## Grade 12 Mathematical Literacy: Question Paper 2

**MARKS: 150** **TIME: 3 hours**

### QUESTION 1

In January 2006 Luka (36 years old) worked for a hotel chain. Luka's gross annual salary was R97 575,00.

**ANNUAL DEDUCTION TABLES**

| Remuneration | Persons under 65 | | | Persons over 65 | | |
|---|---|---|---|---|---|---|
| | SITE | PAYE | TOTAL SITE +PAYE | SITE | PAYE | TOTAL SITE + PAYE |
| 91991 - 92290 | 4500.00 | 6635.13 | 11135.13 | 0.00 | 6635.13 | 6635.13 |
| 92291 - 92590 | 4500.00 | 6710.13 | 11210.13 | 0.00 | 6710.13 | 6710.13 |
| 92591 - 92890 | 4500.00 | 6785.13 | 11285.13 | 0.00 | 6785.13 | 6785.13 |
| 92891 - 93190 | 4500.00 | 6860.13 | 11360.13 | 0.00 | 6860.13 | 6860.13 |
| 93191 - 93490 | 4500.00 | 6935.13 | 11435.13 | 0.00 | 6935.13 | 6935.13 |
| 93491 - 93790 | 4500.00 | 7010.13 | 11510.13 | 0.00 | 7010.13 | 7010.13 |
| 93791 - 94090 | 4500.00 | 7085.13 | 11585.13 | 0.00 | 7085.13 | 7085.13 |
| 94091 - 94390 | 4500.00 | 7160.13 | 11660.13 | 0.00 | 7160.13 | 7160.13 |
| 94391 - 94690 | 4500.00 | 7235.13 | 11735.13 | 0.00 | 7235.13 | 7235.13 |
| 94691 - 94990 | 4500.00 | 7310.13 | 11810.13 | 0.00 | 7310.13 | 7310.13 |
| 94991 - 95290 | 4500.00 | 7385.13 | 11885.13 | 0.00 | 7385.13 | 7385.13 |
| 95291 - 95590 | 4500.00 | 7460.13 | 11960.13 | 0.00 | 7460.13 | 7460.13 |
| 95591 - 95890 | 4500.00 | 7535.13 | 12035.13 | 0.00 | 7535.13 | 7535.13 |
| 95891 - 96190 | 4500.00 | 7610.13 | 12110.13 | 0.00 | 7610.13 | 7610.13 |
| 96191 - 96490 | 4500.00 | 7685.13 | 12185.13 | 0.00 | 7685.13 | 7685.13 |
| 96491 - 96790 | 4500.00 | 7760.13 | 12260.13 | 0.00 | 7760.13 | 7760.13 |
| 96791 - 97090 | 4500.00 | 7835.13 | 12335.13 | 0.00 | 7835.13 | 7835.13 |
| 97091 - 97390 | 4500.00 | 7910.13 | 12410.13 | 0.00 | 7910.13 | 7910.13 |
| 97391 - 97690 | 4500.00 | 7985.13 | 12485.13 | 0.00 | 7985.13 | 7985.13 |
| 97691 - 97990 | 4500.00 | 8060.13 | 12560.13 | 0.00 | 8060.13 | 8060.13 |
| 97991 - 98290 | 4500.00 | 8135.13 | 12635.13 | 0.00 | 8135.13 | 8135.13 |
| 98291 - 98590 | 4500.00 | 8210.13 | 12710.13 | 0.00 | 8210.13 | 8210.13 |
| 98591 - 98890 | 4500.00 | 8285.13 | 12785.13 | 0.00 | 8285.13 | 8285.13 |
| 98891 - 99190 | 4500.00 | 8360.13 | 12860.13 | 0.00 | 8360.13 | 8360.13 |
| 99191 - 99490 | 4500.00 | 8435.13 | 12935.13 | 0.00 | 8435.13 | 8435.13 |
| 99491 - 99790 | 4500.00 | 8510.13 | 13010.13 | 0.00 | 8510.13 | 8510.13 |
| 99791 - 100090 | 4500.00 | 8585.13 | 13085.13 | 0.00 | 8585.13 | 8585.13 |

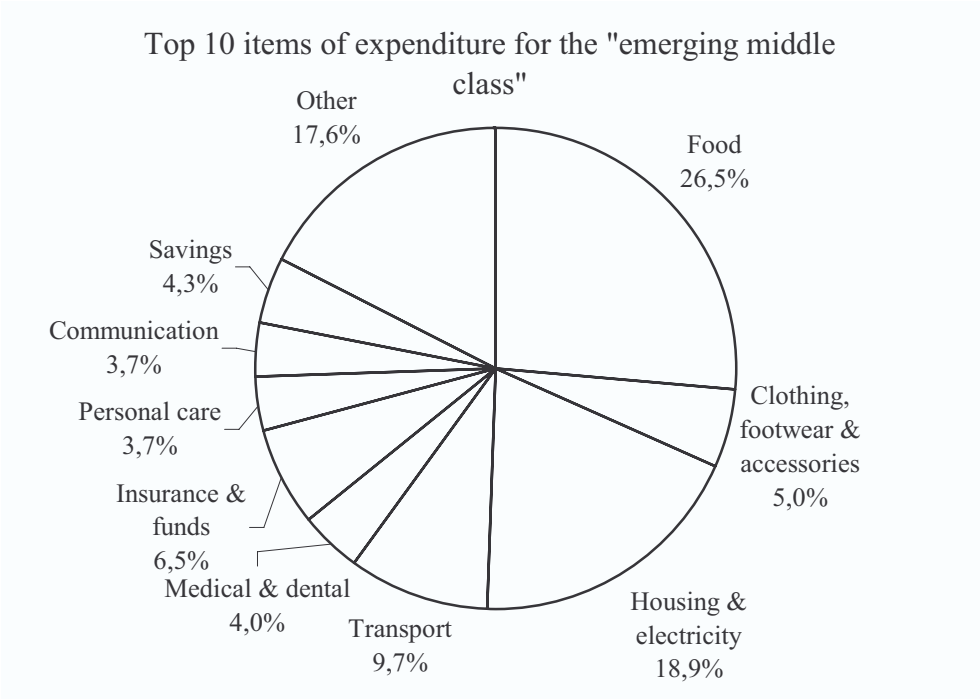
1.1 Use the extract from the SARS tax table to determine how much tax (SITE + PAYE) Luka paid in 2006 (3)

1.2 All employees contribute 1% of their monthly salary to the Unemployment Insurance Fund (UIF), how much did Luka contribute to UIF each month in 2006? (4)

1.3 Hence, or otherwise, show that Luka's take-home salary was R7 009,51 (3)

According to market researchers, people in Luka's income bracket typically spend their money as shown in the pie chart below.




1.4 Assume that Luka's money is spent as shown in the graph and calculate to the nearest Rand how much of each month's take-home salary is spent on the following:

- Food
- Clothing, footwear and accessories
- Housing and electricity
- Transport (8)

1.5 Refer to the table below which lists the change in CPI for each of the expenditure groups listed in the pie chart from 2006 to 2007.
By referring to you answers to 1.4, determine the missing values a to e in the table (you need only write down the values and show your calculations). (10)

| Expenditure group | Typical monthly spend by Luka in January 2006 | Percentage change in CPI for expenditure group | Anticipated monthly spend by Luka in January 2007 |
|---|---|---|---|
| Food | *see answer 1.4* | 9,3% | a |
| Clothing, footwear & accessories | *see answer 1.4* | -10,9% | b |
| Housing & electricity | *see answer 1.4* | 9,2% | c |
| Transport | *see answer 1.4* | 6,8% | d |
| Medical & dental | R280,00 | 5,6% | R296,00 |
| Insurance & funds | R456,00 | – | R480,00 |
| Personal care | R259,00 | 5,0% | R272,00 |
| Communication | R259,00 | 0,2% | R260,00 |
| Savings | R301,00 | – | R395,00 |
| Other | R1 234,00 | 6,9% | R1 319,00 |
| | R7 003,00 | – | e |

1.6 Calculate the percentage change in total expenses for Luka from 2006 to 2007. (4)

1.7 Luka's employer offers Luka an "inflation-linked" salary increase of 5% for 2007.What would Luka's gross salary be after this increase? (3)

1.8 The tax formula applicable to 2007 is shown below. Use this formula and the salary you calculated in 1.7 to show that Luka's monthly take home salary after paying tax and UIF contributions will be R7 501,31. (7)

**Rates applicable to individuals**

| TAXABLE INCOME | | | RATES OF TAX | | | | |
|---|---|---|---|---|---|---|---|
| R | | R | R | | | | R |
| 0 | — | 100 000 | | | 18% | of each R1 | |
| 100 001 | — | 160 000 | 18 000 | + | 25% | of the amount above | 100 000 |
| 160 001 | — | 200 000 | 33 000 | + | 30% | of the amount above | 160 000 |
| 220 001 | — | 300 000 | 51 000 | + | 35% | of the amount above | 200 000 |
| 300 001 | — | 400 000 | 79 000 | + | 38% | of the amount above | 300 000 |
| 400 001 | | and above | 117 000 | + | 40% | of the amount above | 400 000 |

**Tax Rebates**

- Primary rebate ……. R7 200
- Additional rebate (for person 65 years and older) ……. R4 500

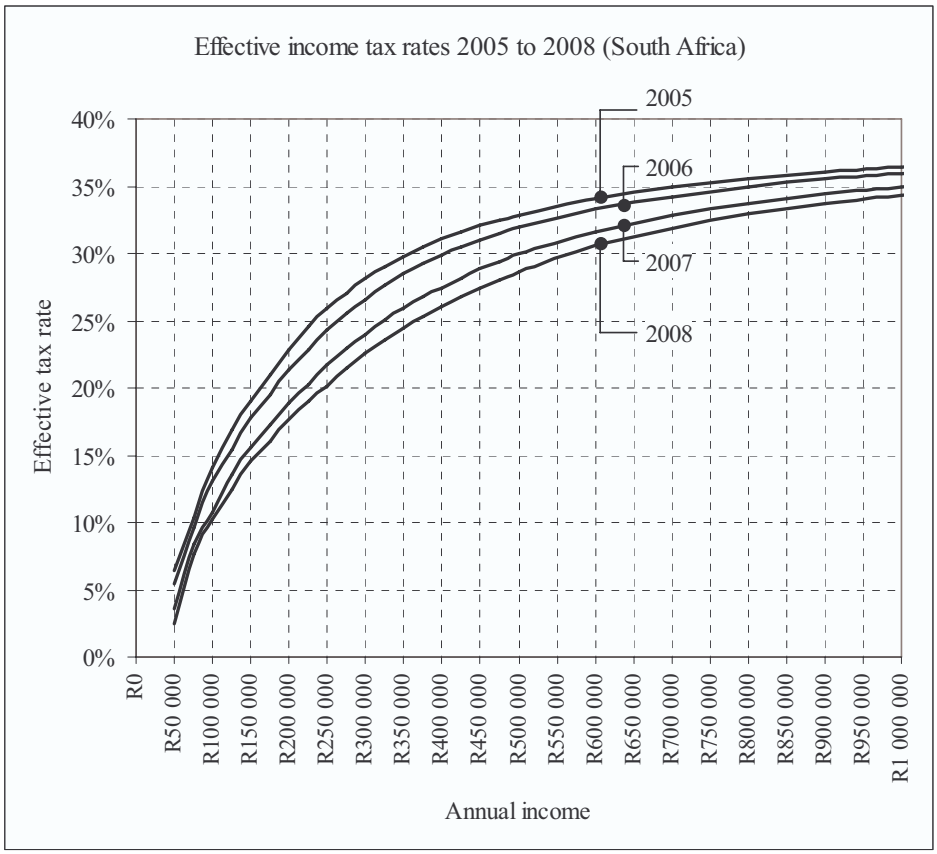
1.9 Calculate the percentage increase in take-home salary from January 2006 to January 2007 and explain in terms of tax rates why this is greater than the 5% increase that the employer gave Luka. (8)

1.10 By referring to Luka's anticipated expenses (question 1.5) determine whether Luka will be able to maintain the lifestyle of January 2006 in January 2007 justify your answer. (3)

**[53]**

**QUESTION 2**

The graph below compares the effective income tax rate applicable to South Africans from the 2005 to 2008 tax years.




2.1 What was the effective tax rate paid by a person earning R150 000 in each of the years 2005; 2006; 2007 and 2008? (4)

2.2 How much would a person have to earn to pay an effective tax rate of 25% in each of the years 2005; 2006; 2007 and 2008? (4)

2.3 How much would a person earning R100 000 in 2008 have paid in income tax? (2)

2.4 Describe the trend in effective income tax rate over the period 2005 to 2008 – motivate your answer. (4)
**[14]**

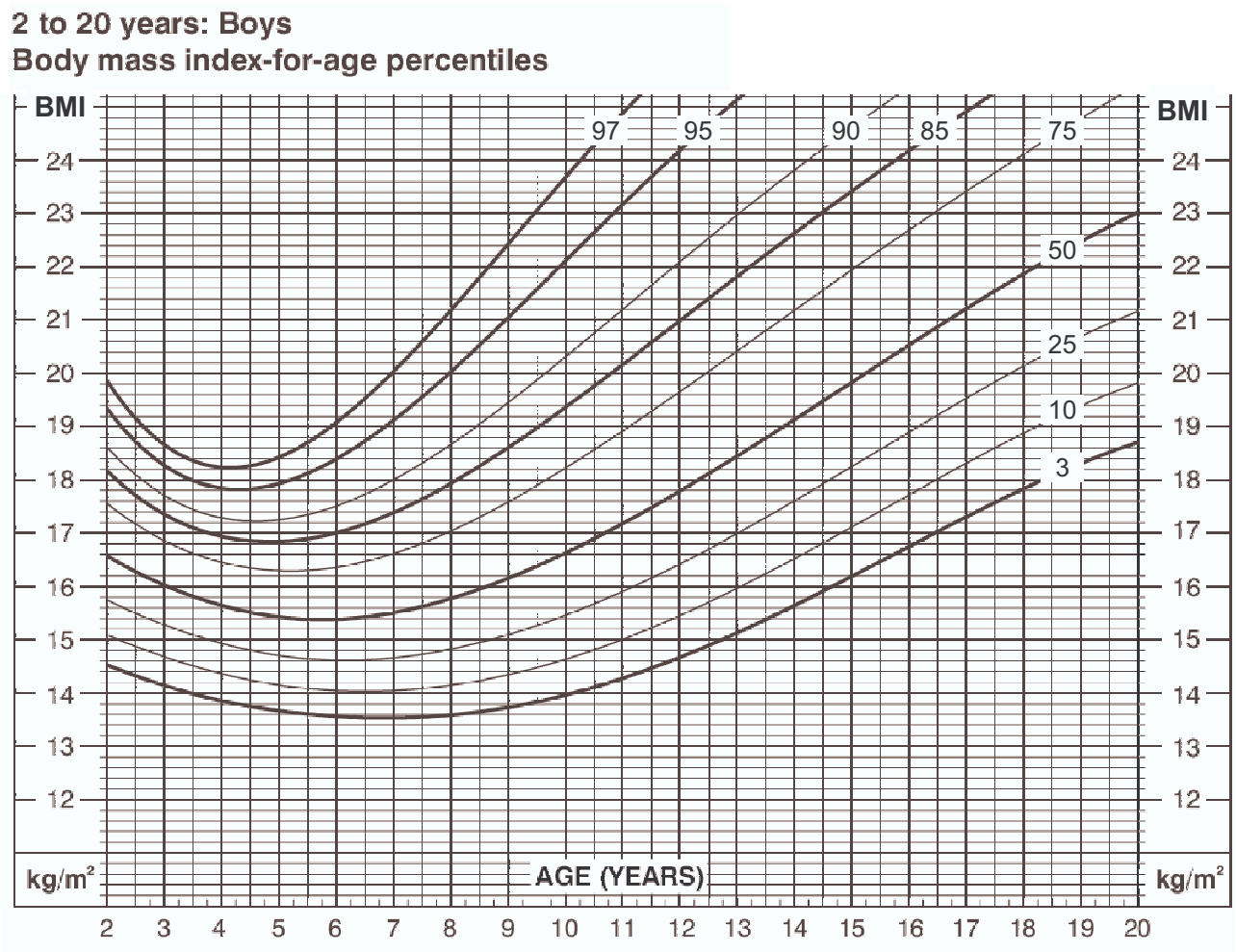
**QUESTION 3**

3.1 Describe in your own words what is meant by the following: "the student taking the test scored at the 75th percentile" (2)

3.2 Test results for a particular test are summarised alongside. In which quartile would a person with a total of 88 fall? (2)

| Test Scores | Frequency |
|---|---|
| 66 - 70 | 4 |
| 71 - 75 | 3 |
| 76 - 80 | 2 |
| 81 - 85 | 6 |
| 86 - 90 | 3 |
| 91 - 95 | 2 |

Questions 3.3 and 3.4 on the next page refer to the graph below.



3.3 Body Mass Index (BMI) is a number calculated from a child's weight and height. BMI number is plotted on the CDC BMI-for-age growth charts (for either girls or boys) to obtain a percentile ranking. BMI-for-age weight status categories and the corresponding percentiles are shown in the following table.

| Weight Status Category | Percentile Range |
|---|---|
| Underweight | Less that the $5^{th}$ percentile |
| Healthy weight | $5^{th}$ percentile to less than the $85^{th}$ percentile |
| At risk of overweight | $85^{th}$ to less that the $95^{th}$ percentile |
| Overweight | Equal to or greater that the $95^{th}$ percentile |

3.3.1 At what percentile would an 8 year old boy with a BMI of 17 be? (2)

3.3.2 What is the BMI of a 5 year old boy if his BMI places him at the $90^{th}$ percentile? (2)

3.3.3 Within what range can a 10 year old boy's BMI be if his weight is to be considered "healthy"? (4)

3.4 BMI is calculated using the formula $\text{BMI} = \frac{\text{weight (kg)}}{(\text{height (m)})^2}$

3.4.1 What is the weight status of an 8 year old boy who is 120cm tall and who weighs 30kg? (5)

3.4.2 How heavy would a 16 year old boy be if he is 1,65m tall and his BMI is at the $50^{th}$ percentile? (5)

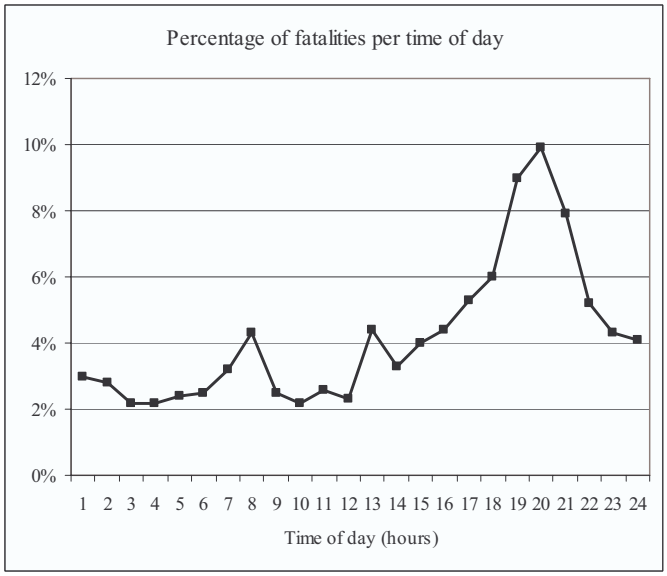
**[22]**

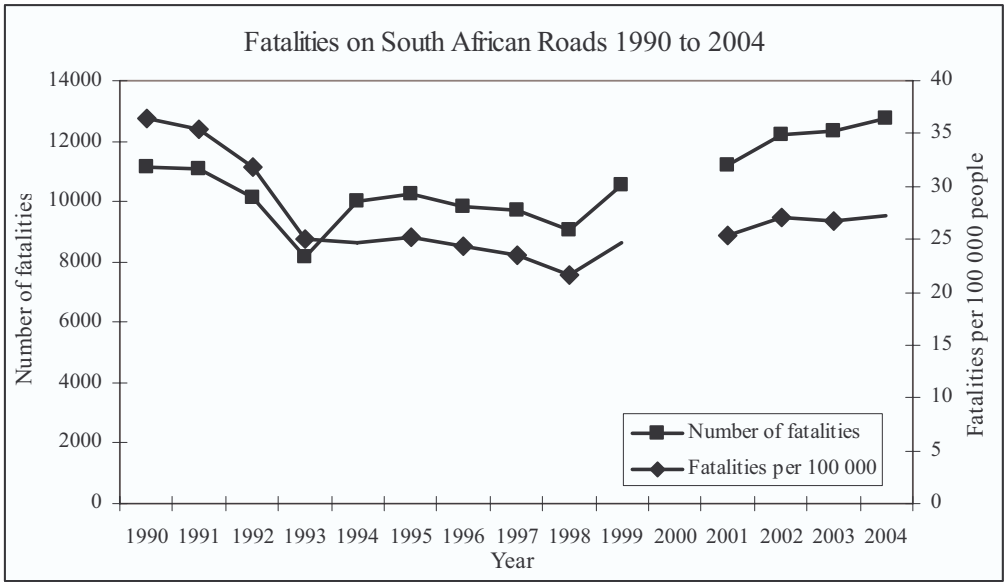
 

## QUESTION 4

*Arrive Alive* (www.arrivealive.co.za) publishes a large number of statistics related to fatalities (deaths) as a result of motor car accidents. The questions that follow are based on the information supplied in the tables and graphs below.

| Fatalities on South African Roads 1990 to 2004 | | | |
|---|---|---|---|
| | Number of road fatalities | South African population (millions) | Number of fatalities per 100 000 people |
| 1990 | 11 157 | 30,6 | 36,46 |
| 1991 | 11 069 | 31,2 | 35,48 |
| 1992 | 10 142 | 31,9 | 31,79 |
| 1993 | 8 140 | 32,6 | 24,97 |
| 1994 | 9 981 | 40,4 | a |
| 1995 | 10 256 | 40,63 | 25,24 |
| 1996 | 9 848 | 40,58 | 24,27 |
| 1997 | 9 691 | 41,27 | 23,48 |
| 1998 | 9 068 | 41,95 | 21,62 |
| 1999 | 10 523 | 42,64 | b |
| 2000 | not available | 43,33 | not available |
| 2001 | 11 201 | 44,25 | 25,31 |
| 2002 | 12 198 | 45,17 | 27,00 |
| 2003 | 12 354 | 46,13 | 26,78 |
| 2004 | 12 727 | 46,59 | 27,32 |




The fatalities on the South African Roads have been reported in terms of both the actual number of fatalities and as a rate: the number of fatalities per 100 000 people in the population.

4.1 Consider the graph that reports the percentage of fatalities per time of day

4.1.1 What fraction of all fatalities occurs between 17h00 and 22h00? (4)

4.1.2 Why do you think there is a sharp rise in the graph around 08h00? (3)

4.1.3 At what times of day are you at greatest risk of being killed in a motor vehicle related accident? Substantiate your claim (4)

4.2 Refer to the table and graph that report on the fatalities from 1990 to 2004
4.2.1 Why is there a gap in each of the broken line graphs? (2)
4.2.2 Calculate the missing values a and b on the table. (8)

4.3 Calculate the change in the number of fatalities from:
4.3.1 1994 to 1999
4.3.2 1999 to 2004 (4)

4.4 Calculate the change in the number of fatalities per 100 000 people from
4.3.1 1994 to 1999
4.3.2 1999 to 2004 (4)

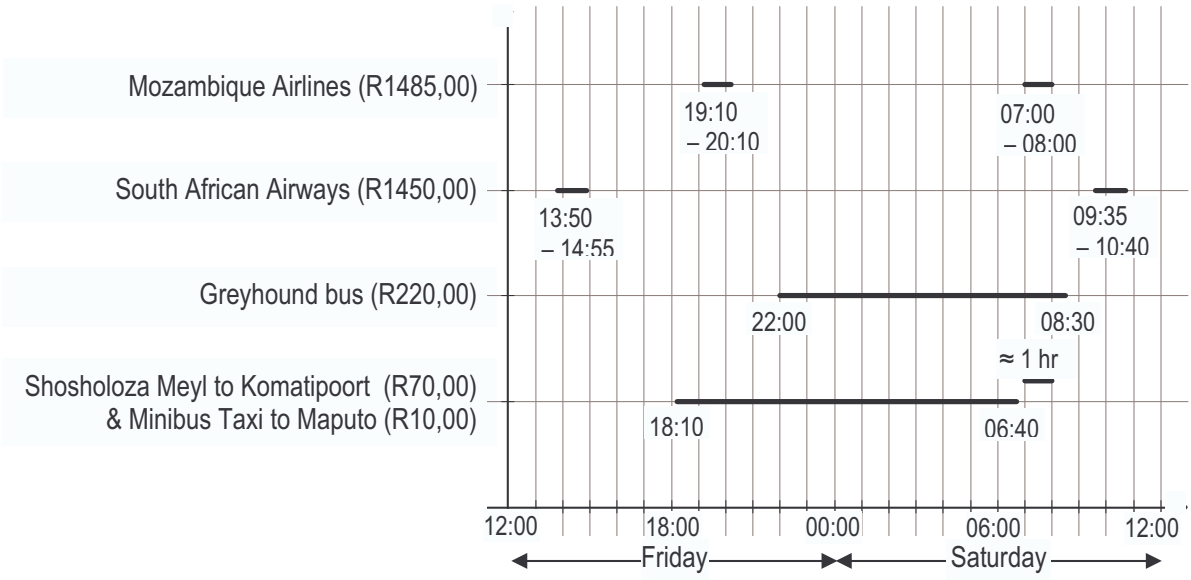
4.5 Consider the graphs of the two statistics and discuss which graph might be used by the Minister of Transport to support an argument that claims progress in managing road accident fatalities and which graph might be used by somebody trying to contradict the Minister. Provide a detailed motivation for your answer. (6)

4.6 Which statistic (actual number of fatalities or number of fatalities per 100 000) best represents the risk (likelihood) of dying in a motor vehicle related accident. Motivate your answer. (4)
**[37]**

**QUESTION 5**

The time line below has been developed by Luka who lives in Johannesburg and is considering attending the wedding of a friend in Maputo.

The timeline shows the four different travel options available to Luka as well as the cost (one way) and departure and arrival times for each option.



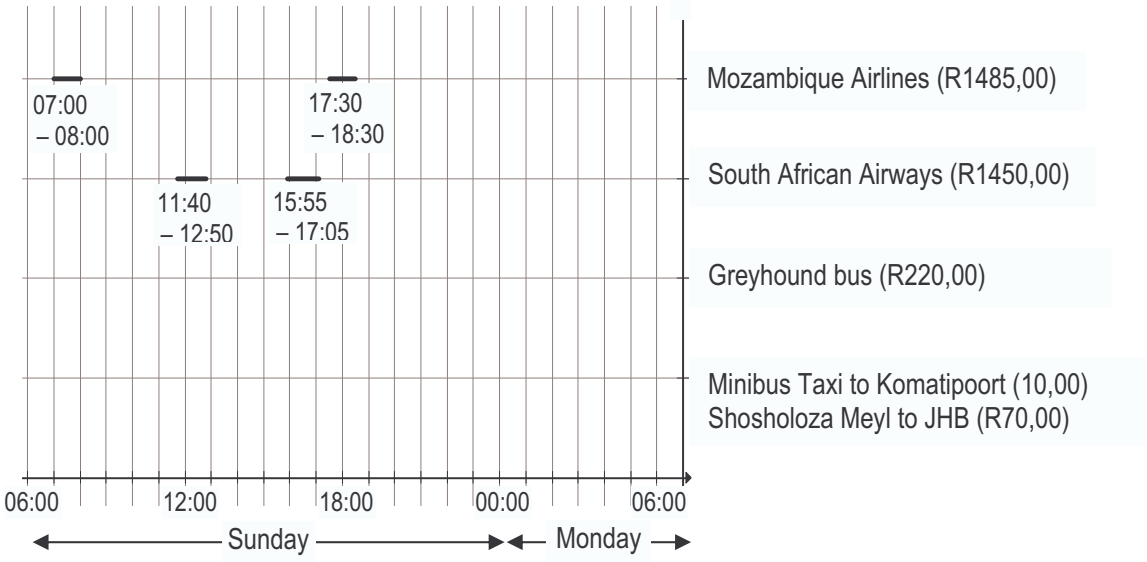

5.1 Approximately how long will the train (Shosholoza Meyl) and taxi option take? (2)

5.2 How much does the bus option cost? (1)

5.3 Explain the difference in costs between the four different options in terms of time spent traveling and convenience. (6)

5.4 Draw the following details onto the timeline provided:
Shosholoza Meyl and taxi:
- Shosholoza Meyl departs Maputo at 18:00 and arrives in JHB at 06:20;
- Taxi journey takes ≈ 1hr from Maputo with taxis departing all the time

Greyhound Bus:
- Option 1 departs Maputo at 07:30 and arrives in Johannesburg at 16:30
- Option 2 departs Maputo at 19:00 and arrives in Johannesburg at 03:55 (6)




5.5 If Luka can afford to spend no more than R1800,00 on travel costs on the trip to Maputo, decide on what combination of travel options to use if Luka:
- Cannot leave work before 16:00 on Friday and must be back at work by 08:00 on Monday morning
- Wants to spend as much time as possible and at least two nights in Maputo
- Would like to be as comfortable as possible while traveling

Give detailed travel arrangements and costs for your solution. (9)
**[24]**

– End of Paper –