



**LIMPOPO**  
PROVINCIAL GOVERNMENT  
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF  
**EDUCATION**

**VHEMBE EAST DISTRICT**

**MATHEMATICAL LITERACY**

**GRADE 11 INVESTIGATION**

**TOPIC: PATTERNS, RELATIONS & REPRESENTATIONS**

**DUE DATE : 27 FEBRUARY 2023**

**TERM 1**  
Stanmorephysics.com

**MARKS: 50**

**SCHOOL:** \_\_\_\_\_

**LEARNER:** \_\_\_\_\_

I, \_\_\_\_\_, hereby declare that the content of my responses to the tasks of this investigation is my own work. In instances where resources were used, the required reference details are indicated.

Learner Signature: \_\_\_\_\_ Date: \_\_\_\_\_

## INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. This INVESTIGATION consists of TWO PARTS.
  2. Clearly show ALL calculations, diagrams, graphs, et cetera that you have used in determining the answers.
  3. Marks will be awarded for stating your resources.
  4. Answers only will not necessarily be awarded full marks.
  5. You may use an approved scientific calculator (non-programmable and nongraphic), unless stated otherwise.
  6. If necessary, round off answers to TWO decimal places, unless stated otherwise.
  7. Number the answers correctly according to the numbering system used in this question paper.
  8. Write neatly and legibly.
-

**PART 1: LINEAR RELATION VERSUS CONSTANT RATIO REPRESENTATIONS**

A manufacturer wants to buy a mechanical part of a machine. The CEO, Mr Murida, took it upon himself to research the most cost-efficient mechanical part that will be beneficial in the long run. He finally narrowed down to two specific brands, A and B. When bought new, these two brands cost exactly the same, but he studied two graphs and made interesting discoveries. Mr. Murida knows that the value of mechanical parts decreases over time, as it gets older. The graphs on ANNEXURE A indicates how the value of the respective brands decreased over a period of time. Both brand new brands were sold for R50 000,00. Their values decreased, due to wear and tear, over the period. Study the graphs and answer the questions below.

- 1.1 Describe the relation between the number of months and the value of the parts. (2)
- 1.2 Identify the graph representing a:
  - 1.2.1 linear relationship (2)
  - 1.2.2 constant ratio. (2)
- 1.3 How many years is the time period? (2)
- 1.4 Estimate the value of brand A after 6 months. (2)
- 1.5 Estimate the value of brand B after 1 and a half years. (2)
- 1.6 After how many years is the value of the brands exactly the same? Write down the value. How did you deduce this answer? (3)
- 1.7 Which brand has the highest value after 8 months? (2)
- 1.8 Suppose the part should be sold and replaced after 16 months, which brand would return the highest value? Explain your answer. (3)
- 1.9 Determine the percentage decrease in the value of brand A within the indicated period. Use the formula below:  
$$\text{Percentage Decrease} = \frac{\text{Value in Beginning} - \text{Value at End}}{\text{Value in Beginning}} \times 100$$
 (4)
- 1.10 Conclusion: Determine the difference in price at the end of the period. (3)

[27]

**PART 2: RELATING DISTANCE AND TIME (OBSERVING POSSIBLE PATTERNS)**

Granton participated in the Two Oceans Half Marathon of 21,1km. The marathon starts at 06:30 and all athletes are required to finish before the cut-off time at 10:10. Athletes not reaching the cut-off point within the prescribed time, are said to be unfit and asked to leave the road. His time after running every 2,5km are indicated in the table below. [1 mile = 1,60934km]

**TABLE 1: GRANTON'S RUNNING TIME EVERY 2,5km**

Distance Run (km)	Total Running Time (Hours: Minutes: Seconds)
2,5	00:09:59
5,0	00:23:56
7,5	00:47:37
10,0	01:08:15
12,5	01:29:24
15,0	01:54:02
17,5	02:38:19
21,1	03:24:40

- 2.1 Write the starting time of the half marathon in words. (2)
- 2.2 Write the meter-distance of the half marathon in words. (2)
- 2.3 Convert the half marathon distance to miles. (2)
- 2.4 What is the distance covered during a *marathon* in km? (2)
- 2.5 Within how many hours, minutes and seconds did Granton run the first:
- 2.5.1 2,5km (2)
- 2.5.2 15km? (2)
- 2.6 The last interval ran is not 2,5km, as all the other intervals.  
Determine the distance of the last interval as well as time (in hours, minutes and seconds) Granton took to run this last interval. (4)
- 2.7 Determine the duration of the half marathon time (in hours, minutes and seconds), from start to cut-off time. (3)
- 2.8 Conclusion: Determine whether Granton managed to finish before the cut-off time.  
Indicate the number of minutes he either ended *before* cut-off time or *after* cut-off time. (4)

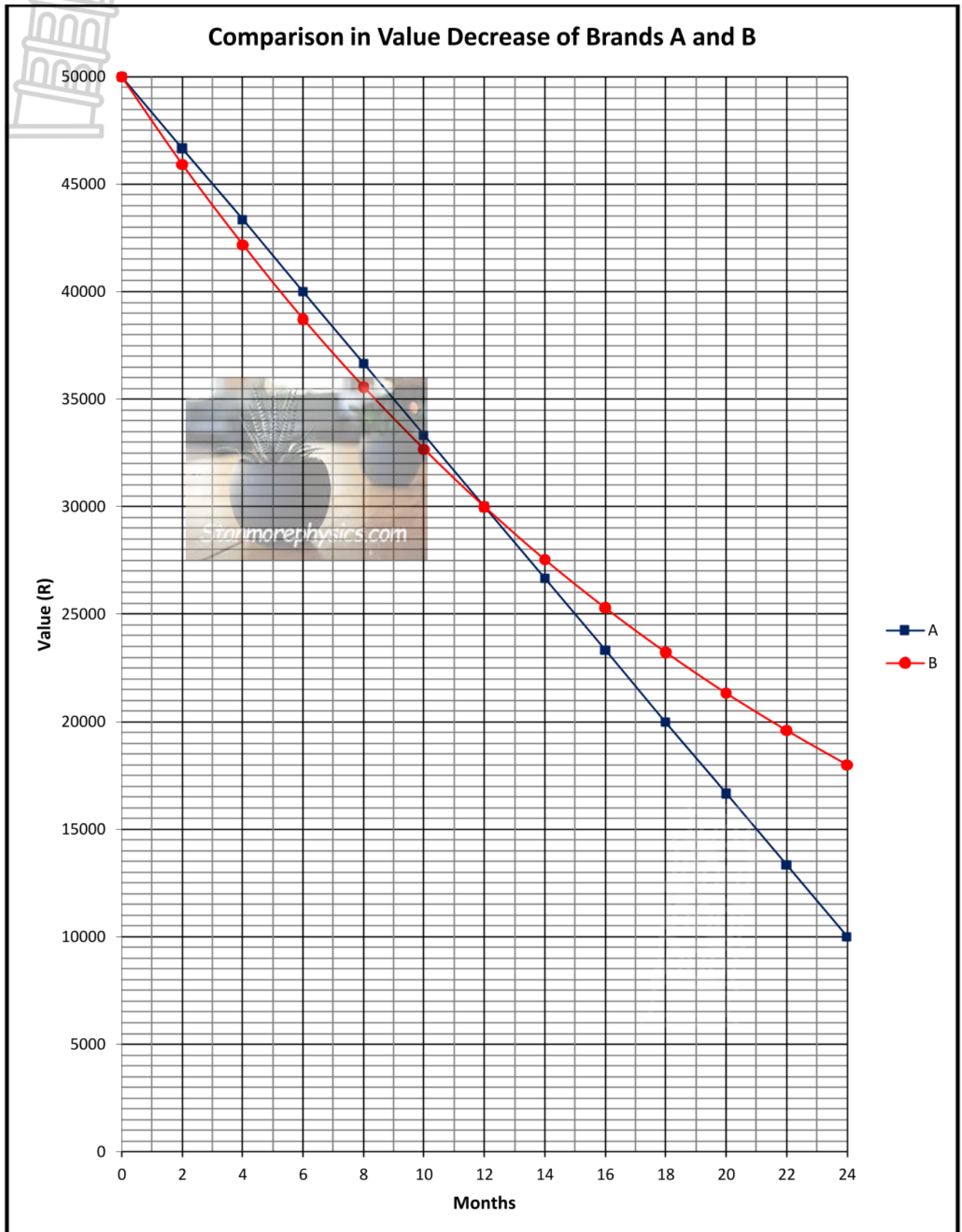
**[23]**


**TOTAL: 50**

ANNEXURE A

NAME: \_\_\_\_\_


GRADE: \_\_\_\_\_





**LIMPOPO**  
PROVINCIAL GOVERNMENT  
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF  
**EDUCATION**



**VHEMBE EAST DISTRICT MATHEMATICAL LITERACY**

**GRADE 11      INVESTIGATION**

**2023   TERM 1**

**MARKING GUIDELINES**

<b>SYMBOL</b>	<b>EXPLANATION</b>
<b>M</b>	Method
<b>MA</b>	Method with accuracy
<b>CA</b>	Consistent accuracy
<b>A</b>	Accuracy
<b>C</b>	Conversion
<b>S</b>	Simplification
<b>RT</b>	Reading from a table/a graph/a document/diagram
<b>SF</b>	Correct substitution in a formula
<b>O</b>	Opinion/Explanation
<b>P</b>	Penalty, e.g. for units, incorrect rounding off, etc.
<b>R</b>	Rounding off
<b>NRP</b>	No penalty for rounding
<b>AO</b>	Answer only
<b>MCA</b>	Method with constant accuracy

PART 1 [27]

Q	Solution	Explanation
1.1	The number of months is indirectly proportional to the value of the parts. ✓✓	2O description (2)
1.2		
1.2.1	Brand A ✓✓	2A linear (2)
1.2.2	Brand B ✓✓	2A constant ratio (2)
1.3	2 years ✓✓	2RT 2 years (2)
1.4	R40 000 ✓✓	2RTR40 000 (2)
1.5	R23 237,90 [±R500] ✓✓	2RT estimated value (2)
1.6	1 year ✓; R30 000 ✓ The point where the two graphs intersect. ✓	1RT 1 year 1RT R30 000 1O deduction (3)
1.7	Brand A ✓✓	2RT brand A (2)
1.8	Brand B ✓ At 16 months, the curve of brand B is above brand A ✓, meaning the value is higher. ✓	1RT brand B 1O graph above 1O higher value (3)
1.9	$\text{Percentage Decrease} = \frac{50000 - 10000}{50000} \times \frac{100}{1}$ = 80% ✓	1M subtraction 1M division by 50000 1C multiplication 1CA percentage 80% (4)
1.10	Difference = Brand B – Brand A ✓ = R18 000 – R10 000 ✓ = R8 000,00 ✓	1M correct order 1M subtraction 1CA R8 000,00 (3)

[27]

**PART 2 [23]**

Q	Solution	Explanation
2.1	Half past six in the morning ✓✓	2A words correct (2)
2.2	Twenty-one thousand one-hundred metres ✓✓	2A correct words (2)
2.3	$21,1 \div 1,60934$ ✓ = 13,11 miles ✓	1M division 1A 13,11 miles (2)
2.4	$21,1 \times 2$ ✓ = 42,2km ✓	1M multiply by 2 1A 42,2km (2)
2.5 2.5.1	0 hours, 9 minutes and 59 seconds ✓✓	2RT time correct (2)
2.5.2	1 hour, 54 minutes and 2 seconds ✓✓	2RT time correct (2)
2.6	Distance = $21,1 - 17,5$ ✓ = 3,6km ✓  Time = $03:24:40 - 02:38:19$ ✓ = $00:46:21$ ✓	1M difference 1CA distance  1M difference 1CA time (4)
2.7	Duration = $10:10 - 06:30$ ✓ = $03:40:00$ ✓✓	1M difference 2A time 03:40:00 (3)
2.8	Granton finished $03:24:40$ before the cut-off time ✓ Time before = $03:40:00 - 03:24:40$ ✓ = $00:15:20$ ✓  Hence, Granton finished 15 minutes ✓ and 20 seconds before cut-off time.	1A before cut-off 1M difference 1A time 00:15:20  1A minutes before (4)

**[23]**

**TOTAL: 50**



TAXONOMY LEVELS					
GRADE 11					
MATHEMATICAL LITERACY					
INVESTIGATION - TERM 1 - 2023					
MARKS: 50					
QUESTION	KNOWLEDGE	ROUTINE PROCEDURES	COMPLEX PROCEDURES	PROBLEM SOLVING	TOTAL
<b>DESIRED %</b>	<b>30%</b>	<b>30%</b>	<b>20%</b>	<b>20%</b>	<b>100%</b>
1.1	2				2
1.2.1	2				2
1.2.2	2				2
1.3		2			2
1.4		2			2
1.5		2			2
1.6		3			3
1.7		2			2
1.8			3		3
1.9			4		4
1.10		3			3
					0
2.1	2				2
2.2	2				2
2.3		2			2
2.4	2				2
2.5.1	2				2
2.5.2	2				2
2.6				4	4
2.7			3		3
2.8				4	4
<b>Total</b>	<b>16</b>	<b>16</b>	<b>10</b>	<b>8</b>	<b>50</b>
<b>Actual %</b>	<b>32,0</b>	<b>32,0</b>	<b>20,0</b>	<b>16,0</b>	<b>100,0</b>
<b>Desired %</b>	<b>30%</b>	<b>30%</b>	<b>20%</b>	<b>20%</b>	<b>100</b>