

basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

**GREENBURY SECONDARY
SCHOOL**

GRADE 10

MATHEMATICS

PAPER 1

MARKS: 100

EXAMINER : A.D.SOOMAROO

TIME: 2 Hours

MODERATOR: D. CHELLAN

This question paper consists of 11 pages, including this page, and 7 questions.

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. This question paper consists of 7 questions.
2. Answer ALL the questions.
3. Clearly show ALL calculations, diagrams, graphs, et cetera that you have used in determining the answers.
4. Answers only will not necessarily be awarded full marks.
5. An approved scientific calculator (non-programmable and non-graphical) may be used, unless stated otherwise.
6. Round your answers off to TWO decimal places if necessary, unless stated otherwise.
7. Diagrams are NOT necessarily drawn to scale.
8. Number the answers correctly according to the numbering system used in this question paper.
9. Write legibly and present your work neatly.
10. A diagram sheet has been provided for **QUESTION 5.2.1** and **QUESTION 7.1.1**

QUESTION 1.

1.1. Given $M = \frac{\sqrt{x}}{x-1}$

1.1.1. For which value(s) of x is M

1.1.1.1. undefined ? (1)

1.1.1.2. Non-real ? (1)

1.1.1.3. Real ? (1)

1.2. Factorise Fully.

1.2.1. $2x^2 - 4x$ (1)

1.2.2. $36y^4 - 1$ (1)

1.2.3. $3p^2 + 5p - 2$ (2)

1.2.4. $\frac{a^2}{9}(3 - b) + \frac{b^2}{16}(b - 3)$ (4)

1.3. Simplify.

1.3.1. $\frac{3}{x} - \frac{5}{x^2 - x}$ (3)

1.3.2. $\frac{25^x - 1}{5^x + 1}$ (2)

[16]

QUESTION 2.

2.1. Solve for x

2.1.1. $x^2 - 2x = 15$ (4)

2.1.2. $9^x = 27$ (3)

2.2. Solve for x and y simultaneously

$$2^{x+2} = 8^{2y-1}$$

$$3x + 2 = 4y + 1$$

(5)

2.3. Solve for x :

$$1 < 2x - 3 \leq 5$$

and then illustrate your answer on a number line.

(3)

[15]

QUESTION 3.

3.1. Consider the number pattern :

4; 9; 14; 19; ...

If the pattern behaves consistently;

3.1.1. Write down the next three terms of the sequence.

(1)

3.1.2. Determine the n^{th} term of the sequence in the form

$$T_n = \dots$$

(2)

3.1.3. Which term in the sequence has a value of **174**

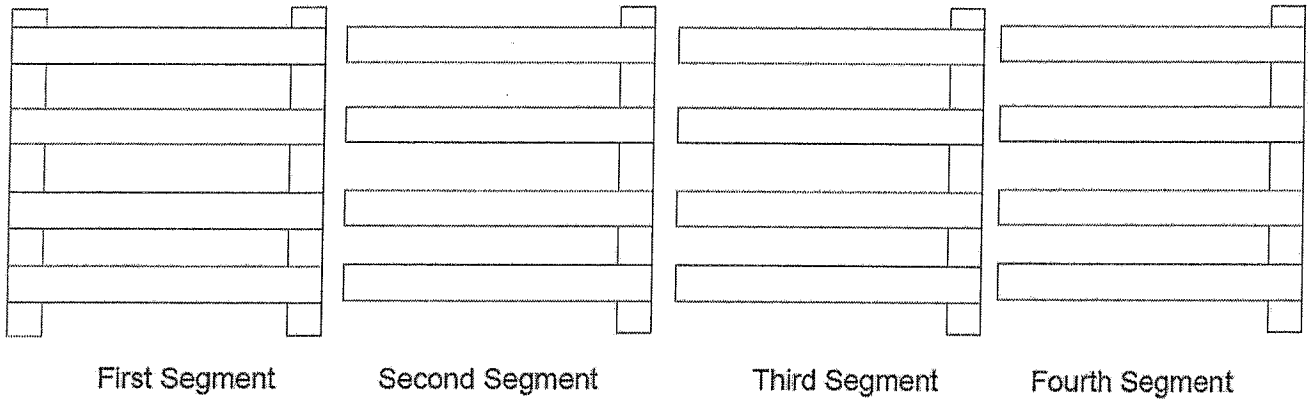
(2)

3.1.4. Is **345** a term in the sequence?

Fully justify your answer with calculations.

(2)

3.2. A farmer puts up a fence. The fence is made up of segments **that are attached to each other**. The first segment has 6 boards, as shown below, and each of the segments that follow are attached to the next part of the fence have 5 boards each



3.2.1. Complete the table below.
Write down the letter and its corresponding value, for example, **A = 200**

Segment	1	2	3	4	5	6	7
Boards	6	5	5	5	5	5	5
Total Boards	6	11	16	A	B	C	D

(4)

3.2.2. Determine the rule for this pattern (1)

3.2.3. Determine the total number of boards used after 20 segments (1)

3.2.4. If the farmer used 136 boards, how many fences did he put up? (2)

[15]

QUESTION 4.

4.1. Sai invested R120 000 with Beat Bank. The bank paid interest at 9% p.a. which was compounded annually.

Calculate :

4.1.1. the accumulated amount in the account at the end of 12 years. (3)

4.1.2. the total interest earned. (1)

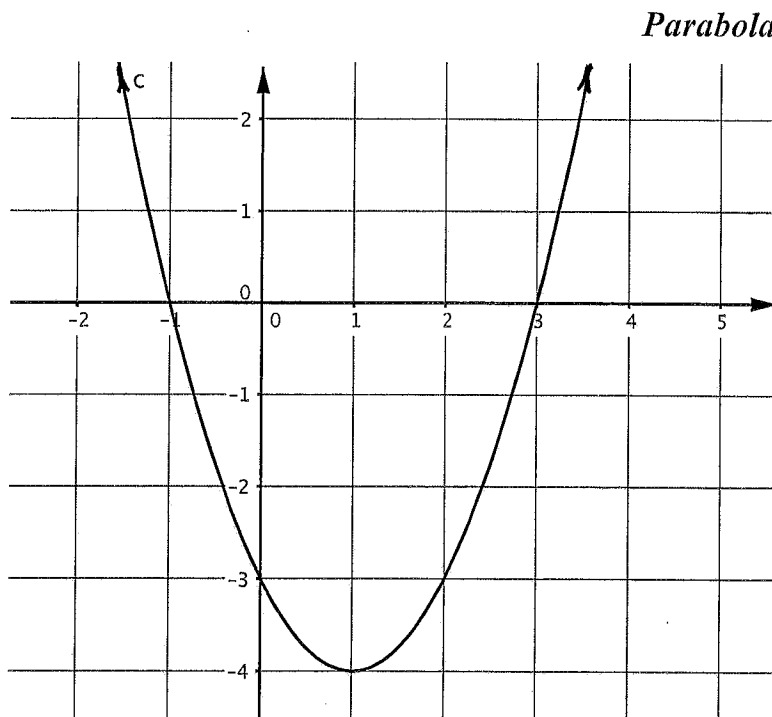
4.2. R100 000 was invested in a pension fund. The growth of the fund amounts to R250 000 after 10 years. Calculate the annual interest rate if the interest was compounded annually. (3)

4.3. Rama borrows R300 000 and agrees to repay the money after 4 years in one amount. How much will he be required to pay if the interest is charged at 10% p.a. simple interest? (3)
[10]

QUESTION 5.

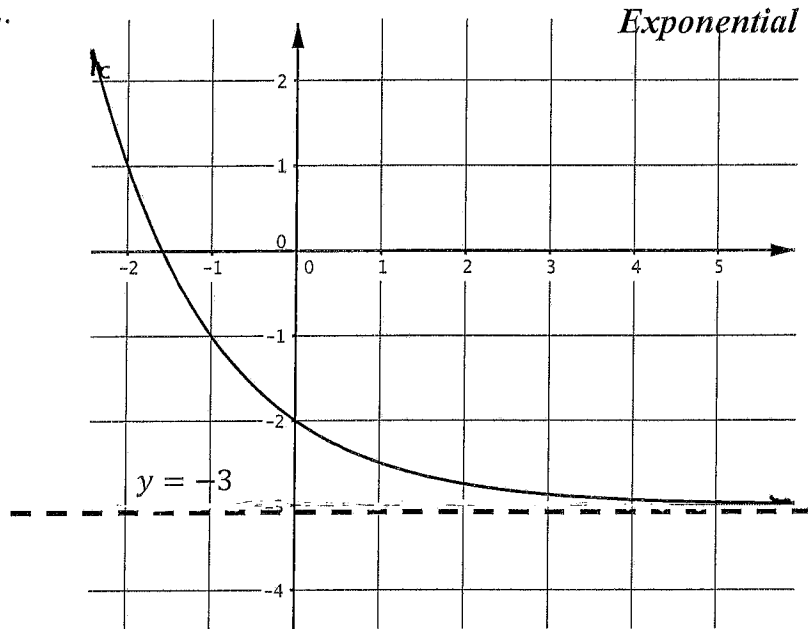
5.1. State the domain and range of the functions shown in each sketch.

5.1.1.



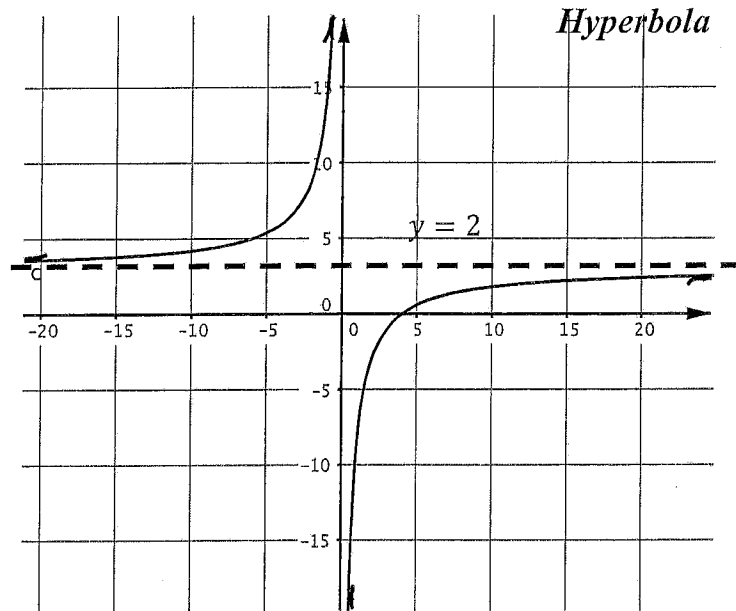
(2)

5.1.2.



(2)

5.1.3.



(2)

5.2. Answer this question on the Diagram Sheet provided .

Given $f(x) = \frac{12}{x} + 3$

5.2.1. Sketch the graph of the given function $f(x)$ on the axes provided, indicating all intercepts with the axes and asymptotes. (5)

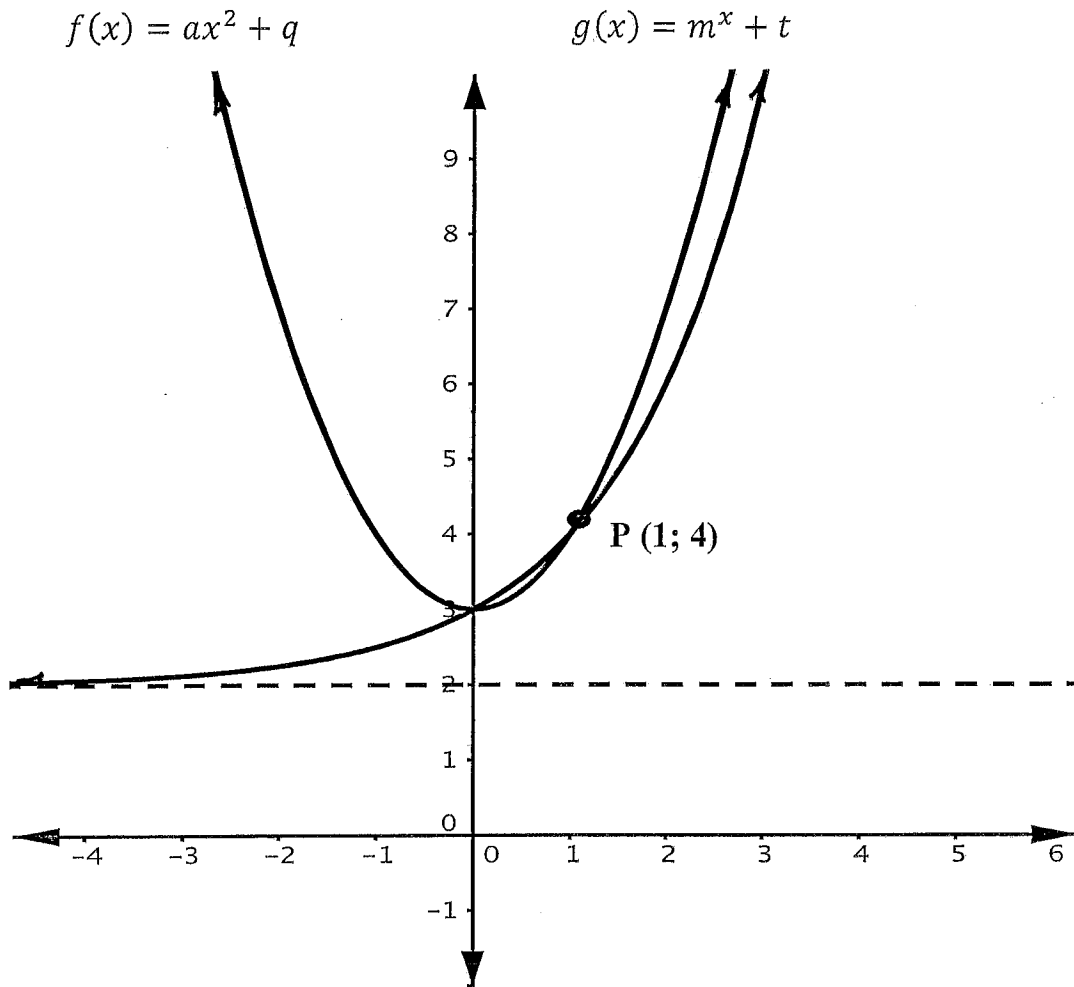
5.2.2. Determine the equation(s) of the axes of symmetry. (4)

5.2.3. Sketch the axes of symmetry on the given diagram sheet (2)

[17]

QUESTION 6.

Sketched below are the graphs of :



6.1. Both graphs intersect at point $P(1; 4)$.

Show, by observations and calculations that

$$a = 1; q = 3; m = 2; \text{ and } t = 2.$$

(6)

6.2. Use the graph to determine the value(s) of x for which.

6.2.1. $f(x) \leq g(x)$

(2)

6.2.2. $f(x) > 0$

(2)

6.3. Determine the equation of $h(x)$ the results when $f(x)$ is shifted 5 units down, in the form $h(x) = \dots$

(2)

[12]

QUESTION 7

7.1. 200 teenagers had to answer the following question:

Which type of music do you like?

The teenagers responded as follows:

- 160 said hip-hop
- 140 said Rap
- 108 said hip-hop and Rap

7.1.1. Use the above information to complete the Venn diagram on the **DIAGRAM SHEET** provided

[H] stands for hip-hop and [R] for Rap. (4)

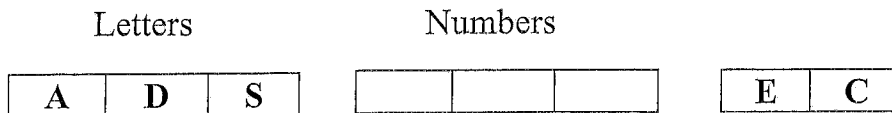
7.1.2. Use the Venn diagram in Question 7.1.1. to calculate the probability (to two decimal digits) that a teenage, randomly chosen, will like the following music:

7.1.2.1. Rap only (2)

7.1.2.2. None of the TWO (2)

7.1.2.3. Hip-hop or Rap (2)

7.2. The vehicle registration numbers in the Eastern Cape consists of three letters from the alphabet starting with A, then three natural numbers and lastly the letters EC.



7.2.1. How many possible outcomes are there for the **first** digit? List them. (2)

7.2.2. Events for the numbers, of the number plates are defined as follows :

A : the first digit is a prime number

B: the second digit is less or equal to 6

C: the third digit is a square

Determine :


7.2.2.1. P(A) (1)

7.2.2.2. P(C) (1)

7.2.2.3. P(not B) (1)

[15]

TOTAL MARKS : 100.

GREENBURY SECONDARY SCHOOL
DEPARTMENT OF MATHS & SCIENCES
H.O.D. MR L PILLAY


NOVEMBER EXAMINATION

GRADE 10

PAPER 1

QUESTION 1

1.1.1.1. $x=1$ ✓ A
 1.1.1.2. $x < 0$ ✓ A
 1.1.1.3. $x > 0$ $x \neq 1$ ✓ A

1.2.1. $2x^2 - 4x$
 $= 2x(x-2)$ ✓ A

1.2.2. $36y^4 - 1$
 $= (6y^2 - 1)(6y^2 + 1)$ ✓ A

1.2.3. $3p^2 + 5p - 2$
 $= (3p - 1)(p + 2)$ ✓ A

1.2.4. $\frac{a^2}{9}(3-b) - \frac{b^2}{16}(3-b)$
 $= (3-b)\left(\frac{a^2}{9} - \frac{b^2}{16}\right)$ ✓ CA
 $= (3-b)\left(\frac{a}{3} - \frac{b}{4}\right)\left(\frac{a}{3} + \frac{b}{4}\right)$ ✓ CA

1.3. $\frac{3}{x} - \frac{5}{x^2 - x}$
 $= \frac{3}{x} - \frac{5}{x(x-1)}$ ✓ A
 $= \frac{3(x-1) - 5}{x(x-1)}$ ✓ CA
 $= \frac{3x - 3 - 5}{x(x-1)}$
 $= \frac{3x - 8}{x(x-1)}$ ✓ CA

1.3.2. $\frac{25^x - 1}{5^x + 1}$
 $= \frac{(5^x - 1)(5^x + 1)}{(5^x + 1)}$ ✓ A
 $= 5^x - 1$ ✓ CA

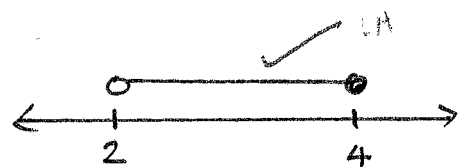
QUESTION 2

2.1.1. $x^2 - 2x = 15$
 $x^2 - 2x - 15 = 0$ ✓ A
 $(x-5)(x+3) = 0$ ✓ CA
 $x = 5$ ✓ CA OR $x = -3$ ✓ CA

2.1.2. $9^x = 27$
 $3^{2x} = 3^3$ ✓ A
 $2x = 3$ ✓ CA
 $x = \frac{3}{2}$ ✓ CA

2.2. $2^{x+2} = 8^{2y-1}$
 $2^{x+2} = 2^{6y-3}$ ✓ A
 $\Rightarrow x+2 = 6y-3$ ✓ CA
 $x = 6y-5$
 $3x = 4y-1$ ✓ CA
 $3(6y-5) = 4y-1$
 $18y - 15 = 4y - 1$
 $14y = 14$
 $y = 1$ ✓ CA
 $x = 6(1) - 5$
 $= 1$ ✓ CA

2.3. $1 < 2x - 3 \leq 5$
 $4 < 2x \leq 8$ ✓ A
 $2 < x \leq 4$ ✓ CA



QUESTION 3.

3.1.1. $24; 29; 34$ ✓ A

3.1.2. $T_n = 5n + 19$ ✓ A

3.1.3. $T_n = 174$
 $5n + 19 = 174$ ✓ CA
 $5n = 155$
 $n = 31$ ✓ CA

3.1.4 IF 345 IS A TERM
 $\Rightarrow 5n + 19 = 345$
 $5n = 326$
 $n = 65,2$ ✓ CA
 $n \notin \mathbb{N}$ ✓ CA
 $\Rightarrow 345$ IS NOT A TERM ✓

3.2.1 $A = 21$ ✓ A $B = 26$ ✓ A
 $C = 31$ ✓ A $D = 36$ ✓ A

3.2.2. $T_n = 5n + 1$ ✓ A

3.2.3. $T_{20} = 5(20) + 1$
 $= 101$ ✓ CA

3.2.4 $T_n = 5n + 1 = 136$ ✓
 $5n = 135$
 $n = 27$ ✓

QUESTION 4.

4.1.1. $A = P(1+i)^n$ ✓ A
 WRONG FORMULA
 ZERO MARKS
 $= 120\,000(1 + \frac{9}{100})^{12}$ ✓ A
 $= R337\,519,77$ ✓ CA

4.1.1. INTEREST = $337\,519,77 - 120\,000$
 $= R217\,519,77$ ✓ CA

4.2. $A = P(1+i)^n$ ✓ A
 $250\,000 = 100\,000(1+i)^{10}$ ✓ A
 $i = 9,6\%$ ✓ CA

WRONG FORMULA
 ZERO MARKS Q4.2
 Q4.3.

4.3. $A = P(1+i)^n$ ✓ A
 $= 300\,000(1 + \frac{10}{100} \times 4)$ ✓ A
 $= R420\,000$ ✓ CA

QUESTION 5.

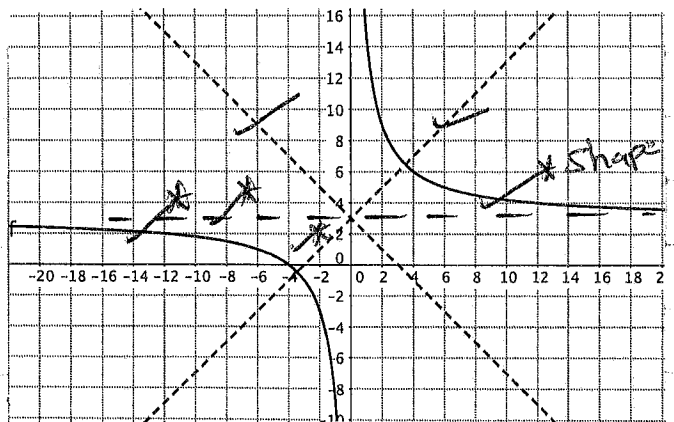
5.1.1 DOMAIN: $x \in \mathbb{R}$ ✓ A
 RANGE: $y \geq -4$ ✓ A

5.1.2. DOMAIN: $x \in \mathbb{R}$ ✓ A
 RANGE: $y > -3$ ✓ A

5.1.3. DOMAIN: $x \in \mathbb{R} \quad x \neq 0$ ✓ A
 RANGE: $y \in \mathbb{R} \quad y \neq 2$ ✓ A

5.2.1. & 5.2.3.

X-INT let $y = 0$
 $\frac{12}{x} + 3 = 0$
 $x = -4$ ✓
 OR it may be implied in diagram.



5.2.2. $y = x + 3$ ✓ A
 AND $y = -x + 3$ ✓ A

QUESTION 6.

6.1. $q = 3$ ✓ A
 $\Rightarrow f(x) = ax^2 + 3$
 $f(1) = a(1)^2 + 3 = 4$ ✓ A
 $a = 1$ ✓ A
 $t = 2$ ✓ A
 $\Rightarrow g(x) = m^x + 2$ ✓ A
 $g(1) = m^{(1)} + 2 = 4$
 $m = 2$ ✓ A

$$6.1.1 \quad 0 \leq x \leq 1 \quad \checkmark \text{H}$$

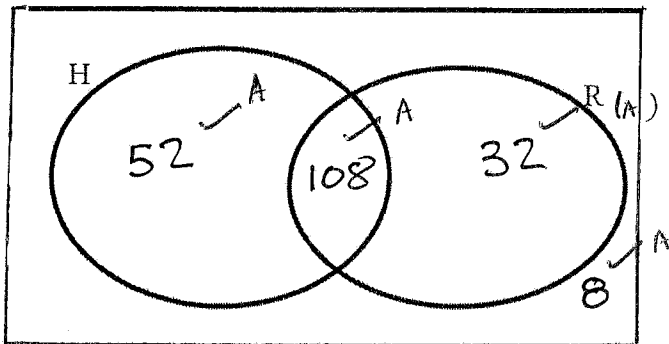
$$6.1.2 \quad x \in \mathbb{R} \quad \checkmark \text{H}$$

$$6.2 \quad h(x) = x^2 - 2 \quad \checkmark \text{H}$$

QUESTION 7.

7.1.1.

S(200)



7.1.2.1 P(RAP ONLY)

$$= \frac{32}{200} \quad \checkmark \text{CA}$$

$$= 0,16 \quad \checkmark \text{CA}$$

7.1.2.2. P(NOT RAP OR HH)

$$= \frac{8}{200} \quad \checkmark \text{CA}$$

$$= 0,04 \quad \checkmark \text{CA}$$

7.1.1. P(HH OR R)

$$= \frac{192}{200} \quad \checkmark \text{CA}$$

$$= 0,96 \quad \checkmark \text{CA}$$

7.2.1 {1, 2, 3, 4, 5, 6, 7, 8, 9} $\checkmark \text{A}$

\Rightarrow 9 OUTCOMES $\checkmark \text{A}$

7.2.2.1 P(A)

$$= \frac{4}{9}$$

$$= 0,44 \quad \checkmark \text{A}$$

7.2.2.2. P(C)

$$= \frac{3}{10}$$

$$= 0,3 \quad \checkmark \text{A}$$

7.2.2.3 P(NOT B)

$$= \frac{3}{10}$$

$$= 0,3 \quad \checkmark \text{A}$$

OR//

$$P(\text{NOT RAP or HH}) = 1 - P(\text{H or R})$$
$$= 1 - \frac{192}{200}$$
$$= 0,04 \rightarrow$$

OR//

$$P(\text{HH or R}) = 1 - \frac{8}{200}$$
$$= 0,96 \rightarrow$$

TOTAL: 100

