



NATIONAL SENIOR CERTIFICATE EXAMINATION
NOVEMBER 2010

MATHEMATICAL LITERACY: PAPER II

Time: 3 hours

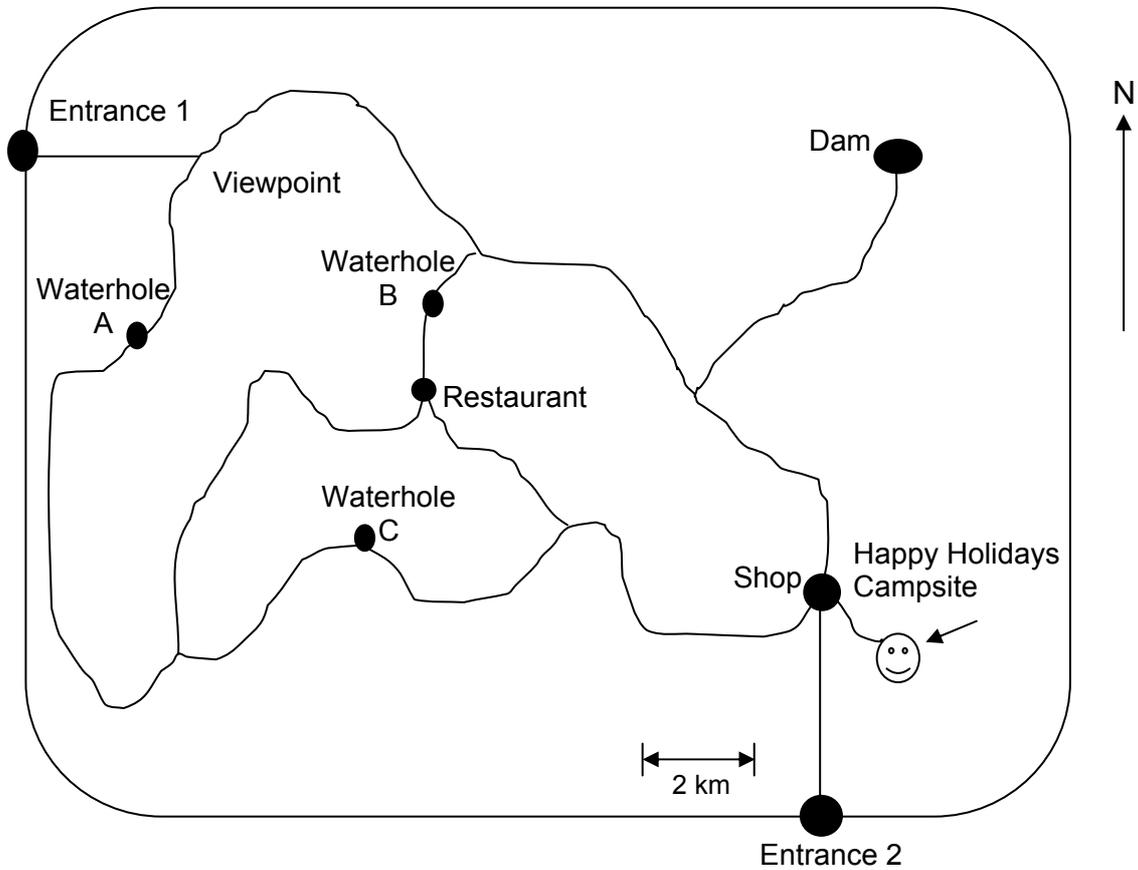
150 marks

PLEASE READ THE FOLLOWING INSTRUCTIONS CAREFULLY

1. This question paper consists of 13 pages and an Answer Sheet of 1 page. Remove the Answer Sheet from the middle of the Question paper.
 2. This question paper consists of FOUR questions. Answer all questions.
 3. Question 4.1.3 must be answered on the Answer Sheet. Write your examination number in the space provided and hand it in with your Answer Book.
 4. Number the answers correctly according to the numbering system used in this question paper.
 5. Approved non-programmable calculators may be used in all questions.
 6. ALL the calculations must be clearly shown.
 7. It is in your own interest to write legibly and to present your work neatly.
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QUESTION 1

1.1 Below is a map of a game reserve.



1.1.1 Determine your destination if you follow the following directions:

- Depart from the campsite and travel in a north-westerly direction until you reach an intersection.
- At the intersection take the second left exit.
- Continue along this road until you reach another intersection. At this intersection turn right.
- Continue along this road for approximately 4 km and you will arrive at your destination.

(2)

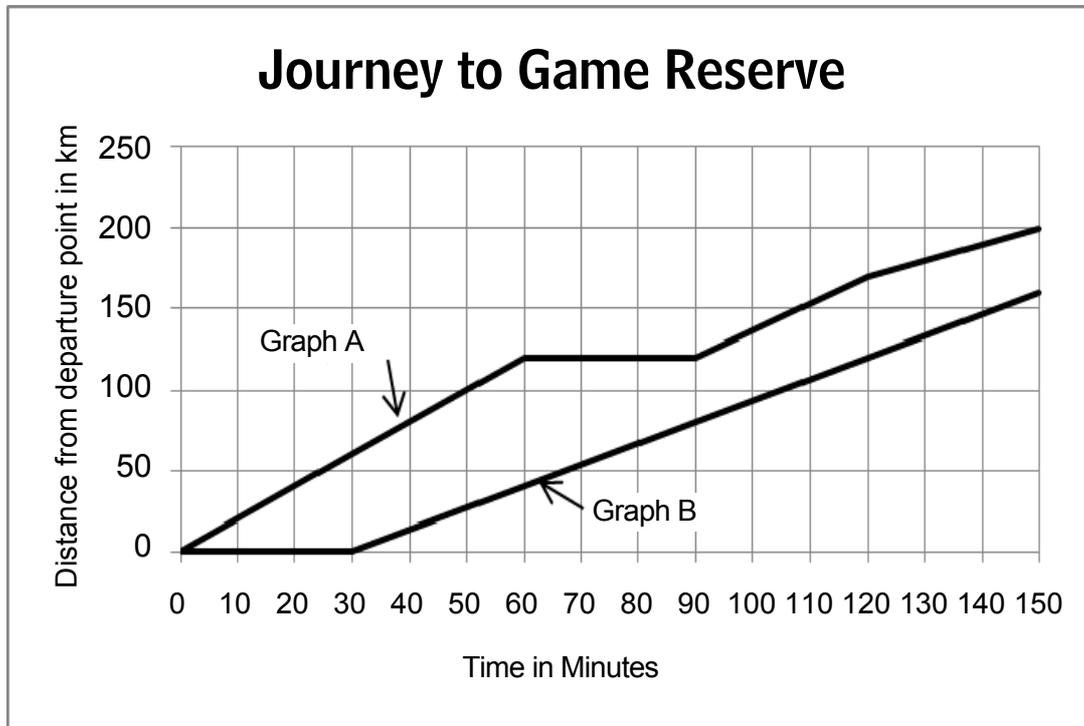
1.1.2 (a) The diagram $\left| \longleftrightarrow \right|$ on the map shows the scale of the map. Use this scale to determine the actual distance (to the nearest km) travelled from Entrance 2 to the shop using the centre of the dots as reference points.

(5)

(b) Express the scale (rounded to the nearest thousand) in the form of 1: ...

(3)

1.2 Two families are driving from their home towards the game reserve for the weekend. The graphs below show the distance travelled by the two vehicles over time while travelling towards the game reserve. The game reserve is 200 km from where the families left for their journey.



Four statements are given below. You need to match each of the two graphs above to only one correct statement.

(4)

Answer as follows: Graph A = Statement ?
 Graph B = Statement ?

- STATEMENT 1: The vehicle travels at a constant speed before stopping for a while. It then continues at a constant speed, but later reduces to a slower constant speed just before arriving at the game reserve.
- STATEMENT 2: The vehicle does not leave at the expected time and is delayed for 30 minutes. Once it begins, it travels at an inconsistent speed until it arrives at the game reserve.
- STATEMENT 3: The vehicle travels at a constant speed before stopping. It then continues its journey at a constant speed, and increases to a faster constant speed just before arriving at the game reserve.
- STATEMENT 4: The vehicle travelled at a constant speed and does not reach its destination within 2,5 hours.

1.3

1.3.1 During the 2010 World Cup, many foreigners visited some of our game reserves. Many American Dollars (US \$) had to be converted to South African Rand (R). At a particular exchange bureau at O.R. Tambo International Airport, the following commission fees were charged:

Amount of US \$ exchanged	Commission charged*
US \$1 – US \$300	R45
US \$301 and above	2% of the money exchanged

* A further 14% VAT must be added to the commission.

Before visiting the game reserve, an American tourist exchanged US \$700 into Rand. If the exchange rate was US \$1 = R7,75, show how the exchange bureau calculated that he should receive R5 301,31 (including VAT) for his US \$700.

(6)

1.3.2 At another exchange bureau, another American visitor exchanged US \$700 into Rand. The exchange rate was also given as US \$1 = R7,75, but he received R5 264,20 for his US \$700 of which R19,75 was for the 14% VAT on the commission. Calculate the commission (as a percentage, rounded to one decimal place) charged at this exchange bureau.

(7)

[27]

QUESTION 2

2.1 William won six million rand in the South African National Lottery. He decides to invest four million rand of his winnings until his 30th birthday.

2.1.1 How many months is William going to invest the money if he won the lottery on his 21st birthday? (3)

2.1.2 William tries to calculate how much money (to the nearest cent) he will have on the day he turns 30, if he invests the money at 6% interest per year, compounded monthly. He uses the formula below.

Compound Interest

$$A = P(1 + i)^n$$

where: A = Investment, inclusive of the interest

P = Amount that was initially invested

i = Interest rate

n = Number of times the interest is calculated

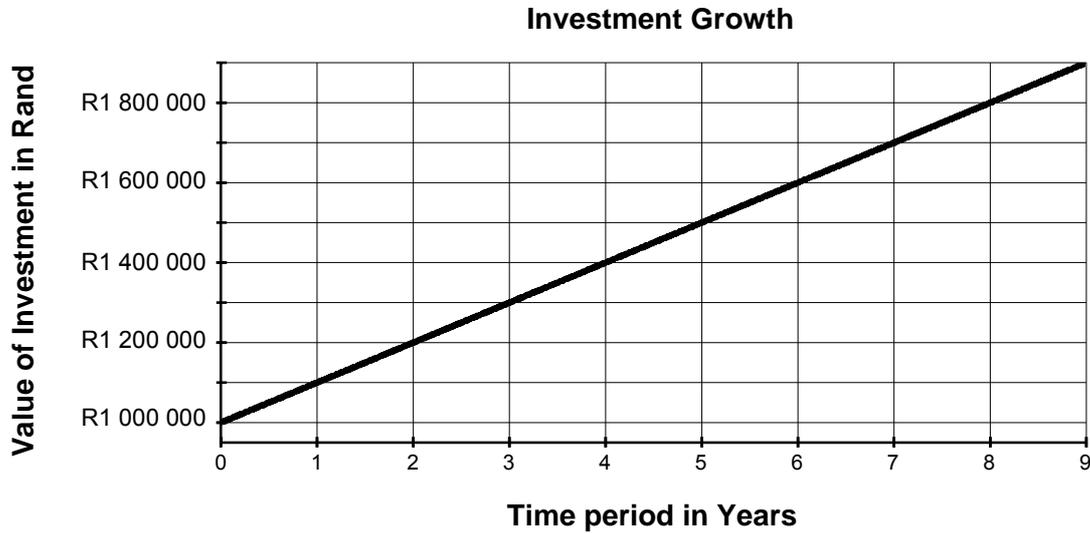
His calculation looks as follows:

$$\begin{aligned} A &= P(1 + i)^n \\ &= R400\,000 \left(1 + \frac{0,6}{11} \right)^9 \\ &= R6\,854\,797,995 \end{aligned}$$

Identify five mistakes that William has made in his calculations. For each mistake, identify the mistake, write down the correct value, and explain what William has done wrong. (10)

2.2 Another investment company, *Payout Investors*, approached William and offered him the opportunity of taking one million rand of his payout and investing it with them until he turns 30. They show him the graph below which indicates how his investment will grow over time.

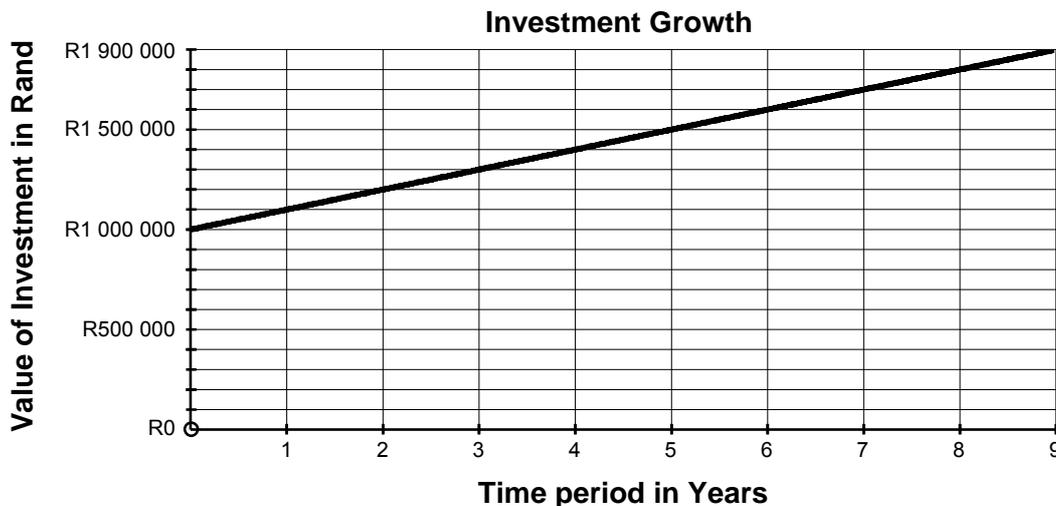
Graph drawn by *Payout Investors*



2.2.1 Is *Payout Investors* offering William simple or compound interest on his investment? Explain. (2)

William decides to draw his own graph to see how his money would grow over time in the investment offered by *Payout Investors*. William's graph is shown below:

Graph drawn by William



2.2.2 Compare the graph that William drew to the graph drawn by *Payout Investors*.

- (a) What feature (aspect) on the graphs drawn by *Payout Investors* and William has resulted in the two graphs appearing to have different gradients? (1)
- (b) Why do you think *Payout Investors* would prefer to show their clients their graph rather than William's graph? (1)

2.3 In order to win the South African National Lottery, you need to select 6 winning numbers from 1 to 49. These numbers can be selected in any order.

2.3.1 What is the probability of the number 50 being selected? (1)

2.3.2 What is the probability of a number greater than 45 being selected first? (2)



Wednesday, 14 July 2010

WINNING LOTTO NUMBERS

06 - 21 - 27 - 32 - 37 - 49 + Bonus --> 18

MATCHES	No. of WINNERS	PAYOUTS per WINNER
Match 6 Numbers	1	R1 500 000
Match 5 Numbers + Bonus	1	R244 429
Match 5 Numbers	41	R13 749
Match 4 Numbers + Bonus	A	R1 996
Match 4 Numbers	2 470	R414
Match 3 Numbers + Bonus	4 542	R147
Match 3 Numbers	52 299	R42

[Adapted from <<http://www.saweb.co.za/lotto.html>>]

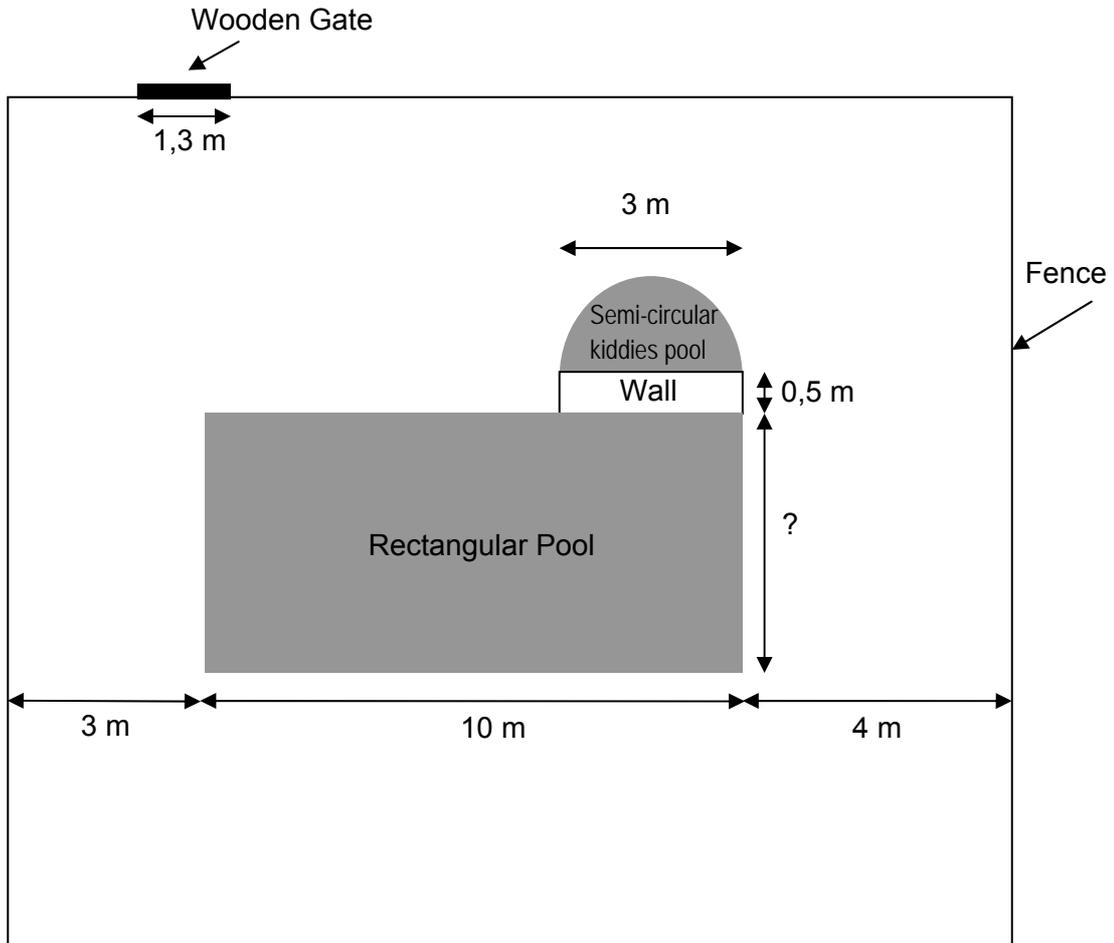
2.3.3 How many winners won 'Match 4 + Bonus' (the value of A) if the average number of winners per payout was 8 501? (6)

[26]

QUESTION 3

The diagram below shows the layout of a swimming pool area. It is made up of a rectangular part with a shallow semi-circular kiddies pool attached. The two pools are separated by a wall. The entire pool area, which is in the shape of a square, is surrounded by a fence. There is a wooden gate 1,3 m wide in the fence.

Top View



- 3.1 Determine the cost of the fencing for the swimming pool area if the fencing comes in 5 m rolls that cost R389,95 each. The gate does not form part of the fencing. (8)
- 3.2 The area around the pool, yet within the fence, is to be paved with bricks. Calculate the breadth of the main rectangular pool if the area needed to be paved is approximately 244 m² when rounded to the nearest square metre. (10)

Area of a rectangle = $l \times b$
 where l = length and b = breadth

Area of a circle = $\pi \times r^2$
 where r = radius and $\pi = 3,14$

3.3

- 3.3.1 The volume of the main rectangular pool is 61 m^3 . Calculate the total volume of both the kiddies pool (which has a uniform depth of 45 cm) and the main rectangular pool, and round off your answer to the nearest whole number. (6)

$$\text{Volume of a cylinder} = \pi \times r^2 \times d$$

where r = radius, d = depth and $\pi = 3,14$

- 3.3.2 (a) Calculate the amount of water (to the nearest kilolitre) needed to fill both the pools to 95% capacity. (4)

$$1 \text{ m}^3 = 1 \text{ kilolitre}$$

- (b) Why do you think the pools are not filled to 100% capacity? (2)

3.4 Below is a table, which shows the costing structure of water as well as an example of how the cost of using 24 kℓ of water in a month is calculated.

Water Tariffs

These tariffs came into effect on July 1, 2010

Water Usage in Kilolitres	Tariff * (per kilolitre)
0 kℓ to 9 kℓ	Nil
From 9 kℓ to 25 kℓ	R9,27
From 25 kℓ to 30 kℓ	R12,36
From 30 kℓ to 45 kℓ	R19,06
More than 45 kℓ	R20,96

Fixed charges per month	Tariff * (per kilolitre)
0 kℓ to 9 kℓ	Nil
Greater than 9 kℓ	R83,43

* Tariffs excludes 14% VAT

An example:

For example, a domestic customer, using 24 kℓ in one month, would be charged as follows:

	Costs
Fixed charge	R83,43
9 (x R0)	Nil
15 (x R9,27)	R139,05
Total charge for month (exclusive of VAT)	R222,48

The tariff has been structured for domestic customers so that the first 9 kℓ of water is free. This has been done to provide a life-sustaining supply to the very poor.

[Modified from <<http://www.durban.gov.za/durban/services>>]

In order to fix a crack in the side of the pool, 46 kℓ of water had to be drained from the pool. With the use of the water tariff table above and using the example above, calculate the cost of refilling 46 kℓ of water into the pool. **Remember to include the 14% VAT to your answer.**

(9)
[39]

QUESTION 4

- 4.1 An elderly couple, Mr and Mrs Ramakan, want to go on a camping holiday, but they do not own a caravan. As a result they investigate the possibility of hiring a caravan. They come across two companies that hire out caravans.

Rent-a-Van : R750 per day

Holiday Fun : A once-off fee of R3 000 and a further R400 per day

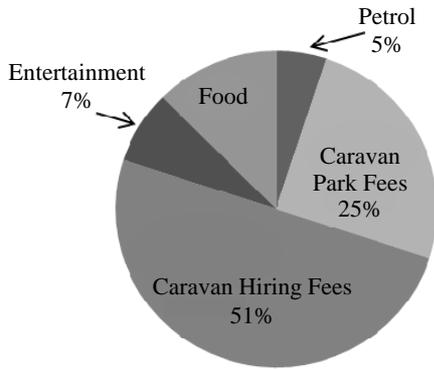
Refer to the graph on the Answer Sheet provided. The graph indicates the cost structure of one of the companies.

- 4.1.1 Which company's cost structure is represented on the graph? Give two reasons for your answer. (3)
- 4.1.2 Explain why this graph is represented by a series of points instead of a straight line. (1)
- 4.1.3 Answer the following two questions on the set of axes provided on the Answer Sheet:
- (a) Give a suitable title for the graph. (1)
- (b) Sketch a graph to show the cost of renting a caravan from the other company. (4)
- 4.1.4 If D represents *number of days*, then write a formula that represents the cost of hiring a caravan from:
- (a) Rent-a-Van company (2)
- (b) Holiday Fun (3)
- 4.1.5 With the use of the formulas you constructed in Question 4.1.4, show that for more than 8 days it is cheaper to use the 'Holiday Fun' company, rather than the 'Rent-a-Van' company. (4)

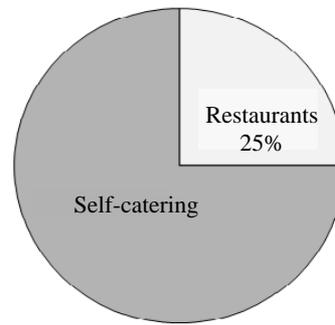
4.2 The Ramakans set out for a 10 night holiday. They budget as follows:

Petrol Cost	R730
Caravan Park Fees	R?
Food	R?
Entertainment	R1 022
Caravan Hire	R7 400

Breakdown of Expenses

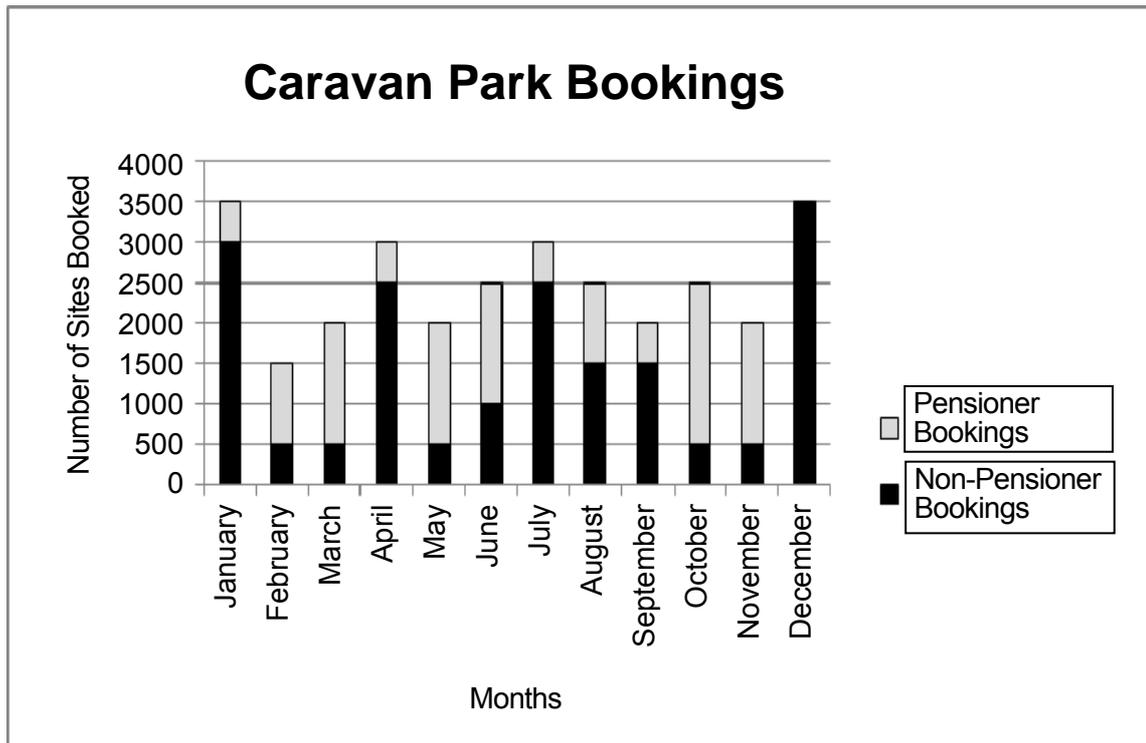


Further Breakdown of Food Expenses



- 4.2.1 (a) Calculate how much money the Ramakans have budgeted for entertainment per night. (2)
- (b) Is the answer to Question 4.2.1 (a) above the mode, the mean or the median of the entertainment costs? (1)
- 4.2.2 The cost of petrol is R8,76 per litre and their car's average consumption is 6 km per litre. Would they be able to travel a total distance of 540 km if they only budgeted R730 for petrol? Show all your working. (5)
- 4.2.3 Although the Ramakans spent 10 nights in a caravan park, they hired the caravan for 11 days.
- (a) Explain why they needed to hire the caravan for 11 days. (1)
- (b) Which hiring company (Rent-a-Van or Holiday Fun) did the Ramakans use? Justify your answer with calculations. (3)
- 4.2.4 If the total budget is R14 600 for the entire holiday, calculate the amount of money that has been set aside for eating out at restaurants. (5)

4.3 The graph below illustrates the monthly bookings of Malong Caravan Park during 2009.



- 4.3.1 Why do you think the caravan park's bookings for December is greater than those for the month of February? (2)
- 4.3.2 Calculate the mean number of total bookings per month. (5)
- 4.3.3 Determine the range of the number of bookings made by pensioners. (2)
- 4.3.4 The cost per night at Malong Caravan Park for a site is R150. Pensioners get a 30% discount.
 - (a) Why do you think that there is no pensioner rate for the month of December? (2)
 - (b) Show that pensioners only pay R105 a night for a caravan site. (2)
 - (c) Every month, the caravan park has fixed expenses of R65 000 and a further expense of R35 for every site booked. Determine the **profit** the caravan park had during the month of February. Show ALL working. (10)

[58]

Total: 150 marks