MICHAELHOUSE

Mathematical Literacy Department

A BLOCK: MATHEMATICAL LITERACY
PAPER 2
September 2016

Examiner: Mr A van Wyk | Moderator: Ms L Hardie
Time: 3 Hours | Marks: 150

PLEASE READ THE FOLLOWING INSTRUCTIONS CAREFULLY

1. This question paper consists of 15 page(s). Please check that your paper is complete.
   - Answer sheet 1 – to be handed in
   - Answer sheet 2 – to be handed in
   - Annexure A
   - Annexure B

2. Read the questions carefully.

3. Answer all the questions.

4. Number your answers exactly as the questions are numbered.

5. You may use an approved non-programmable and non-graphical calculator, unless otherwise stated.

6. All the necessary working details must be clearly shown. Answers only, without relevant calculations, may incur penalties.

7. It is in your own interest to write legibly and to present your work neatly.

8. Round all answers to **ONE decimal place** unless told to do otherwise.

Do not write here:

Question 1	Question 2	Question 3	Question 4	Question 5	Total
37	25	34	26	28	**150**

Name: _____ **Teachers Name:** _____

QUESTION 1

Lindiwe is sole owner of a shop that sells handbags, hair extensions and cosmetics.

Lindiwe kept a record of her expenses and income for the first quarter of 2014; these are listed below. For tax purposes all amounts are rounded off to the nearest rand. All the expenses for March have been omitted as shown in the statement below:

Income and Expenses Statement for the first Quarter of 2014

	January	**February**	**March**
	R	R	R
Turnover [1]	189189	197012	221261
Less: Cost of sales	142702	150349	162215
Gross Income	**46487**	**46663**	**59046**
Less: Expenses[2]	26602	27727	34238
Rent	11025	12600	
Salary[3]	9715	9715	
Packaging	965	679	
Telephone	252	240	
Transport Costs	4645	4493	
Net Income	**19885**	**18936**	**24808**

1. The income generated from the sale of products.
2. The expenses are for the rent, salaries, packaging, telephone and transport costs.
3. Does not include Lindiwe's salary.

1.1. Calculate Lindiwe's transport costs for March if:

- The rent amount remained unchanged from February
- An additional person, earning a salary of R6556, was employed from 1st March 2014.
- The packaging cost was 46,425% less than the January packaging costs
- The ratio of the telephone cost for February : March = 8:11

(10)

1.2. Determine, showing **All** calculations, for which month the percentage mark-up on the cost of sales for the first quarter of 2014 was the highest.

You may use the following formula:

$$\text{Percentage mark-up} = \frac{\text{Gross Income}}{\text{Cost of Sales}} \times 100\% \qquad (5)$$

1.3. Based on the statement for the first quarter of 2014, Lindiwe projected that her annual net income for 2014 would be R254 516.

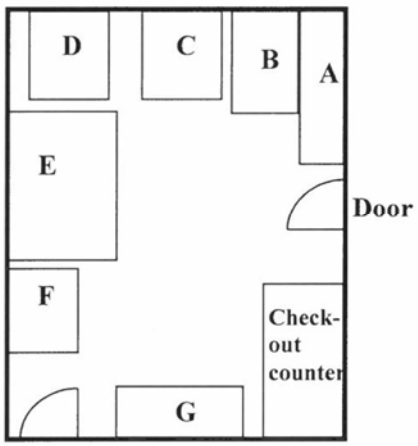
Verify, showing All calculations, whether this projected amount is valid. (4)

1.4.

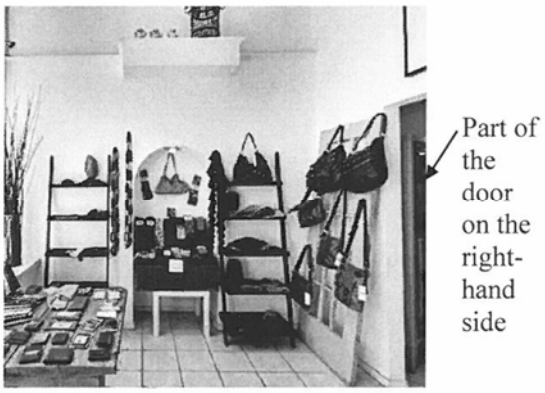
The scaled layout of Lindiwe's shop and a photograph of a part of the shop are shown below.

The areas marked A to G represent the layout of the different products on display in the store. The photograph was taken by a person standing between area F and area G.

Layout of Lindiwe's shop



Photograph of part of Lindiwe's shop



Scale: 1 : 100

1.4.1 Identify which product is displayed in area A. (2)

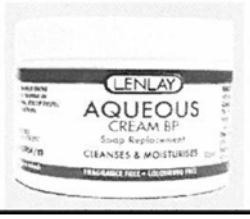
1.4.2 Use the given scale to determine the actual width of the store. (3)

1.5.

One of the products that Lindiwe sells is an aqueous cream used for cleansing and moisturising, as shown in the picture below.

The aqueous cream is sold in 100ml jars. The cylindrical jars are filled with cream to height of 4 cm.

Picture of a cylindrical jar of aqueous cream



Calculate (in cm) the diameter of the jar.

You may use the following formula:

$$\text{Volume of a cylinder} = \pi \times (\text{radius})^2 \times \text{height, where } \pi = 3{,}142$$

$$Note: 1ml = 1cm^3$$

(5)

1.6.

Lindiwe wanted to go on holiday for five days. Since she does not have a car, she investigated the possibility of renting one. She requested a quotation from PriceCheck using the Internet. She compared three rental deals and found that all of them charged a basic fee which included free kilometres. A fixed rate per kilometre for any additional kilometres travelled was also charged.
She constructed the following formulae for the different rental deals:

- Ford Figo (with 200 km free per day)

Total Rental cost = R1264,40 + R1,39 x *a*, where *a* = additional km travelled.

- Opel Corsa (with 500 km free)

Total rental cost = R1299,70 + R1,75 x *a*, where *a* = additional km travelled.

- Toyota Yaris (with 200km free per day):

Total rental cost = R1359,40 + R1,21 x *a*, where *a* = additional km travelled.

The graphs representing the total car rental cost for a maximum of 2000km for the Ford Figo and the Toyota Yaris have been drawn on Answer Sheet 1.

Use the information above and Answer Sheet 1 to answer the following questions:

1.6.1 Draw on Answer Sheet 1 another line graph representing the total rental cost for a maximum of 2 000 km for the Opel Corsa. (4)

1.6.2 After how many kilometres, will the total rental cost for an Opel Corsa be the same as that for a Toyota Yaris? (2)

1.6.3 Lindiwe estimates that she will cover a distance of 1 850 km for her whole trip. Determine which **One** of the three rental deals will be the most economical for her to choose. (2)

[37 Marks]

QUESTION 2

2.1.

From 1 July 2014 to 28 July 2014 workers in the metal and engineering industry went on strike, demanding a 15% increase in wages as from 1 July 2014. Employers applied the no work, no pay principle.

Table 2 below shows the monthly gross wage offer before the strike and the final wage settlement for two wage rates, A and H.

TABLE 2: Wage offers before the strike and the final, improved offers for two wage rates

GROSS MONTHLY WAGE JUNE 2014			GROSS MONTHLY WAGE DUE TO STRIKE	
WAGE A	**WAGE H**		**WAGE A**	**WAGE H**
R 11 000	R 6 000		…	…

	EMPLOYER'S OFFER BEFORE STRIKE (PERCENTAGE INCREASE)		IMPROVED WAGE OFFER DUE TO STRIKE(PERCENTAGE INCREASE)	
01 July 2014	7,00%	8,00%	8,00%	10,00%
01 July 2015	CPI	CPI + 1%	7,50%	10,00%
01 July 2016	CPI	CPI + 1%	7,00%	10,00%

Source: www.solidariteit.co.za

For the purposes of comparison, the consumer price index (CPI) of 6,5% for both 2015 and 2016 will be used.

2.1.1 It was calculated that a worker on Wage Rate A lost a total of R10 834,85 in wages during the strike.

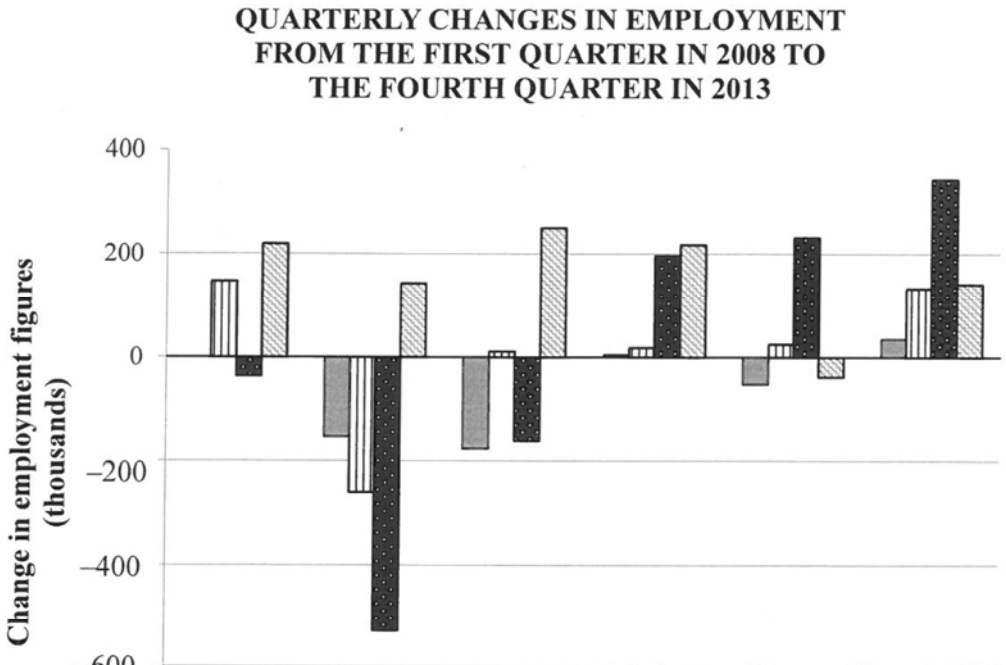
(a) Show, with calculations, how this loss was calculated.
[Hint: Calculate daily rate] (6)

(b) Hence, state **ONE** other negative financial implication of a prolonged strike for a worker. (2)

2.1.2 Verify, showing ALL calculations, whether a worker on Wage Rate H would be able to make up the loss of income (due to the no work, no pay principle) by the end of June 2015, using the improved wage offer, without working overtime or having an extra job. (6)

2.2

The bar graph and corresponding table below represent quarterly changes in South African Employment figures from the first quarter in 2008 to the fourth quarter in 2013.



	2008	2009	2010	2011	2012	2013
1ste	0	-153	-176	5	-52	35
2de	147	-259	11	18	25	133
3de	-36	-527	-161	197	232	344
4de	220	143	250	218	-38	141

[Source: *Stats SA: Quarterly Labour Force Survey. Quarter 4. 2013*]

Use the graph and the table above to answer the questions that follow.

2.2.1 Interpret the employment change data for the first quarter in 2008. (2)

2.2.2 Identify the year during which the greatest number of job losses occurred **AND** calculate the total number jobs lost in that year. (5)

2.2.3 During this period there was only one year during which there was an increase in employment for each quarter for that year.

Identify the year AND calculate the mean quarterly increase in employment numbers for that year. (4)

[25 Marks]

QUESTION 3

3.1

In recent years households in South Africa have experienced a large increase in electricity costs. Mr Chan would like to replace his electric stove with a gas stove. He received quotations from The Alternative Heat Company (Option 1) and TG Gas Stove Specialist (Option 2), as shown in ANSWER SHEET 2. Some information has been omitted.

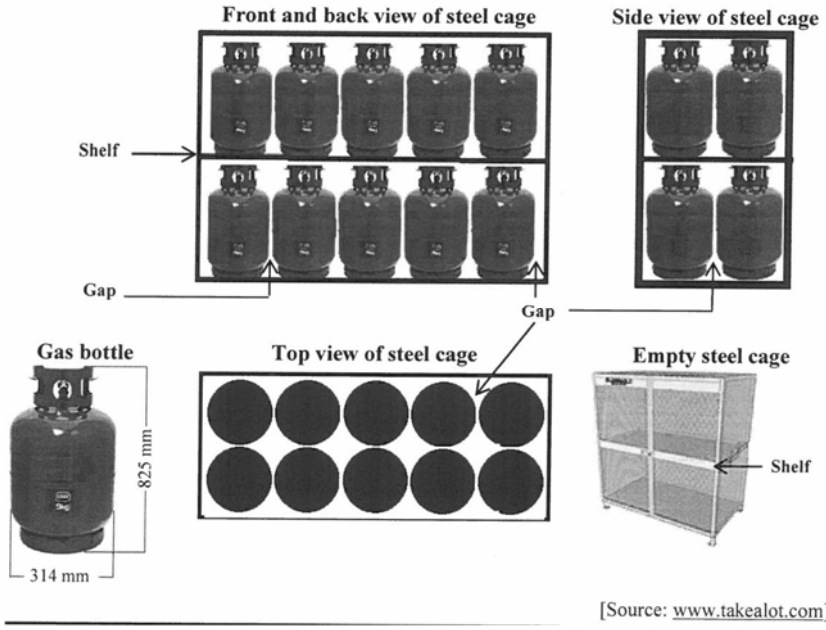
Use **Answer Sheet 2** to answer the questions that follow.

3.1.1 Calculate the total quotation amount for Option 1. Complete on answer sheet two and hand in. (5)

3.1.2 Mr Chan estimates that the difference in total cost between the two options is less than R1 000,00.
Verify, **showing ALL calculations**, whether Mr Chan's estimation is valid. (5)

3.1.3 Give ONE reason why Mr Chan may choose the more expensive option. (2)

3.2. A certified gas dealer sells 9kg gas bottles. These cylindrical bottles are stored outside the shop in a steel cage, as shown below. There is a gap of 10mm on either side of each gas bottle when placed on the shelf in the steel cage.



3.2.1 What is the maximum number of gas bottles that can fit into ONE steel cage. (2)

3.2.2 A company sells rectangular metal sheets with dimensions 3,4 m by 2,1 m.

Determine, showing ALL calculations, the maximum number of shelves for a steel cage that could be cut from ONE metal sheet. (8)

3.3

A certified gas dealer who is 48 years old earned a taxable income of R0,742 million during the 2014/2015 tax year and contributed to a registered medical aid scheme for herself and four dependants. She projected that her taxable income would remain the same during the 2015/2016 tax year.

Study the tax table and the medical aid credits in ANNEXURE A to answer the following questions that follow.

3.3.1 Explain the impact of the tax rebate and the medical aid credits on the tax payable. (4)

3.3.2 The dealer calculated that her annual tax due to SARS (South African Revenue Service) would increase by only R150,00 from the 2014/2015 tax year to the 2015/2016 tax year.

Verify, showing ALL calculations, whether her calculation is valid. (8)

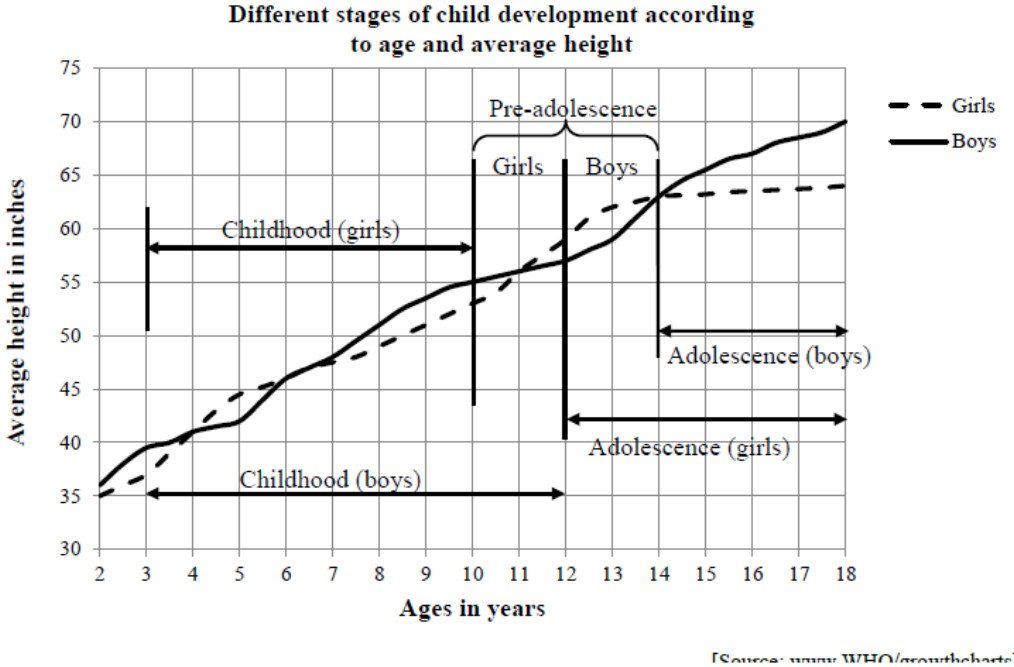
[34 Marks]

QUESTION 4

4.1

Daya is interested in the different stages of child development, namely childhood, pre-adolescence and adolescence.

The graph below shows the different stages of child development according to age and average height.



[Source: www.WHO/growthcharts]

4.1.1 In which age group will both boys and girls have approximately the same average height for nearly a whole year? (2)

4.1.2 Give TWO possible reasons why it cannot be said with certainty that a 10-year-old boy will be 55 inches tall. (2)

4.1.3 Identify the different age groups where the average height of girls is more than that of boys. (2)

4.1.4 A colleague of Daya made the following statement: 'All the stages of child development for boys are longer than those for girls.'

Give a detailed motivation why this statement is not correct. (5)

4.1.5 Describe a possible trend for the average height of girls who are 14 years and older. (2)

4.1.6 Daya's 14 year-old son is 165cm tall. Show by calculation whether he is above the average height for his age.
NOTE: 1 cm = 0,3937 inches (4)

4.2 At the movies a person buying from the Kiosk has various options. One of these options is to buy a Special which consists of three choices; a large popcorn or medium popcorn; a large Coke or a medium Coke and box of Smarties or a box Wine Gums. The Special allows only one large option i.e a large popcorn goes with a small Coke or a medium popcorn goes with large Coke.

4.2.1 Draw a tree diagram to represent the possible sections that this Special offers. (6)

4.2.2 If the probability of selecting a large Coke is 0,5 and the Popcorn 0,5 and 0,5 for a box of Wine Gums. What is the probability of selecting a Large Popcorn; medium Coke and a box of Wine Gums? (3)

[26 Marks]

QUESTION 5

5.1

Greenland is an island between the Arctic Ocean and the North Atlantic Ocean. Some facts about Greenland:

- Total land area: 2 166 086 square km
- 81% of Greenland is ice capped.*
- The coastline is 44 087 km.
- North-south length of approximately 2 655km or 1650 miles and an east-west length of 1290 km.
- Population of 56 370.
- Nuuk is the capital city.
- Qaanaaq is the northern – most town which is best known for its Inuit culture for 24 hours midnight sun that lasts from 25th April to 18th August.

[Midnight sun is a time of the year when the sun never sets because Greenland is so far north.]

* Area fully covered by ice

Source: Wikipedia.org

Use the information above to answer the following questions:

5.1.1 Calculate the conversion factor used to convert kilometres to miles. (3)

5.1.2 Explain why the total land area of Greenland cannot be calculated by merely multiplying the north-south length by the east-west length. (2)

5.1.3 A tourist to Qaanaaq would like to experience the midnight sun. Calculate the total number of days during which it is possible to experience the midnight sun. (4)

5.2 A map showing the population distribution in Greenland is given on ANNEXURE B. Use this map and the information in QUESTION 5.1 to answer the following questions:

5.2.1 Calculate the population density of Greenland.

You may use the following formula:

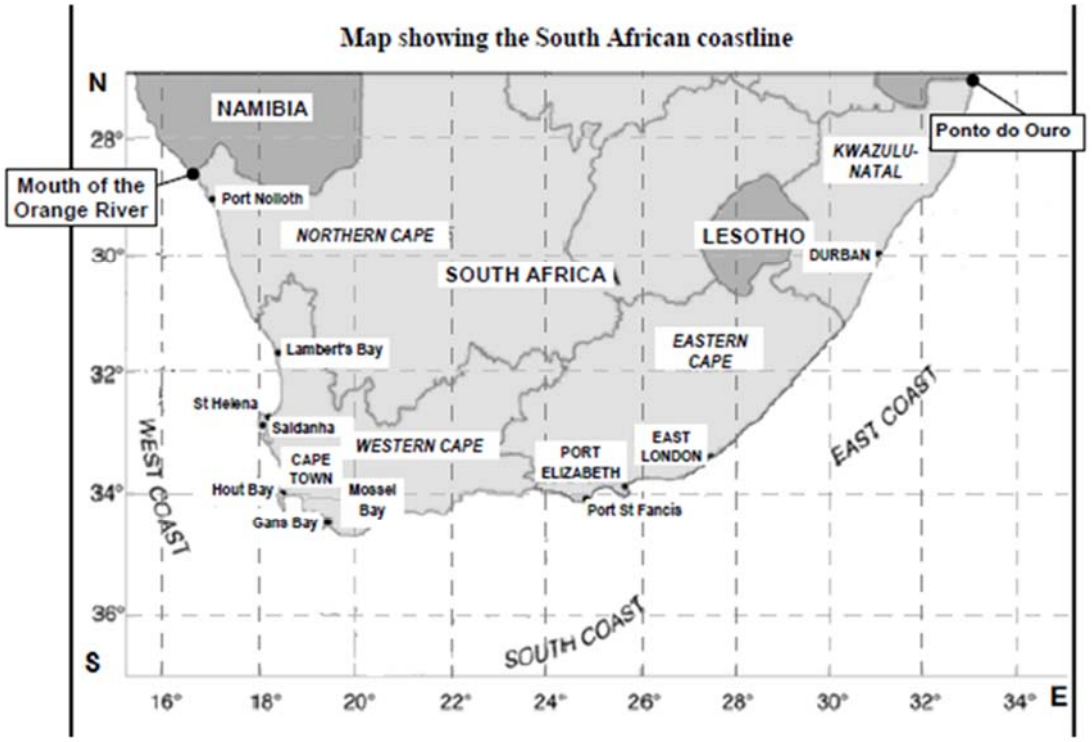
$$\text{Population density} = \frac{\text{total number of persons living on the island}}{\text{ice-free area(in km}^2\text{)}} \quad (4)$$

5.2.2 Estimate the size of the indigenous population who lived in Nuuk during 2003. (3)

5.2.3 Determine the number of towns which have a population of less than 2000. (2)

5.3

The South African coastline measures approximately 2 798 km from the mouth of the Orange River on the West Coast to Ponto do Oro in Mozambique on the East Coast. The Eastern Cape has approximately 800km of coastline.
The map below shows the coastline of South Africa



5.3.1 Determine the total length, in miles, of the South African coastline if the coastline of the Eastern Cape is approximately 500 miles long. (3)

5.3.2 Use the map to list the coastal provinces of South Africa in descending order according to the length of their coastlines. (3)

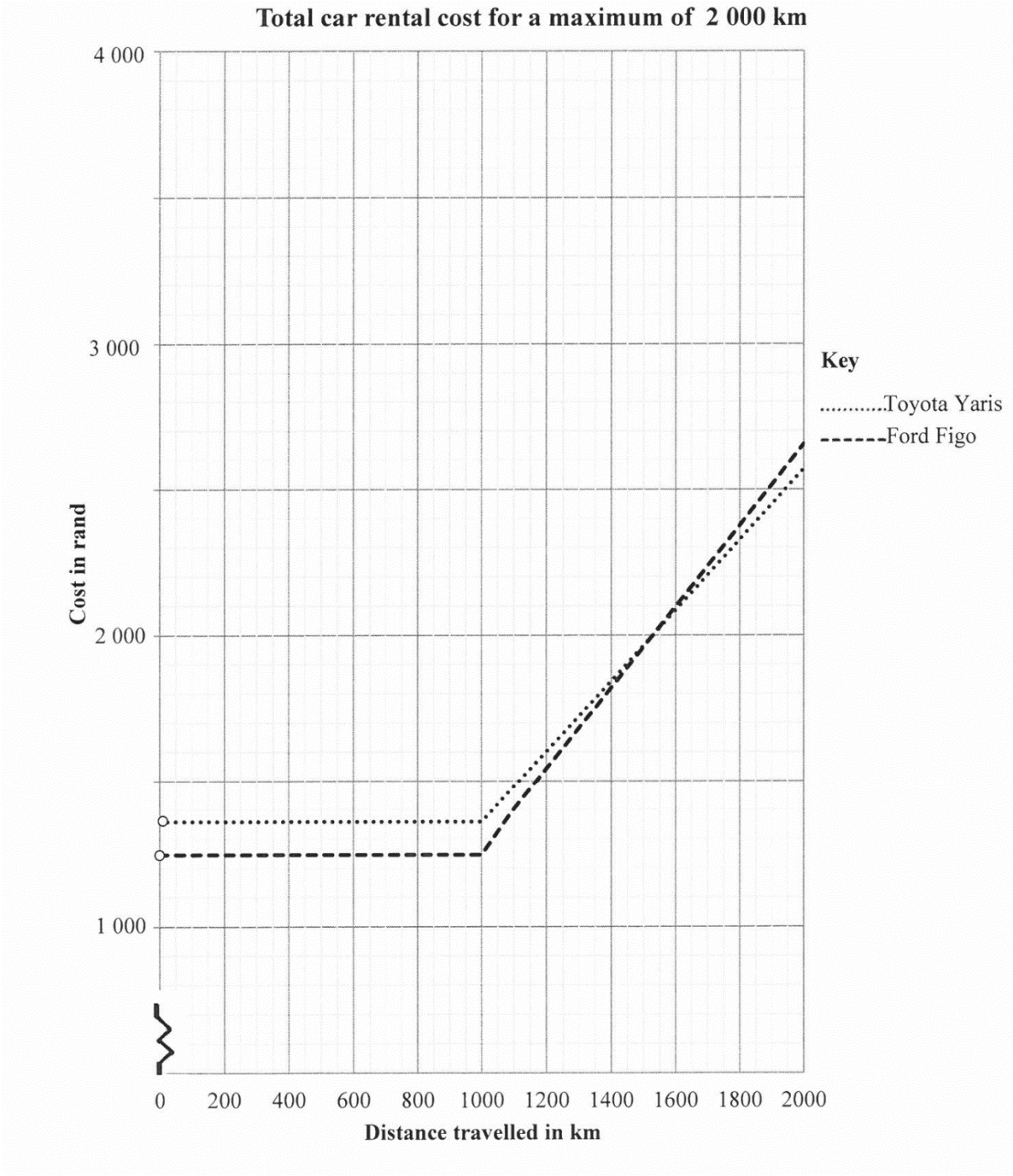
5.3.3 Annie measured the length of the coastline of South Africa on her map and found it to be 223 mm long.

Determine the scale of the map in the form 1 : …
Round off the answer to the nearest hundred thousand. (4)

[28 Marks]

Name: _____

Answer Sheet 1 **Please complete and hand in.**



NAME:_____

ANSWER SHEET 2

Quotation 1

The Alternative Heat Company 375 Nelson Drive Upington 1826			
Date: 23/04/2015		**Customer ID**	Won 283
Issued to: Mr RS Chan 23 Third Avenue Upington			
Description	**Quantity**	**Price Excluding 14% Vat**	**Amount in Rand**
Defy DHG 121 gas stove	1	R 2 893.86	R 2 893.86
Empty 9kg gas bottle	1	R 394.74	R 394.74
Refill 9kg gas bottle	9 kg	R20,00 per kg	….
Internal installation (parts and gas certificate included)	1	R 2 719.30	R 2 719.30
Gas piping	2m	R15,35 per metre	….
		Subtotal	….
		14% VAT	….
		Total amount	….
This Quotation is valid for 14 days from the issue date.			

Quotation 2

TG Gas Stove Specialist 37 Rooiness Street Upington 1826			
Quote Number	# 1416	Date: 25/04/2105	
Issued to: Mr RS Chan 23 Third Avenue Upington			
Item Description		**Measurements**	**Price Including 14% VAT**
Five plate stove, each		900mm	R 3 499.00
Gas bottle cylinder, each		9kg	R 499.00
Refill 9kg gas bottles cylinder, each		per 9kg	R 189.00
Hose and regulator set:			R 235
4 metal clips @ R3,50 each			….
Copper Pipe @ R23,50/m		2m	….
Installation by certified technician@ R350,00 per hour		3hours	…
Gas certificate			R 349.00
Total Cost (Including VAT)			….

Annexure A

TABLE 1: SARS tax rates plus medical aid credits for two tax years ending 29 February 2016 and 28 February 2015

Statutory rates for personal income tax for individuals:

YEAR OF ASSESSMENT ENDING 29 FEBRUARY 2016

TAXABLE ANNUAL INCOME (R)	RATES OF TAX (R)
0–181 900	18% of taxable income
181 901–284 100	32 742 + 26% of taxable income above 181 900
284 101–393 200	59 314 + 31% of taxable income above 284 100
393 201–550 100	93 135 + 36% of taxable income above 393 200
550 101–701 300	149 619 + 39% of taxable income above 550 100
701 301 and above	208 587 + 41% of taxable income above 701 300

YEAR OF ASSESSMENT ENDING 28 FEBRUARY 2015

TAXABLE ANNUAL INCOME (R)	RATES OF TAX (R)
0–174 550	18% of taxable income
174 551–272 700	31 419 + 25% of taxable income above 174 550
272 701–377 450	55 957 + 30% of taxable income above 272 700
377 451–528 800	87 382 + 35% of taxable income above 377 450
528 001–673 100	140 074 + 38% of taxable income above 528 000
673 001 and above	195 212 + 40% of taxable income above 673 100

TAX REBATES

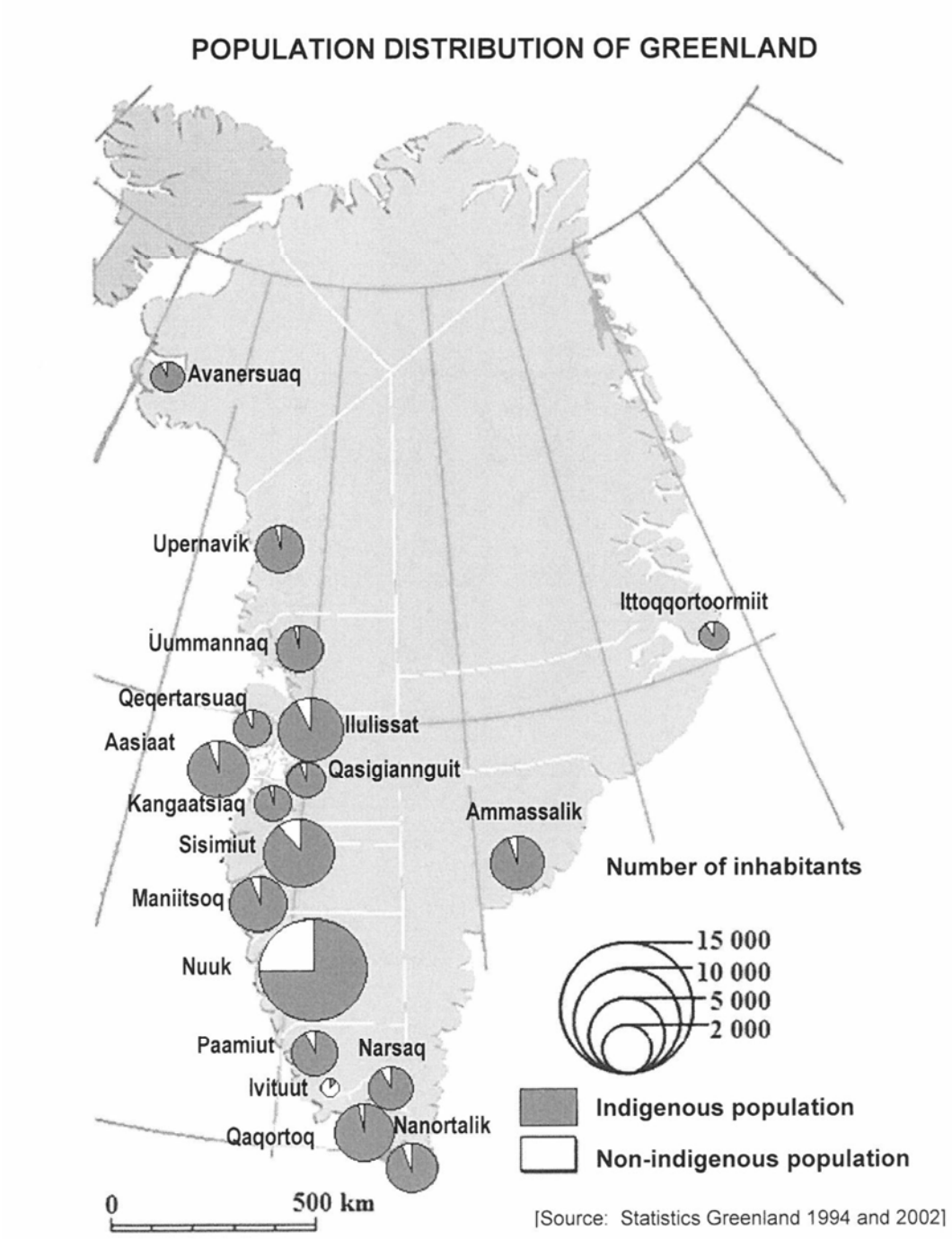
	2016	2015
Primary rebate	R13 257	R12 726
Secondary rebate (for persons 65 years and older) in addition to primary rebate	R7 407	R7 110
Tertiary rebate (for persons 75 years and older) in addition to primary and secondary rebate	R2 466	R2 367

MEDICAL AID CREDITS IN RESPECT OF MONTHLY MEDICAL AID CONTRIBUTIONS

	2016	2015
Tax payer only	R270	R257
First dependant	R270	R257
Additional dependants	R181 each	R172 each

[Adapted from www.bdo.co.za]

Annexure B


POPULATION DISTRIBUTION OF GREENLAND
Avanersuaq
Upernavik
Uummannaq
Qeqertarsuaq
Aasiaat
Kangaatsiaq
Sisimiut
Maniitsoq
Nuuk
Paamiut
Ivituut
Qaqortoq
Narsaq
Nanortalik
Ittoqqortoormiit
Ilulissat
Qasigiannguit
Ammassalik
Number of inhabitants
15 000
10 000
5 000
2 000
Indigenous population
Non-indigenous population
0
500 km
[Source: Statistics Greenland 1994 and 2002]