



**LIMPOPO**  
PROVINCIAL GOVERNMENT  
REPUBLIC OF SOUTH AFRICA

Department of

**EDUCATION**

**CAPRICORN SOUTH DISTRICT**

**MATHEMATICS**

**INVESTIGATION**

**GRADE 11**

School: .....

Learner's Name: ..... Class.....

**DUE DATE: 30 JANUARY 2020**

**TOTAL MARKS: 50**

**INSTRUCTIONS TO LEARNERS**

Read the following instructions carefully before answering questions.

1. Complete ALL the investigations (#1, #2 and #3)
2. Use spaces provided on each investigation sheet to answer
3. Write legibly and neatly for presentable work.

### INVESTIGATION # 1:

1.1 State the exponent rules and clearly explain how each rule works.

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1.2 In the following equations, solve for  $x$  (to two decimal places where necessary) and write all the steps until the final answer.

a.  $5^{3x} - 5^{3x-1} = 4$

b.  $3^{x+1} \cdot 5 - 4 \cdot 3^{x+2} = -\frac{7}{3}$

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c.  $3^{2-x} - 3^{-x-3} = \frac{242}{9}$

d.  $5^{2x+4} - 25^{x-1} = 78\,120$

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## INVESTIGATION # 2

2.1 State the rules for **surds**.

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2.2 When we simplify surds, we often leave a square-root or cube-root in the denominator. However, the calculator rationalizes the answer so that there is no surd in the denominator. With that said, rationalise and also solve for  $x$  in the following:

a.  $\frac{3}{1-\sqrt{2}}$

b.  $\sqrt[3]{4+x} = 3$

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c.  $\sqrt{3x^2} - \sqrt{12} = 0$

d.  $\sqrt{18} - x\sqrt{2} = \sqrt{32}$

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### INVESTIGATION # 3

3.1 The solutions of a quadratic equation are given by  $x = \frac{-2 \pm \sqrt{2m+5}}{7}$ . For which value(s) of m will this equation have?

a) Two equal solutions?

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b) No real solutions

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3.2 Show that k lies between -8 and 1 in the following inequality.

$$k^2 + 7k \leq 8$$

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**TOTAL: [50]**

**RUBRIC**

Learner Name: .....

Grade: .....

CRITERIA	Rating Scale (RS)			Weight (W)	Mark RS × W
	1	2	3		
Stating and explaining the exponential rules	Lack of understanding of exponential laws	Moderate understanding of exponential laws	Clear understanding of exponential laws	× 3	
Solving equations using exponential rules	No attempt or irrelevant solutions with application of exponential rules	Clear and relevant solutions in two or three equations and to some extent able to take out a common factor	Clear and relevant solutions in all questions and being able to write all needed steps in all questions	× 4	
Stating and explaining surds rules	Lack of understanding of surds rules	Moderate understanding of surds rules	Clear understanding of surds rules and applications	× 3	
Solving surds equations using surds rules	No attempt or irrelevant solutions with application of surds rules	Clear and relevant solutions in two or three equations and to some extent able to write all the relevant steps	Clear and relevant solutions in all the questions and in all aspects able to write all the much needed steps	× 4	
Solving roots of quadratic equations the correct way	Not able to equate the root to zero and solving it	Able to extract the solution and correctly solved one of the questions	Able to extract the solution and solving all the questions correctly	× 2	
Appropriately solving the inequality	Incorrect simplification of the inequality	Clear and correct simplification of the inequality		× 1	
<b>GRAND TOTAL</b>					<b>50</b>