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MATHEMATICAL LITERACY
Preliminary Examination – Paper 1

Date: August 2022

Time: 3 hours

Marks: 150

Examiner: Ms Y Oosthuizen

Moderator: Dr C Sam

NAME:

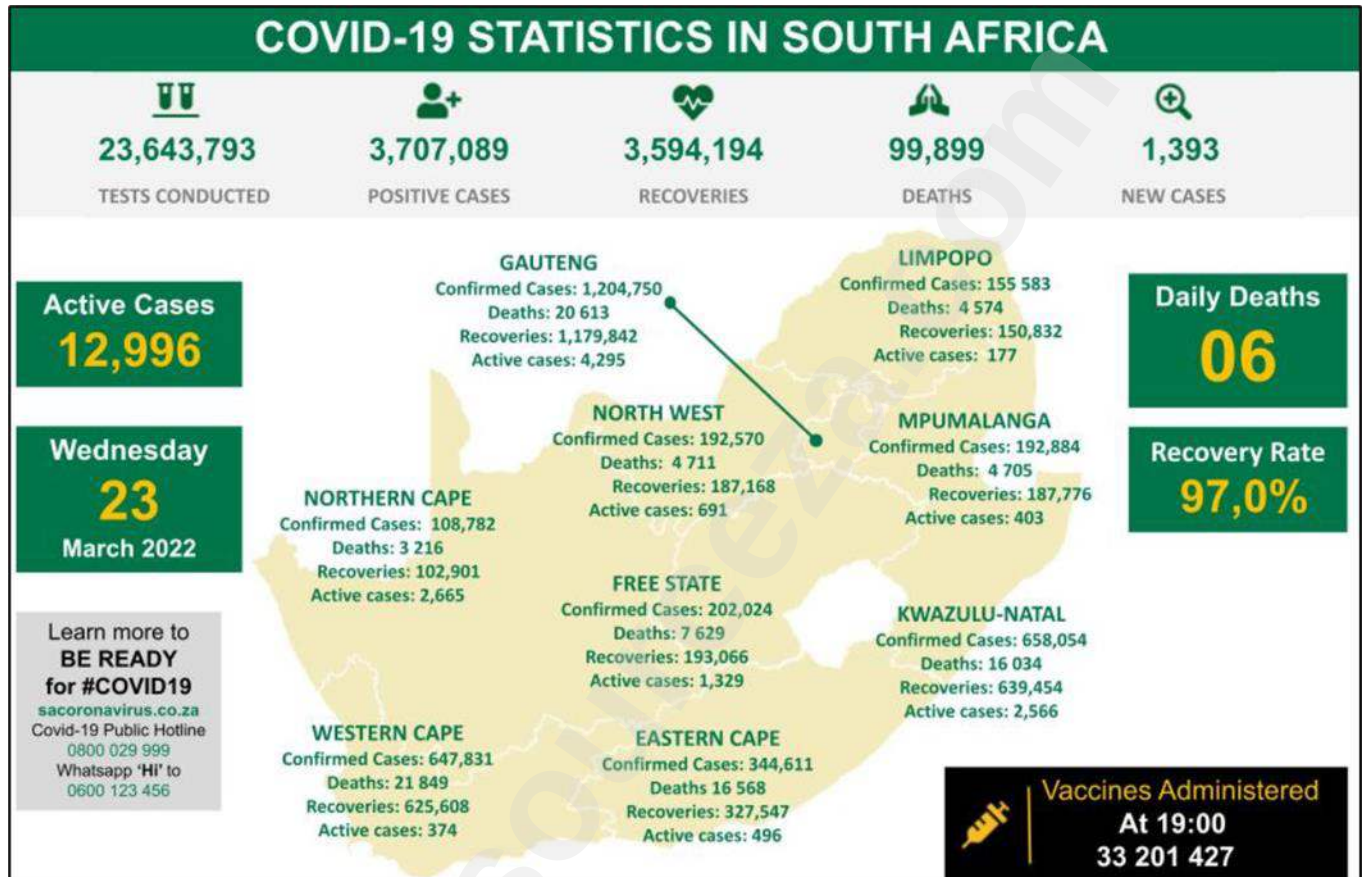
INSTRUCTIONS:

1. This question paper consists of:
 - 22 pages which includes 2 pages at the back for extra calculations or rough work)
2. Read the questions carefully.
3. Answer ALL the questions on the question paper.
4. Diagrams are not necessarily drawn to scale.
5. You may use an approved non-programmable and non-graphical calculator unless otherwise stated.
6. Answers should be **rounded off to two decimal places** unless otherwise stated, or if the context requires rounding up or down.
7. Clearly show ALL calculations. Answers only will NOT necessarily be awarded full marks.
8. It is in your own interest to write legibly and to present your work neatly.

QUESTION	1	2	3	4	5	TOTAL
ACTUAL						
POSSIBLE	29	51	33	23	14	150

- 1.1 Coronavirus disease (COVID -19) is an infectious disease caused by the SARS-CoV-2 virus. COVID has caused major disruptions to economies and families across the world. Study the figures below to answer the questions.

Figure 1: COVID – 19 cases in South Africa



<https://tinyurl.com/mwzf84xr>

- 1.1.1 Write the number of tests conducted in South Africa in words. (2)

- 1.1.2 Which province had the lowest number of deaths? (2)

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- 1.1.3 Calculate the range of active cases across the provinces. (2)

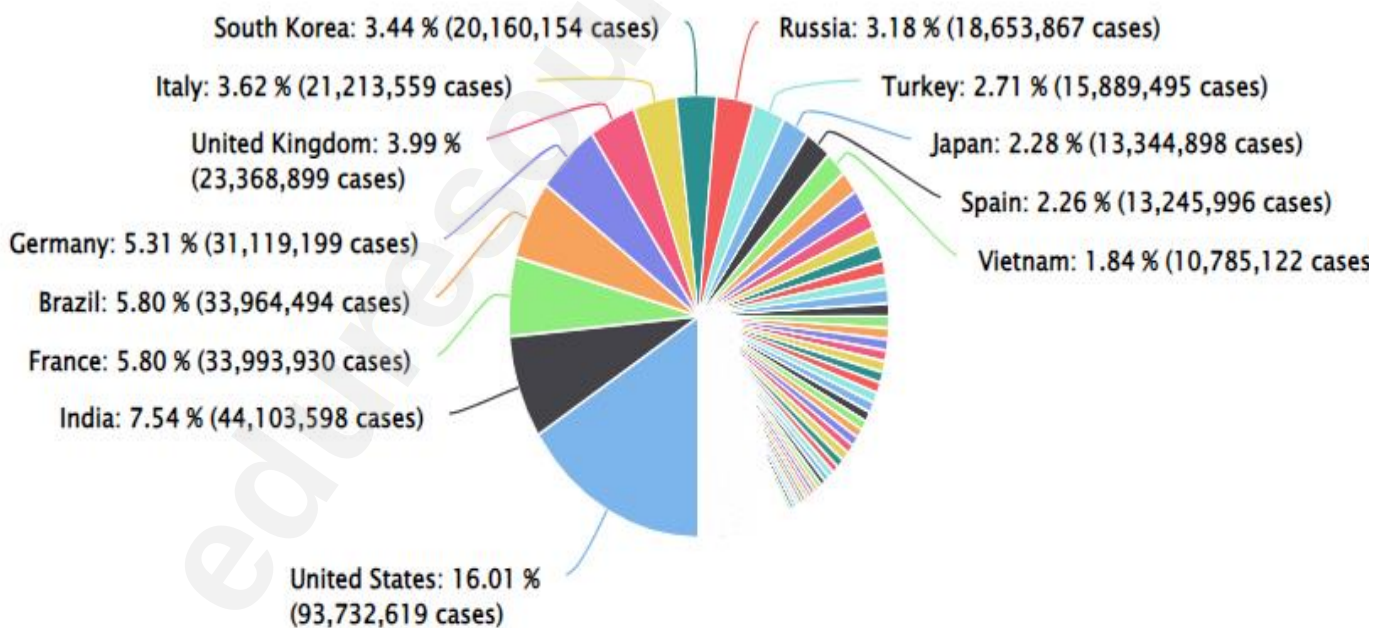
1.1.4 What percentage of tests conducted in South Africa resulted in positive cases? (3)

1.1.5 Determine the median number of active cases across the provinces. (3)

1.1.6 The cost of a Rapid Antigen Test is R150,00. How much money has been spent on testing in South Africa if only all the **new cases** were confirmed using the Rapid Antigen Test? (2)

Figure 2: Distribution of COVID-19 cases across various countries

Distribution of cases



<https://www.worldometers.info/coronavirus/>

World Bank Group COVID-19 Response

Since the start of the COVID-19 pandemic, the World Bank Group has **deployed over \$157 billion** to fight the health, economic, and social impacts of the pandemic, the fastest and largest crisis response in its history. **In 2021 the Bank spent \$20 billion for the middle-income countries, and for 2022 this amount will increase by 15,25%.**

1.1.7 Using Figure 2, calculate the size of the angle of the sector for the United States, correct to the nearest 10 degrees. (3)

1.1.8 How much money (in dollars) will The World Bank spend on middle-income countries in 2022? (2)

1.1.9 If the current exchange rate is: 1 South African Rand equals 0,069 United States Dollars. Calculate in Rand how much the World Bank Group has deployed since the start of the pandemic to fight the health, economic and social impacts of the pandemic. (2)

- 1.2 Mr and Mrs Naidoo are interested in buying a home in Heidekruid. Mr Naidoo researched how much their monthly bond payments would be.

Calculate your monthly bond repayments:	
Purchase price: R1 000 000	Monthly Bond Repayment: R8 209
Interest rate: 7,75%	Once-off Cost: R60 295 Deposit: R0 Bond Registration: R32 746 Property Transfer: R27 549
Loan duration: 20 Years	Gross Monthly Income Required: R27 364

- 1.2.1 Show how the Once-off Cost was calculated. (2)

- 1.2.2 The Real cost of the loan can be determined as follows:

$$\text{Real Cost of Loan} = \text{Bond Repayments} \times \text{number of payments.}$$

- Calculate the real cost of Mr Naidoo's loan. (2)

- 1.2.3 Determine the interest Mr Naidoo paid on the loan. (2)

- 1.2.4 Calculate the total cost of the house at the end of the bond term. (2)

QUESTION 2

- 2.1 Mpumi's sister has emigrated to England and Mpumi would like to visit her. She decides to start saving money for her trip and opens a fixed deposit savings account with Bob's Bank. The table below shows the various **interest rates per annum** that the bank offers.

Bob's Bank: Best Rates						
Duration	3 months	6 months	12 months	24 months	36 months	60 months
Interest rate per annum	4,5%	5%	6%	7%	7,25%	9,16%

- 2.1.1 Mpumi deposited R5 500 in a fixed deposit account for 2 years. She earns interest at a rate that is **compounded monthly**. Determine the monthly interest rate the bank offers Mpumi. Round off your answer to three decimal places. (2)

- 2.1.2 What will the balance in her account be after two months? (4)

- 2.2 Mpumi works for a law firm. She is 24 years old and single, without dependents. Study the salary slip below and the tax tables to answer the questions that follow.

VAP Law Firm			
Payslip for the month of September 2022			
Employee ID:	9808252018602	Bank name:	Bob's Bank
Employee Name:	Mpumi Mogale	Account number:	455 5554 54464
Department:	Advocate	Paid Days:	30
Designation:	Senior Partner	Unpaid Days:	0
Gender:	Female	Days in month:	30
Earnings	Amount (R)	Deductions	Amount (R)
Basic:	73 000	Pension fund	5 110
Gross salary:	73000	PAYE	A
Other earnings:	0	Skills Levy	200
		Medical Aid	12 400
		UIF	177,12
Total earnings:	73 000	Total deductions:	B
Net Pay:	C		

Tax rates from 1 March 2022 to 28 February 2023:

Individuals and special trusts

Taxable Income (R)	Rate of Tax (R)
1 – 226 000	18% of taxable income
226 001 – 353 100	40 680 + 26% of taxable income above 226 000
353 101 – 488 700	73 726 + 31% of taxable income above 353 100
488 701 – 641 400	115 762 + 36% of taxable income above 488 700
641 401 – 817 600	170 734 + 39% of taxable income above 641 400
817 601 – 1 731 600	239 452 + 41% of taxable income above 817 600
1 731 601 and above	614 192 + 45% of taxable income above 1 731 600

Rebates

Primary	R16 425
Secondary (Persons 65 and older)	R9 000
Tertiary (Persons 75 and older)	R2 997

Age	Tax Threshold
Below age 65	R91 250
Age 65 to below 75	R141 250
Age 75 and over	R157 900

Monthly Medical Aid Tax Credit:

Main member	R347
First dependent	R347
Second dependent	R234

2.2.1 Calculate Mpumi's annual contribution to her pension fund, which is her only tax-deductible item. (2)

2.2.2 Hence show that Mpumi's annual taxable income is R814 680. (2)

2.2.3 Using the Income Tax tables, calculate the value of **A** in the salary slip on the previous page. (7)

2.2.4 Mpumi is upset that her total deductions are more than 50% of her basic salary. Verify using calculations if she is correct. (5)

2.2.5 Calculate Mpumi's monthly Net Pay. (2)

2.3 Mpumi resides in Sandton Johannesburg. Electricity can be purchased from Eskom in two ways; prepaid and post-paid. Below is an adapted, comparative table of the two options. Use the table to answer the questions.

System	Fixed monthly cost	Cost per unit (c/kWh)	
Prepaid	nil	82,026	
		kWh	Cost (c)
Post - paid	R220	$0 < kWh \leq 50$	72,346
		$50 < kWh \leq 350$	83,601
		$350 < kWh \leq 600$	132,025
Costs exclude VAT			

2.3.1 What is the fixed monthly cost for the post-paid system? (2)

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2.3.2 If a household uses 312 kWh of electricity on a post-paid system, how much would they pay for their electricity consumption, excluding VAT? (5)

2.3.3 Mpumi bought electricity for R850 including VAT, on the prepaid system. Determine how much electricity she can use. (5)

2.4 Mpumi wants to buy a car from a local car dealer. The car was advertised as follows:



Cash price

R139 900 Excl VAT

5% discount to 1st time buyers

The salesperson informed Mpumi that she will also need to pay for the following **additional costs**:

- VAT
- Pre-delivery cost: 0,75% calculated on the VAT inclusive discounted cash price.
- Licensing, registration and for the roadworthy test of the car: R1 400
- Two-year maintenance contract: R4 950

2.4.1 Mpumi is a first-time buyer and qualifies for the discounted price. Calculate the cash price she will pay for the car (excluding VAT and additional costs). (2)

2.4.2 Calculate the final VAT inclusive cash price of the car, which takes the discount and the additional costs into account. (6)

2.4.3 Mpumi does not have enough money to pay the final cash price of the car. She approaches her sister for financial assistance. Her sister, an accountant, will lend her the R161 000 needed and offers her the following terms:

- 4,5% simple interest per annum.
- 5 years to pay off the loan.

Calculate the monthly installments to the nearest R100, that Mpumi will pay her sister. (5)

2.4.4 What other car related financial implications besides the cost of buying the car will Mpumi have to budget for? (2)

QUESTION 3

Eldo Coaches is a luxury bus which travels between various cities across South Africa. The distance between Durban and Johannesburg is **568 km**.



ZAR 325

06:00 AM Durban – DURBAN – Eldo Coach Office Durban Station 4 Jelf Taylor Cres
04:40 PM Johannesburg – JOHANNESBURG – A 41, Johannesburg Park Station, Park Station, Rissik St, CBD, Johannesburg

Bus 10 H 40 M

Select



ZAR 230

06:15 AM Durban – Central – Soldiers Way
03:55 PM Johannesburg – Park City Transit Centre, Johannesburg Station

Bus 9 H 40 M

Select



ZAR 315

06:45 AM Durban – Beach
03:20 PM Johannesburg – JOHANNESBURG (BP DENVER) – BP M2 Motorway, Denver, Johannesburg

Bus 8 H 35 M

Select

https://www.busbud.com/en/bus-schedules-results/kdwn4h/ke7fyn?outbound_date=2022-08-19&adults=1

- 3.1 Calculate the income Eldo Coaches will receive for the trip from Durban to Johannesburg carrying 60 passengers. (2)

- 3.2 The various costs involved in driving the bus are as follows:

Fuel (fixed cost):

- Fuel R24,62 per liter
- Fuel usage : 22 liters per 100km

Variable cost:

- R80 per passenger.

- 3.2.1 List 2 costs that could be included in the variable cost per passenger on a luxury bus. (4)

3.2.2 Show that the fixed cost (fuel) of the trip from Durban to Johannesburg is R3 076,52. (4)

3.2.3 Use the Income and Expense equations of the trip from Durban to Johannesburg below to answer the questions that follow:

$$\text{Income} = R315 \times \text{number of passengers}$$

$$\text{Expense} = R3\,076,52 + R80 \times \text{number of passengers}$$

a) Determine the profit that Eldo Coaches will make if there are 56 passengers on board. (3)

b) Using the above equations, calculate the number of passenger seats that must be sold for Eldo Coaches to break-even. (4)

c) Hence, determine the income at which Eldo Coaches breaks even. (3)

3.2.4 Calculate the missing value in the table below.

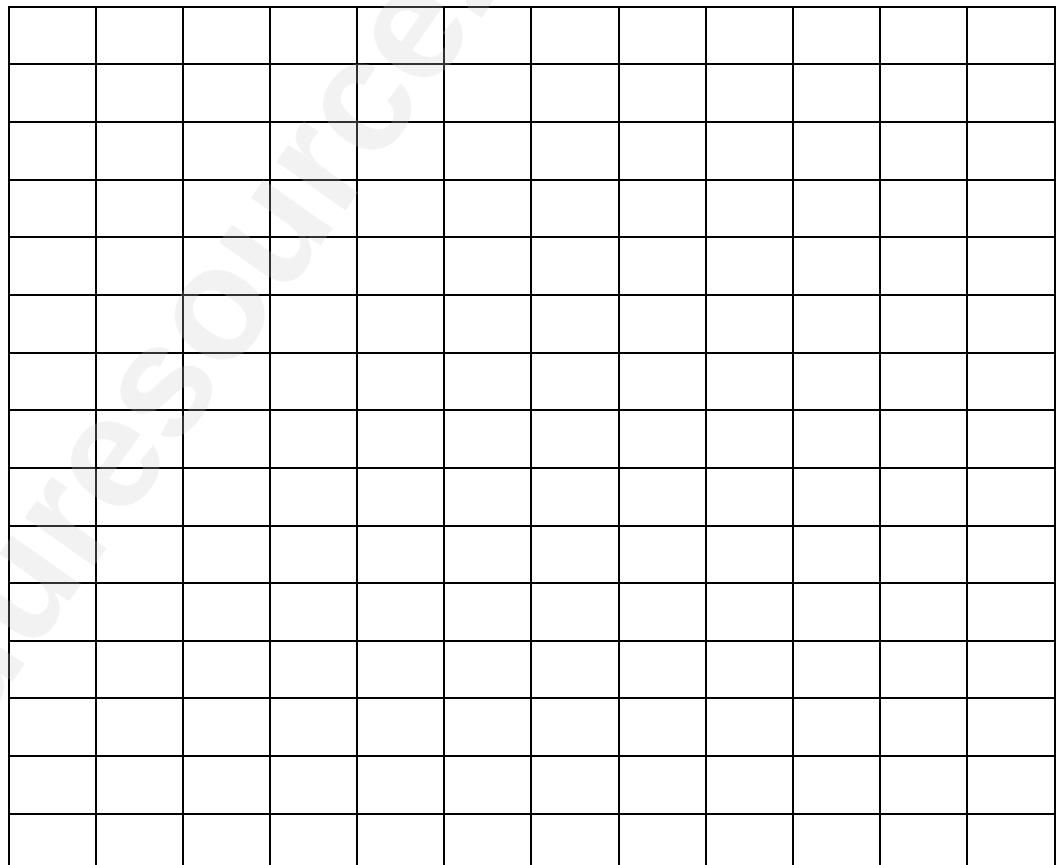
(2)

No. of passengers	0	10	30	A	60
Income	0	3 150	9 450	7 245	18 900
Expenses	3 076,52	3 876,52	B	4 916,52	7 876,52

3.2.5 Using the table above, draw the Income and Expense graphs for Eldo Coaches on the grid below.

(6)

Figure: _____



- 3.2.6 If there were 45 people on the bus, did Eldo Coaches make a profit or a loss? Use your graph to justify your answer. (3)

- 3.2.7 There were 55 passengers on a trip from Durban to Johannesburg. When the luggage was offloaded there were 13 blue bags, 7 green bags and the rest were black. Determine the probability that someone picked up the black bag. (2)

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One of the most lucrative careers these days is to become a social media influencer. Brands are even willing to pay them millions of dollars every year in brand deals and sponsorships. Being the new kid on the block, TikTok has been creating some of the world's highest paid influencers.

Table 1: Top Highest TikTok Earners for 2021

TikToker	Annual Est. Earnings:	Number of Followers:
1. Charli D'Amelio	17,5M	135M
2. Dixie D'Amelio (sister)	10M	57M
3. Addison Rae	8,5M	86M
4. Bella Poarch	5M	87M
5. Josh Richards	5M	26M
6. Kris Collins	4,75M	42M
7. Avani Gregg	4,75M	39M
8. Riyaz Aly	2M	44M
9. Arishfa Khan	24 000	28M
10. Awez Darbar	23 500	26M
11. Nisha Guragain	23 500	28M

<https://tinyurl.com/msxjevbu>

Instagram is another platform with high earning potential. Below is a list of the 10 highest-paid celebrities on Instagram for 2021, according to Hopper.

Table 2: Top Highest celebrity Instagram earners for 2021

Celebrity	Income per post: \$	Followers:
10. Kendall Jenner, @kendalljenner	1 053 000	167 400 000
9. Justin Bieber, @justinbieber	1 112 000	176 800 000
8. Beyoncé Knowles, @beyonce	1 147 000	182 400 000
7. Lionel Messi @leomessi	1 169 000	215 700 000
6. Kim Kardashian, @kimkardashian	1 419 000	225 700 000
5. Selena Gomez, @selenagomez	1 468 000	233 400 000
4. Kylie Jenner, @kyliejenner	1 494 000	237 600 000
3. Ariana Grande, @arianagrand	1 510 000	240 200 000
2. Dwayne 'The Rock' Johnson, @therock	1 523 000	242 100 000
1. Cristiano Ronaldo, @cristiano	1 604 000	285 900 000

<https://tinyurl.com/2p8eprw>

- 4.1 What is the probability that you would follow a TikToker that had a sibling on the top earner list? (2)

- 4.2 Determine the probability that a TikToker with more than 40M followers will earn less than \$10M. (2)

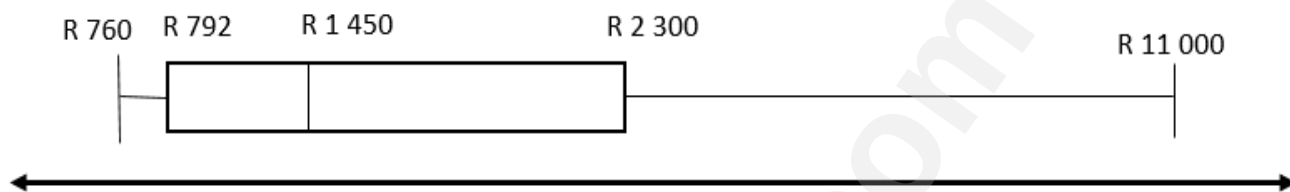
- 4.3 By comparing the earnings of a TikToker and Instagrammer, advise which career would be most profitable. Justify your answer. (3)

- 4.4 Calculate the five number summary for the number of Instagram followers. (6)

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- 4.5 Several South Africans have joined the TikTok platform, and they are making it big already. You may have come across some of the influencers if you are already on the app. Most of them earn their income sharing their content. Below is a box-and-whisker plot showing the Top TikTok earners in South Africa. Use the box and whisker plot below to complete the paragraph.

Box-and-Whisker Diagram of the Income (thousands) of TikTok earners in South Africa

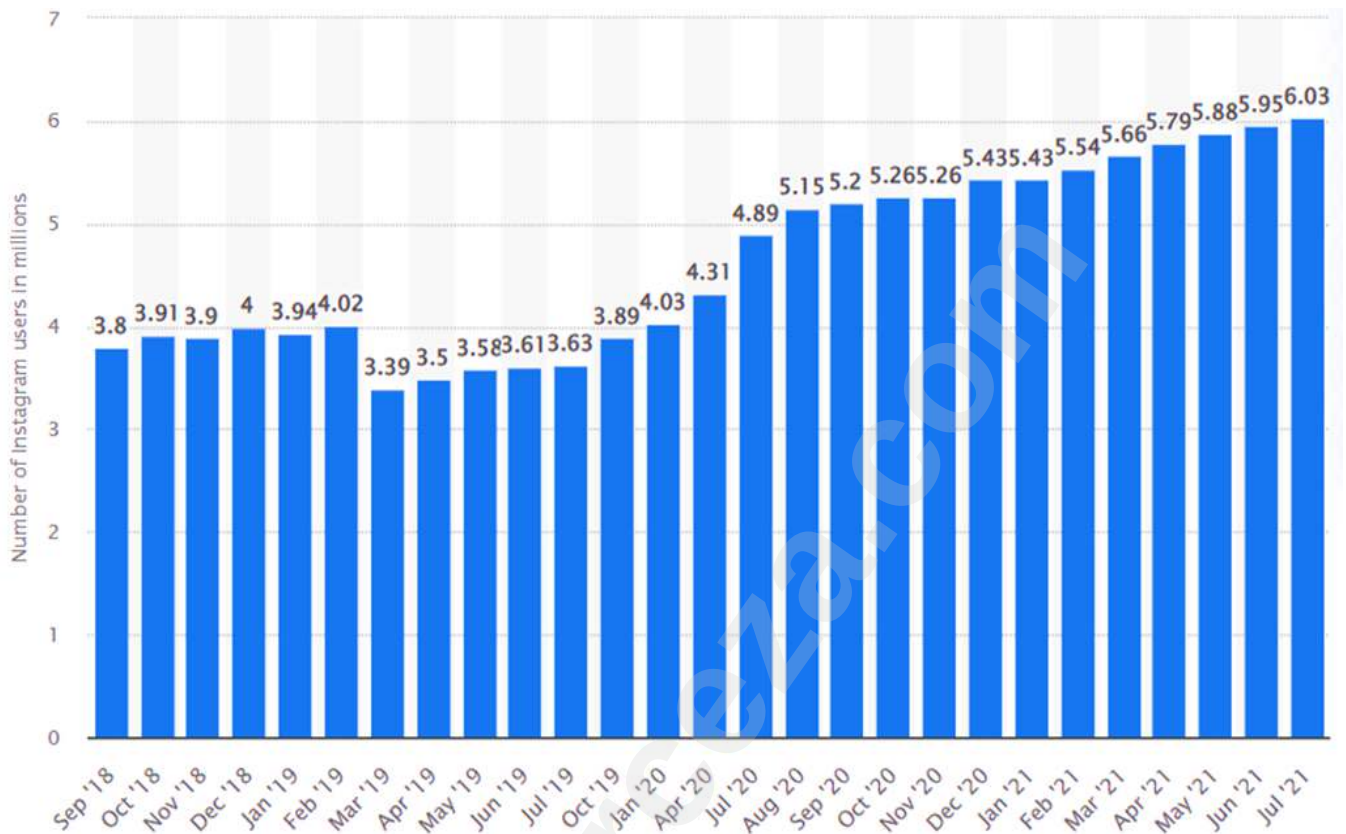


- 4.5.1 _____% of the South African TikTokers earn more than R2,3M. The middle 50% earn between R_____ and R_____ and this is known as the _____. $\frac{1}{4}$ of the TikTokers earn less than R_____.
- The _____ is the only measure of central tendency that can be determined from a box-and whisker plot. R_____ would be considered the outlier value. (7)

- 4.5.2 If there are 25 Top TikTok earners, how many would earn less than R1,45M? (3)

QUESTION 5**[14]**

5.1 Below is a graph showing the number (in millions) of Instagram users in South Africa from September 2018 to 20 July 2021.

www.statista.com

5.1.1 Calculate the mean number of Instagram users between Jan 2021 – Jul 2021. (3)

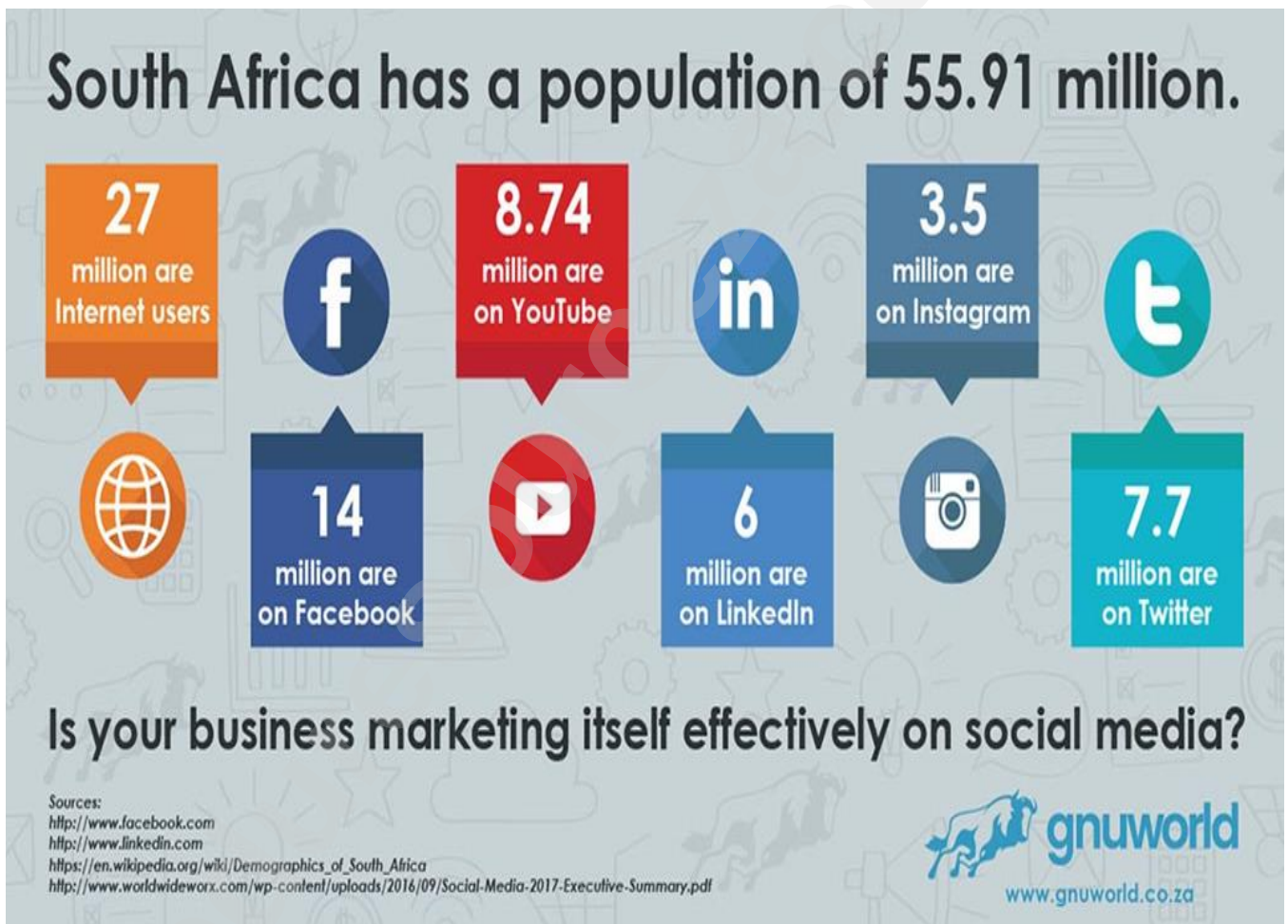
5.1.2 Give a reason why the number of users of Instagram has increased in the last 2 years. (2)

5.1.3 Specify the month and year of the lowest recorded number of Instagram followers. (2)

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- 5.1.4 Round off each of the values for the number of instagram users for 2018 to the nearest 100 000 and use these rounded values to determine the modal value for 2018. (3)

- 5.2 Benji's Sport Wear is launching a new advertising campaign across the various social media platforms. Study the infographic below showing social media usage in South Africa to answer the questions.



- 5.2.1 The company would like to hire an advertising specialist to oversee the launch of the new media campaign. Which of the above platforms would be most appropriate to advertise for this new position and why? (2)

5.2.2 Calculate what percentage of the South African population uses YouTube.

(2)

TOTAL: 150 MARKS

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EXTRA SPACE (IF NEEDED)

[illegible]

