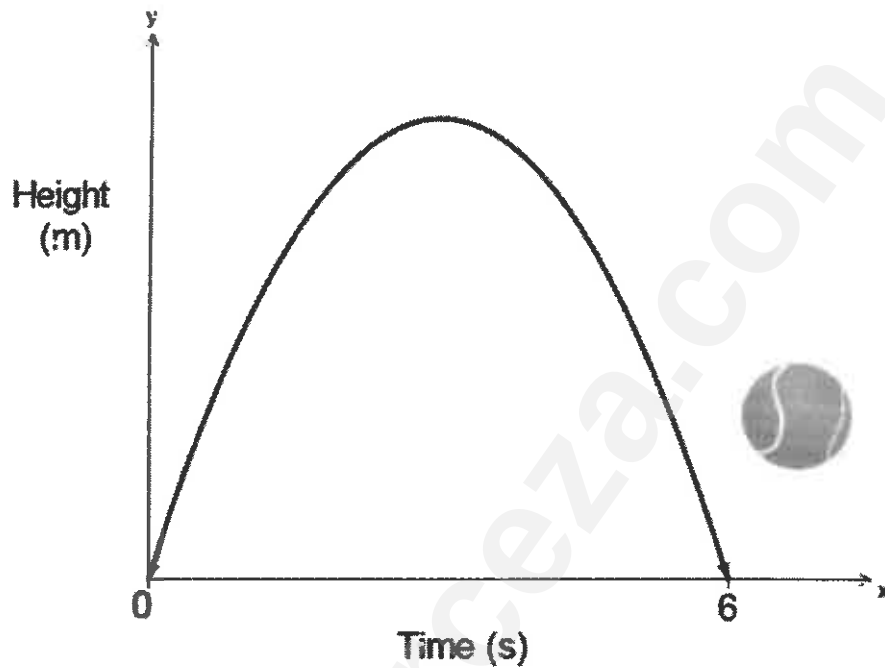
6.2 Simplify Q (3)

6.3 Write a mathematical expression (equation) to show the relationship between P and Q. (1)

[11]

QUESTION 7

- 7.1 Rafael Nadal plots the bounce of a tennis ball on a graph. He calculates that the formula he needs to use is: $H = -2t^2 + 12t$, where H is the height of the ball above the ground (in metres) and t is the time elapsed (in seconds).



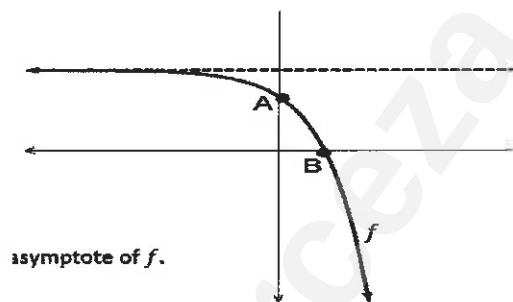
- 7.1.1 How long will it take the ball to reach its maximum height ? (1)

- 7.1.2 What is the maximum height of the ball ? (2)

7.1.3 At what time(s) will the ball be 16m above the ground ?

(3)

7.2 The graph of $f(x) = -3^x + 3$ is drawn below:



7.2.1 Write down the equation of the asymptote of f .

(1)

7.2.2 Determine the co-ordinates of A.

(1)

7.2.3 Determine the co-ordinates of B.

(1)

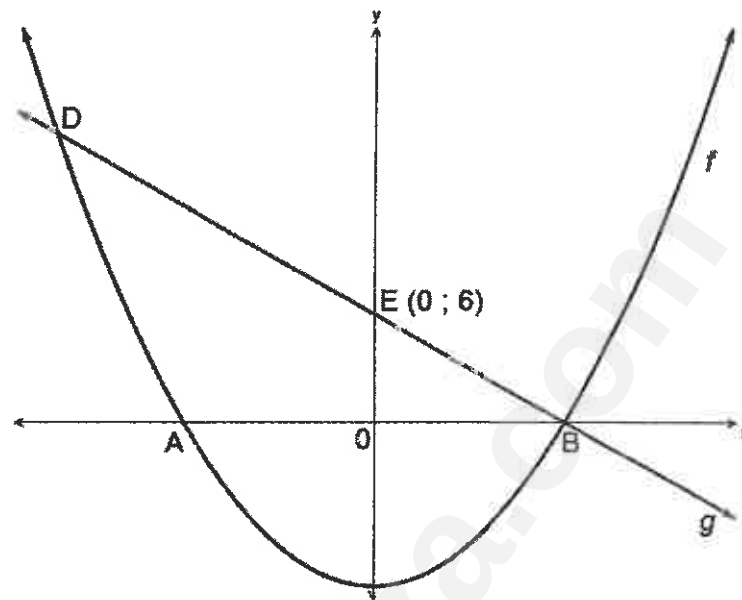
[9]

QUESTION 8

Given:

$$f(x) = x^2 - 9$$

$$g(x) = mx + c$$



8.1 Find the values of m and c .

(3)

8.2 Find the co-ordinates of D, a point of intersection between f and g .

(4)

8.3 Write down the domain of g .

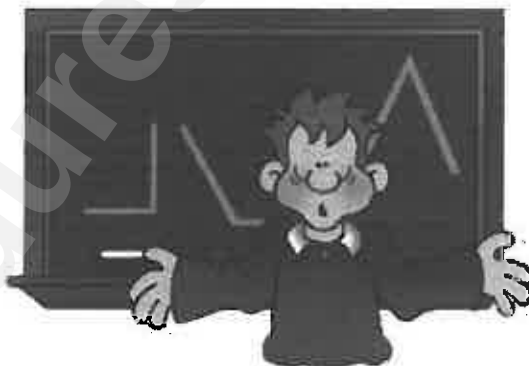
(2)

8.4 For which values of x is $f(x) < g(x)$?

(2)

8.5 Find the length of AB.

(2)



[13]

TOTAL : 100 MARKS

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