HILLCREST HIGH SCHOOL

Grade 12 Trials Exam Paper 2
September 2019

Examiner: Mrs Leuschke
MARKS: 150

Moderator: Mrs Jugmohan
TIME: 3 hours

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. This question paper consists of 4 questions .Answer ALL the questions.
2. Write your name and **your Maths Lit teacher**'s name on your answer booklet.
3. Clearly show ALL calculations, diagrams, graphs, etc which you have used to determine your answers.
4. Answers only will NOT necessarily be awarded full marks.
5. An approved scientific calculator (non-programmable) may be used, unless otherwise stated.
6. If necessary, answers should be rounded off to TWO decimal places, unless otherwise stated.
7. Number the answers EXACTLY as the questions are numbered.
8. Diagrams are not necessarily drawn to scale.
9. It is in your own interest to write legibly and to present your work neatly.

QUESTION 1

1.1 ANNEXURE A shows a summary of the Income and Expenditure statement of the South African National Blood Service (SANBS) for the financial year ended 31 March 2017. 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 11,84% from 2016 to 2017. Calculate (to the nearest thousand rand) the communication costs for 2017. (4)

1.1.2 The SANBS imports 75% of its product testing material and consumables. Explain what possible impact a weakening rand will have on their total profit for the year. (2)

1.1.3 Compare, showing ALL calculations, the 2016 and 2017 percentage profit for the SANBS.

You may use the following formula:

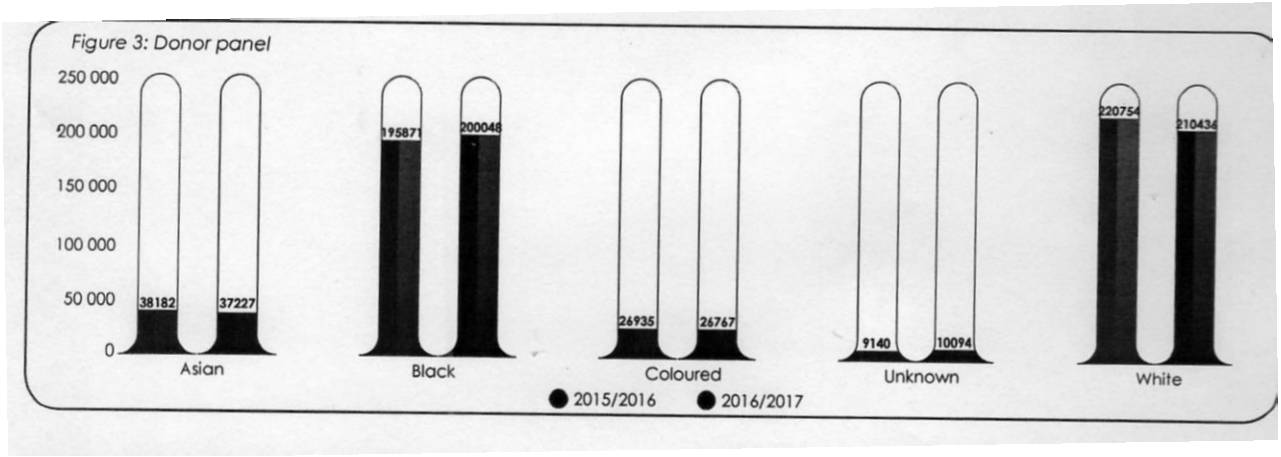
$$\textbf{Percentage profit} = \frac{\textit{Annual Total Profit}}{\textit{Total Annual Primary Income}} \textbf{ x 100}$$ (5)

1.2 ANNEXURE B shows the individual tax rates for the 2018/2019 tax year.

One of the SANBS directors who is 72 years old, earned a taxable income of R715 500 during the 2018/2019 tax year.
The director says that he will pay less than R190 000 for his annual income tax. Verify, using calculations, whether or not he is correct. (Ignore pension and medical tax credits) Show ALL calculations. (7)

1.3 During 2016, a total of 119 000 South Africans in the age group 16 to 19 years donated blood. The SANBS decided to appeal to eligible high school learners to donate their blood. Their target is to increase the number of donors in this age group by annual growth rate of 8,65%, compounded over the next three years.
Calculate, showing ALL calculations, the targeted number of blood donors in this age group for 2019. (3)

1.4 The bar graph below shows the racial composition of the blood donors from 2015/2016 and 2016/2017. The 2015/2016 is on the left hand side and the 2016/2017 is on the right hand side.



1.4.1 Give a possible explanation for the including a ‘ Unkown’ category as a racial group. (2)

1.4.2 Describe a possible trend relating to the percentage of black donors. (2)

1.4.3 Explain why it cannot be said with certainty that the number of Asian donors remained the same from 2016 to 2017. (2)

1.4.4 The total number of donors in 2018 was 490 914. This total donor base grew slightly from the previous year by 1,08%.

a) Calculate the number in donors in 2017? (2)

b) Hence, determine (rounded to the nearest 10) the number of coloured donors in 2017. (4)

1.5 Human blood is classified into five basic blood groups. The SANBS is regularly appealing to eligible people to donate blood. The table below shows the distribution of the five basic groups in the South African population.

	BLOOD GROUP				
	AB	A	B	O-	O+
% Distribution	3	38		9	40

1.5.1 Write down the probability of a randomly selected South African who is classified in the B blood group. (2)

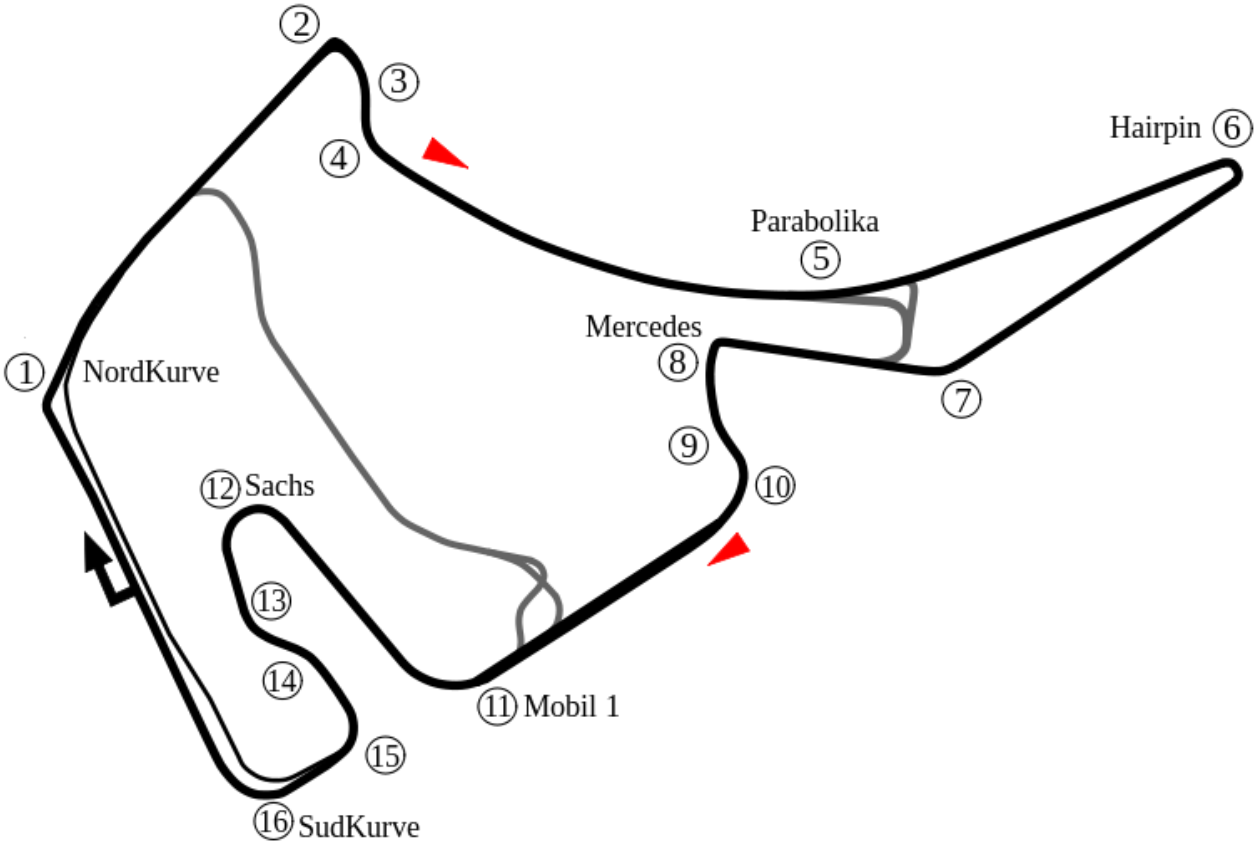
1.5.2 Write down the probability of randomly selecting a South African who is classified in the O blood group. (2)

1.5.3. A representative from the SANBS states that if there are 9300 donors, 350 will be blood type AB. Verify, showing all calculations, whether this statement is correct or not. (3)

[40]

QUESTION 2

The Formula 1 German Grand Prix was held in Hockenheim on the 28th July 2019. Below is a sketch of the track known as Hockenheimring.



By Sentoan - Own work, CC BY-SA 3.0, https://commons.wikimedia.org/w/index.php?curid=20198326

The record for the fastest lap on this track is held by Kimi Räikkönnen who completed the one lap in a time of 1 minute 14 seconds. One lap of the track is 4,574km.

2.1 Convert Räikkönnen's lap record of 1 minute 14 seconds to seconds. (2)

2.2 Determine Räikkönnen's average speed for his record lap. Round off your answer to the nearest km/h. You may use the formula:

Distance = speed x time (3)

2.3 The distance of the entire race is 190,424 miles.

1 mile = 1,609344km

2.3.1 How many laps was the race? (3)

2.3.2 If Räikkönnen managed to maintain his record speed throughout the race, then calculate how long the race would have taken Räikkönnen to complete (excluding any stops or detours for tyre changing). Write your answer in hours, minutes and seconds. (3)

2.4 The track is 4,574km and the average track is 15m. The cost of tar is €45. (€45/m²). The organiser of the event says that it would cost R40 million to replace all the tar on the race track. Verify, showing ALL calculations, whether or not the race organiser is correct. You may use the formula given for area.

Area = length x breadth

€1 = R15,66 (7)

2.5 Below is a table showing a number of different Grand Prix circuits and their length.

Grand Prix Event	Length of Circuit	Date of Event
Australian Grand Prix	5,303	17th March
Bahrain Grand Prix	5,412km	31st March
Chinese Grand Prix	5,451km	14th April
Spanish Grand Prix	4,655km	12th May
Canadian Grand Prix	4,361km	9th June
French Grand Prix	5,842km	23rd June
British Grand Prix	5,891km	14th July
German Grand Prix	4,574km	28th July
Italian Grand Prix	5,793km	8th September
Russian Grand Prix	5,848km	29th September
Mexican Grand Prix	4,421km	27th October
Brazilian Grand Prix	4,309km	17th November

2.5.1 Calculate the average length of a circuit. Round off your answer to THREE decimal places. (3)

2.5.2 Determine the median for the length of the circuits. (3)

2.5.3 Calculate the values of the first and third quartiles, and hence calculate the inter quartile range. (4)

2.5.4 Using the information in the table above, determine the probability that a Grand Prix will take place in the second half of the year. (2)

2.5.5 If Kimi Räikkönnen were to drive at the speed you calculated in 2.2 during the Chinese Grand Prix, how long would it take him to complete one lap? Give your answer in minutes and seconds. (3)

2.6 The fastest recorded lap at the Mexican Grand Prix is 1 minute 19 seconds and the fastest recorded lap at the British Grand Prix is 1 minute 27 seconds. Your friend who enjoys watching Formula 1 racing says that fastest lap at the Mexican Grand Prix is travelled at a faster speed than the fastest lap at the British Grand Prix. Justify, showing ALL calculations whether your friend is correct or not. (7)

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QUESTION 3

3.1 The following information was obtained from Statistics South Africa on urban food price trends for selected products for the period May 2018 to May 2019.

	AVERAGE (MEAN) PRICE IN RAND			PERCENTAGE CHANGE	
PRODUCT	MAY 2018	APRIL 2019	MAY 2019	APRIL 2019 TO MAY 2019	MAY 2018 TO MAY 2019
Baked Beans – tinned 410g	9,99	10,58	10,57	-0,1	5,8
Full cream milk – long life 1 litre	13,89	14,30	14,45	1,0	4,0
Rice – 2kg	25,40	K	26,02	2,4	-0,4
Loaf of brown bread 700g	11,39	12,56	12,63	0,6	10,9
Loaf of white bread 700g	12,92	13,85	13,96	0,8	8,0
Maize Meal – 5kg	36,55	40,57	41,13	Q	12,5
Cabbage – fresh per kg	12,19	14,18	14,38	1,4	17,9
Potatoes – fresh per kg	12,05	12,50	12,81	2,5	6,3
White sugar – 2,5kg	36,06	39,66	39,20	-1,2	8,7
TOTAL	A	B	C		
Average Percentage Change					E

Use the table above to answer the questions that follow.

3.1.1 Determine the missing values :

a) K (3)
b) Q (3)
c) E (3)

3.1.2 Describe the trend in the average mean prices for white bread (700g) for the period May 2018 to May 2019. (2)

3.1.3 Mr Smith buys all the products listed in the table above regularly. He has not received a salary increase from January 2018 to January 2019.
Explain the impact the change in prices has on his household income. (You may want to calculate values for A, B and C to help you). (3)

3.1.4 The average year-on-year inflation rate for 2018 was 3,2% and 4,5% has been projected for 2019.
Calculate the projected price of white bread (700g) in April 2020. (6)

3.2 The table below shows the difference in price between rural and urban areas for some products.

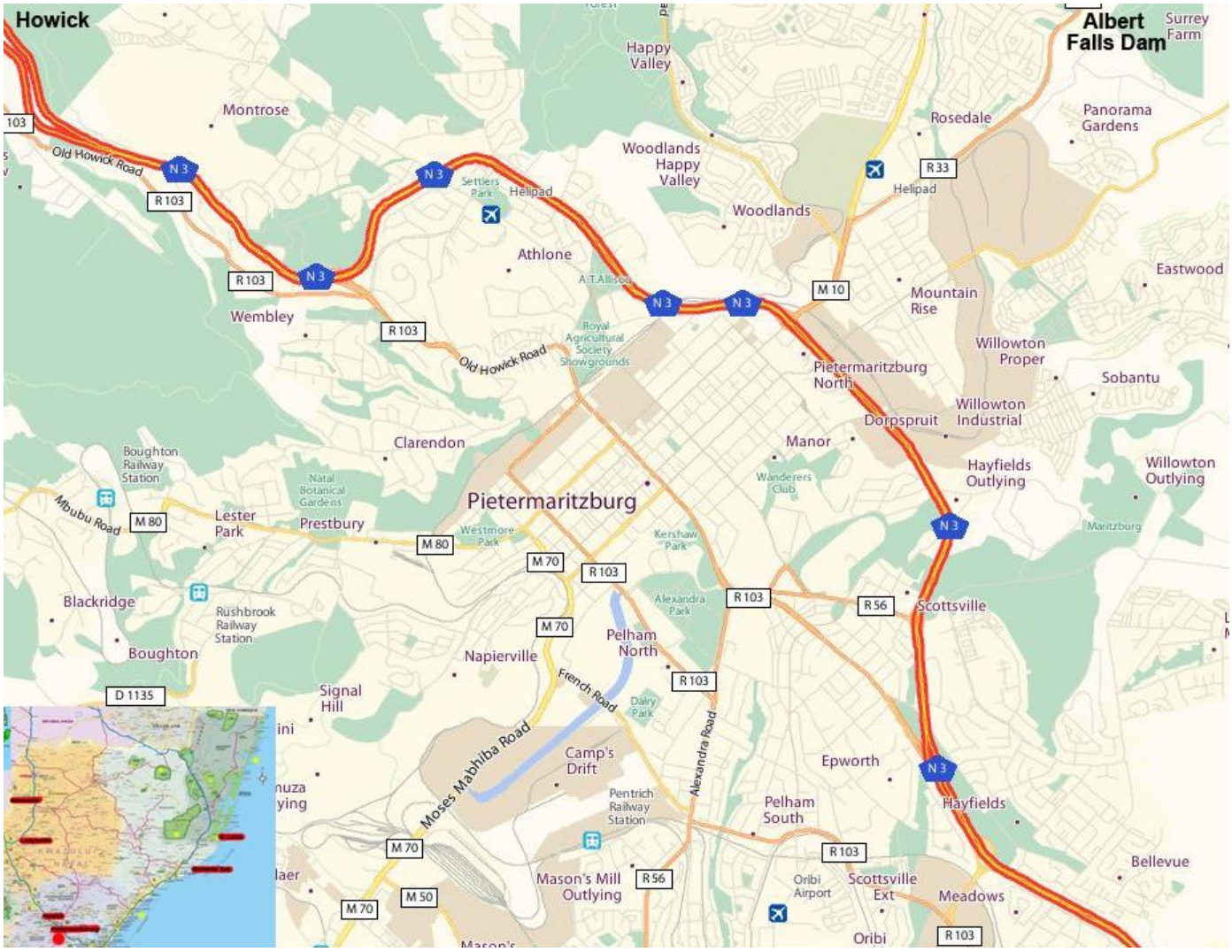
PRODUCT	URBAN FOOD PRICE MAY 2019 (R/UNIT)	RURAL FOOD PRICE MAY 2019 (R/UNIT)	PRICE DIFFERENCE (R/UNIT) (Urban price – Rural price)
Full cream milk- long life 1 litre	14,45	15,29	-0,84
Loaf of brown bread (700g)	12,63	12,55	0,08
Loaf of white bread (700g)	13,96	13,54	W
Maize Meal – 2,5kg	23,53	22,58	0,95
Rice – 2kg	26,02	26,78	-0,76
White Sugar - 2,5kg	39,20	Y	-3,19

3.2.1 Determine the missing values :

a) W (2)
b) Y (3)

3.2.2 Mr Smith says that his family who live in a rural area have to spend less per month on the six items listed in the table above than he does living in the city. Verify, showing ALL calculations whether or not Mr Smith is correct. (5)

3.3Mr Smith lives with his family in Pietermaritzburg. They live in the suburb of Prestbury. He works in Pelham North and his children go to school in Wembly.



http://www.stocklandsfarm.co.za/wp-content/uploads/2016/06/pietermaritzburg-street-map.jpg

3.3.1 What is the general direction from their home to the children's school. (2)

3.3.2 On a Saturday morning the family likes to take a drive to a market that is held in Howick. Name the National road that they will need to travel on. (2)

3.3.3 Howick has a population of 21 639 people while Pietermaritzburg has a population of 238 029. Write the population of Pietermaritzburg to Howick in its simplest form. (3)

3.3.4 The table below shows the racial makeup of the population of Howick in 2011.

Race Group	Percentage of the Population
Black African	47,0
Coloured	4,1
Indian/Asian	13,5
White	35,1
Other	0,3

3.3.4. Use the table above to calculate the number of degrees that the Coloured population would occupy if a pie chart was to be drawn for the table above. (3)

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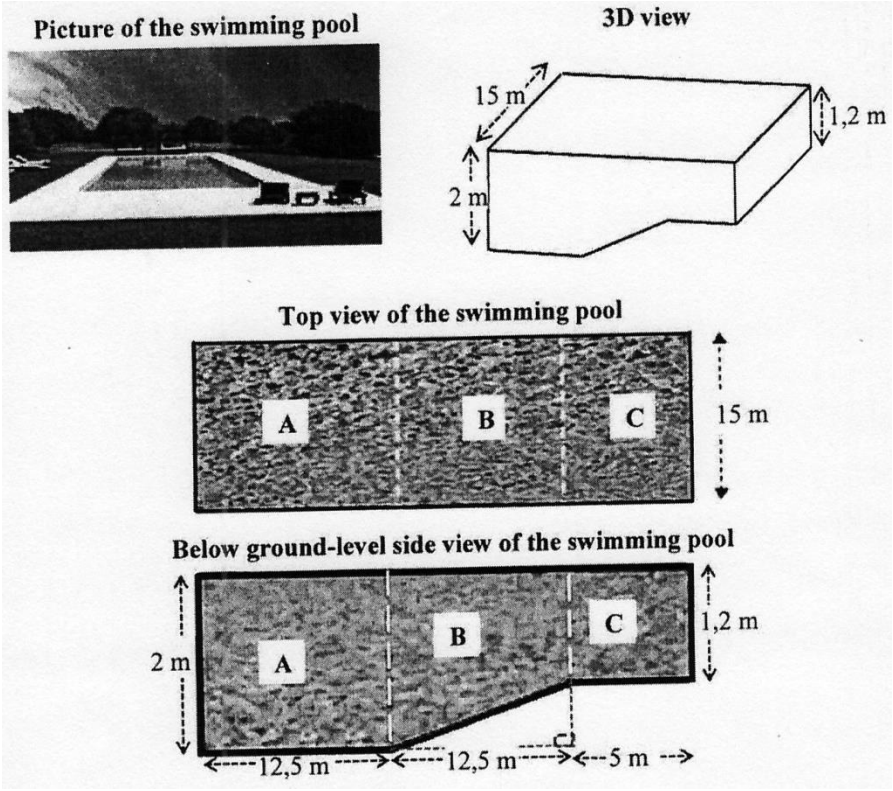
QUESTION 4

Langa uses the local swimming pool to give swimming lessons . The rectangular pool has a shallow section, C, a deep end, A and a sloping section,B as shown in the various posts below.



The capacity of section B of the swimming pool is $300m^3$.

You may use the following formula

Volume of a rectangular prism = length x width x height

NOTE :

- 1 gallon = 3,785 litres
- $1m^3$ = 1000 litres

4.1.1 Show, with calculations, that the maximum capacity of the swimming pool is $765m^3$. (5)

4.1.2 Calculate the volume of water (in gallons) required to fill the swimming pool to 88% of its capacity. (4)

4.1.3 The pool must be topped up with 135 000 litres of water due to evaporation. The pool is filled with water at a constant rate of 2730 litres per hour. Langa says that it will take exactly 2½ days to fill the pool.

Verify, showing ALL calculations, if his statement is correct. (5)

4.2 Swimming lessons are offered three times a week to different groups.
The morning group (M) and afternoon group (A) each has 20 registered participants. The evening group (E) has 8 registered participants.

ANNEXURE C shows the attendance records for the three groups over a period of 18 days, as well as corresponding box and whisker plots representing the attendance of groups M and A.

Use ANNEXURE C to answer the following questions.

4.2.1 Determine the missing value, x, if the mean attendance of M is 15. (4)

4.2.2 Determine the interquartile range for A. (4)

4.2.3 Give a possible reason why E has full attendance on more days than M. (2)

4.2.4 Determine the probability (expressed as a whole percentage) of randomly selecting a day on which A has full attendance. (2)

4.2.5 Give TWO reasons why the attendance of A is considered to be better than that of M by using the box and whisker plots. (4)

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ANNEXURE A

Question 1.1

Summary of income statement and expenditure statement for the year ended 31 March 2017

	Notes	2017	2016
Primary Income	1	2 486 971	2 403 509
Other Income		15 668	26 572
Primary expenses	2	(2 441 278)	(2 163 571)
Other expenses : Interest paid		(196)	(202)
Total annual profit		179 562	360 651

Notes to the annual financial statement

	2017 (R'000)	2016 (R'000)
1. Primary income	2 484 501	2 402 029
• Service fees		
• Product sales	2470	1480
Total annual primary income	2 486 971	2 403 509
2. Primary expenses		
• Advertising and promotions	41 645	42 606
• Communication costs		30 770
• Consumables	656 944	568 268
• Depreciation	62 649	56 423
• Employee benefits	1 001 345	918 729
• Freight	148 163	135 768
• Rent	37 274	34 087
• Product testing	65 769	55 267
• Other expenses – Include bad debts written off, computer costs, foreign exchange, insurance, repairs and maintenance	251 534	176 363
Total annual primary expenses	2 441 278	2 163 571

(Adapted from 2017 SANBS Annual Report)

NOTE : Brackets ( ) indicate deduction

ANNEXURE B

Question 1.2

Individual Tax Rates for the 2019 Tax Year

Taxable Annual Income	Rates of Tax
R0 – R195 850	18% of each R1
R195 851 – R305 850	R35 253 +26% of amount above R195 850
R305 851 – R423 300	R63 853 + 31% of amount above R305 850
R423 301 – R555 600	R100 263 + 36% of amount above R423 300
R555 601 – R708 310	R147 891 + 39% of amount above R55 600
R708 311 – R 1 500 000	R207 448 + 41% of amount above R708 310
R1 500 001 and above	R532 041 + 45% of amount above R1 500 000
TAX REBATES	
Primary Rebate	R14 067
Secondary Rebate	R7713
Tertiary Rebate	R2574

(Adapted from the SARS pocket guide 2018)

ANNEXURE C

Question 4.2

RECORDS OF ATTENDANCE FOR THREE GROUPS OVER A PERIOD OF 18 DAYS (D1–D18)

Morning Group (M)																	
D1	**D2**	**D3**	**D4**	**D5**	**D6**	**D7**	**D8**	**D9**	**D10**	**D11**	**D12**	**D13**	**D14**	**D15**	**D16**	**D17**	**D18**
20	18	9	10	12	3	15	15	14	8	18	x	19	20	17	x	20	18
Afternoon Group (A)																	
D1	**D2**	**D3**	**D4**	**D5**	**D6**	**D7**	**D8**	**D9**	**D10**	**D11**	**D12**	**D13**	**D14**	**D15**	**D16**	**D17**	**D18**
14	12	20	20	16	15	19	20	18	20	19	15	20	11	18	12	20	19
Evening Group (E)																	
D1	**D2**	**D3**	**D4**	**D5**	**D6**	**D7**	**D8**	**D9**	**D10**	**D11**	**D12**	**D13**	**D14**	**D15**	**D16**	**D17**	**D18**
8	7	8	6	8	6	7	8	8	6	6	7	8	8	8	8	7	8

[Source: www.emorycommunityswimming.com]

BOX AND WHISKER PLOTS REPRESENTING ATTENDANCE FOR MORNING AND AFTERNOON GROUPS OVER A PERIOD OF 18 DAYS