

basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

**NATIONAL
SENIOR CERTIFICATE**

GRADE 12

MATHEMATICAL LITERACY P2

NOVEMBER 2017

MARKS: 150

TIME: 3 hours

This question paper consists of 12 pages, an addendum with 6 annexures and 1 answer sheet.



INSTRUCTIONS AND INFORMATION

1. This question paper consists of FOUR questions. Answer ALL the questions.
2. 2.1 Use the ANNEXURES in the ADDENDUM to answer the following questions:

ANNEXURE A for QUESTION 1.1
ANNEXURE B for QUESTION 1.2
ANNEXURE C for QUESTION 2.3
ANNEXURE D for QUESTION 3.1
ANNEXURE E for QUESTION 3.2
ANNEXURE F for QUESTION 4.2
- 2.2 Answer QUESTION 4.2.2 on the ANSWER SHEET attached.
- 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 ANNEXURE A shows a summary of the Income and Expenditure statement with notes of the South African National Blood Service (SANBS) for the financial year ended 31 March 2016. Some of the amounts have been omitted.

Use ANNEXURE A and the information above to answer the questions that follow.

- 1.1.1 Communication costs decreased by 4,402% from 2015 to 2016.
Calculate (to the nearest thousand rand) the communication costs for 2016. (4)
- 1.1.2 The SANBS imports 75% of its product testing material and consumables. Explain what possible impact a weakening of the rand will have on their total profit for the year. (2)
- 1.1.3 Compare, showing ALL calculations, the 2015 and 2016 percentage profit for the SANBS.

You may use the following formula:

$$\text{Percentage profit} = \frac{\text{Annual Total Profit}}{\text{Total Annual Primary Income}} \times 100\% \quad (5)$$

- 1.2 ANNEXURE B shows the individual tax rates for the 2016/2017 tax year.

One of the SANBS directors, who is 68 years old, earned a taxable income of R663 000 during the 2016/2017 tax year.

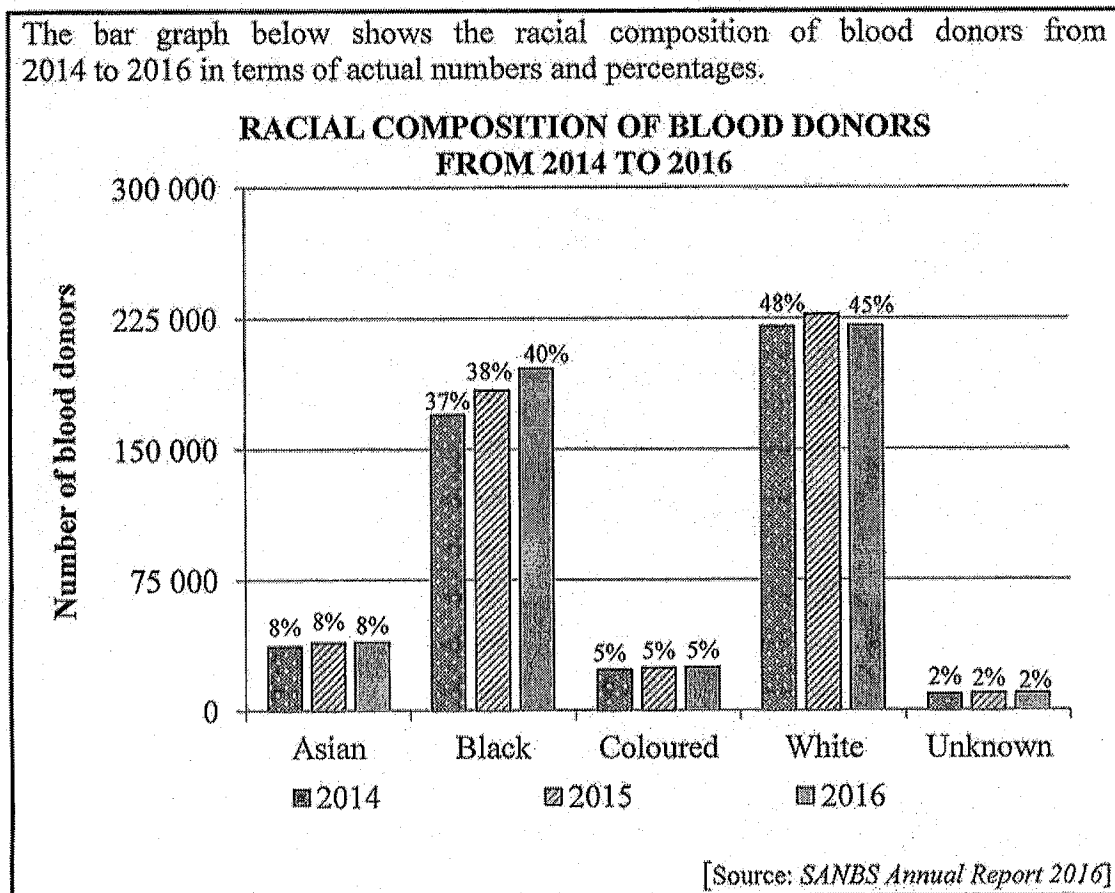
Calculate the total income tax this director has to pay on his annual taxable income (ignore medical aid credits). (6)

- 1.3 During 2016, a total of 110 000 South Africans in the age group 16 to 19 years donated blood. The SANBS decided to appeal to eligible high-school learners to donate blood. Their target is to increase the number of donors in this age group by an annual growth rate of 9,6%, compounded over the next two years.

Calculate, showing ALL calculations, the targeted number of blood donors in this age group for 2018. (4)



- 1.4 The bar graph below shows the racial composition of blood donors from 2014 to 2016 in terms of actual numbers and percentages.



Use the bar graph above to answer the questions that follow.

- 1.4.1 Give a possible explanation for including an 'Unknown' category as a racial group. (2)
- 1.4.2 Describe a possible trend relating to the percentage black donors. (2)
- 1.4.3 Explain why it cannot be said with certainty that the number of Asian donors remained the same from 2014 to 2016. (2)
- 1.4.4 The total number of donors in 2016 was 490 914. This total donor base grew marginally from the previous year by 1,02%.
- (a) Calculate the number of donors in 2015. (2)
- (b) Hence, determine (rounded off to the nearest 10) the number of white donors in 2015. (4)



1.5

Human blood is classified into eight main blood groups. The SANBS is regularly appealing to eligible people to donate blood.

TABLE 2 below shows the distribution of the eight different blood groups in the South African population.

TABLE 3 below shows the compatibility between the blood group of the donor and the possible recipient.

TABLE 2: DISTRIBUTION OF BLOOD GROUPS IN THE SOUTH AFRICAN POPULATION

	BLOOD GROUP							
	O ⁺	O ⁻	A ⁺	A ⁻	B ⁺	B ⁻	AB ⁺	AB ⁻
% Distribution	39	6	32	5	12	2	3	1

TABLE 3: COMPATIBILITY BETWEEN DONOR BLOOD GROUP AND POSSIBLE RECIPIENT BLOOD GROUP

		DONOR BLOOD GROUP							
		O ⁺	O ⁻	A ⁺	A ⁻	B ⁺	B ⁻	AB ⁺	AB ⁻
RECIPIENT BLOOD GROUPS	AB ⁺	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	AB ⁻		Yes		Yes		Yes		Yes
	A ⁺	Yes	Yes	Yes	Yes				
	A ⁻		Yes		Yes				
	B ⁺	Yes	Yes			Yes	Yes		
	B ⁻		Yes				Yes		
	O ⁺	Yes	Yes						
	O ⁻		Yes						

[Source: SANBS Annual Report 2016]

- 1.5.1 Write down the probability of randomly selecting a South African who is classified in the **O** blood group. (2)
- 1.5.2 Identify the blood group of a recipient that has a 100% probability of being able to receive blood from any donor blood group. (2)
- 1.5.3 Verify, with a reason, whether it is most likely for an **O⁻** blood group recipient to be able to receive blood from any donor blood group. (3)

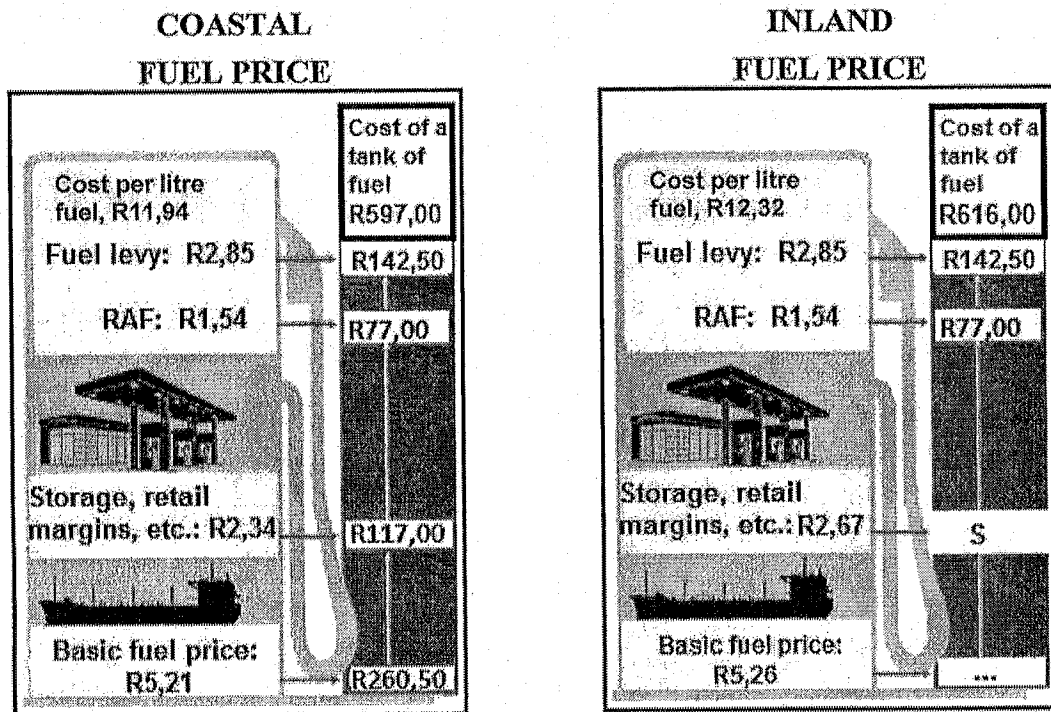
[40]



QUESTION 2

2.1

The cost of fuel in South Africa is made up of the basic fuel price and other costs, as shown in the infographics below.



Other costs include:

- Transport
- Customs and excise duties
- Retail margins paid to fuel station owners
- Secondary storage
- Fuel levy
- Road Accident Fund (RAF) levy

[Adapted from SARS, RAF, SA Petroleum Industry Association, National Treasury]

Use the information above to answer the questions that follow.

- 2.1.1 Explain why the inland and coastal fuel prices are not the same. (2)
- 2.1.2 Calculate the missing value S. (3)
- 2.1.3 Jabu's vehicle has an average fuel consumption of 7,3 litres per 100 km.

Jabu stated that it cost her R50 more for fuel to travel 1 250 km in an inland region than it cost to travel the same distance in the coastal region.

Verify, showing ALL calculations, whether Jabu's statement is valid. (5)



ANSWER SHEET

QUESTION 4.2.2

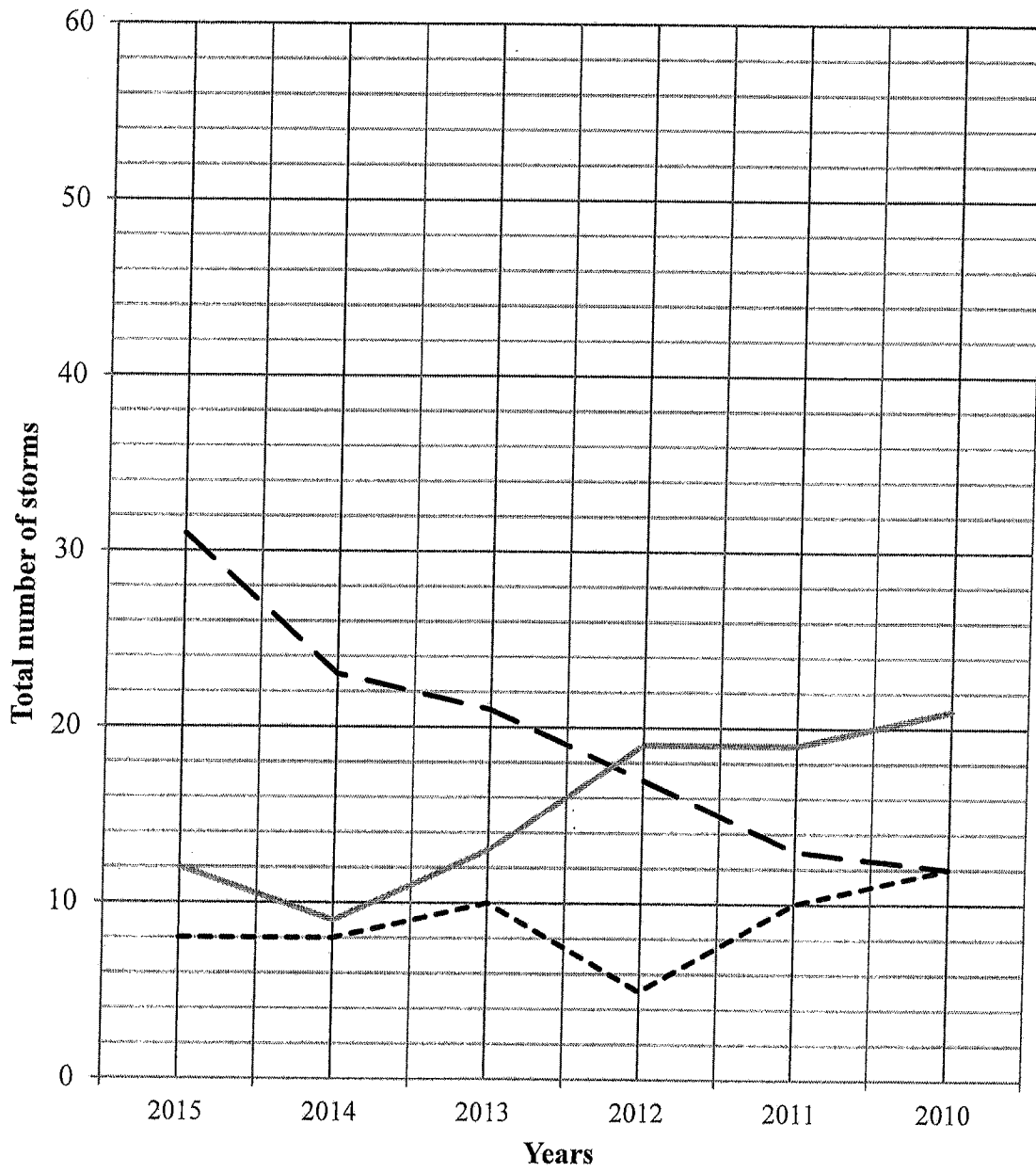
CENTRE NUMBER:

--	--	--	--	--	--	--	--

EXAMINATION NUMBER:

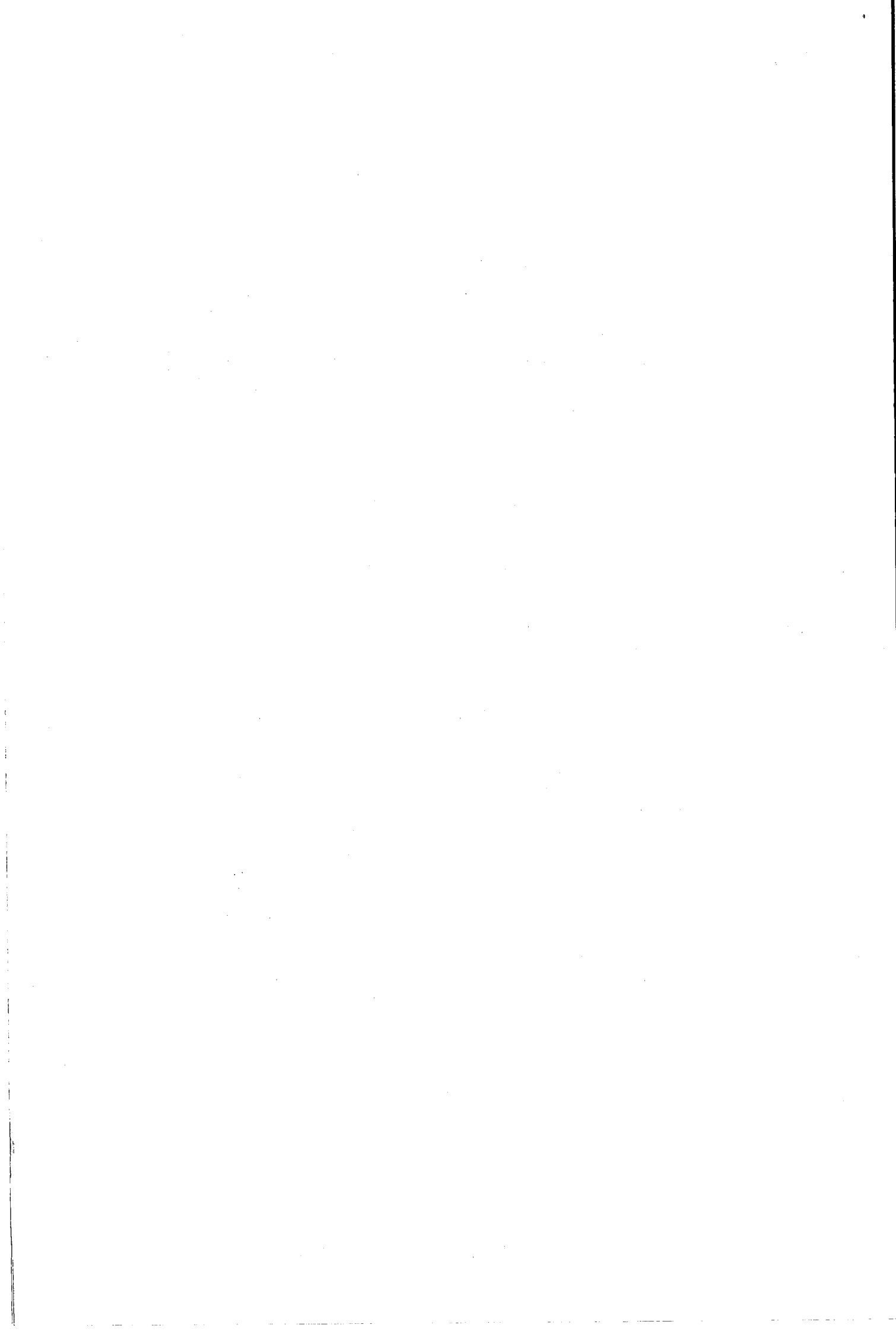
--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

TOTAL NUMBER OF STORMS PER YEAR FOR WORLD OCEANIC REGIONS



--- Indian — Eastern Pacific North Atlantic





2.2

In his 2017/2018 budget speech the Minister of Finance announced an increase in fuel levies and stated that the projected income from the fuel levies would be R70,9 billion. The income from the fuel levies for 2016/2017 was R54 billion.

2.2.1 Determine the percentage increase in the income received from the fuel levies for 2017/2018. (3)

2.2.2 Calculate (to the nearest billion rand) the total national budgeted income for the financial year 2017/2018 if the ratio of the income received from fuel levies to other income received is 7 : 118. (4)

2.3

TABLE 4 in ANNEXURE C shows the ranking for a sample of 11 countries according to:

- Mean fuel price per gallon in Russian rouble
- Affordability of a gallon of fuel as a percentage of the mean daily wage in each country
- Percentage mean income spent on fuel

Use ANNEXURE C to answer the questions that follow.

2.3.1 Identify the country that is the median of the percentage mean income spent on fuel. (2)

2.3.2 Determine the interquartile range of the mean income spent on fuel. (4)

2.3.3 Give ONE valid reason why the sample is considered unbiased with respect to the percentage mean income spent on fuel. (2)

2.3.4 Determine the difference (in Russian rouble) between the mean daily wage in India and South Africa. (6)

2.3.5 A learner's solution for calculating the range (in rand per gallon) of the mean fuel prices is shown below.

LEARNER'S SOLUTION	
Range =	$425,52 - 21,44$
	$= 404,08$ Russian rouble
404,08 Russian rouble =	$404,08 \div 0,016$
	$= 25\,255$ euro
25 255 euro =	$25\,255 \times 0,07$
	$= R1\,767,85$

Verify, showing ALL calculations, whether the learner's solution is correct. (6)

[37]



QUESTION 3

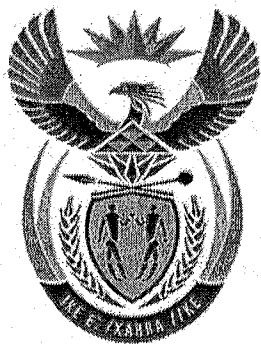
3.1

ANNEXURE D shows the location of Lizette's property, marked **H** (which includes the house), on the map of Mandela Park. The new extension is indicated using dark, bolder lines, as shown on the map. An enlargement of a section of the main map is also shown.

Use ANNEXURE D to answer the questions that follow.

- 3.1.1 If the numbering system for the properties follows the same pattern, as shown on the main map, determine the street address of the property marked **H**. (3)
- 3.1.2 Use measurement and the given scale to determine the actual dimensions (in metres) of the rectangular property marked **H**. (6)
- 3.1.3 Lizette stated that the enlargement is 5 times bigger than the corresponding section on the main map. (4)
- Verify, showing ALL calculations, whether her statement is valid.





basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

**NATIONAL
SENIOR CERTIFICATE**

GRADE 12

MATHEMATICAL LITERACY P2

ADDENDUM

NOVEMBER 2017

This addendum consists of 7 pages with 6 annexures.



ANNEXURE A

QUESTION 1.1

SUMMARY OF INCOME STATEMENT AND EXPENDITURE STATEMENT FOR
THE YEAR ENDED 31 MARCH 2016

	Notes	2016 R'000	2015 R'000
Primary income	1	2 403 509	2 250 041
Other income		120 915	86 609
Primary expenses	2	(2 163 571)	(1 993 476)
Other expenses: Interest paid		(202)	(172)
Total annual profit		360 651	342 534

NOTES TO THE ANNUAL FINANCIAL STATEMENTS

	2016 R'000	2015 R'000
1. Primary income		
Service fees	...	2 249 081
Product sales	...	960
Total annual primary income	2 403 509	2 250 041
2. Primary expenses		
Advertising and promotions	(67 257)	(56 401)
Communication costs	...	(32 187)
Consumables	(640 601)	(582 823)
Depreciation	(69 866)	(64 748)
Employee benefits	(953 592)	(888 662)
Freight	(135 768)	(125 736)
Rent	(34 087)	(30 115)
Product testing	(55 267)	(54 252)
Other expenses – Includes bad debts written off, computer costs, foreign exchange variance, insurance, repairs and maintenance	(176 363)	(158 552)
Total annual primary expenses	(2 163 571)	(1 993 476)

[Adapted from 2016 SANBS Annual Report]

NOTE: Brackets () indicate deduction.



ANNEXURE B

QUESTION 1.2

TABLE 1: INDIVIDUAL TAX RATES FOR THE 2016/2017 TAX YEAR

TAXABLE ANNUAL INCOME	RATES OF TAX
R0 –R188 000	18% of each R1
R188 001–R293 600	R33 840 + 26% of the amount above R188 000
R293 601–R406 400	R61 296 + 31% of the amount above R284 100
R406 401–R550 100	R96 264 + 36% of the amount above R406 400
R550 101–R701 300	R147 996 + 39% of the amount above R550 100
R701 301 and above	R206 964 + 41% of the amount above R701 300
TAX REBATES	
Primary rebate	R13 500
Secondary rebate (for persons 65 years and older)	R7 407
Tertiary rebate (for persons 75 years and older)	R2 466

[Source: SARS pocket guide, 2016/2017]



ANNEXURE C

QUESTION 2.3

TABLE 4: COMPARISON OF THE MEAN FUEL PRICES PER COUNTRY BY PRICE, AFFORDABILITY AND PERCENTAGE OF MEAN INCOME SPENT ON FUEL

COUNTRY	MEAN FUEL PRICE		AFFORDABILITY		MEAN INCOME SPENT ON FUEL	
	RUSSIAN ROUBLE PER GALLON	RANKING	GALLON COST AS A PERCENTAGE OF MEAN DAILY WAGE	RANKING	PERCENTAGE	RANKING
Venezuela	21,44	1	0,07	1	0,02	1
China	237,93	22	19,44	50	0,52	3
Norway	425,52	61	3,63	10	0,63	7
Nigeria	92,33	5	22,57	51	0,91	14
Italy	395,98	59	8,57	29	1,12	20
India	236,51	20	93,76	61	1,23	25
Chile	260,87	24	12,52	38	2,03	46
Russia	135,67	8	9,01	30	2,17	47
Canada	226,30	18	3,32	9	2,97	58
Mexico	193,45	14	13,92	44	3,62	60
South Africa	237,35	21	26,20	55	4,11	61

[Adapted from bloomberg.com/graphic, 20 Feb. 2017]

EXCHANGE RATES:

1 Russian rouble = 0,016 euro

1 South African rand = 0,070 euro

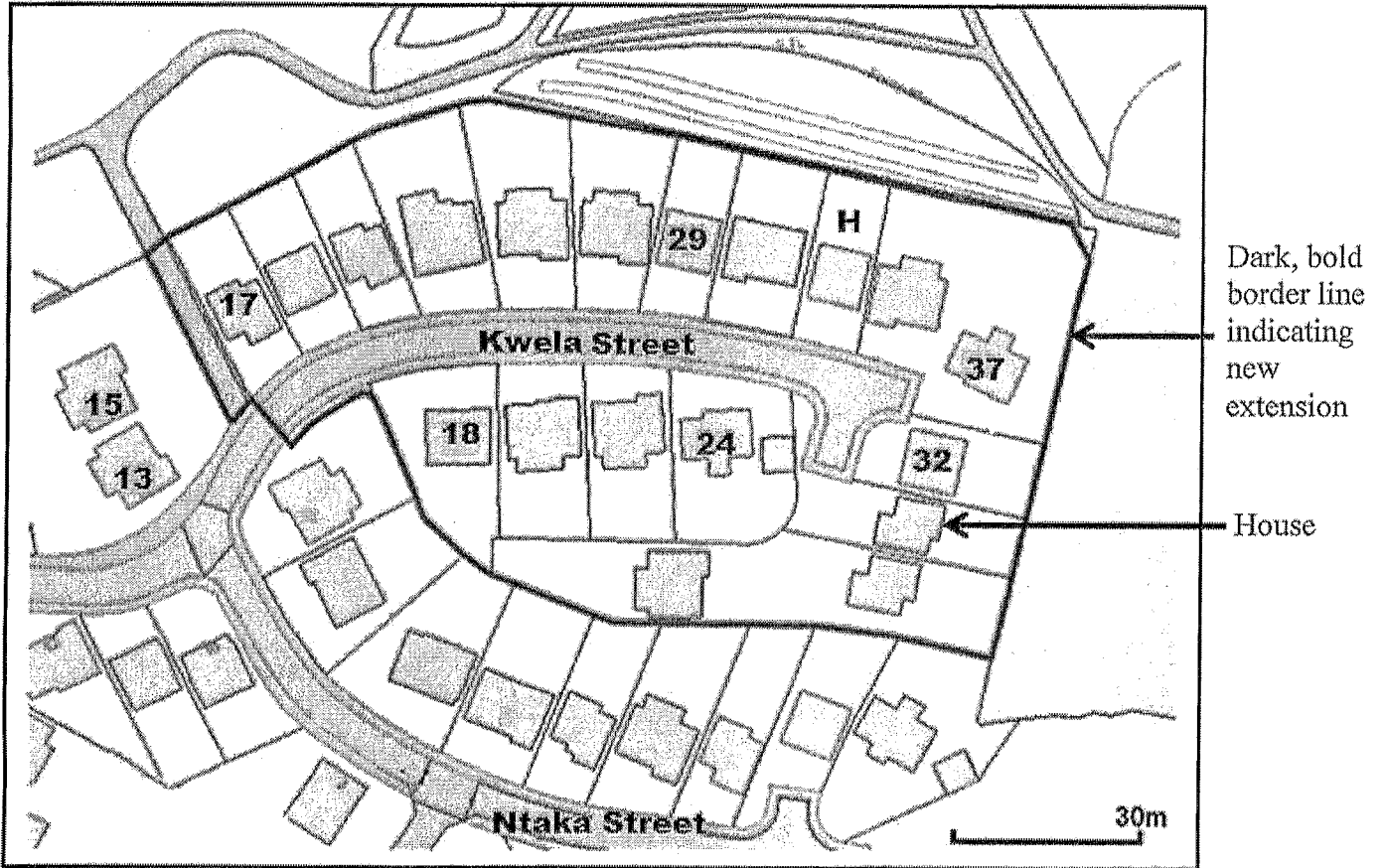
[Source: Currency converter, 4 February 2017]



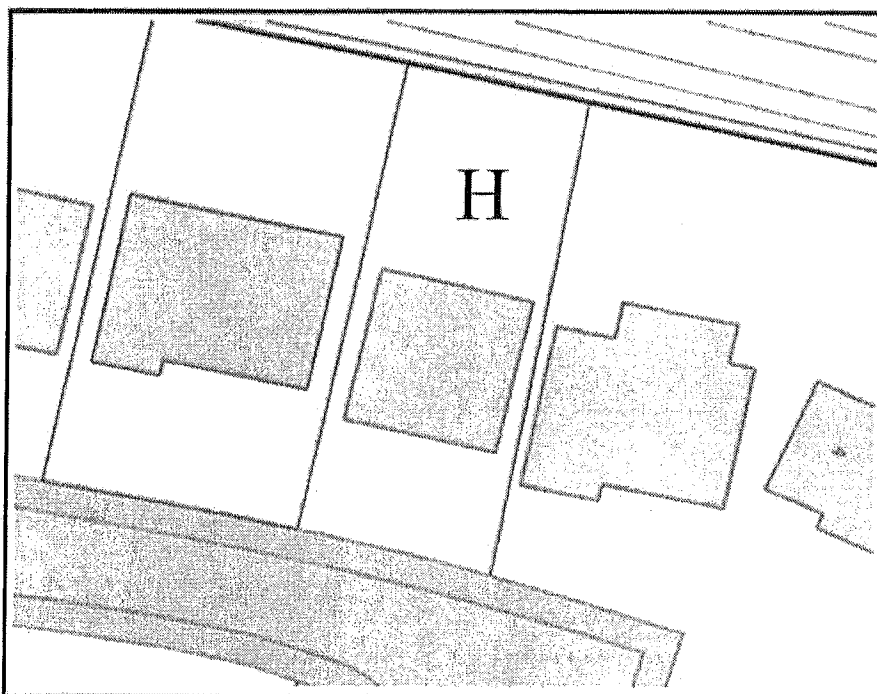
ANNEXURE D

QUESTION 3.1

Map of Mandela Park Extension



Enlargement of a section of the main map



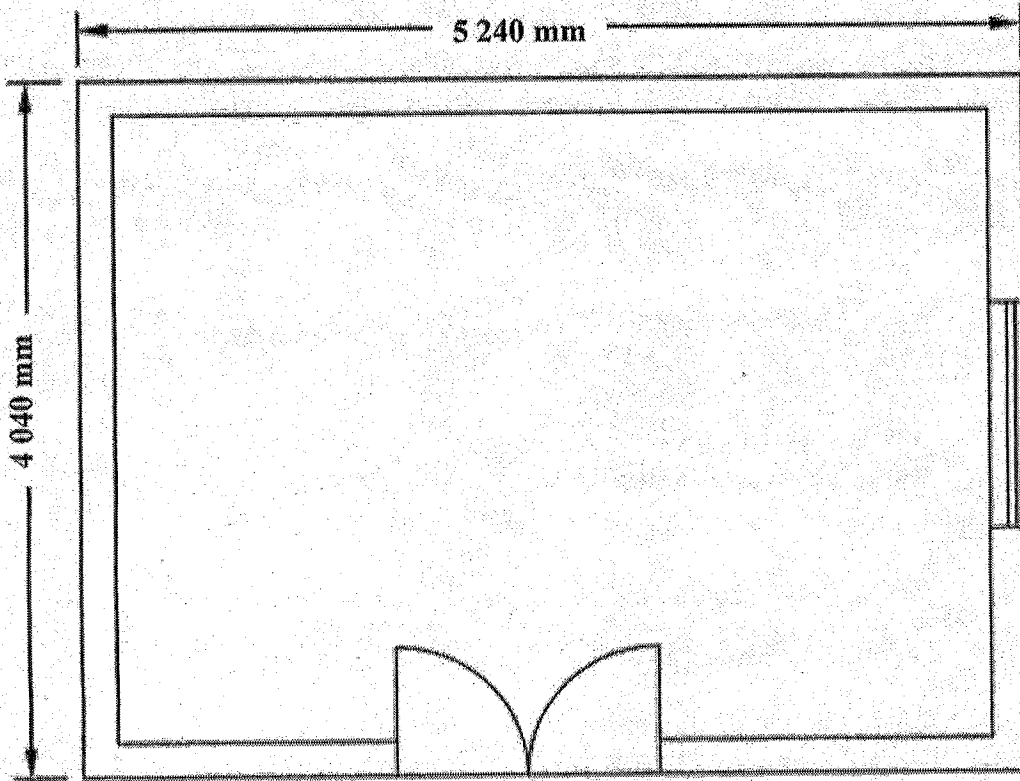
[Source: [https://uniformonline.harrogate.gov.uk/arcgis/rest/services/Base Mapping/](https://uniformonline.harrogate.gov.uk/arcgis/rest/services/Base%20Mapping/)]



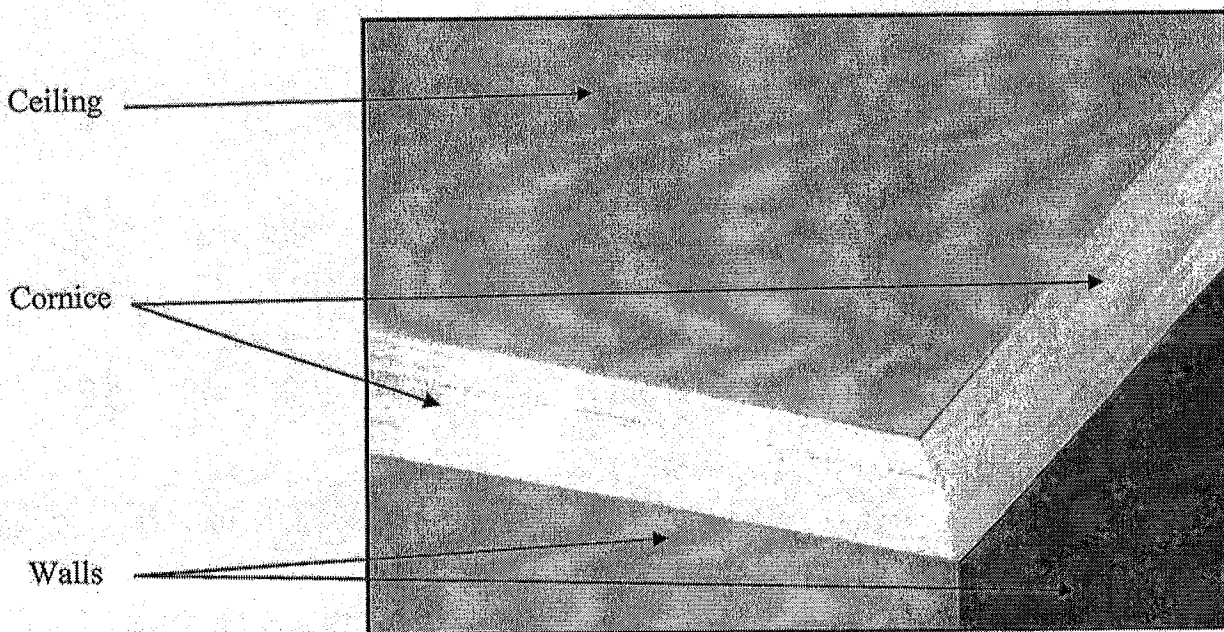
ANNEXURE E

QUESTION 3.2

Floor plan of a rectangular room showing exterior measurements



Part of a room showing the ceiling with the position of the cornice



ANNEXURE F

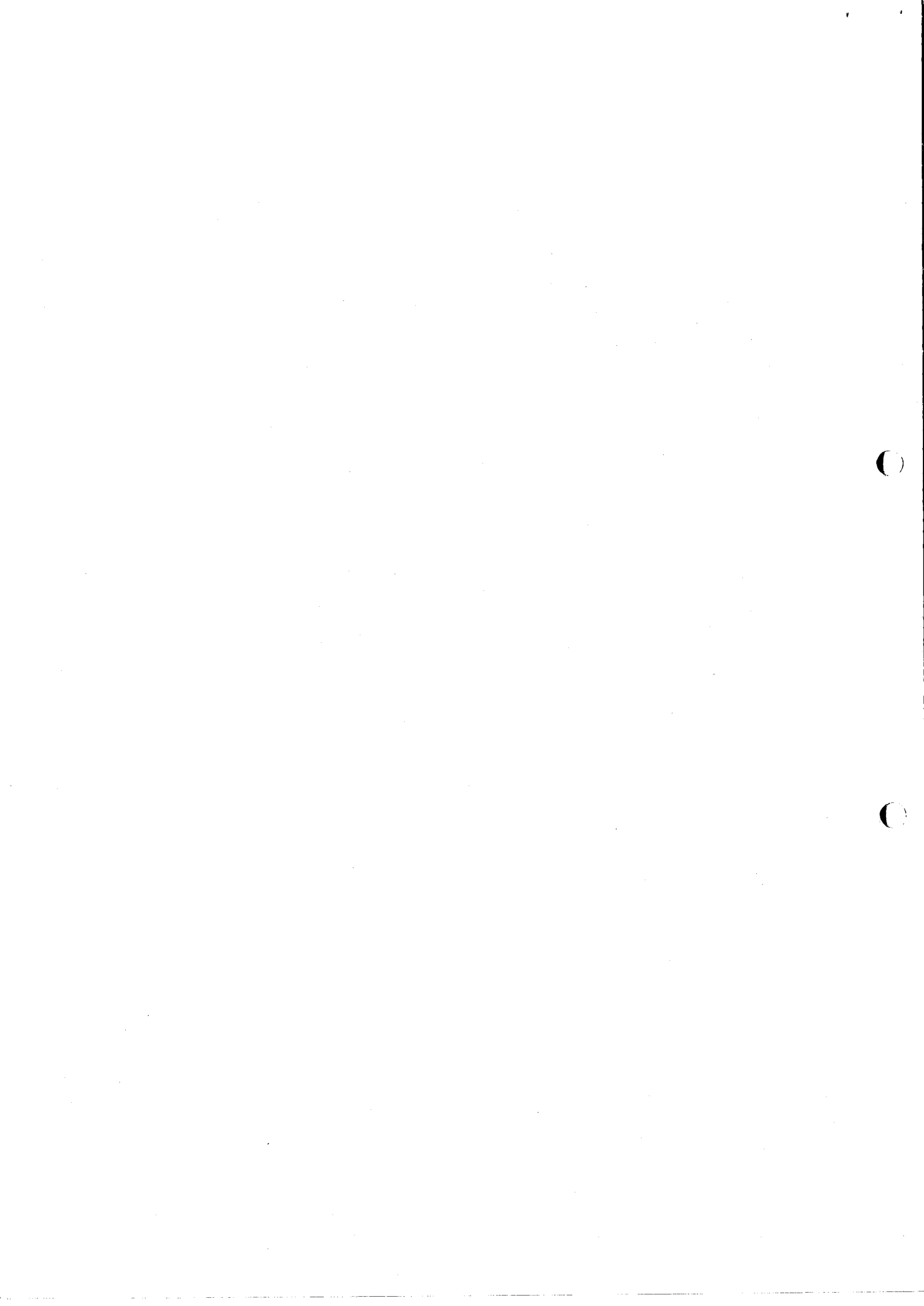
QUESTION 4.2

TABLE 6: TOTAL NUMBER OF STORMS FROM 2010 TO 2015 AFFECTING VARIOUS WORLD OCEANIC REGIONS AND THE TOTAL COST OF DAMAGE

		WORLD OCEANIC REGIONS			
		INDIAN	WESTERN PACIFIC	EASTERN PACIFIC	NORTH ATLANTIC
Total number of storms per year	2015	8	39	31	12
	2014	8	30	23	9
	2013	N	52	21	13
	2012	5	34	17	19
	2011	N	40	13	19
	2010	12	19	12	21
Total cost of damage in millions (US dollar)	2015	258	10 200	562	590
	2014	3 400	8 410	1 401	232
	2013	1 500	22 800	4 201	1 510
	2012	56	6 080	28	75 000
	2011	277	10 600	203	21 000
	2010	No data available			12 356

[Adapted from Meteo France]





3.2

ANNEXURE E shows the floor plan of a rectangular room that Lizette wants to add to her property. The room will have a roof and a ceiling with cornices.

Other information:

- Exterior measurements of the room are 5 240 mm × 4 040 mm
- The walls have a uniform thickness of 220 mm
- The ceiling boards only cover the internal area of the ceiling of the room
- Cornices (a decorative edge) will be placed between the walls and the ceiling right around the ceiling of the room, as shown in ANNEXURE E

You may use the following formulae:

Area of a rectangle = length × width

Perimeter of a rectangle = 2 × (length + width)

3.2.1 Calculate (in m²) the floor area of the room. (6)

3.2.2 The dimensions of each of the ceiling boards she intends using:

$$900 \text{ mm} \times 2\,400 \text{ mm}$$

Determine, showing ALL calculations, whether a minimum of seven ceiling boards would be needed for this room. (5)

3.2.3 Calculate (in mm) the exact length of cornices needed for this room. (3)

3.2.4 TABLE 5 below shows the price list of materials that can be used.

TABLE 5: PRICE LIST OF MATERIALS (INCLUDING VAT)

CEILING BOARDS	LENGTH (in mm)	PRICE (in R)
4 mm × 900 mm	2 400	91,44
4 mm × 900 mm	3 000	114,31
DECORATIVE MOULDINGS	LENGTH (in mm)	PRICE (in R)
Cornice	2 000	53,64

[Adapted from Pricelist, Feb. 2016, SA]

Lizette stated that the total cost of the materials (ceiling boards and cornices) (including VAT) would be less than R1 250.

Verify, showing ALL calculations, whether her statement is CORRECT. (5)

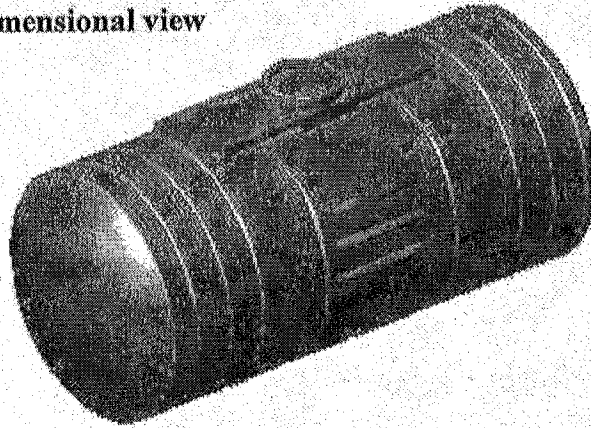


3.3

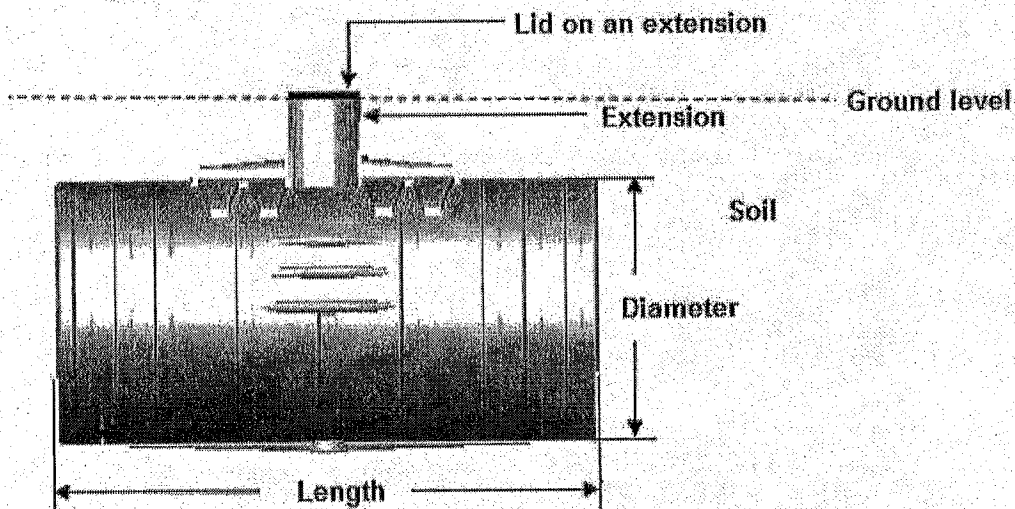
Lizette also plans to install an underground cylindrical water storage tank on her property, as shown in the diagrams below.

DIFFERENT VIEWS OF A CYLINDRICAL WATER STORAGE TANK

Three-dimensional view



Side view



Dimensions of the tank:

- Capacity: 8 000 ℓ
- Length: 2,9 m

You may use the following formula:

Volume of a cylindrical tank = $\pi \times (\text{radius})^2 \times \text{length}$, using $\pi = 3,142$

NOTE: 1 litre = 1 000 cm^3

3.3.1 Give ONE possible reason why Lizette would plan to install the water storage tank underground. (2)

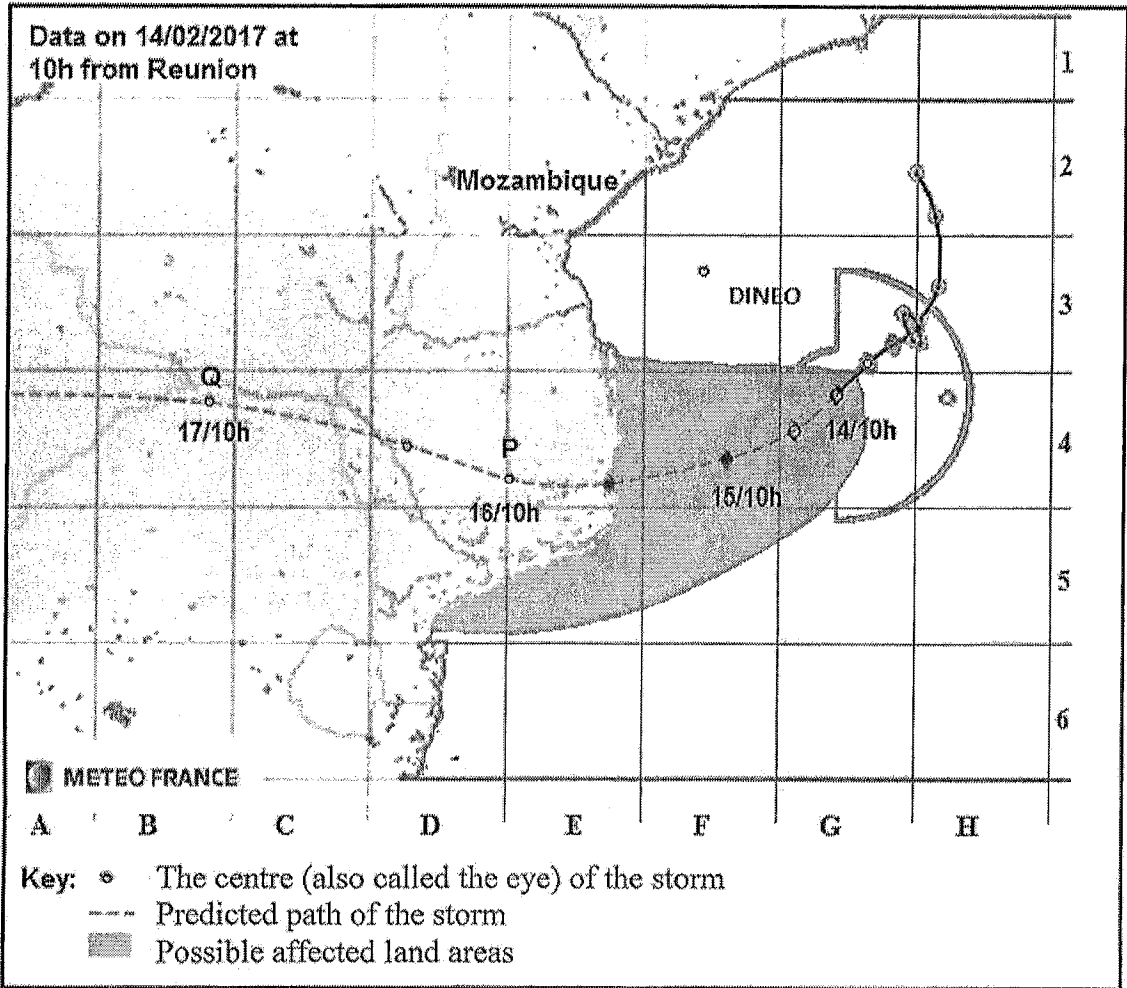
3.3.2 Calculate (in m) the diameter of the water storage tank. (6)
[40]



QUESTION 4

4.1

During February 2017 tropical storm Dineo caused damage to property in Mozambique, but it also brought much needed rain. Below is a chart issued by Meteo France (the French weather office) showing the projected path of the storm as well as likely affected land areas.



NOTE: 15/10h indicates the predicted position at 10:00 on 15 February.

[Adapted from Meteo France]

4.1.1 Dineo was classified as a Category 1 tropical storm with a maximum average wind speed of 95 miles per hour.

NOTE: 50 miles = 80,4672 km

Convert (rounded off to TWO decimal places) the maximum average wind speed to kilometres per hour.

(3)

4.1.2 The distance between two vertical gridlines on the map is approximately 205,043 km.

Calculate, using the measured distance, the predicted average speed (in km/h) of the storm from point P to point Q.

You may use the following formula:

Distance = average speed × time

(8)



4.2

TABLE 6 on ANNEXURE F shows the total number of storms from 2010 to 2015 that affected four world oceanic regions, as well as the cost of damages (in millions US dollars (USD)) during this period. Some of the data in the table have been omitted.

Broken line graphs representing the number of storms for three regions have been drawn on the ANSWER SHEET.

Use TABLE 6 and the graph on the ANSWER SHEET to answer the questions that follow.

4.2.1 Determine the missing value N. (2)

4.2.2 Draw another broken line graph on the ANSWER SHEET representing the total number of storms affecting the Western Pacific region from 2010 to 2015. (5)

4.2.3 Name the region that showed a downward trend in the number of storms experienced from 2010 to 2014. (2)

4.2.4 A news reporter compared the total cost of damage caused in the Western Pacific and North Atlantic regions to the total number of storms from 2011 to 2015. He stated that the more storms a region experienced, the greater the amount of the damage caused by them.

Verify (showing ALL calculations and give a reason) whether his statement is valid. (9)

4.3 In 2016 the Mozambican information department recorded the following data:

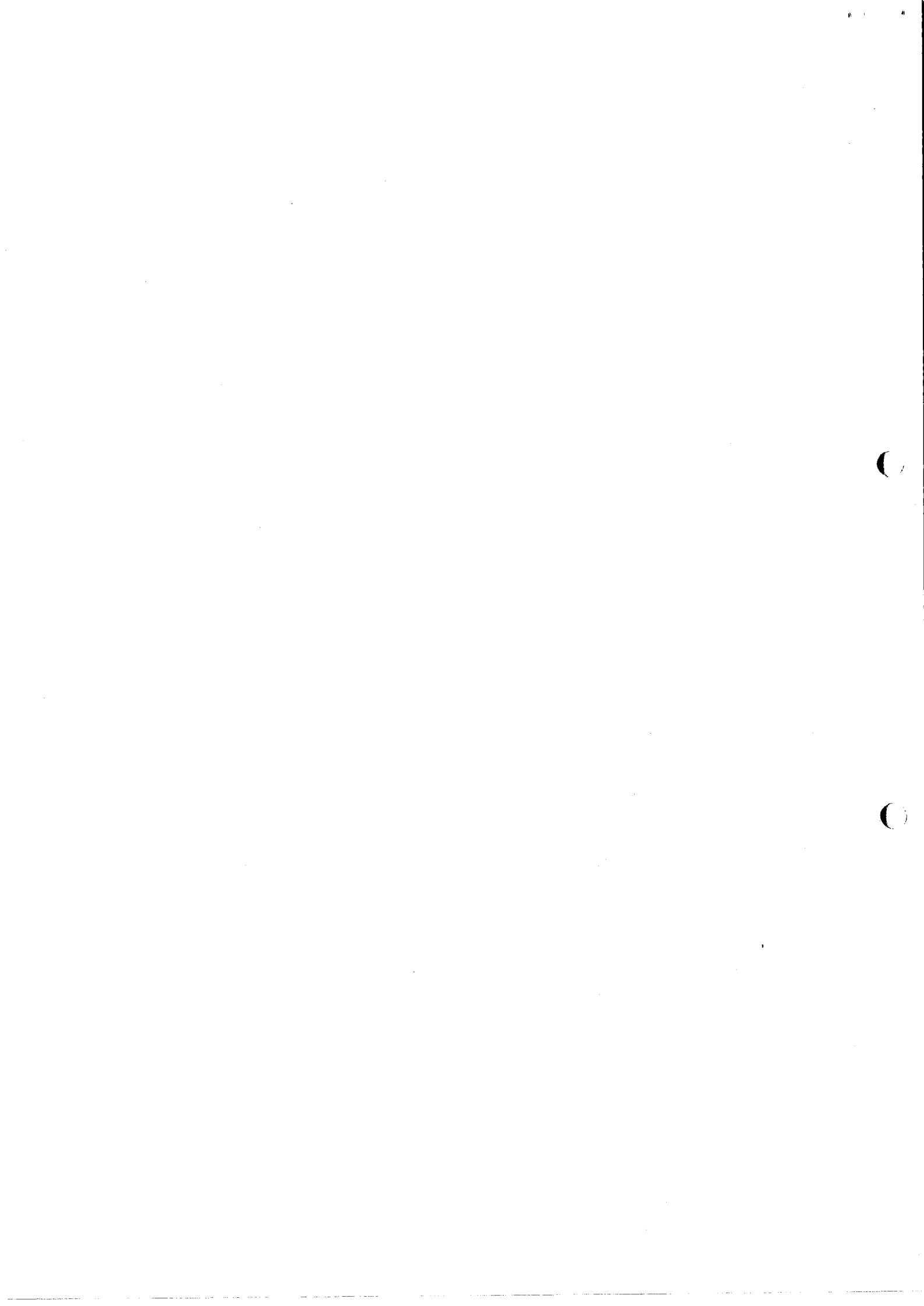
- Birth rate is 38,3 births per 1 000 population
- Death rate is 11,9 deaths per 1 000 population
- Net migration rate is -1,9 migrants per 1 000 population

Determine Mozambique's percentage population growth rate for 2016. (4)
[33]

TOTAL: 150











EA517LF2K0088421