



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

SENIOR CERTIFICATE EXAMINATION

MATHEMATICAL LITERACY P2

2015

MARKS: 150

TIME: 3 hours

This question paper consists of 14 pages, 2 annexures and 2 answer sheets.

INSTRUCTIONS AND INFORMATION

1. This question paper consists of FIVE questions. Answer ALL the questions.
2. Use ANNEXURE A to answer QUESTION 1.1 and ANNEXURE B for QUESTION 5.1. Answer QUESTION 2.2.2 on the attached ANSWER SHEET A and QUESTION 5.5 on ANSWER SHEET B. Write your centre number and examination number in the spaces on the ANSWER SHEETS. Hand in the ANSWER SHEETS 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 context, unless stated otherwise.
8. Indicate units of measurement, where applicable.
9. Maps and diagrams are NOT necessarily drawn to scale, unless stated otherwise.
10. Write neatly and legibly.

QUESTION 1

- 1.1 Three friends from Cape Town planned a trip to Gold Reef City in Johannesburg. They travelled by train from Cape Town to Johannesburg, stayed in a hotel for THREE nights and returned to Cape Town by train. TABLE 1 on ANNEXURE A shows the stations, schedules and the cost of a single train ticket.

NOTE: The cost of a single train ticket from Johannesburg to Cape Town is the same as a ticket from Cape Town to Johannesburg.

Use ANNEXURE A to answer the following questions.

- 1.1.1 Name the station where the train stops for longer than 20 minutes. (2)

- 1.1.2 Calculate the cost of a single train ticket from Laingsburg to Klerksdorp. (2)

- 1.1.3 Between which TWO stations will the train be at 10:00? (2)

- 1.1.4 The distance from Cape Town to Johannesburg is approximately 1 400 km. Calculate the average speed (to the nearest km/h) of the train between Cape Town and Johannesburg using the following formula:

$$d = s \times t, \text{ where } \begin{array}{l} d = \text{distance (in km)} \\ s = \text{average speed (in km/h)} \\ t = \text{total time (in hours)} \end{array} \quad (4)$$

- 1.1.5 The total cost of hotel accommodation is R2 933 per person sharing or R3 133 per person not sharing. The maximum number of guests allowed per room is two.

Verify that the average total cost per person for a return train ticket and hotel accommodation exceeds R4 000. (6)

- 1.2 The price per day visitor for rides at Gold Reef City are as follows:

R165	Persons (height above 1,3 m)
R100	Persons (height below 1,3 m)
R130	Students (upon presentation of student card)
R110	Pensioners older than 60 years
R515	Family ticket (2 parents and 2 children below the age of 16)
Children younger than 3 years are admitted free of charge	

[www.goldreefcity.co.za]

- 1.2.1 Calculate the maximum amount a family (father, mother and two children, 15 years and 13 years old) can save if they buy a family ticket. Assume all of them are taller than 1,3 m. (4)

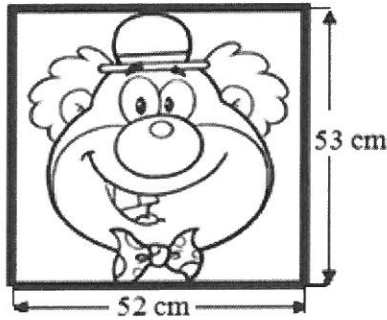
- 1.2.2 Give a possible reason why Gold Reef City based the prices of rides for day visitors on the height of a person. (2)

1.3

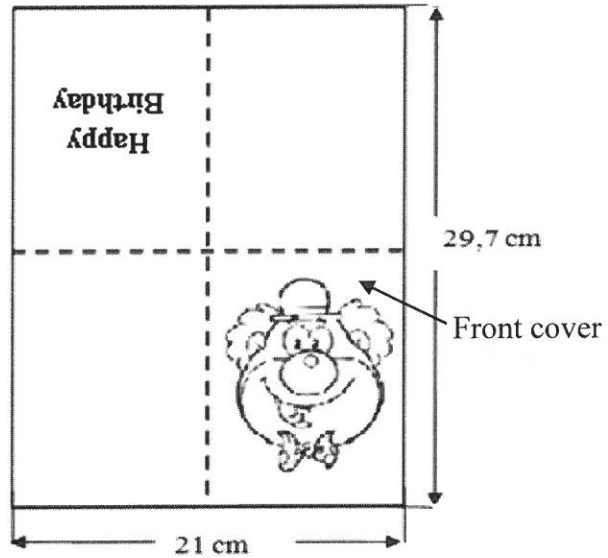
While the three friends are at Gold Reef City, they watch an artist drawing a clown on the bottom right-hand quarter of an A4 page.

- The original size of the picture of the clown is 52 cm wide and 53 cm long.
- The A4 page is 21 cm wide and 29,7 cm long.

Picture of a clown



Layout of the drawing of a clown on the bottom right-hand quarter of the A4 page



The A4 page is folded to make a card.
The folding instructions for the card are as follows:

Step 1	Fold along this middle line	
Step 2	Fold in half again to produce the final folded card	

1.3.1 Give a reason why the 'Happy Birthday' is printed upside down on the A4 page. (2)

1.3.2 Explain why the picture of the clown cannot be drawn on the bottom right-hand quarter of the A4 page using a scale 1 : 4. Show ALL calculations. (5)
[29]

QUESTION 2

2.1

TABLE 2 below shows a list with the annual inflation rates for some countries.

TABLE 2: Annual inflation rates for some countries during 2014

Country	Annual inflation rates (%)	Month
Montenegro	-1,20	July
Spain	-0,85	July
Cyprus	-0,58	July
Switzerland	0,00	July
Cameroon	1,06	March
Austria	3,00	June
South Africa	6,30	July
Egypt	10,61	February
Venezuela	60,90	May

[Adapted from en.wikipedia.org/wiki/List_of_countries_by_inflation_rate]

- 2.1.1 A South African tourist visited Switzerland during July 2014 and paid the equivalent of R75 for a standard cup of coffee when the exchange rate was R14,2417 per euro.

Determine (in euros) the expected price of a standard cup of coffee in Switzerland during 2015, if the inflation rate did not change. (3)

- 2.1.2 The annual inflation rate for flat rental in Egypt remained unchanged for the past few years and is identical to the 2014 annual inflation rate.

- (a) Calculate the monthly rental during 2014 for a flat which had a monthly rental of 1654EGP (Egyptian pound) two years ago. (4)
- (b) Mr Lesufi owns similar flats in South Africa. During 2012 the monthly rental for these flats was R4 613,20 and during 2014 the monthly rental was R5 212,77.

Mr Lesufi claims that the percentage monthly rental increase is half the percentage rental increase in Egypt over the same two years.

Verify whether his claim is valid. Show ALL necessary calculations (7)

2.2 The month-on-month inflation rates in Cyprus are given in TABLE 3 below.

TABLE 3: Month-on-month inflation rates (%) for Cyprus from July 2013 to August 2014

Jul/13	Aug/13	Sep/13	Oct/13	Nov/13	Dec/13	Jan/14
-0,31	-0,95	-1,03	-1,6	-2,1	-2,3	-2,89
Feb/14	Mar/14	Apr/14	May/14	Jun/14	Jul/14	Aug/14
-2,58	-2,29	-1,6	-1,36	-1,19	-0,58	-0,72

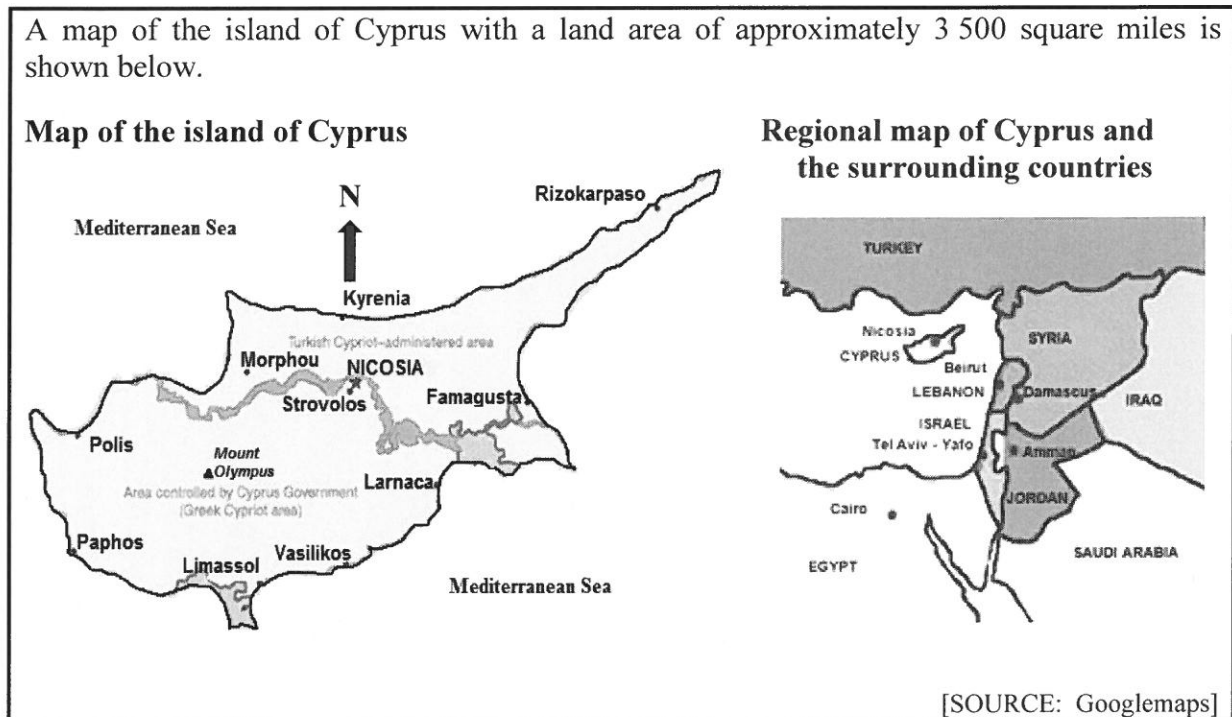
[Adapted from www.tradingeconomics.com/cyprus/inflation-cpi]

2.2.1 Calculate the range of the inflation rates from July 2013 to August 2014. (3)

2.2.2 The horizontal bar graph representing the mean quarterly inflation rates for July 2013 to September 2013 has already been drawn on ANSWER SHEET A.

Use the information in TABLE 3 to complete the horizontal bar graph, representing the mean quarterly inflation rates for the period October 2013 to June 2014 on ANSWER SHEET A. Show ALL necessary calculations. (8)

2.3 A map of the island of Cyprus with a land area of approximately 3 500 square miles is shown below.



Use the maps above to answer the following questions.

2.3.1 Convert the land area of Cyprus to the nearest square kilometre if 1 km = 0,62139 miles. (3)

2.3.2 If Syria is located to the east of Cyprus, name the town in Cyprus that is furthest west of Syria. (2)

[30]

QUESTION 3

3.1

A hospital in South Africa has a helipad that is used for emergency helicopter landings, as shown in the picture alongside.

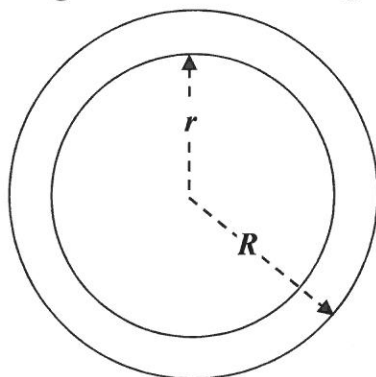
Picture of a helicopter landing on a helipad



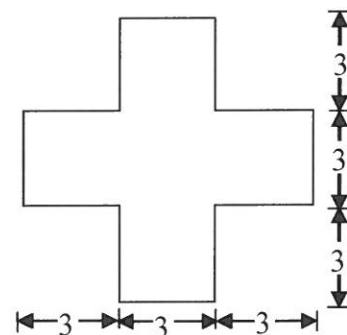
The maintenance manager uses the following layout plan to determine the quantity of paint required to re-paint the white circular ring and the white rectangular cross.

LAYOUT PLAN OF THE AREA THAT NEEDS TO BE RE-PAINTED

Diagram of the white ring



Dimensions (in m) of the white cross



The two circles forming the ring have the same centre. The radius (r) of the inner circle is 7,34 m and the radius (R) of the outer circle is 7,65 m.

The following formulae may be used:

Area of ring = $\pi \times (R^2 - r^2)$, using $\pi = 3,142$

Area of square = **side** \times **side**

Area of rectangle = **length** \times **breadth**

The manager obtained the following information from a local paint supplier:

- The white paint is only available in 5 litre tins.
- A 5 ℓ tin of paint cost R675 (excluding VAT).
- One litre of paint covers an area of 8 m².
- This paint can be applied to any surface.

3.1.1 Determine (to the nearest m²) the total surface area that needs to be re-painted. (8)

3.1.2 The manager claims that the total cost (including VAT) of the paint would be NOT more than R2 500,00 (if TWO coats of paint are applied). Verify if his claim is correct. (7)

- 3.2 The manager noticed that the cylindrical tins of paint are placed in rectangular crates for delivery to the store. The tins form a rectangular pattern when placed on the base of the crate.

Net of the surface area of the crate with inside measurements in mm

3-dimensional sketch of a rectangular crate

5 litre paint tin

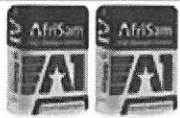
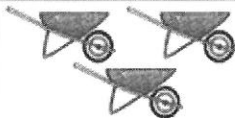
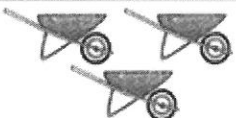

The dimensions of the tin are as follows:
radius = 91,5 mm
height = 222 mm

Determine the maximum number of tins of paint that can be packed in ONE crate. (4)

3.3

- The manager also has to erect a wire fence around a section of the helipad.
- The wire fence is attached to poles that are cemented into the ground.
 - These poles are planted in square-based rectangular holes to a depth of 610 mm in the ground.
 - A concrete mix is used to secure these poles in the ground.
 - The ratio of the number of bags of cement to the number of wheelbarrows of coarse sand and stone is shown below.

Ratio for the concrete mix

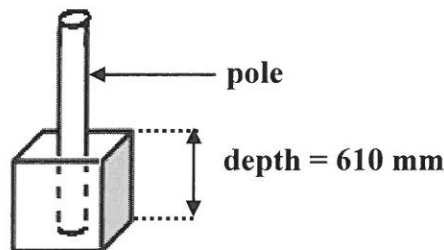
High strength cement	Coarse sand	Stone	Approximate yield
			
2 Bags (1 = 50 kg)	3 Wheelbarrows	3 Wheelbarrows	0,3 m ³

[Source: www.afrisam.co.za]

The following formula may be used:

Volume = (side)² × depth

Sketch of pole cemented in the hole



3.3.1 Calculate the length of the side (in mm) of the hole, if the volume of soil removed to make the hole is 0,1525 m³. (4)

3.3.2 The manager decided to buy 10 bags of cement to mix the concrete to fill the holes. Each pole occupies a volume of 0,03 m³ in the prepared hole. Verify, with calculations, whether he bought enough bags of cement to secure the 12 fencing poles in the 12 holes. (6)

- 3.4 During the 2014/2015 tax year the 48-year-old manager earned an average net taxable monthly salary of R5 500,00. His monthly payslip reflects a deduction of R70,50 for personal income tax.

The personal income tax rates for the 2014/2015 tax year are set out in the tax table below.

Taxable Income (R)	Rate of Tax	
0 to 174 550	18% of taxable income	
174 551 to 272 700	R31 419 + 25% of taxable income above R174 550	
272 701 to 377 450	R55 957 + 30% of taxable income above R272 700	
377 451 to 528 000	R87 382 + 35% of taxable income above R377 450	
528 001 to 673 100	R140 074 + 38% of taxable income above R528 000	
673 101 and above	R195 212 + 40% of taxable income above R673 100	
Rebate		
Below age 65	Age 65 to below 75	Age 75 and over
R12 726	R7 110	R2 367

[Source: SARS]

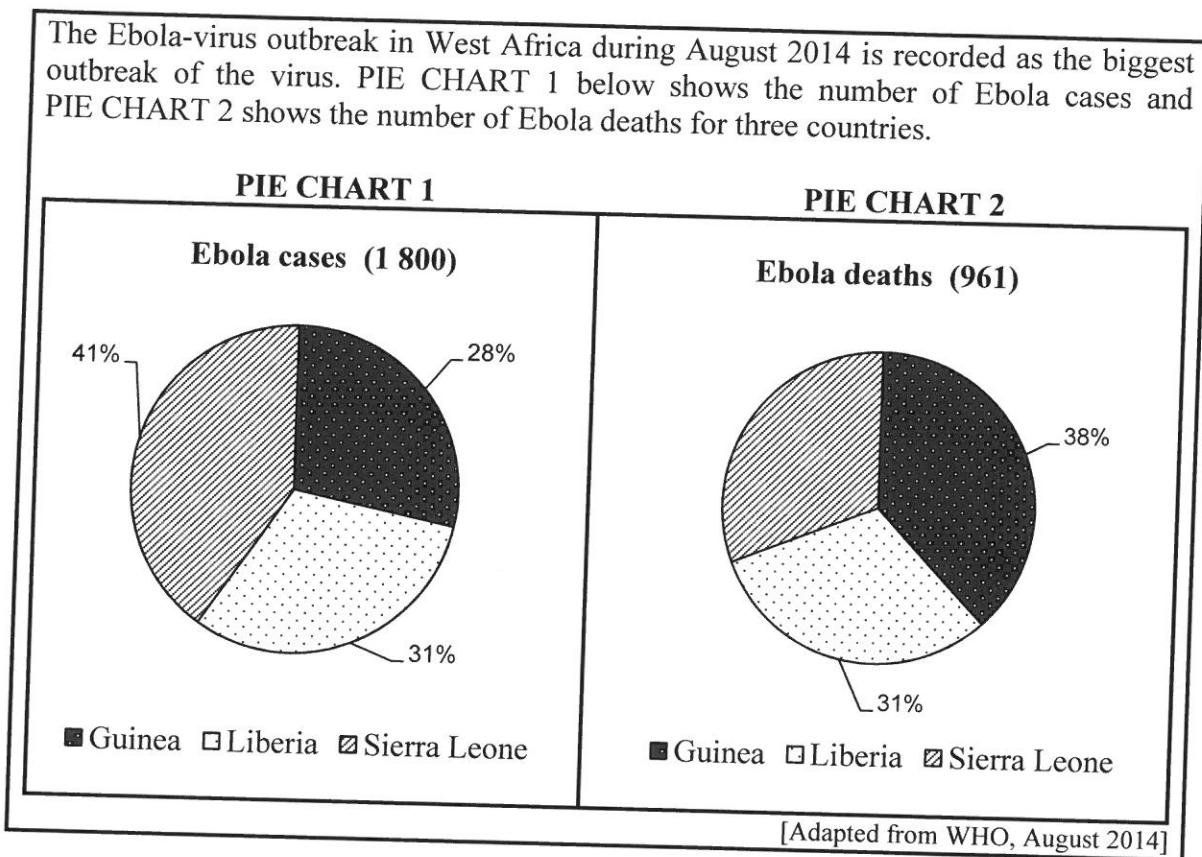
Verify whether his monthly personal income tax deduction, as shown on his payslip, is correct. Show ALL calculations.

(6)
[35]

QUESTION 4

4.1

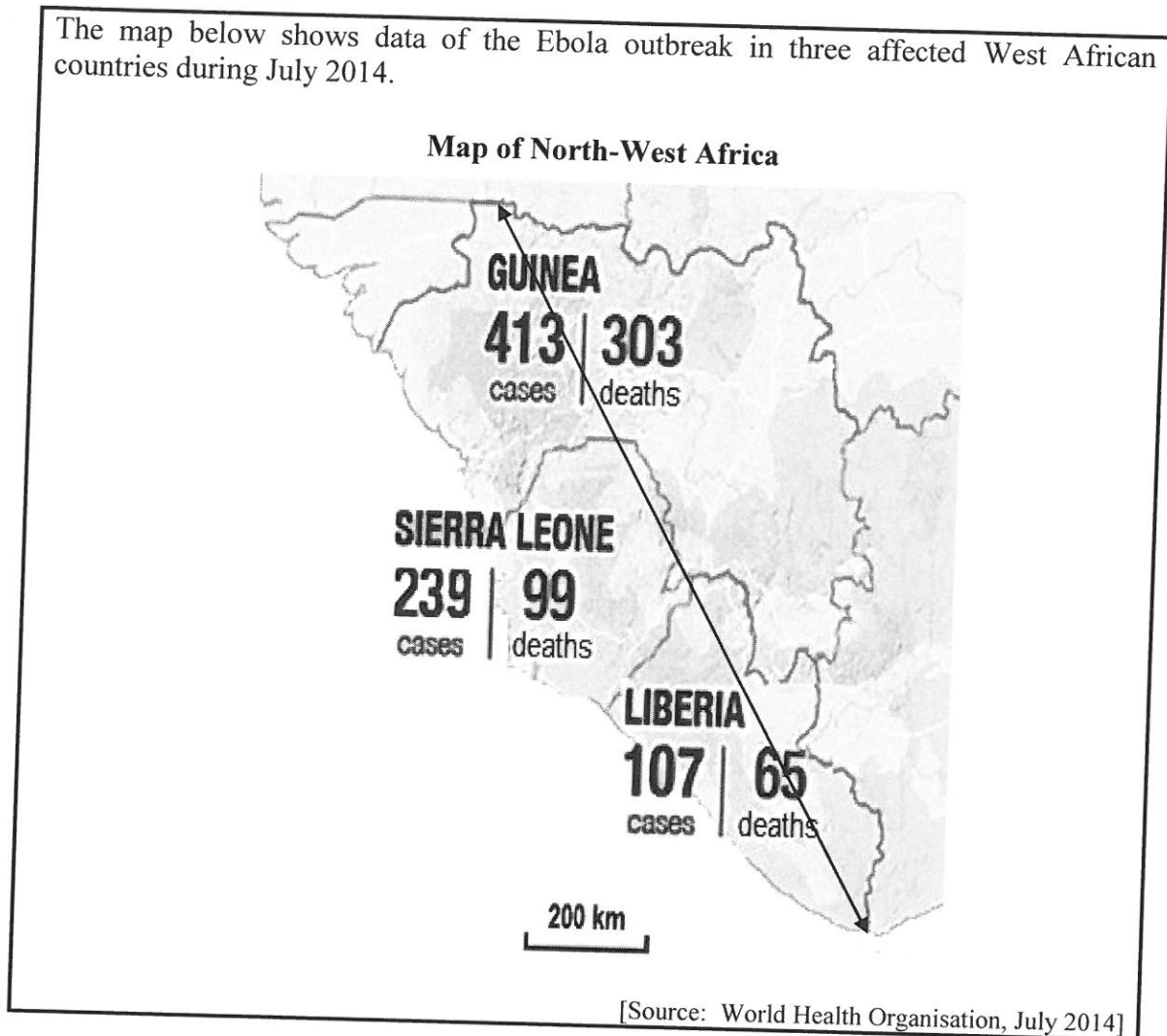
The Ebola-virus outbreak in West Africa during August 2014 is recorded as the biggest outbreak of the virus. PIE CHART 1 below shows the number of Ebola cases and PIE CHART 2 shows the number of Ebola deaths for three countries.



Study the pie charts above to answer the following questions.

- 4.1.1 The total number of Ebola deaths for all three countries was recorded as 961. Calculate the total number of Ebola deaths for Sierra Leone during August 2014. (3)
- 4.1.2 During August 2014, Nigeria, also in West Africa, had no reported cases of Ebola. How can this data about Nigeria be represented on a pie chart? (2)
- 4.1.3 Calculate the percentage of Ebola cases that ended up in Ebola deaths. (3)
- 4.1.4 Motivate whether it can be said with certainty that all Liberia's Ebola cases ended up being Ebola deaths. Show ALL calculations. (4)

- 4.2 The map below shows data of the Ebola outbreak in three affected West African countries during July 2014.



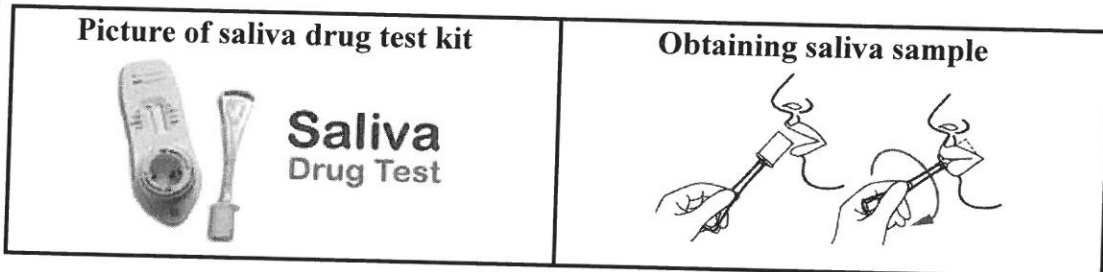
Use the map and data above to answer the following questions.

- 4.2.1 Arrange the data of the percentage of deaths of the THREE countries in ascending order. (5)
- 4.2.2 Determine, using accurate measurement, the actual distance (to the nearest km) between the most northern part of Guinea to the most southern part of Liberia, as represented by the arrow on the map. (5)

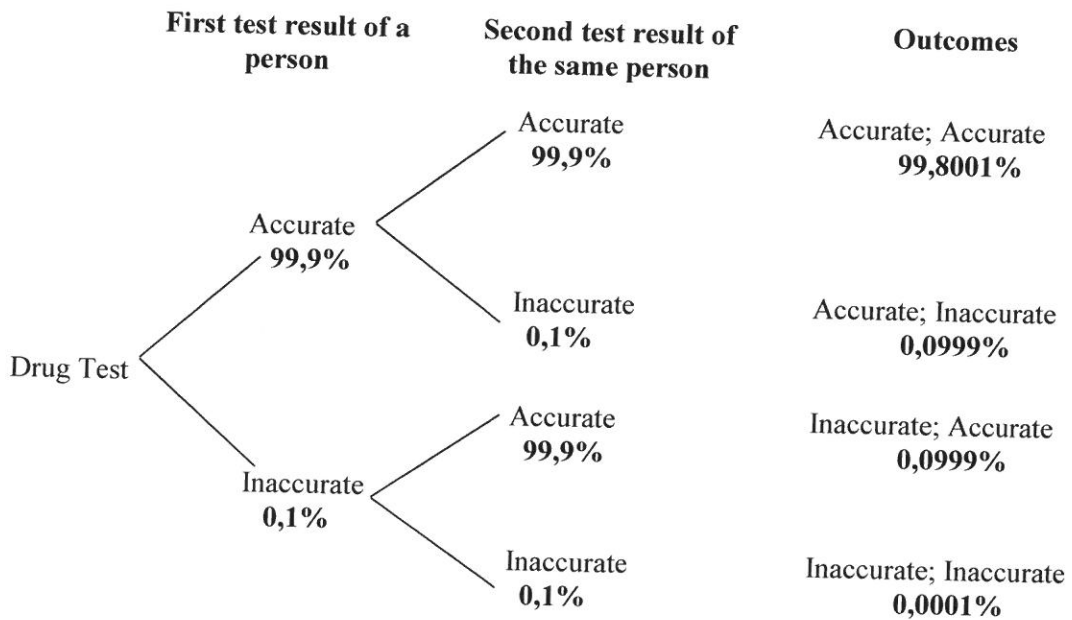
4.3

Drug-testing kits are sometimes used in schools. The current drug test which uses blood or urine samples is considered to be too personal (invasive). A new drug test, the Saliva Drug Test (SDT), uses saliva and is considered to be less personal than the current test. It can be used to test for up to 9 different types of drugs.

The pictures below show the drug-testing instrument and the swab used to take a sample of saliva.



The tree diagram below shows the outcomes of the SDT after testing the saliva of the same person twice.



Study the tree diagram above to answer the following questions.

- 4.3.1 Give the probability (as a common fraction) of obtaining both inaccurate outcomes after the same person has been tested twice. (2)
- 4.3.2 Determine the probability that the outcome will be ONE accurate and ONE inaccurate after the same person has been tested twice. (2)
- 4.3.3 Presently a certain school uses a different kind of drug test that has an accuracy rate of 97%. This school is considering using the SDT. The school counsellor commented that the difference between the accuracy rates of the two tests is negligible.

Critique his comment by determining how many less inaccurate results will be obtained if the SDT is applied only once to a sample of 1 000 learners.

(6)
[32]

QUESTION 5

Mr Rich is interested in buying a block of flats in New York for investment purposes. After a 5-year period the block of flats will be sold back to the original owner at a cost of \$17 980 341.

After extensive research he used TABLE 5 on ANNEXURE B which shows projected data based on actual data.

Use ANNEXURE B to answer the following questions.

5.1 Determine the general vacancy amount for 2017. (2)

5.2 The break-even occupancy percentage formula below indicates the percentage of the block of flats that must be rented out in order to meet all expenses and loan obligations.

$$\text{The break-even occupancy percentage} = \frac{\text{Projected total expenses} + \text{Bank loan repayment}}{\text{Possible rental income}} \times 100\%$$

Use the formula above to calculate the break-even occupancy percentage for 2016. (3)

5.3 Calculate the possible projected monthly rental income per bachelor flat for 2018. (4)

5.4 It is predicted that in 2019 all the two-bedroom flats will be occupied and two bachelor flats will be vacant for the entire year.

Mr Rich states that the predicted ratio of the number of unoccupied flats is as follows:

$$\text{bachelor flat} : \text{one-bedroom flat} = 1 : 4$$

Verify whether this predicted ratio is correct showing ALL working details. (6)

5.5 The line graph of the projected net operating income for the period 2016 to 2020 has been drawn on ANSWER SHEET B using the data from TABLE 5.

5.5.1 Use the same grid to draw another line graph representing the projected total expenses for the same period. (6)

5.5.2 Compare the trends in the projected annual expense and the projected annual income during this period. (3)

[24]

TOTAL: 150

ANNEXURE A

QUESTION 1.1

TABLE 1: Tourist class train routes, schedules and single fares

Cape Town to Johannesburg			
Days running: Wed./Thu./Fri./Sun.			
Stations	Single ticket cost in R	Arrival time	Departure time
Cape Town to ...			10:00 day1
Bellville	90	10:25 day1	10:35 day1
Huguenot	100	11:15 day1	11:19 day1
Wellington	100	11:30 day1	11:36 day1
Worcester	120	13:10 day1	13:30 day1
Matjiesfontein	160	15:31 day1	15:36 day1
Laingsburg	170	16:00 day1	16:10 day1
Beaufort West	240	19:25 day1	19:50 day1
Hutchinson	290	21:34 day1	21:39 day1
De Aar	330	23:25 day1	23:45 day1
Kimberley	430	03:32 day2	03:46 day2
Warrenton	460	04:43 day2	04:48 day2
Christiana	470	05:16 day2	05:21 day2
Klerksdorp	550	08:14 day2	08:26 day2
Potchefstroom	570	09:08 day2	09:13 day2
Krugersdorp	620	11:20 day2	11:25 day2
Johannesburg	630	12:16 day2	

[Source: www.shosholoza.co.za]

ANNEXURE B

QUESTION 5

TABLE 5: Projected data based on actual data for five years

Sources of projected values		Annual End of Year Total Amounts in American Dollars (US\$)				
		31/12/2016	31/12/2017	31/12/2018	31/12/2019	31/12/2020
Possible rental income	40 bachelor flats	312 000	315 120	318 271	321 454	324 688
	60 one-bedroom flats	864 000	881 280	898 906	916884	935 221
	40 two-bedroom flats	1 008 000	1 028 160	1 048 723	1 069 698	1 091 092
Total possible rental income		2 184 000	2 224 560	2 265 900	2 308 036	2 351 001
General vacancy ¹		196 560	...	158 613	138 483	117 569
Projected actual rental income		1 987 440	2 046 595	2 107 287	2 169 553	2 233 432
Projected total expenses ²		670 580	679 432	688 436	697 594	706 909
Projected net operating income		1 316 860	1 367 163	1 418 851	1 471 959	1 526 524
Bank loan repayment ³		1 053 154	1 053 154	1 053 154	1 053 154	11 453 354

[Adapted from <http://www.propertymetrics.com>]**Explanation of notes:**

- Note 1: Projected loss of income due to flats not rented
 Note 2: Expenses due to salaries and general maintenance
 Note 3: Amount payable to the bank

ANSWER SHEET A

QUESTION 2.2.2

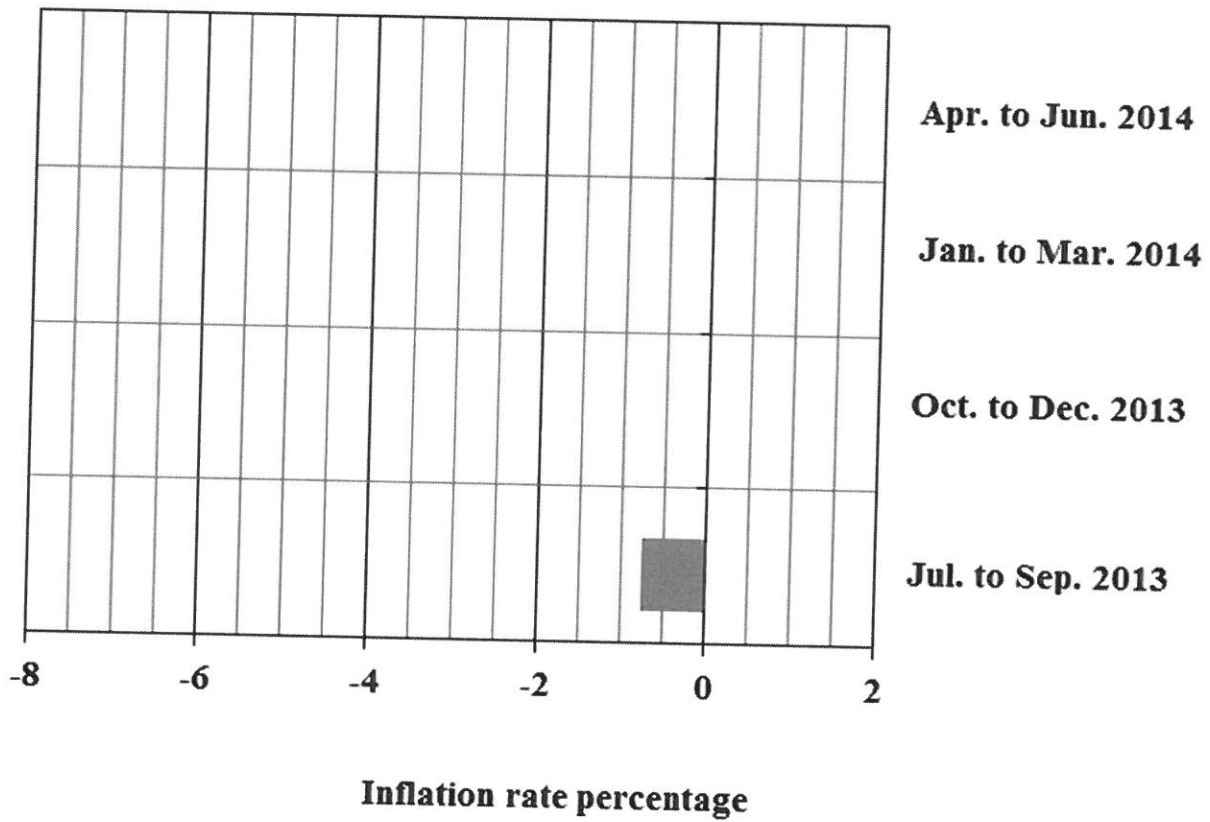
CENTRE NUMBER:

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EXAMINATION NUMBER:

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**Mean quarterly inflation rate percentages for Cyprus
from July 2013 to June 2014**



ANSWER SHEET B

QUESTION 5.5

CENTRE NUMBER:

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	2016	2017	2018	2019	2020
Projected Total Expenses	\$670 580	\$679 432	\$688 436	\$697 594	\$706 909
Projected Net Operating Income	\$1 316 860	\$1 367 163	\$1 418 851	\$1 471 959	\$1 526 524

Projected Net Operating Income and Expenses

