



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

MATHEMATICAL LITERACY P2

NOVEMBER 2015

MARKS: 150

TIME: 3 hours

This question paper consists of 14 pages, 1 answer sheet and 5 annexures.

INSTRUCTIONS AND INFORMATION

1. This question paper consists of FIVE questions. Answer ALL the questions.
2.
 - 2.1 Answer QUESTION 1.3.2 on the attached ANSWER SHEET.
 - 2.2 Use the ANNEXURES to answer the following questions:
 - ANNEXURE A for QUESTION 2.1
 - ANNEXURE B for QUESTION 3
 - ANNEXURE C for QUESTION 4.1
 - ANNEXURE D for QUESTION 4.3
 - ANNEXURE E for QUESTION 5.3
 - 2.3 Write your centre number and examination number in the spaces on the ANSWER SHEET. Hand in the ANSWER SHEET with your ANSWER BOOK.
3. Number the answers correctly according to the numbering system used in this question paper.
4. Start EACH question on a NEW page.
5. You may use an approved calculator (non-programmable and non-graphical), unless stated otherwise.
6. Show ALL calculations clearly.
7. Round off ALL final answers appropriately according to the given context, unless stated otherwise.
8. Indicate units of measurement, where applicable.
9. Maps and diagrams are NOT drawn to scale, unless stated otherwise.
10. Write neatly and legibly.

QUESTION 1

1.1

Mrs Letsie owns a large national cleaning company that cleans office blocks in various cities.

Four years ago she obtained an additional cleaning contract. She employed additional employees on a contract basis for the four years. The Unemployment Insurance Fund (UIF) requires that an employer and employee each contribute 1% of the employee's gross monthly salary to the fund.

The number of additional employees and their gross salaries are as follows:

- 11 handymen each receiving a monthly salary of R4 410,37
- 272 cleaners (men and women in the ratio 1 : 3), each receiving R18,66 per hour and working 8 hours per day for a total of 20 days per month
- 12 supervisors (in the same gender ratio as the cleaners), each receiving a monthly salary of R230 more than a cleaner's monthly salary
- 11 drivers paid weekly*, each receiving R734,53 per week

***NOTE:** For the purposes of UIF contributions, the weekly salary is to be multiplied by 52 and then divided by 12 to determine the monthly salary.

[Source: *Government Gazette No. 23064*]

1.1.1 Show, with calculations, that the gross monthly salary for an additional driver is R3 182,96. (2)

1.1.2 Calculate the total monthly UIF contributions payable to the UIF for all the additional employees. (10)

1.1.3 Mrs Letsie stated, 'The percentage difference between the salary of the lowest paid additional employee and the mean salary of all the additional employees is less than 3%.'

Verify, showing ALL calculations, whether her statement is valid. (6)

1.2 Every month the company randomly selects an 'Employee of the Month' from all the additional employees.

1.2.1 Calculate the probability of randomly selecting a female cleaner as the employee of the month, rounded off to THREE decimal places. (4)

1.2.2 Explain why the chance of randomly selecting a male supervisor as the employee of the month is **most unlikely**. (2)

1.3

At the end of the contract period some workers may become unemployed. They will be entitled to apply for UIF benefits.

TABLE 1 below shows an extract of the UIF benefits payable on various gross monthly salaries.

TABLE 1: Extract of UIF benefits payable on various gross monthly salaries

LAST GROSS MONTHLY SALARY (RAND)	INCOME REPLACEMENT RATE (IRR*) (%)	MONTHLY BENEFIT (RAND)
500	55,88	279,40
700	54,53	381,71
1 500	50,25	753,75
2 000	A	964,87
B	41,31	2 065,49
8 099	38,00	3 077,62
9 050	34,01	3 077,62
10 000	30,78	3 077,62

[Source: *Government Gazette No. 23064*]

* Income Replacement Rate (IRR) – the percentage of the last gross monthly salary that will be used to determine the monthly UIF benefit amount

NOTE: The monthly UIF benefit amount is set at a maximum of R3 077,62.

1.3.1 Calculate the missing values A and B. (5)

1.3.2 Draw a line graph that illustrates the relationship between the gross monthly salary and the IRR on the grid provided on the ANSWER SHEET.

(5)
[34]

QUESTION 2

2.1

Thembeka decided to analyse the weight loss of males and females who follow weight-loss programmes. She found data on the Internet about the Biggest Loser Club, a weight-loss programme in the United States of America (USA), and Weigh-Less, a weight-loss programme in the Republic of South Africa (RSA).

She used the data in TABLE 2 in ANNEXURE A to draw box and whisker plots that represent the weight loss of males and females for the two combined programmes.

Use the information in ANNEXURE A to answer the following questions.

2.1.1

Determine, as a percentage, the probability of randomly selecting a South African who participated in the Weigh-Less programme and lost more than 20 kg. (3)

2.1.2

Thembeka stated that the median weight loss of all the males was 33,8 kg.

Verify, showing ALL calculations, whether her statement is valid. (7)

2.1.3

Compare, by calculating, the interquartile ranges of the males and females who participated in these two weight-loss programmes and comment on it. (5)

2.2

Thembeka analysed the data and realised that she needed to reduce the number of calories she consumed daily. She read an article from the Internet about the amount of sugar contained in some drinks. TABLE 3 below shows the sugar content per volume of some drinks.

TABLE 3: Sugar content per volume of some drinks

Drink	Volume (in mL)	Number of teaspoons (tsp.) of sugar	Number of calories
Energy drink	240	7,75	124
Vitamin water	240	3,25	52
Lemon ice tea	240	6	96
Orange juice	240	6	96
Chocolate milk	240	7,25	116
Vanilla soy milk	240	2	32
Cola	330	8,75	140
Diet cola	330	0,00	0
'Dry Lemon'	330	10,50	168

[Sources: www.sugarstacks.com/beverages.htm and <http://recipes.howstuffworks.com>]

NOTE:

- 1 tsp. of sugar = 4 g
- 1 tsp. of sugar = 16 calories

Thembeka usually drank TWO 240 mL cans of energy drink, ONE 240 mL bottle of chocolate milk and ONE 330 mL can of 'Dry Lemon' per day.

She decided to be more health conscious and changed her daily drinks intake to TWO 500 mL bottles of vitamin water, ONE 240 mL bottle of vanilla soy milk and ONE 330 mL bottle of diet cola.

Use TABLE 3 to answer the following questions.

- 2.2.1 Calculate the total mass of sugar (in grams) that will be consumed by ONE person in ONE year by drinking TWO 330 mL cans of cola daily. (4)
- 2.2.2 Calculate the difference in the total number of calories that Thembeka consumes after changing her daily drinks intake. (5)
- 2.2.3 Thembeka stated, 'By changing my daily drinks intake I will now consume only 50% of my previous daily amount of sugar.'
- Verify, showing ALL calculations, whether Thembeka's statement is valid. (6)
[30]

QUESTION 3

Mr Vermeulen intends to cover the FOUR interior walls of his living room with wood panelling. The northern side of his house is exposed to the sun during daytime.

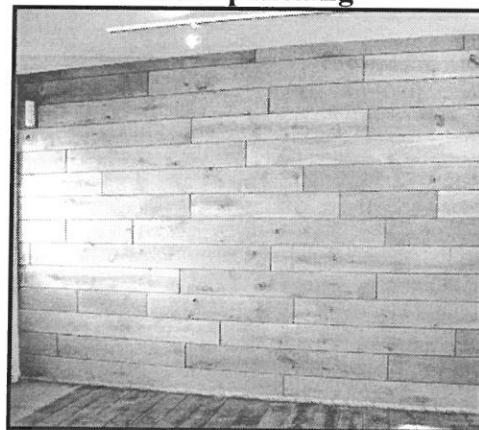
Use the floor plan of his house in ANNEXURE B to answer the following questions.

- 3.1 Give a reason why it is acceptable for the kitchen and living room to only have door openings (without doors) leading into the passage. (2)
- 3.2 Which rooms shown on the floor plan will be much cooler during winter? Give a reason for your answer. (3)
- 3.3 Mr Vermeulen bought wood panels to cover the four interior walls of his living room, as shown in the photographs below.

Photograph of a living room wall with wood panelling



Close-up photograph of a wall with wood panelling



The interior dimensions of the living room floor are 7,04% less than the exterior dimensions, as shown on the floor plan.

- 3.3.1 Show that the interior dimensions of the living room floor are $3,3 \text{ m} \times 3,3 \text{ m}$. (3)
- 3.3.2 Determine the total surface area (to the nearest m^2) of the interior walls of the living room that have to be covered with wood panels.

The following formula may be used:

$$\text{Area of a rectangle} = \text{length} \times \text{width}$$

(11)

- 3.4 Wood panels are sold per cubic metre (m^3) and not per length. The timber retailer gave Mr Vermeulen a quote of R5 000,00 per cubic metre, excluding 14% VAT.

Mr Vermeulen noted the following:

- Each wood panel is 2 m long, 150 mm wide and 12,5 mm thick.
- 4,5% more than the required number of panels is required due to cutting and wastage.
- Labour cost for panelling is R125,00 per square metre, including VAT.

He budgeted R6 000,00 for the cost of the panels and the labour.

Verify whether Mr Vermeulen's budgeted amount is enough to cover the cost of the panels and labour.

The following formulae may be used:

$$\text{Area of a rectangle} = \text{length} \times \text{width}$$

$$\text{Volume of a rectangular prism} = \text{length} \times \text{width} \times \text{height}$$

(12)

[31]

QUESTION 4

4.1

Takahiro is a Namibian citizen from Okahandja who matriculated in South Africa in 2014.

She decided to study for the degree BA (Sport Development). She applied online and was accepted to study in the Department of Sport and Movement Studies at the University of Johannesburg (UJ) in 2016.

She also applied and was accepted for student accommodation in the Amper Daar ladies' residence.

Use ANNEXURE C containing information about the average annual tuition costs for undergraduate studies, student admission fees and accommodation fees at UJ for 2016 to answer the following questions.

- 4.1.1 Give ONE possible reason why the course fees are given as a scale of fees and not as a single fee. (2)
- 4.1.2 Staying in a double room in a residence costs less than staying in a single room. Give ONE reason for the difference in fees. (2)
- 4.1.3 Calculate the total tuition cost and accommodation fee Takahiro will pay during the first year of her studies if she pays the minimum annual tuition fee. (3)
- 4.1.4 Calculate the minimum amount Takahiro will have to pay on registration, including the residence deposit, if she pays the minimum tuition fee for her chosen degree. (5)

- 4.2 UJ awards merit bursaries to deserving students according to the admission points score (APS) based on their matric results.

The total APS is calculated by adding the APS for only seven subjects as follows:

- Pass percentage of the candidate's SIX best subjects with Life Orientation as the seventh subject
- For all subjects (except Life Orientation) the percentages scored in the NSC final examination are used to calculate the APS.
- For Life Orientation the percentage scored is divided by two and then rounded up to the nearest 10%.

TABLE 5 below shows the APS. TABLE 6 below shows the merit bursary value awarded as a percentage of the total tuition costs payable.

TABLE 5: Admission Points Scores (APS)

APS	NSC RESULTS
7	80% to 100%
6	70% to 79%
5	60% to 69%
4	50% to 59%
3	40% to 49%
2	30% to 39%
1	0% to 29%

TABLE 6: Merit bursary value as a percentage (%) of tuition costs

TOTAL APS	MERIT BURSARY VALUE
Below 39	0%
39	30%
40–42	50%
43–45	75%
Above 45	100%

[Source: www.uj.ac.za]

Takahiro completed matric with the following results:

SUBJECT	FINAL RESULT (%)
Afrikaans HL	62
English FAL	70
Mathematical Literacy	64
Life Orientation	92
Accounting	79
Life Sciences	84
Economics	85
Geography	83

Calculate the percentage bursary value that Takahiro will receive if she qualifies for a merit bursary.

(6)

4.3

Takahiro and her mother and father plan to travel from Okahandja to Johannesburg along the B1, A2 and other roads as indicated on the strip chart shown in ANNEXURE D. They will cross the border into Botswana and they plan to stay overnight in Gaborone. The following morning they will continue on their journey across the border into South Africa and then travel via Pretoria to Johannesburg.

Other information about the trip from Namibia to South Africa is as follows:

- The average time they will spend at a border crossing is 20 minutes, while they will stop for 15 minutes at other stops along the way.
- They plan to stop in towns or cities approximately every 200 km.
- They plan to stop twice between Gaborone and Johannesburg.
- Accommodation, including meals, costs 680 pula per person in Gaborone.
- The cost for crossing the border by car into Botswana is as follows:
 - 50 pula per border crossing
 - 50 pula for third party insurance
 - 20 pula for road fund tax

NOTE: The currency exchange rates are as follows:

AFRICAN CURRENCY	SOUTH AFRICAN RAND (ZAR)
1 Botswana pula (BWP)	1,2454
1 Namibian dollar (NAD)	0,998

[Source: coinmill.com, 11/06/2015]

Use ANNEXURE D and the information above to answer the following questions.

- 4.3.1 Calculate the total driving time (excluding stops) from Okahandja to Johannesburg if the average speed at which they drive is 108 km/h.

The following formula may be used:

$$\text{Total distance} = \text{average speed} \times \text{driving time} \quad (5)$$

- 4.3.2 Explain why the length of the strip from **Lobatse** to **Gaborone** is shorter than the length of the strip from **Rustenburg** to **Sun City**, whereas the actual distances shown in the strip chart are nearly equal. (2)

- 4.3.3 Takahiro estimated that they will only need 2 160 Namibian dollars to pay for both the accommodation in Gaborone and the border crossing from Namibia to Botswana.

Verify, showing ALL calculations, whether her estimation is valid. (6)
[31]

QUESTION 5

- 5.1 The People's Republic of China (China) and the United States of America (USA) have the two largest GDPs* (gross domestic product) in the world.

TABLE 7 below shows comparable data for China and the USA.

TABLE 7: Comparable data for China and the USA during 2014

	CHINA	USA
GDP (millions of US\$)	10 380 380	17 418 925
Population in millions	1 356	319
Annual population growth	0,44%	0,77%
Net migration** rate per 1 000 of the population	- 0,32	2,45
Working population (workers) in millions	797,6	155,4
Oil imports in million barrels per day	5,664	9,213

[Adapted from <http://www.indexmundi.com>]

*GDP – the net monetary value of all the manufactured goods and services during one year

**Migration – the movement of people from one country to another

- 5.1.1 Interpret China's net migration rate.

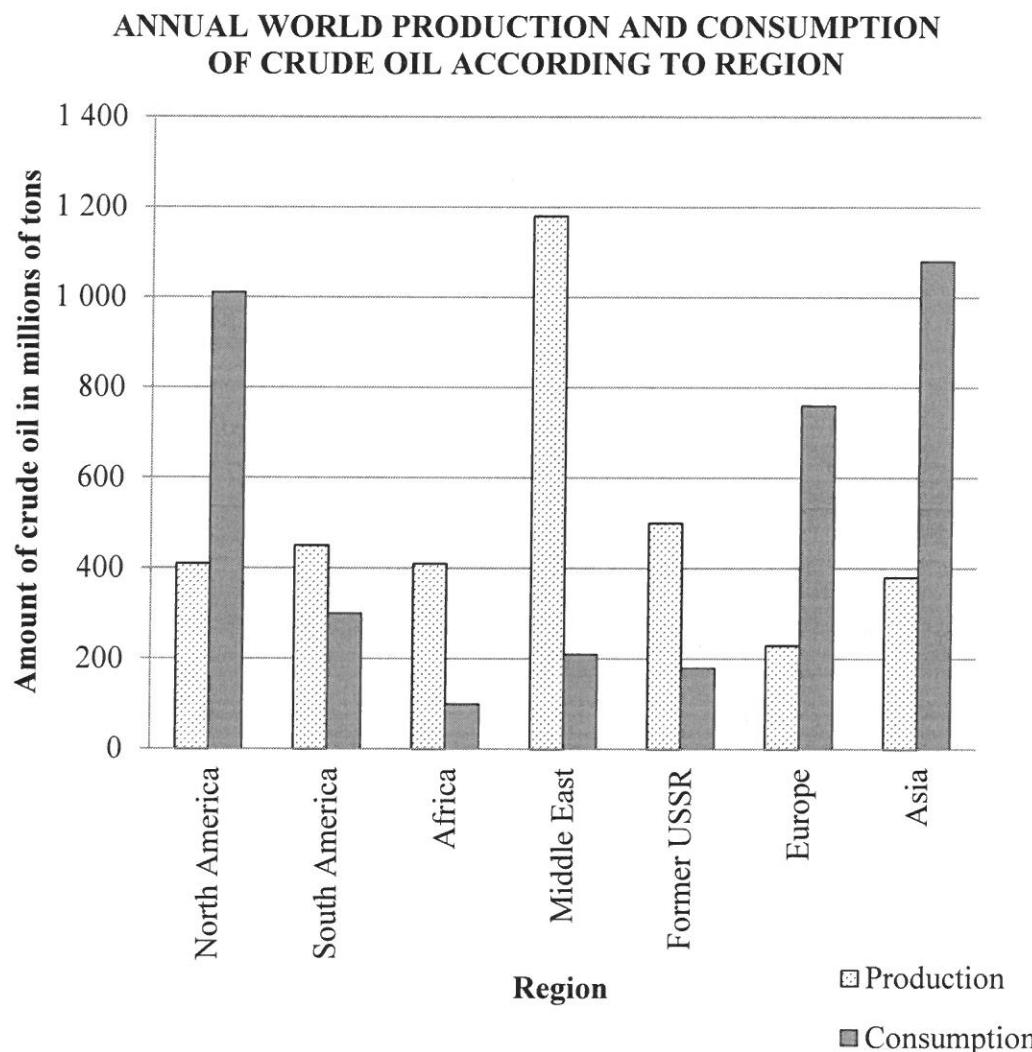
(2)

- 5.1.2 Calculate the difference between the projected population sizes of China and the USA at the end of 2015 based on their population growth.

(5)

5.2

China and the USA import most of their crude oil. The bar graph below shows the world production and consumption of crude oil according to region.



[Adapted from US Energy Information Administration]

Use the bar graph to answer the following questions.

- 5.2.1 Name the region that shows the greatest difference between the amount of crude oil they produced and the amount of crude oil they consumed. (2)
- 5.2.2 Calculate the difference in the production and the consumption of crude oil for both North America and Asia and comment on the difference. (3)
- 5.2.3 Give ONE possible reason for the high consumption of crude oil in North America and Asia. (2)

5.3

About 63% of the world's crude oil is transported by ship (seaborne). Choke points* in the major sea trade routes used to transport crude oil are extremely important for global crude oil security.

The Strait of Hormuz is the world's most important choke point because:

- It allows for a flow of 30% of all seaborne crude oil.
- Crude oil transported through this choke point is destined mostly for India, Japan, South Korea, China and North America.

Crude oil to Europe can be transported around the Cape of Good Hope or through the Suez Canal.

[Source: www.eia.gov/emeu/cabs]

*Choke points – narrow channels along the most commonly used global sea routes/narrow passages through which ships must pass

The following conversions may be used:

$$\begin{aligned}1 \text{ mile} &= 1,609344 \text{ kilometres} \\1 \text{ barrel} &= 158,9873 \text{ litres}\end{aligned}$$

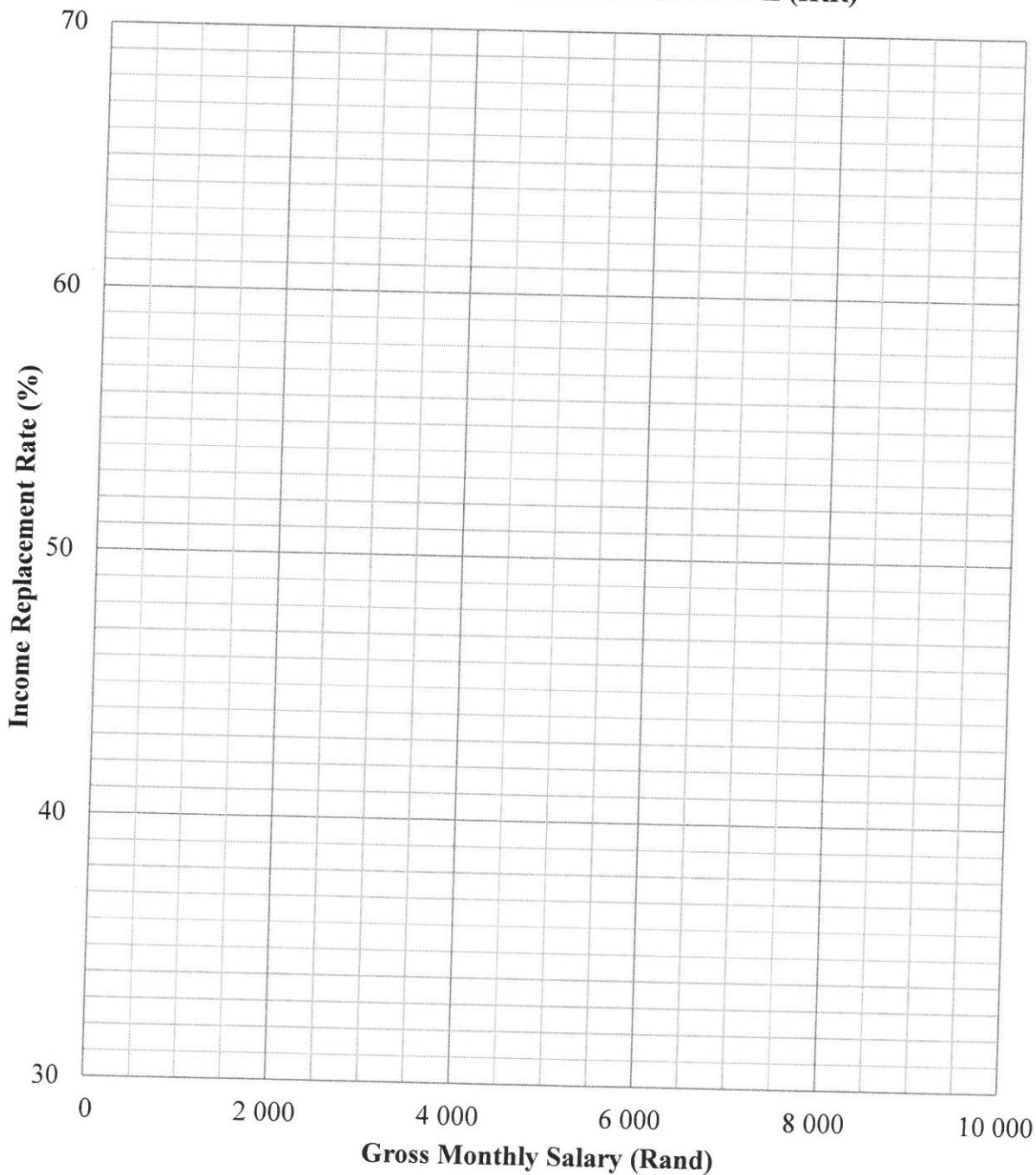
Use the information provided in ANNEXURE E to answer the following questions.

- 5.3.1 Determine the approximate distance, in miles, between the two largest choke points. (3)
- 5.3.2 30% of all seaborne crude oil passes through the Strait of Hormuz daily.
Calculate the total amount of crude oil transported by ship daily. (3)
- 5.3.3 Give TWO economic reasons why it is not advisable to transport crude oil around the Cape of Good Hope to Europe. (4)
[24]

TOTAL: 150

ANSWER SHEET**QUESTION 1.3.2****CENTRE NUMBER**

EXAMINATION NUMBER

**THE RELATIONSHIP BETWEEN GROSS MONTHLY SALARY
AND THE INCOME REPLACEMENT RATE (IRR)**

ANNEXURE A**QUESTION 2.1**

**TABLE 2: Information of 25 participants in two weight-loss programmes
(some of the data has been omitted)**

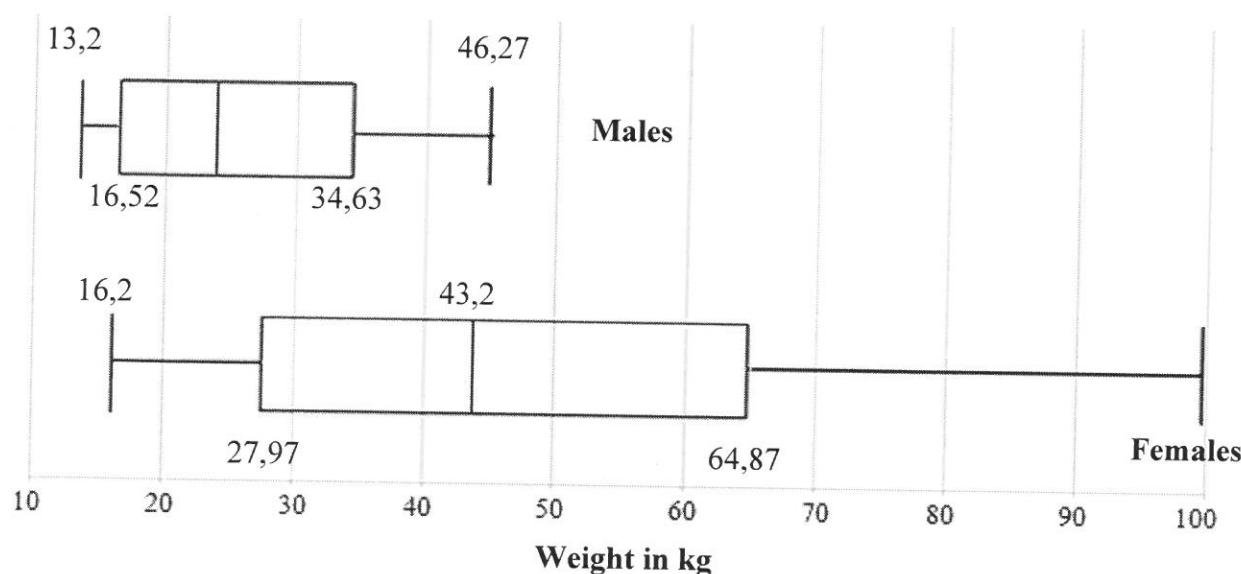
Biggest Loser Club in USA			Weigh-Less programme in RSA	
Gender	Pounds lost	Kilograms lost	Gender	Kilograms lost
Female	66	29,93	Female	16,2
Female	112	50,80	Male	23,7
Male	100	43,36	Female	36
Female	100	43,36	Female	25
Female	154	69,85	Male	13,2
Female	136	61,69	Male	16,7
Male	83	37,65	Female	26
Female	220	...	Male	25,6
Male	102	...	Male	31,6
Male	55	...	Female	36,5
Male	36	...	Male	18,8
Female	...	68,04	Female	43,2
Male	29,10	13,2		

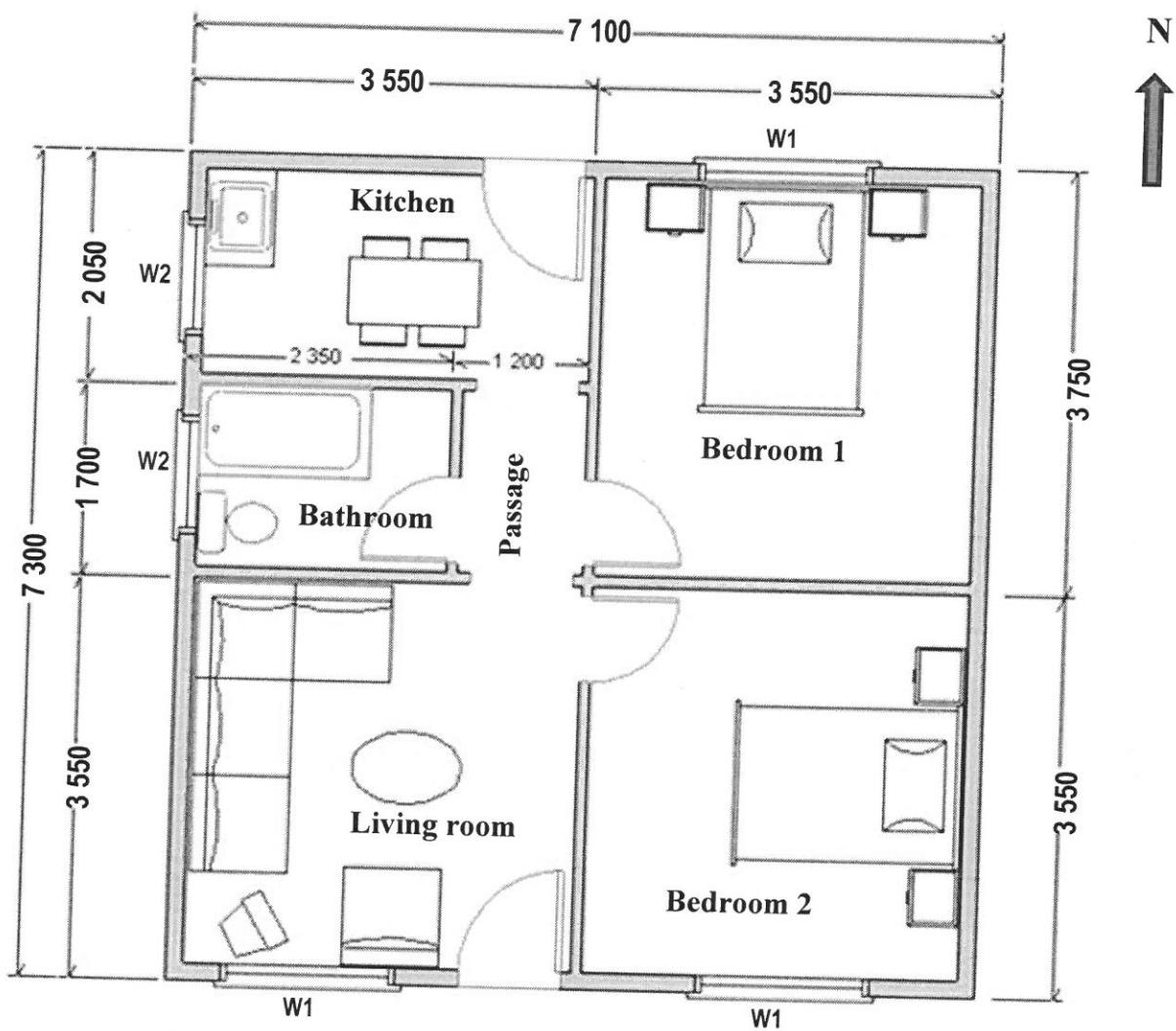
[Sources: <http://www.biggestloserclub.com> and www.weighless.co.za]

NOTE: 1 pound = 0,453592 kg

BOX AND WHISKER PLOTS:

**WEIGHT LOSS (IN KG) FOR MALES AND FEMALES
FOR THE COMBINED WEIGHT-LOSS PROGRAMMES**



ANNEXURE B**QUESTION 3****FLOOR PLAN OF MR VERMEULEN'S HOUSE****KEY: ITEMS**

- W1 (window opening)
- W2 (window opening)
- Internal height from floor to ceiling
- Standard door opening
- Door opening to passage

MEASUREMENTS (in mm)

1 511 × 949
1 022 × 949
2 650
2 032 × 750
2 082 × 750

[Source: <http://www.sapplans.co.za/plans/zap1003>]

ANNEXURE C**QUESTION 4.1**

**AVERAGE ANNUAL TUITION COSTS FOR UNDERGRADUATE STUDIES,
STUDENT ADMISSION FEE AND ACCOMMODATION FEES AT UJ FOR 2016**

A: Admission fee

All new students should apply for admission and pay the required admission fee.

Fees payable

- Application fee of **R200** for 2016 (manual application)
(No application fee for online applications)

B: Average cost for first-year tuition in the Department of Sport and Movement**Fees payable**

- An upfront payment of **30%** of the tuition fees is to be paid **on registration**.
- At least **35%** of the annual tuition fees is to be paid by **30 April**.
- The balance of the tuition fees is to be paid by **31 July**.
- UJ will offer **5% discount** should all tuition fees be paid in full **on registration**.
- Students that are not South African citizens pay an additional and compulsory **R2 000** tuition fee **on registration**.

Annual tuition fees

BA (Sport Psychology)	R28 470 to R35 260
BA (Communication)	R20 130 to R32 870
BA (Sport Development)	R28 470 to R35 260
BCom (Sport Management)	R30 270 to R37 970

C: Accommodation fees

A **deposit of R1 220** for 2016 **on registration** plus a minimum of the first month's accommodation costs

Annual residence fees

- Amper Daar and Kruinsig ladies' residences (double rooms) **R18 928,00**
- Sophia Town (single rooms) **R31 668,00**

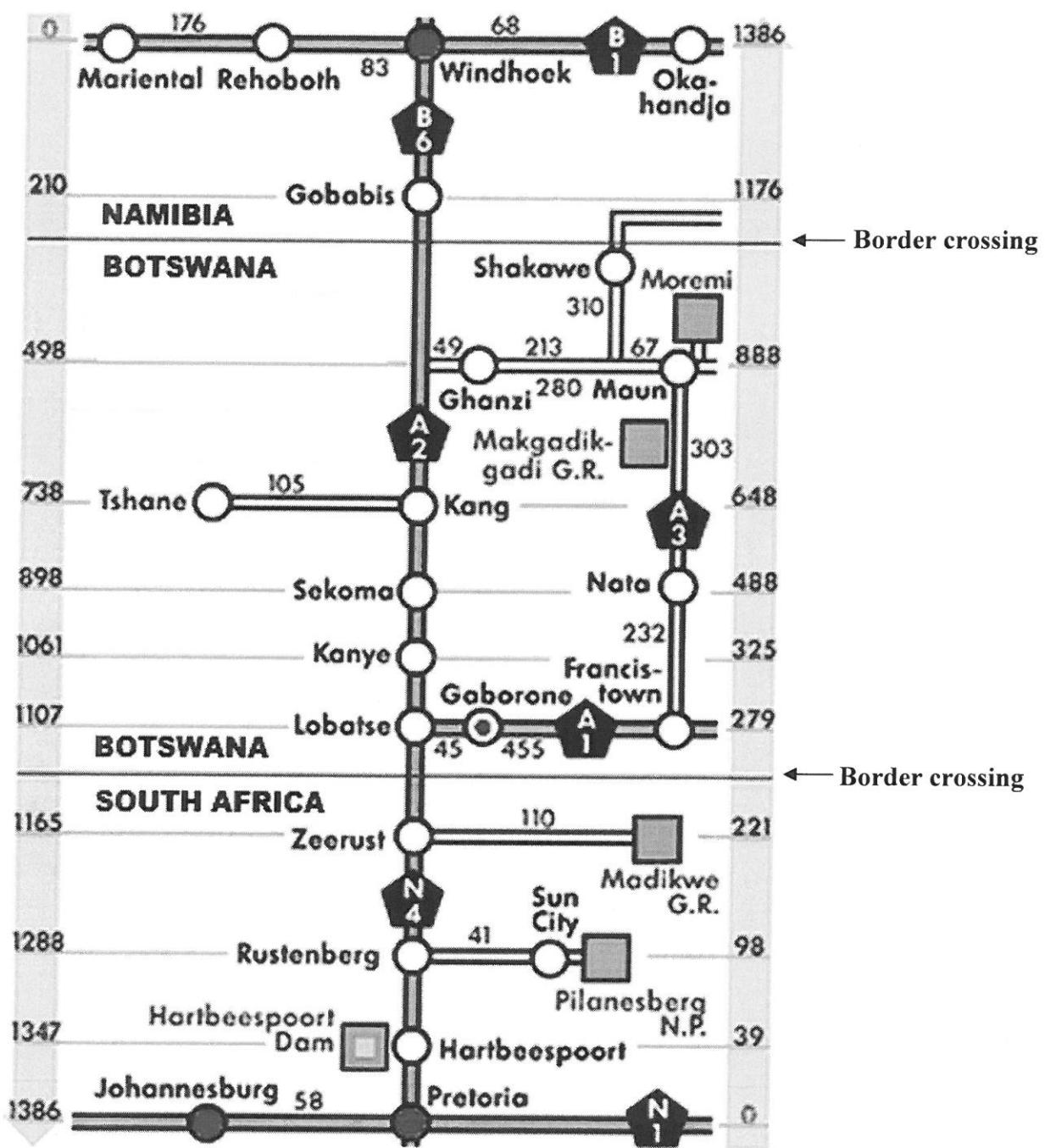
NOTE: For residences the full annual payment or 11 equal monthly payments must be made for the first year of study.

[Source: www.uj.ac.za/0861 00 00 UJ and UJ_Student fees2015/6_Rollfold.indd]

ANNEXURE D

QUESTION 4.3

**STRIP CHART SHOWING ROAD DISTANCES IN KILOMETRES
FROM WINDHOEK TO PRETORIA**

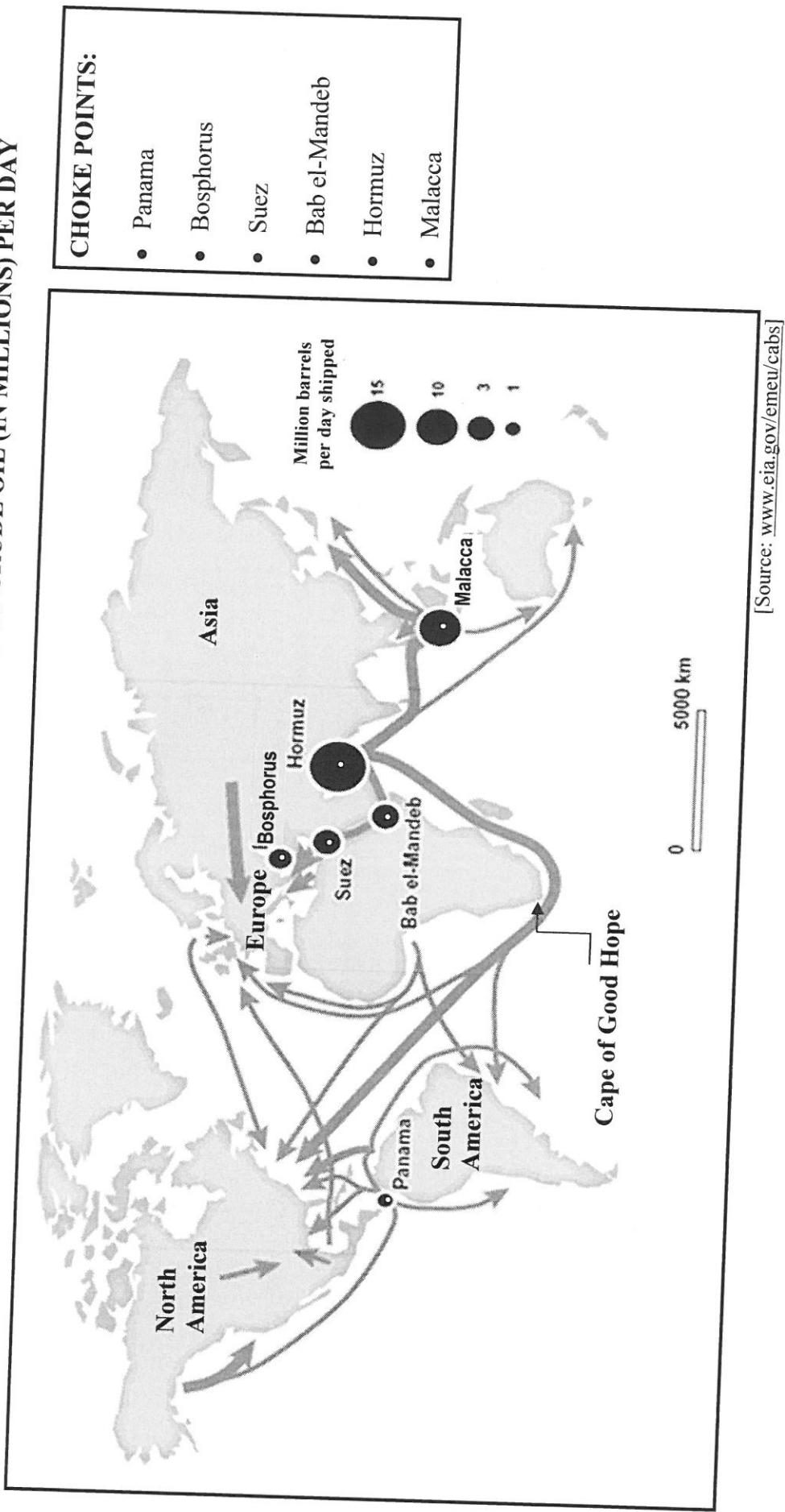


[Source: www.google.com]

ANNEXURE E

QUESTION 5.3

MAP OF CHOKE POINTS ON SEA ROUTES AND THE NUMBER OF BARRELS OF CRUDE OIL (IN MILLIONS) PER DAY



[Source: www.eia.gov/emeu/cabs]