Basic Education

KwaZulu-Natal Department of Basic Education
REPUBLIC OF SOUTH AFRICA

MATHEMATICAL LITERACY P2

PREPARATORY EXAMINATION

SEPTEMBER 2015

NATIONAL SENIOR CERTIFICATE

GRADE 12

MARKS: 150

TIME: 3 Hours

N.B. This question paper consists of 13 pages and 3 annexures.

INSTRUCTIONS AND INFORMATION

1. This question paper consists of **FOUR** questions. Answer **ALL** the questions.

2. Use ANNEXURE A to answer question 1.2, ANNEXURE B to answer 2.2 and ANNEXURE C to answer question 4.2.3. Write your name in the space provided on the annexure and hand in the annexures with your answer book.

3. Number your answers correctly according to the numbering system used in this question paper.

4. Start **EACH** question on a **NEW** page.

5. An approved calculator (non-programmable and non-graphical) may be used, unless stated otherwise.

6. **ALL** the calculations must be clearly shown.

7. **ALL** the final answers must be rounded off to **TWO** decimal places or according to the given context, unless stated otherwise.

8. Units of measurement must be indicated where applicable.

9. Diagrams are NOT necessarily drawn to scale, unless stated otherwise.

10. Write neatly and legibly.

QUESTION 1

1.1

Calvin is running a meter-taxi business in the city of Durban. His running costs are;

Drivers' cost (**D**) is R450 per week
Petrol cost (**P**) is R0,11 per km
Services & Repair cost (**SR**) is R0,21 per km
A tyre cost (**T**) is 0.83 cents per km

He charges R6.50 per km for the first 3km and thereafter R10.50 per km

1.1.1 His motor car should be serviced after 15 000 km. Assume that the car was not broken and tyres were not replaced, determine, (in Rands), the cost of:

(a) service and repairs after 15 000 km (2)

(b) four tyres after 15 000 km (3)

1.1.2 Suggest a simplified formula to calculate Calvin's weekly expenses. (3)

1.1.3 Use the suggested formula (in 1.1.1) to estimate the weekly running cost (in Rands) if the car has travelled a total of 185km .

Note: the car has four tyres (5)

1.1.4 In a certain week Calvin made an income of R650, including driver's cost. Show that his share is only 31% of the income.

You may use the formula.

$$\textbf{Calvin's share} = \frac{\textbf{Income} - \textbf{Drivers Costs}}{\textbf{Income}} \times 100\%$$

(4)

1.1.5 Is it beneficial to the driver or to Calvin if the driver is paid a fixed cost of R450 per week rather than per km like other costs. Justify your answer. (3)

1.2 The map in **Annexure A** indicates the bus routes and bus stops used by EThekwini Metro buses in the City of Durban. There are 3 types of buses according routes and busstops, for example, Beach Line starts from Beach Terminal (No. 1) to Mahatma Gandhi (No. 16). Read the map carefully for other routes and bus stops. The letter **T** in this map represents a bus stop where you can change from one bus to another bus free of charge.

1.2.1 If a taxi has dropped you off next to the Victoria Market near bus stop 53, which bus or buses will you take to reach the hospital. Justify your choice. (4)

1.2.2 You brother's car broke down near SARS (no **32A**) at 11:30 and he decided to walk to Addington Hospital because the next bus was going to arrive at 11:48. Give him the shortest direction to reach the hospital. (4)

1.2.3 The actual distance between Anton Lembede Street and Prixely KaSeme Street is 99m. Hence, determine the scale of this map, in the form:

1 : ..... (3)

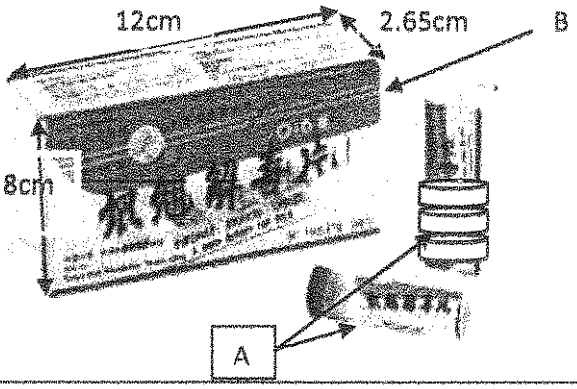
1.2.4 Use the scale determined in 1.2.3 to calculate the actual distance (in metres) travelled on foot by your brother from SARS to Addington Hospital. Note the map distance is 87mm. (3)

1.2.5 The visiting hours at the hospital are from 11:00 to 12:00, 14:00 to 15:00 and 18:00 to 19:00. If, in his walk, he covers an average distance of 100 meters in 1.5 minutes, is he going to arrive on time for the first visiting hour ? Support your answer by calculations. (4)
[38]

QUESTION 2

2.1

The earthquake in Nepal led to different types of illnesses. Thus, thousands of different types of pills were sent to Nepal. One of them, was **Yin Chiao Cold/Flu Pills** bought by South Africa from China.



NOTE: Container A is put inside container B

Source: <www.tga.gov.au>.

2.1.1 Each pill (tablet) has a diameter of 15mm and thickness of 3mm as shown below. Determine the space occupied by each pill in a cylindrical container. (2)

You may use this formula:

Volume $= \pi \times$ **(radius)**$^2 \times$ **height**, where $\pi = 3.142$

2.1.2 Hence, determine the volume (in mℓ) of the cylindrical container (labelled A) if 20 pills are to be loaded into it.

HINT: 1 mℓ = 1cm^3 (3)

2.1.3 It is recommended that the area of the base of the cylinder must be 102% of area of the pill so that the pill will fit in the cylinder. Show that the container with a base of 181mm^2 or 1.81cm^2 meets this requirement. (4)

The following formula may be used:

Area of the circle $= \pi \times$ **(radius)**^{2}, where $\pi = 3.142$

2.14 The South African government donated thousands of these pills to clinics and hospitals of affected areas. Quotations were invited from companies who will wrap both containers in South African colours and provide labels written in English.

(a) Suppose the rectangular box is wrapped and labelled on all sides, determine the surface areas (in cm^2) of a rectangular container. (3)

Surface Area of Rectangular Box = $2(l \times b) + 2(l \times h) + 2(b \times h)$,
where **l** = length , **b** = breadth and **h** = height

(b) A cylindrical container is to be wrapped on the body only. The base and the lid are not to be wrapped. Determine the area to be wrapped. (4)

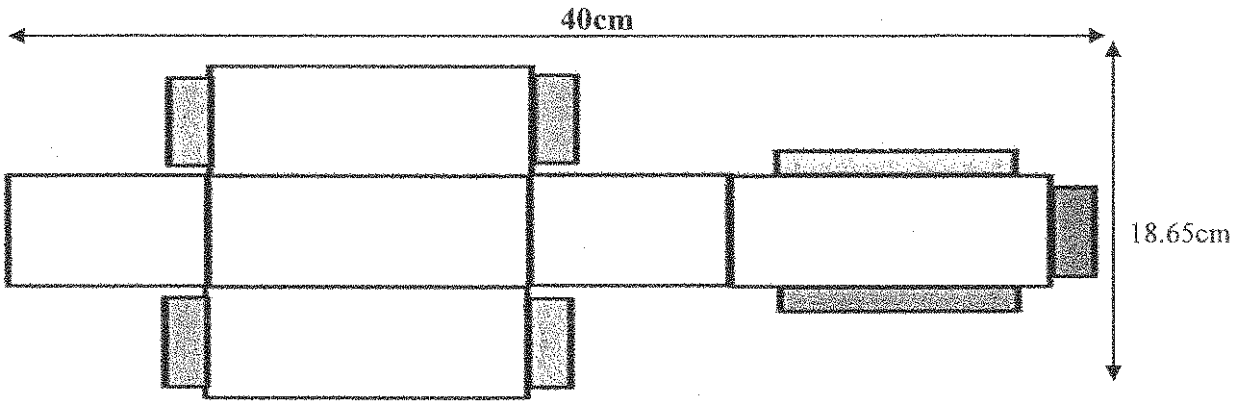
NOTE: the radius of the base of the container is 0.8cm and the height is 6cm

The following formulae may be used:

Surface area of cylinder = $2\pi r (r + h)$

(c) Calculate the cost of the wrapping material if 5 000 rectangular boxes are to be wrapped and the most economical supplier is chosen from the following TWO options.

NOTE: THE NET OF THE RECTANGULAR BOX IS SHOWN BELOW



OPTION 1

Wrapping material is cut according to your order @ R17.50 per m^2, excluding VAT

***** VAT is value-added tax calculated at 14%.**

OR

OPTION 2

Wrapping material which is 30cm wide x 100cm long is sold @ R3,95 per 100cm, including VAT . (9)

2.1.5 If the company that was given the job to wrap the containers chose Option 1 and charged the Department of Health R52.90 per m^2, determine how much the percentage mark-up charge is. (3)

2.2 Ibuprofen is one of the pain killers carried by the medical team to temporary relieve pain associated with headache, cold, flu, etc. The percentile chart in ANNEXURE B indicates one of the combined charts completed for patients to determine the amount of dosage to be given to a particular patient. Study it carefully to answer the following questions.

2.2.1 In which percentile curve does patient A fall and explain what does this percentile mean. (3)

2.2.2 The table in the percentile chart assists in giving a correct dosage to patients according to their weight and age. Identify the patient between A, B, C, and D whose dosage will be hard to identify and provide his age and weight. (2)

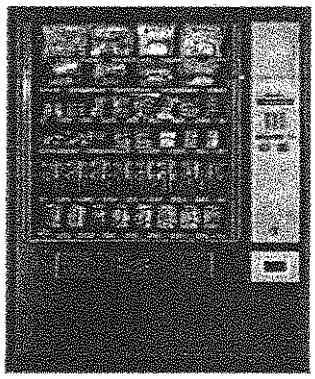
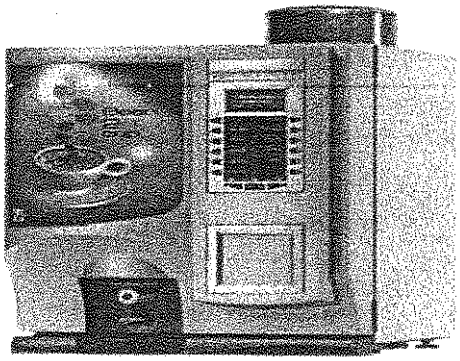
2.2.3 The dosage written on medicine container is 7.5mg per kg. Prove, by calculations, that the dosage indicated in the percentile chart for patients in age 2 - 3 range, is correct. (3)

2.2.4 The **median** of patients labelled by bullets (●) is, 10.2 kg and the median of patients labelled by letters is 10.7kg . Explain what it means if the **median** number of patients labelled by letters is more than the median number of patients labelled by bullets. (4)
[40]

QUESTION 3

3.1

Peter runs a small business which repairs and sells vending machines. These machines sell different types of snacks and beverages (drinks) as shown below. In a particular month Peter sold them at a special or discounted price to clear the stock.

Snack Vending Machine	Coffee/Tea Vending Machine
	
SPECIAL SELLING PRICE: R18 000 (excluding VAT) Discounted by 27%	**SPECIAL SELLING PRICE: R10 000 (excluding VAT) Discounted by 18%**

3.11 Determine the original selling price (including VAT) of the snack vending machine. (3)

3.12 It is compulsory for the seller to pay **company VAT** to SARS for all items sold. Determine how much will be paid by Peter to SARS for selling all 5 snack machines if he bought them at R10 000 (including VAT) each. (4)

The following formula may be used:

Company VAT = Collected VAT – Paid VAT

3.2 Buyers can rent brand new machines at R1824 a month for 12 months which includes free service but excluding the stock.

3.2.1 One of the customers was not sure whether to buy or to rent the machine. suggest to this customer the better option and provide a reason for your option. (3)

3.2.2 One of the snack machines can load (stock) the following item at a time. Complete the values of A and B. (4)

TABLE 1: Items and flavours in the snack vending machine

Item	Flavours	Quantity Per flavour	Quantity in the machine
Chips	6	10	**(A)**
Cans	12	**(B)**	60
Confectionery	6	14	84

3.3 It was noted that snack machine was left with one can of a favourite flavour and other 2 cans from each of the other flavours .

3.3.1 Determine the probability of getting a **non favourite** can if the machine mistakenly releases a wrong flavour. Express your answer as a percentage. (2)

3.3.2 Does this probability suggest that this was **more likely** to happen? Justify your answer. (3)

3.4 Ted is renting a number of these machines. The **ABC Supplies** is supplying him with chips using the following subscription rates.

TABLE 2: Subscription prices

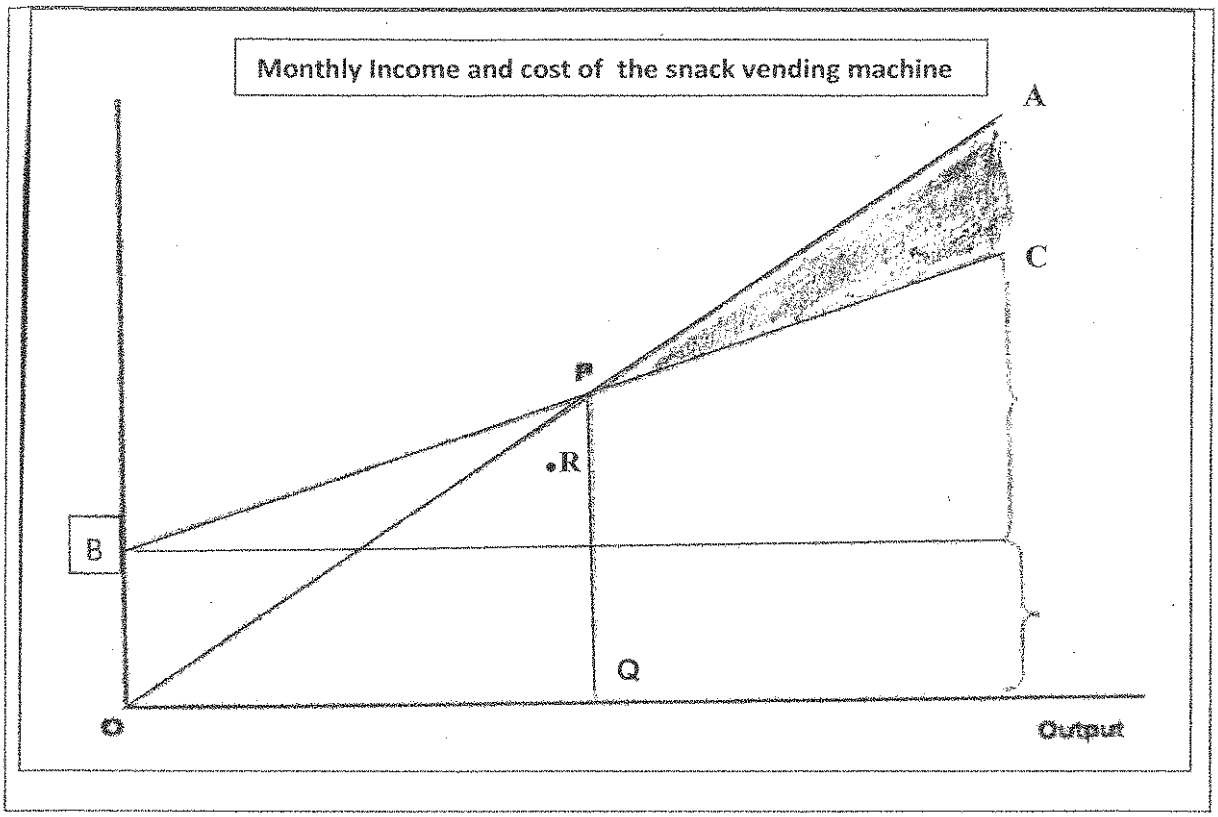
	QUANTITY (in boxes)	SUBSCRIPTION (per box)	DELIVERY (per box)
Package 1	100 packets	R520	R20
Package 2	200 packets	R970	R35,
Package 3	300 packets	R1440	R50

3.4.1 Which Package will be more economical or will yield more profit for Ted? Justify your answer by calculations. (6)

3.4.2 In one of the municipality offices Ted, pays a monthly rent of R350 per machine and sells each packet of chips at R10. Determine the profit for selling all the chips if he had chosen the most economical package. (3)

Profit = Income – Expenditure

3.5 Ted bookkeeper used the graph (shown below) to display income and expenditure of the snacks vending machine in the municipal office.



3.5.1 What does graph A represent and why does it start at 0? (3)

3.5.2 Label B is a starting point of 2 graphs. Name these graphs and explain why the one is increasing and the other remains constant. (4)

3.5.3 Suggest the value on vertical axis labelled B. (2)

3.5.4 Does the shaded part indicate the region where the machine was making a profit or a loss? Justify your answer. (3)

3.5.5 In a particular month there was a strike of municipal workers. Point R represents total revenue for that month. Was this revenue enough for the cost of vending machine. Justify your answer. (2)
[42]

QUESTION 4

4.1 The following is an extract from Ted's bank account. Ted is having a 32-day Notice account to save for holidays. He saves R10 000 monthly in this account.

Account identification
Name of account:
Account number: 06891655

Transaction details

Post date m dd	Transaction description	Payments	Deposits	Balance
	Statement opening balance			R 416,172.99
1 01	CHEQUE DEPOSIT SERVIC 248		R 10,000.00	R 426,172.99
1 03	UNPAID ITEM PDD.	R 10,000.00-		R 416,172.99
1 11	INTEREST CAPITALISED		R 1,678.78	R 417,851.77
1 27	CHEQUE DEPOSIT 790		R 10,000.00	R 427,851.77
1 11	INTEREST CAPITALISED		R 1,759.09	R 429,610.86
1 28	CHEQUE DEPOSIT		R 10,000.00	R 439,610.86
1 11	INTEREST CAPITALISED		R 1,747.67	R 441,358.53
0 02	CHEQUE DEPOSIT SERVIC 091		R 10,000.00	R 451,358.53
0 12	INTEREST CAPITALISED		R 1,909.45	R 453,267.98
	Balance as at 12 January 2015			R 453,267.98

4.1.1 Calculate the total monthly amount (excluded interest) saved by Ted in the year 2014 indicated in this statement. (2)

4.1.2 Is the interest given for this account simple or compound interest? Justify your answer. (3)

4.1.3 Show that Ted's account was paid at a monthly interest rate of 0.4% in 2014. (3)

4.1.4 "This bank offered a small percentage increase from 0.4% to 0.42% in 2015". Is this statement valid? Justify the validity of this statement by calculations (3)

4.2 Tedi family visited the Southern African Large Telescope (SALT) in Sutherland (Western Cape). The tour guide presented information about planets in the following table.

TABLE 3: Planets' diameters, distances from sun and temperatures

PLANET	DIAMETER (in km)	DISTANCE FROM THE SUN (in million km)		TEMPERATURE		
				Minimum	Maximum	
			Rounded off		Actual	Rounded off
EARTH		150	150	-89 °C	58 °C	60 °C
JUPITER	142 800	778	780	-15 °C	-15 °C	-15 °C
MARS	6 794	228	230	18.05 °C	46.7 °C	45 °C
MERCURY	4 880	58	60	-185 °C	467 °C	465 °C
PLUTO	2 300	5 900	5900	-230 °C	-230 °C	-230 °C
SATURN	120 000	1 429	1 430	-170 °C	-230 °C	-230 °C
URANUS	51 000	2 870	2 870	-200 °C	-200 °C	-200 °C
VENUS	12 104	108	110	460 °C	460 °C	460 °C

4.2.1 Express the ratio of **nearest to** the **furthest planet** from the sun in a simplest form. (2)

4.2.2 If the mean of the diameters of these planets is 44 079km, determine the diameter of the Earth. (3)

4.2.3 The scatter plot can be used to illustrate the information provided in Table 3.

(a) Use the graph paper in ANNEXURE C to draw a fully labelled scatter plot showing the relationship between the **POSITIVE** maximum temperatures and the distance from the sun. **Use the rounded off values.** (6)

(b) Identify the trend shown by this scatter plot and provide the possible reason for it. (3)

4.3 Ted's family consists of 7 members. Ted and his wife, 3 children (4 year old, 8 year old and 14 year old, granny and an uncle. The hotel available in Sutherland has the following costs.

TABLE 4: Cost of accommodation

Type of room	Single bed room	Twin bed room	Family room 1	Family Room 2
Cost per day	R 999	R1 399	R1 599	R1 299

Terms and Conditions

- Single Room has 1 single bed and can accommodate one person only.
- Twin Bed Room has 2 separate single beds and can accommodate 2 people
- Family Room 1 has 2 double beds and can accommodate 4 people
- Family Room 2 has a double bed.

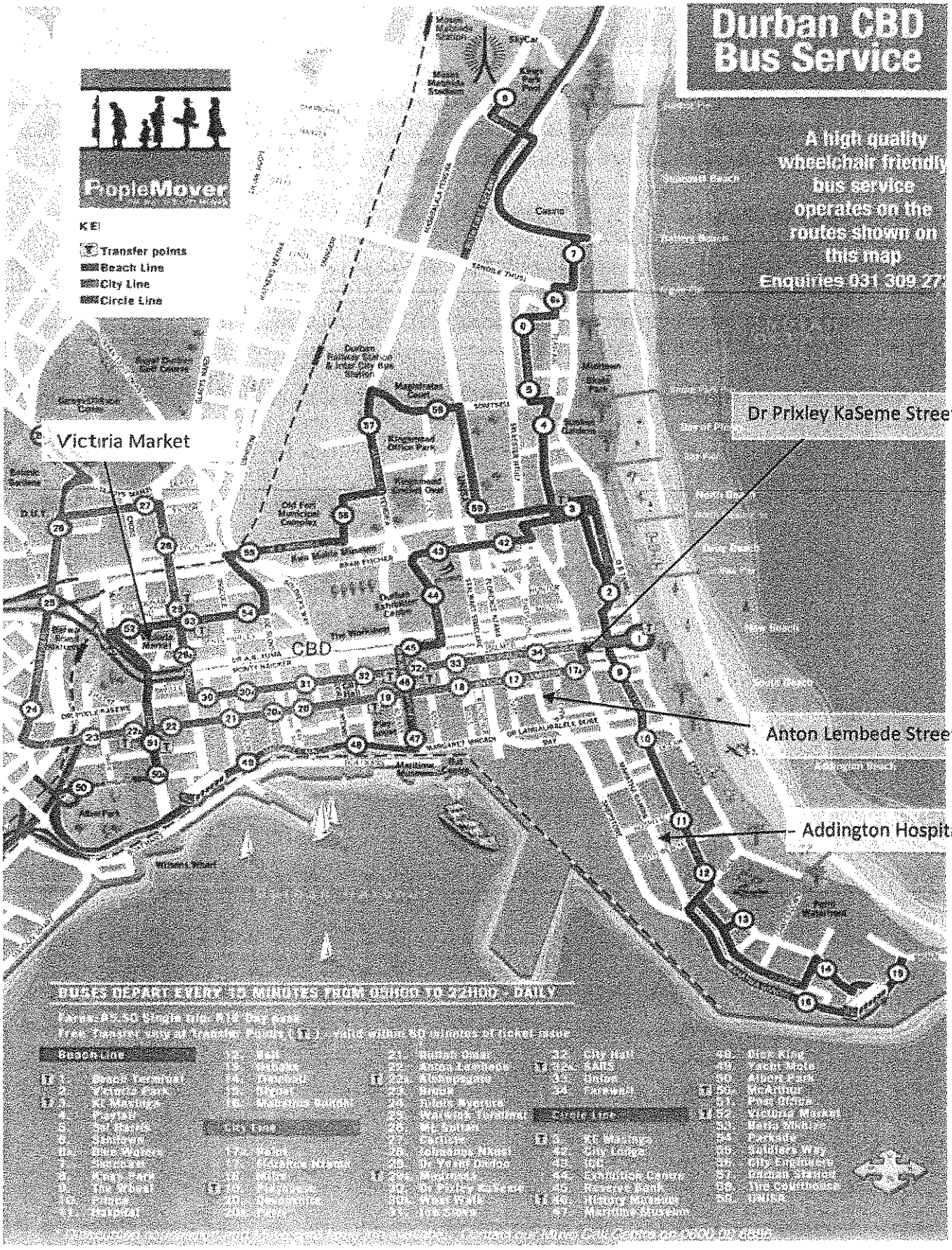
Choose the rooms that will be reasonable for this family and then calculate the total costs for two nights. (5)

[30]

TOTAL: 150

ANNEXURE A

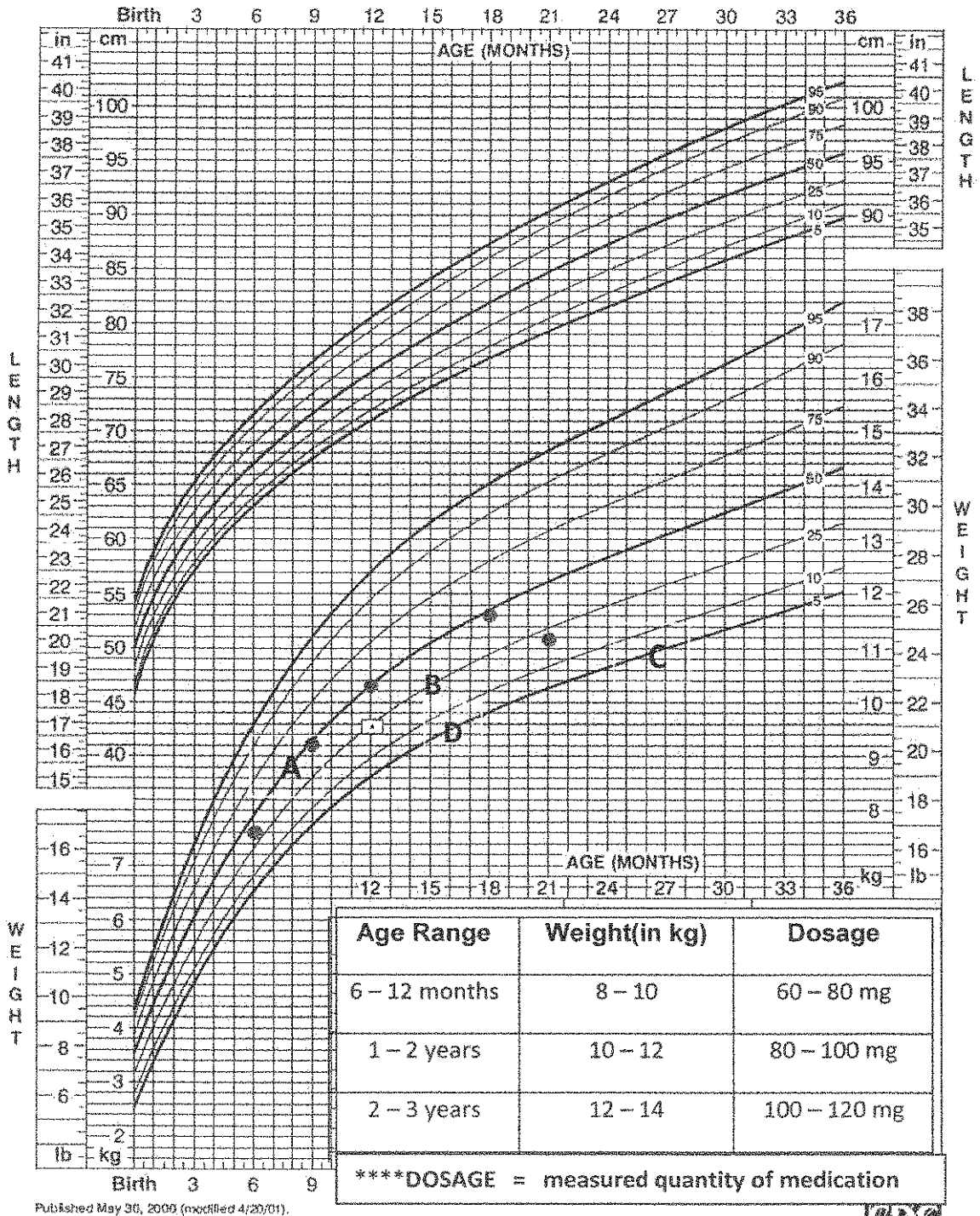
QUESTION 1.2



ANNEXURE B

QUESTION 2.1.5

COMBINED PERCENTILE CHARTS AND DOSAGE



Age Range	Weight(in kg)	Dosage
6 – 12 months	8 – 10	60 – 80 mg
1 – 2 years	10 – 12	80 – 100 mg
2 – 3 years	12 – 14	100 – 120 mg

****DOSAGE = measured quantity of medication

Published May 30, 2000 (modified 4/20/01).
SOURCE: Developed by the National Center for Health Statistics in collaboration with the National Center for Chronic Disease Prevention and Health Promotion (2000).
http://www.cdc.gov/growthcharts

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ANNEXURE C

NAME OF CANDIDATE: _____ **GRADE 12** _____

QUESTION 4.2.3