**NORTHERN CAPE DEPARTMENT OF EDUCATION**

# MATHEMATICAL

# LITERACY

# LEARNER NOTES

# DATA HANDLING

**INDEX:**

**PLEASE NOTE:**

**It is of utmost importance that you study and know the definitions e.g. mean, mode and range. The definition(s) already explain the calculation that must be done.**

# DATA HANDLING

**Data** is raw information that has been collected, without any organization of analysis. It is unprocessed.

**Data Handling** refers to the process of collecting, organizing, summarising, representing and analyzing information. It means gathering and recording information and then presenting it in a way that is meaningful to others.

## DEVELOPING QUESTIONS

The first step in the statistical process is to develop or pose questions.

When developing/posing the question, you must first identify the main question, followed by sub-questions.

## QUESTION 1 - EXAMPLE

**Main question** - what is the average monthly income of people in your community?

**Sub-questions**

In which age category do you fall?

In which sector/industry do you work?

What is your job title?

How long have you been working in this job?

## QUESTION 2

Formulate 3 sub-questions for the main question below that will enable meaningful data collection:

Are the expenses incurred for a Matric dance justified?

## QUESTION 3

Formulate 3 sub-questions for the main question below that will enable meaningful data collection:

How can your school's matric pass rate be improved?

## COLLECTING DATA

Methods of collecting data:

1. Observation – e.g. counting the number of people entering a store. This is the method of collecting data by watching and recording the results. The advantage of this method is that you don't interact with people to get the response.

2. Interview – e.g. asking your fellow learners their opinion of the design for your matric jacket. The interviewer asks the interviewee questions and records the response. The advantage of this method is that the interviewer may ask further questions if the response is vague.

3. Survey – e.g. leaners complete a questioner on cool drink perverseness for the tuck shop. A questionnaire is a tool used to conduct a survey and can be completed online, in person, by telephone etc. Questions should not be long and must be clear. Answer must also be concise. Questionnaires must be anonymous and confidential. Questionnaires should be short and simple and not bias. This is a list of questions used

to collect data from the respondents. Participants do not have to identify themselves. The advantage of using this method is that you get the information directly from the participants.

**Population** – the entire group of interest e.g. all the leaners at school.
**Sample** – a representative part of the population e.g. randomly selects a number of people per grade. A sample must be representative, randomly chosen, large enough and free from bias.

## QUESTION 1
Susan will be managing the new tuck shop at your school, so she decided to hand out questionnaires to the learners in order to do market research.
Draw up a questionnaire Susan can use in order to gather the information she requires.

## QUESTION 2
A researcher is interested in the effect on a high sugar snack on the energy levels of primary school learners. A group of 250 primary school learners were selected. Half are tested while consuming the high sugar snack and the other half are tested without consuming the snack.
2.1 Identify the population
2.2 Identify the sample

## CLASSIFYING DATA
Organising data is taking information and arranging it into some kind of order (such as ascending or descending order).

Classifying data means organising it in groups or classes, based on some common feature.

NUMERICAL DATA:

➢ refers to data consisting of quantities or numerical values.
➢ examples include: measurements e.g. length, height, area, volume, mass, etc.
➢ numerical data can be further classified as discrete data or continuous data.
➢ <u>Continuous data</u> is data that you measure, e.g.

- The height of a learner
- The time taken to run a race

➢ <u>Discrete data</u> is a set of values that can be counted, e.g.

- The number of children in a family
- The number of cars in a parking lot.

CATEGORICAL DATA:

- ➢ is generally descriptive in nature, as data is classified and organised into categories.
- ➢ data is usually observed, but not measured.
- ➢ examples: textures, smells, tastes, gender, eye color and country of birth.
- ➢ categorical data can exist of "yes" and "no" answers.

## SUMMARISING DATA

## MEASURES OF CENTRAL TENDENCY

- Mean
- Median
- Mode

| Mean | $= \dfrac{\text{sum of all the values in a data set}}{\text{number of values in the data set}}$ |
|---|---|
| Median | = middle value of data set, if organized in ascending order (small to big)<br>→ If uneven number of values in data set − use middle value<br><br>**1    3    5    6    8**<br>Median = 5<br><br>→ If even number of values in data set − get average of 2 middle values (add together and divide by 2)<br><br>**1    3    5    7    8    9**<br><br>Median $= \dfrac{5+7}{2} = \mathbf{6}$ |
| Mode | = the value in the data set that appears the most<br>= there may be more than one mode or no mode at all |

**MEASURES OF SPREAD**

| Range | = Maximum – Minimum/ Biggest value – smallest value |
|---|---|
| **Quartiles (Q)** | = Quartiles divide the data set in 4 even parts. Follow these steps:<br>■ Arrange the data from small to big.<br>■ $Q_2$ – is the same as the median. Thus divide the data set in 2 groups.<br>■ $Q_1$ - is die middle value in the group <u>below</u> the median or $Q_2$<br>■ $Q_3$ - is the middle value in the group <u>above</u> the median or $Q_2$<br>■ **Example  A:**<br><br>1  2  3  4  5 \| 6 \| 7  8  9  10  11<br>Q1        Q2        Q3<br><br>● **Example  B:**<br><br>1  2  3  4  5  6  7  8 \| 9  10  11  12  13  14<br>Q2<br>Q1                        Q3<br><br>$Q_1 = 4$        $Q_2 = 7{,}5$        $Q_3 = 11$ |
| **Interquartile range** | = $Q_3 - Q_1$ |
| **Five-point summary** | ● It consists of the following values in the data set<br>1. Minimum value<br>2. $Q_1$<br>3. $Q_2$ (Median)<br>4. $Q_3$<br>5.  Maximum value |

**PERCENTILES (only for interpretation, not calculation)**
Percentiles are the values that divides the data set into 100 equal parts

E.g. 1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20

The position of the 30th percentile: $\dfrac{30}{100}$ (n + 1)

    (n = number of data in the data set)

$\dfrac{30}{100}$ (20 + 1) = 6,3

$Q_1 = 25$th percentile, $Q_2 = 50$th percentile, $Q_3 = 75$th percentile

**GROWTH CHATS**

- Provides an indication of the typical weight, age and height growth patterns of children and babies.
- The concept of percentiles is used in growth charts.
- The curves on the growth chart below represents the percentile values of the data collected from different age groups.
- The growth chart is used to compare the BMI (body mass index) of a child to others in his age group.
- This is also used to determine the health status of the baby.

**EXAMPLES**

1. What is the BMI of a 4 year old girl at the 95$^{th}$ percentile?
2. The couple's 10 year old child has a BMI of 16 kg/m². Between which percentile curve does her BMI lie?

Solutions:

1. Draw a vertical line upward from 4 years to the 95$^{th}$ percentile.
   Draw a horizontal line across to find the relevant BMI.
   The BMI is 18 kg/m².

2. Draw a vertical line upwards from 10 years.
   Draw a horizontal line across from 16 kg/m².
   Locate the percentile where the two lines meet.
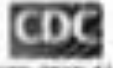   Between the 25$^{th}$ and 50$^{th}$ percentiles.

A South African couple has relocated to USA .The growth chart below has been used to monitor the growth of their female children.

Use the chart to answer the questions.

## CDC Growth Charts: United States
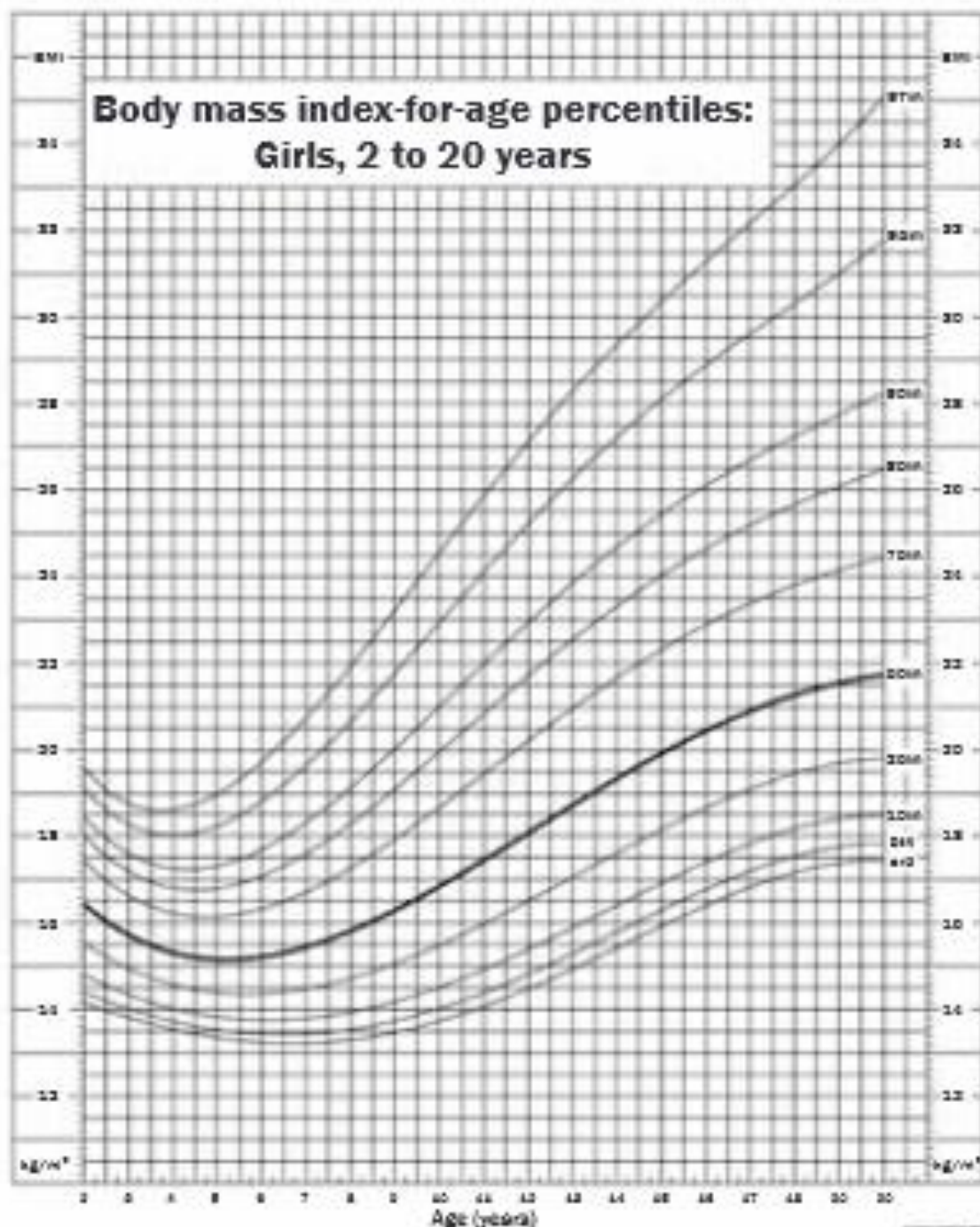
**Body mass index-for-age percentiles: Girls, 2 to 20 years**

Age (years)

## BOX AND WHISKER PLOTS

- Box and whisker plots are graphical representation of the five number summary of a set of data.
- The five number summary:
  1. Minimum value
  2. Lower quartile ($Q_1$)
  3. Median ($Q_2$)
  4. Third quartile ($Q_3$)
  5. Maximum value

## EXAMPLE

Read from the box and whisker plot the values of the five number summary.
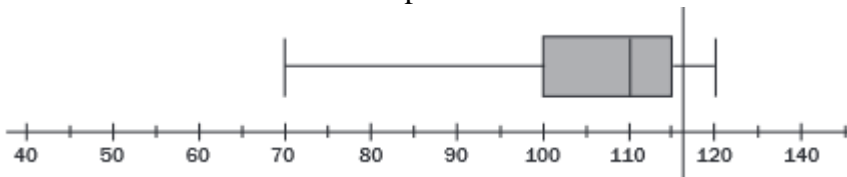


Solution:

| | |
|---|---|
| Minimum value | 70 |
| Lower quartile (Q1) | 100 |
| Median (Q2) | 110 |
| Third quartile (Q3) | 115 |
| Maximum Value | 120 |

**EXERCISES**

**QUESTION 1**

> There is a global increase in the use of communication technology, such as the Internet, social networks and cellphones. TABLE 1 in ANNEXURE A shows data regarding the percentage of the world population living in the 12 regions as well as the percentage of people using different means of communication.
>
> Some of the data in TABLE 1 has been omitted.

Use TABLE 1 to answer the following questions.

1.1 Explain why some data in the table is categorical. (2)

1.2 Write down the modal percentage usage for cellphone communication. (3)

1.3 Calculate the median percentage usage for Internet communication. (3)

1.4 Write down the total percentage of Internet usage in America. (2)

1.5 Determine the total percentage of the world population living in all of Asia. (3)

1.6 Write down the global region that shows the greatest difference between the percentage usage of Internet communication and the percentage usage of cellphone communication. (2)

**[15]**

**ANNEXURE A**

**QUESTION 1**

**TABLE 1: Percentages of the world population and global use of different means of communication**

| | Global regions | World population (%) | Percentage distribution of global means of communication | | |
|---|---|---|---|---|---|
| | | | Internet usage | Social network usage | Cellphone usage |
| **A** | CENTRAL ASIA | 2 | 1 | 1 | 2 |
| **B** | OCEANIA | --- | 1 | 1 | 1 |
| **C** | CENTRAL AMERICA | 3 | 3 | 3 | 3 |
| **D** | MIDDLE EAST | 4 | 4 | 3 | 5 |
| **E** | SOUTH-EAST ASIA | 9 | 6 | 8 | 10 |
| **F** | CENTRAL AND EASTERN EUROPE | 4,5 | 7 | 6 | 7 |
| **G** | SOUTH AMERICA | 6 | 8 | 10 | 8 |
| **H** | AFRICA | … | 8 | 4 | 11 |
| **I** | SOUTH ASIA | 23 | 8 | 6 | 18 |
| **J** | NORTH AMERICA | 4,5 | 11 | 11 | 5 |
| **K** | WESTERN EUROPE | 5,5 | 13 | 10 | 8 |
| **L** | EAST ASIA | 22 | 30 | 37 | 22 |

[Adapted from wearesocial.net]

**QUESTION 2**

TABLE 2 below represents a global data snapshot of cellphone usage.
(A data snapshot is another form of representing data.) Some data has been omitted.

**TABLE 2: Global data snapshot**

| GLOBAL DATA SNAPSHOT | | |
|---|---|---|
| **7 095 476 818**<br>Total world population | | **52%** \| **…**<br>Urban \| Rural |
| **2 484 915 152**<br>Internet users | | **35%**<br>Internet usage |
| **1 856 680 860**<br>Social network users | | **…**<br>Social network usage |
| Six billion, five hundred seventy-two million, nine hundred and fifty thousand, one hundred and twenty-four<br>cellphone users | | **93%**<br>Cellphone usage |

[Adapted from wearesocial.net]

Use TABLE 2 to answer the following questions.

2.1 Determine the total number of people living in rural areas. (3)

2.2 Calculate the percentage of social network usage.

You may use the following formula:

**Percentage social network usage**
$$= \frac{\textbf{number of active social network users}}{\textbf{total world population}} \times \textbf{100\%}$$

(2)

2.3 Write the number of cellphone users in number format. (2)

**[07]**

## QUESTION 3

The population of South Africa, per province, gender and population group for 2016 is shown on TABLE 3 on ANNEXURE B.

Use ANNEXURE B to answer the questions that follow.

3.1 Which province has the most black, male persons and how many are they? (3)

3.2 Which ONE of the following represents the total number of coloured people in South Africa in 2016?

    A  Two million three hundred and seventy thousand
    B  Four hundred and forty thousand three hundred and forty six
    C  Four million nine hundred and six thousand
    D  None of the above (2)

3.3 Identify the population group and provinces that have the exact same number of male and female persons. (2)

3.4 Calculate the missing value **A**. (2)

3.5 Calculate the number of white females in KwaZulu-Natal as a percentage of the total number of female persons in South Africa. (3)

3.6 Express the number of Asian female persons in Gauteng to the total number of persons in Gauteng as a ratio in the form 1 : ... (3)

**[15]**

## QUESTION 4

A box and whiskers plot is given below, as well as terms that describe the different letters on the diagram.
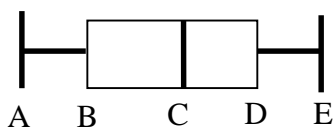


TERMS:
Median ;  Maximum ;  Quartile 3 ;  Minimum ;  Quartile 1

4.1 Provide labels for the box and whiskers plot by matching the terms with the letters shown on the diagram. Write ONLY the letter and correct term. (5)

4.2 Complete by using the correct letters:
Inter quartile range = ......  −  ....... (2)

**[07]**

**ANNEXURE B**

**QUESTION 3**

**POPULATION OF SOUTH AFRICA, PER PROVINCE, GENDER AND POPULATION GROUP FOR 2016**

| Province | Black | | | Coloured | | | Asian | | | White | | | Total | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Male | Female | Total | Male | Female | Total | Male | Female | Total | Male | Female | Total | Male | Female | Total |
| Western Cape | 1 062 | 1 057 | **2 118** | 1 523 | 1 636 | **3 159** | 18 | 19 | **36** | 525 | 524 | **1 049** | 3 127 | 3 236 | **6 362** |
| Eastern Cape | 2 852 | 3 117 | **5 969** | 253 | 283 | **536** | 7 | 4 | **11** | 101 | 114 | **215** | 3 213 | 3 518 | **6 731** |
| Northern Cape | 312 | 333 | **645** | 235 | 239 | **474** | 2 | - | **2** | 34 | 37 | **71** | 583 | 609 | **1 192** |
| Freestate | 1 146 | 1 275 | **2 420** | 53 | 45 | **98** | 8 | 4 | **12** | 103 | 136 | **239** | 1 310 | 1 459 | **2 769** |
| Kwazulu-Natal | 4 647 | 5 013 | **9 660** | 56 | 56 | **112** | 362 | 410 | **772** | 127 | 135 | **262** | 5 192 | 5 614 | **10 807** |
| North West | 1 744 | 1 723 | **3 467** | 20 | 24 | **45** | 9 | 10 | **19** | 104 | 124 | **228** | 1 877 | 1 881 | **3 758** |
| Gauteng | 5 335 | 5 175 | **10 511** | 210 | 225 | **436** | 254 | 212 | **466** | 1 034 | 1 096 | **2 130** | 6 834 | 6 709 | **13 543** |
| Mpumalanga | 1 966 | 2 053 | **4 019** | 9 | 6 | **15** | 9 | 9 | **18** | 116 | 122 | **238** | 2 100 | 2 190 | **4 290** |
| Limpopo | 2 643 | 2 902 | **5 537** | 13 | 18 | **32** | 32 | 16 | **48** | 59 | 50 | **109** | 2 739 | 2 986 | 5 724 |
| **South Africa** | **21 698** | **22 648** | **44 346** | **2 373** | **2 533** | **4 906** | **700** | **684** | **1 384** | **2 203** | **A** | **4 540** | **26 974** | **28 202** | **55 176** |

[Adapted by www.statssa.gov.za]

**QUESTION 5**

The number of learners, teachers and schools in the school sector of South Africa is indicated per province for 2016 in TABLE 4.

**TABLE 4: LEARNERS, TEACHERS AND SCHOOLS PER PROVINCE IN 2016 IN THE SOUTH AFRICAN SCHOOL SECTOR**

| PROVINCES | PUBLIC SCHOOLS | | | PRIVATE SCHOOLS | | |
|---|---|---|---|---|---|---|
| | LEARNERS | TEACHERS | SCHOOLS | LEARNERS | TEACHERS | SCHOOLS |
| Eastern Cape | 1 898 723 | 58 372 | 5 469 | 62 824 | 3 257 | 207 |
| Free State | 671 712 | 22 465 | 1 214 | 16 637 | 1 058 | 68 |
| Gauteng | 2 048 558 | 63 092 | 2 083 | 278 026 | 18 986 | 730 |
| Kwazulu-Natal | 2 808 137 | 84 810 | 5 895 | 69 407 | 4 989 | 247 |
| Limpopo | 1 706 725 | 51 650 | 3 867 | 58 830 | 2 768 | 151 |
| Mpumalanga | 1 046 234 | 34 034 | 1 725 | 28 118 | 370 | 122 |
| Northern Cape | 287 435 | 8 841 | 545 | 4 080 | 295 | 30 |
| North West | 811 340 | 24 876 | 1 471 | 19 207 | 1 232 | 63 |
| Western Cape | 1 063 349 | 33 254 | 1 450 | 53 223 | 4 264 | 237 |
| **South Africa** | **12 342 213** | **...** | **23 719** | **590 352** | **37 219** | **1 855** |

[Adapted from:www.dbe.gov.za]

Use TABLE 4 and the information above to answer the questions that follow.

5.1 Which province had the most learners in private schools in 2016? (2)

5.2 Which provinces have less than the mean number of teachers per province for public schools? (4)

5.3 Determine the median value of teachers per province for private schools. (2)

5.4 Calculate the range for the number of learners in public schools for all nine provinces. (2)

**[10]**

**QUESTION 6**

6.1

In 2016 and 2017 a group of friends decided to take part in the Cape Argus Pick-n-Pay Cycle Tour as a team.

TABLE 5 below summarizes the times in which each member of the team completed the tour in 2016 and 2017.

**TABLE 5: TIME TAKEN TO COMPLETE THE TOUR IN 2016 AND 2017**

| Name | Age in 2016 | Time (2016) | Age in 2017 | Time (2017) |
|---|---|---|---|---|
| Naas | 18 | 03:47:43 | 19 | 03:13:22 |
| Kohli | 17 | 04:10:30 | 18 | Injury |
| Frank | 17 | 03:57:16 | 18 | 04:25:14 |
| Jazzman | 16 | 04:01:27 | 17 | 03:39:45 |
| Sbu | 18 | 03:38:10 | 19 | 04:26:51 |
| Joe | 17 | 05:05:35 | 18 | 03:44:49 |
| Kagiso | 18 | 04:52:00 | 19 | Injury |
| Mike | 20 | 04:52:00 | 21 | 03:56:38 |
| Jonathan | 25 | 05:38:01 | 26 | Injury |
| Sizwe | 25 | 05:28:36 | 26 | 06:05:10 |
| Jackson | | | 26 | 05:33:43 |
| Janda | | | 29 | 06:11:59 |
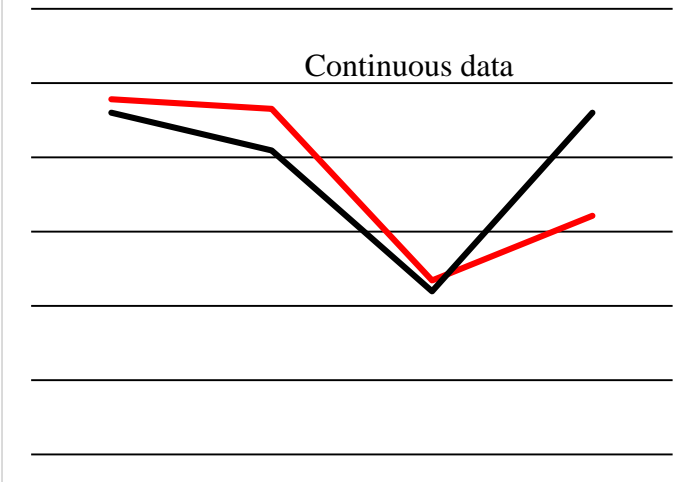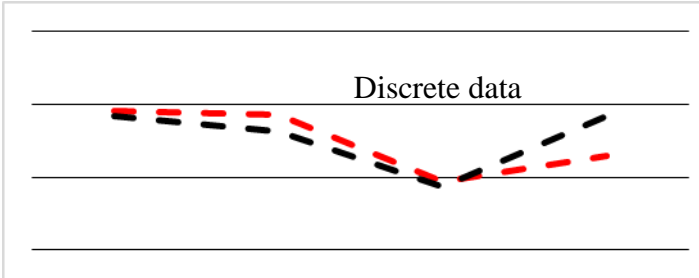
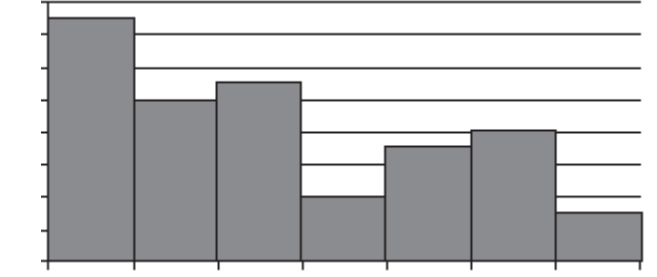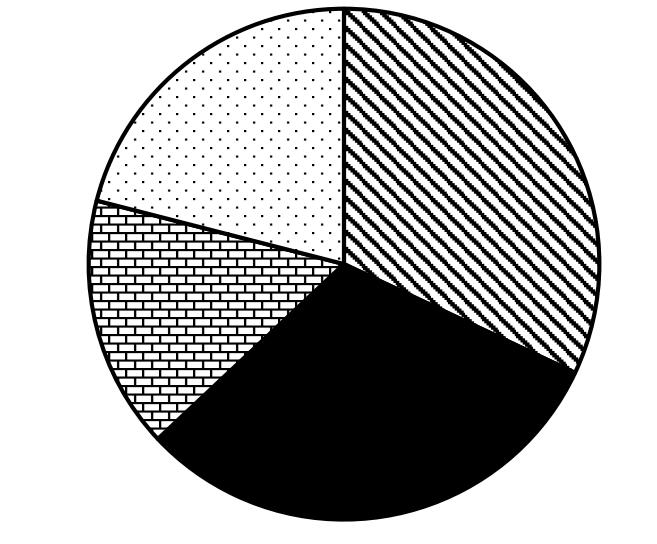Use the information in the above TABEL 5 to answer the following questions:
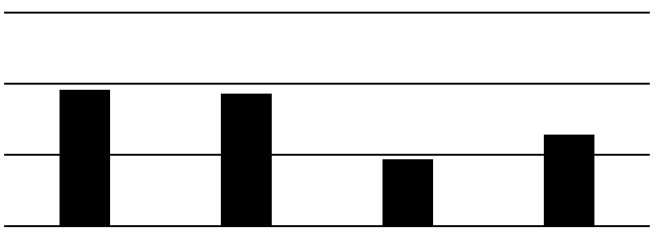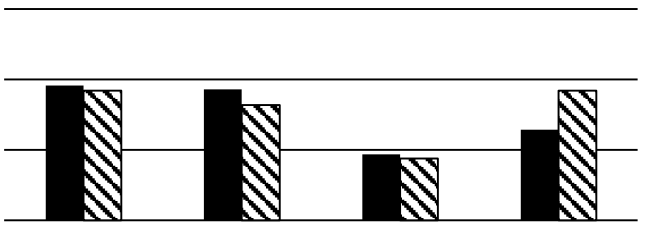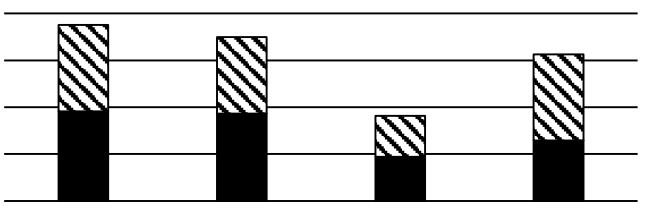
6.1.1  Write down the total number of members belonging to the team in 2017. (2)

6.1.2  Give the names of the members who were NOT part of the team in 2016. (2)

6.1.3  Determine the modal age of the 2017 club members. (2)
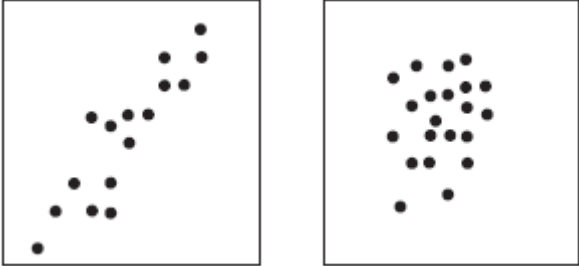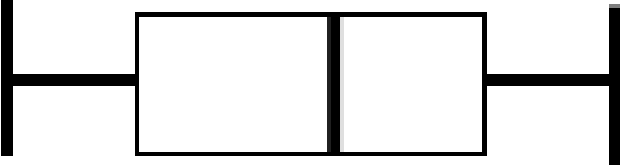
6.1.4  Determine the age range for members in 2016. (2)

6.2

| | John | Sibu | Mike | Tumi | Cole | Joe | Pete | Ed | Stew | Piet |
|---|---|---|---|---|---|---|---|---|---|---|
| **2016** | 306 | 292 | 250 | 228 | 338 | 329 | 281 | 237 | 251 | 292 |
| **2017** | 193 | 220 | 225 | 237 | 265 | 267 | 334 | 265 | 342 | |

The 2016 and 2017 times for the team rounded to the nearest minute, are shown below.

6.2.1   Is the data above discrete or continuous? Motivate your answer.          (3)

6.2.2   Calculate the mean time for 2017.  Give your answer in hours and minutes.          (5)

6.2.3   Determine the median time for 2016.          (3)

6.2.4   Who was the fastest rider in 2016?          (2)

6.2.5   Which rider improved the most from 2016 to 2017 and by how many minutes?          (3)

**[24]**

## REPRESENTING, INTERPRETING AND ANALYSING DATA
The following representations of data can be drawn:

| Line graphs: Broken line graphs | In data handling we use line graphs to show the relationship between two quantities. A line graph is formed by using lines to join data points which have been mapped on a grid. It is used to show the change of information over time. A line graph shows the trend between plotted points. |  |
|---|---|---|

Continuous data

Discrete data

| | | |
|---|---|---|
| Single bar graphs | A bar graph is used to represent data that is sorted into categories. Display data is compared in categories. Each bar shows the number of items in that category and there are spaces between the bars. | |
| Multiple (double) bar graphs | | |
| Compound (stacked) bar graphs | | |
| Histograms | Histograms are different from bar graphs in that they represent continuous data. Data that is displayed on a histogram is also grouped. There are no spaces between the bars. | |
| Pie Charts | Pie charts are circular graphs, divided into sectors. They are used to show the parts that make up a whole. They can be useful for comparing the size of relative parts. The information is often presented as percentages that must add up to 100%. They are often used in media to show clear and important differences, but they cannot show shape and spread of data. | |

| Scatter plots | A scatter plot is the most useful graph for studying the relationship (correlation) between two variables. |  |
|---|---|---|
| Box-and-whisker plots | Box and whisker plots are graphical representation of the five number summary of a set of data.<br>The five number summary:<br>Minimum value<br>Lower quartile (Q1)<br>Median (Q2)<br>Third quartile (Q3)<br>Maximum value |  |

SCATTER PLOT

A scatter plot is the most useful graph for studying the relationship (correlation) between two variables. It shows one of the variables on the horizontal axis and the other variable on the vertical axis. The resulting scatter plot of points will show at a glance whether a relationship exists. You cannot have more than two sets of data on a scatter plot.

A scatter plot can show:
• positive correlation
• negative correlation
• no correlation.

• When seeing patterns remember that the tighter together the points are clustered, the stronger the correlation between the variables you have plotted.
• If you find a pattern that slopes from the lower left to the upper right, this tells you that as x increases, y also increases. This means there is a "positive" correlation between the two variables.
• If you find a pattern that slopes from the upper left to the lower right, this tells you that as x increases, y decreases. This means there is a "negative" correlation between the two variables.
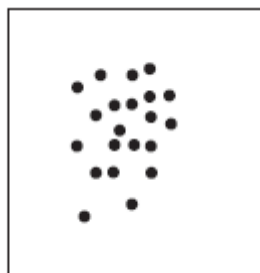


positive correlation          no correlation          negative correlation

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## QUESTION 7

7.1 Two broken-line graphs representing some of the data in TABLE 1 (Question 1) have been drawn on the grid on the ANSWER SHEET.
Draw another broken-line graph on the same grid to represent the percentage cellphone usage for all the global regions on the ANSWER SHEET. (6)
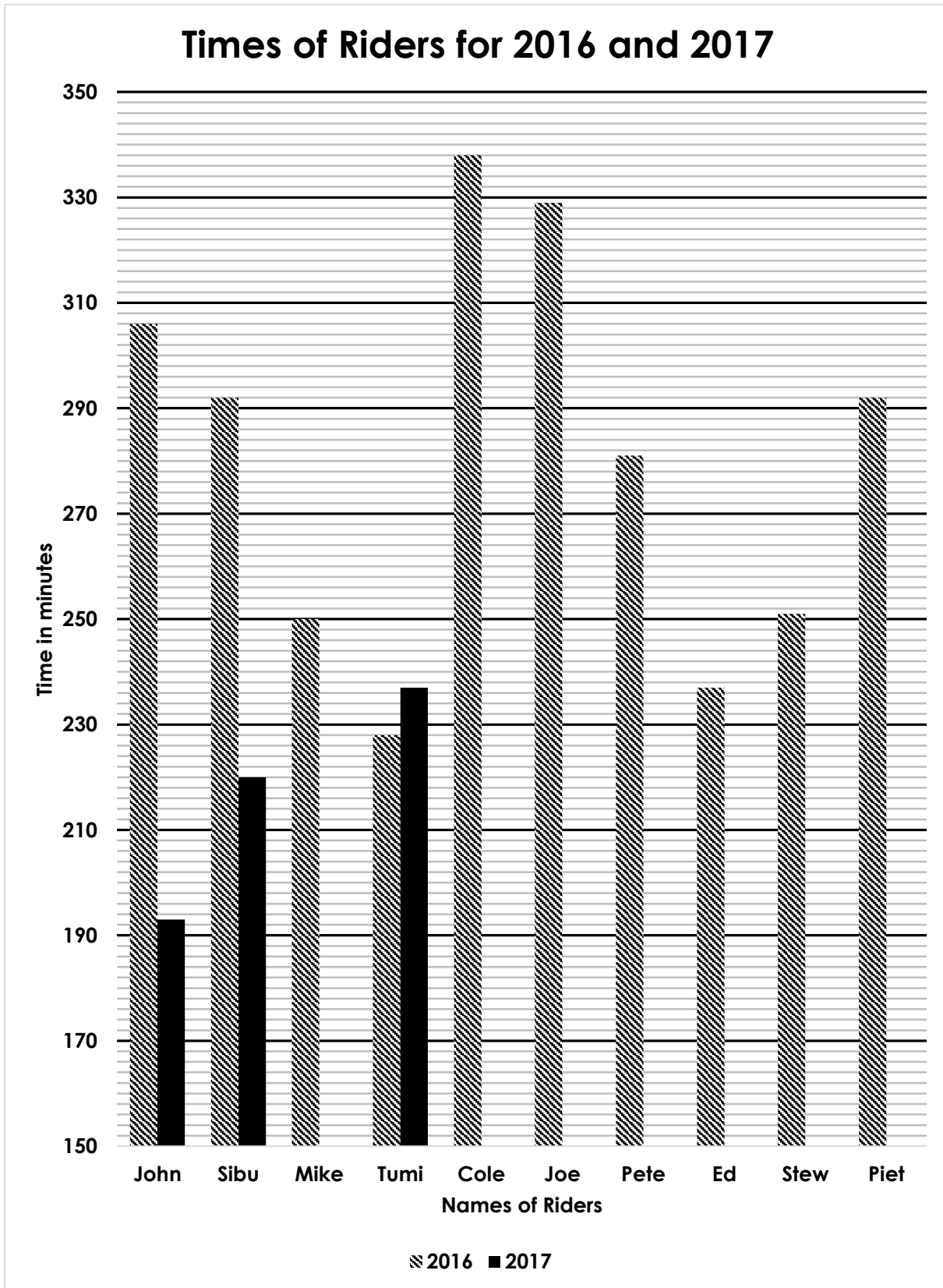
7.2 Use the information in Question 6.2 and the graph on the ANSWER SHEET showing the times for the riders for both 2016 and 2017. Complete the graph for the missing data. (6)

**[12]**

## QUESTION 7.1

**WORLD POPULATION AND MEANS OF COMMUNICATION PERCENTAGES PER GLOBAL REGION**

**QUESTION 7.2**



# Times of Riders for 2016 and 2017

Time in minutes

Names of Riders

⊠ 2016    ■ 2017
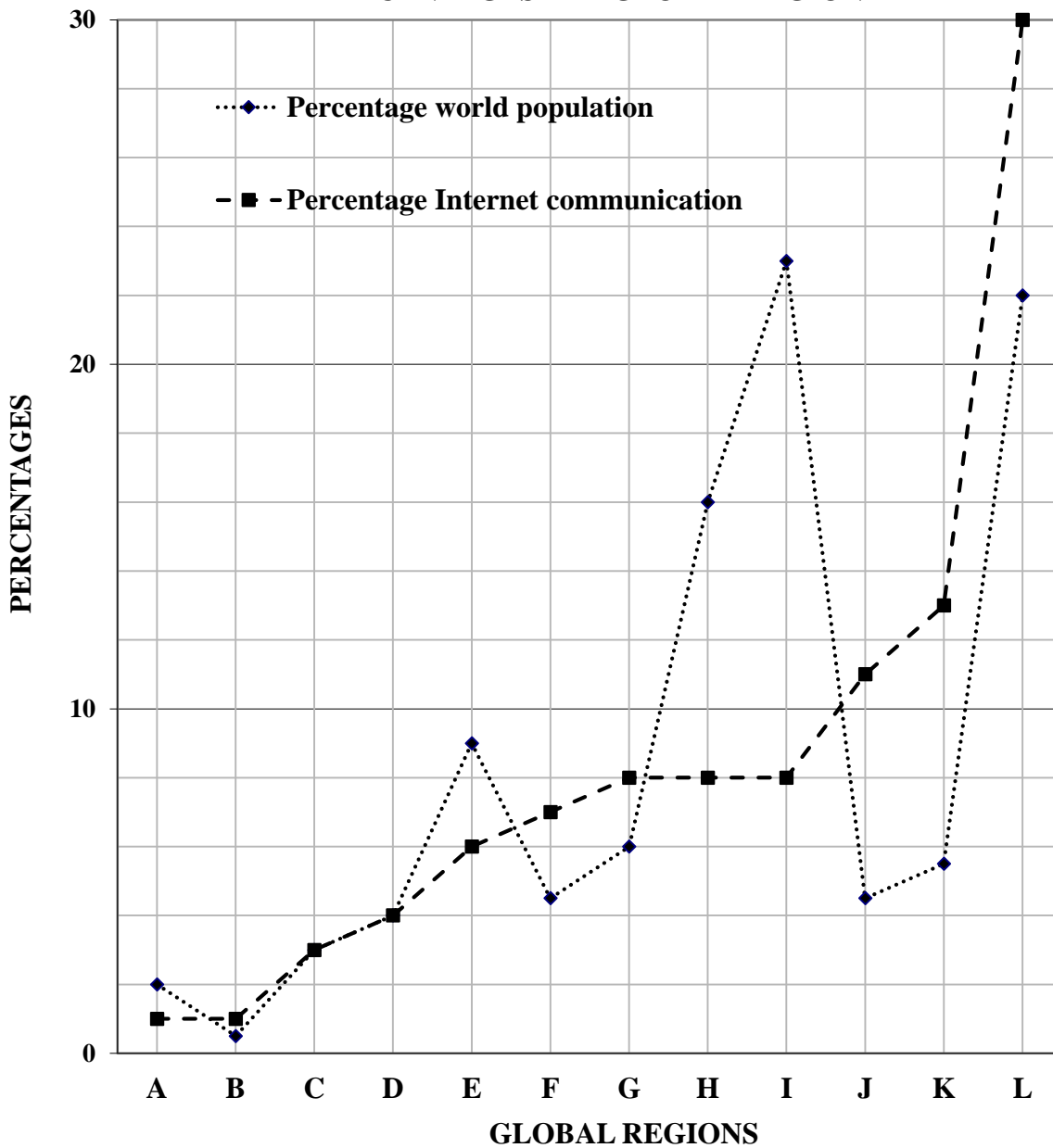
# QUESTION 8

8.1 In a national science olympiad the rules state that each school may enter a maximum of three learners (participants). TABLE 6 below shows the relationship between the number of schools entering and the maximum number of participants.

**TABLE 6: NUMBER OF SCHOOLS AND MAXIMUM NUMBER OF PARTICIPANTS IN THE SCIENCE OLYMPIAD**

| Number of schools | 367 | 900 | B |
|---|---|---|---|
| Number of participants | A | 2 700 | 15 726 |

Use the information above to answer the questions that follow.

8.1.1 Determine the missing values **A** and **B**. (4)

8.1.2 Each school must have ONE teacher who invigilates the writing of the olympiad. Calculate the number of schools that entered the olympiad if a total of 32 712 people were involved on the day the olympiad was written. (3)

8.2 Matuli, Bianca and Khotso wrote some practice tests at their school. Their percentage marks are given in the table below.

**TABLE 7: PERCENTAGE MARKS FOR PRACTICE TESTS**

| Matuli | 53 | 48 | 62 | 80 | 48 | 58 | 72 | 48 | 70 | 86 |
|---|---|---|---|---|---|---|---|---|---|---|
| Bianca | 36 | 42 | 48 | 58 | 60 | 61 | 62 | 76 | 86 | |
| Khotso | 30 | 47 | C | 55 | 60 | 60 | 68 | 68 | 70 | 90 |

**NOTE:** Bianca's median percentage mark is 60%.
Matuli's mean percentage mark is 62,5%.
Khotso's median percentage mark and range are both 60% and the marks are ordered.

Use the information above to answer the questions that follow.

8.2.1 Calculate Matuli's median percentage mark. (4)

8.2.2 Calculate Bianca's mean percentage mark. (3)

8.2.3 The box and whisker diagram below represents the spread of Khotso's percentage marks.
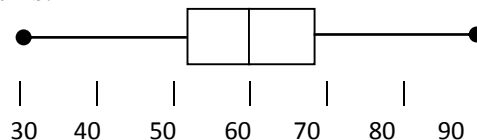


Determine the missing value **C**, the lower quartile mark, if Khotso's interquartile range (IQR) is 16.

The following formula may be used:
**IQR = Upper quartile – Lower quartile** (3)

8.2.4      Bianca stated that Matuli performed better than she did in the practice
tests.
Give TWO possible reasons to support Bianca's statement.     (4)

**[14]**

## QUESTION 9

Bali is an international tourist destination that consists of different regions.
The graphs on ANNEXURE C show the average daily rate and percentage occupancy.

[Percentage occupancy is the percentage of all rental units that are rented out at a given time.]

Use ANNEXURE C to answer the questions that follow.

9.1     The average daily rate in Kula remained almost the same from 2011 to 2014.
Explain your observations regarding the percentage occupancy in Kula during the
same period.      (4)

9.2     Compare the relationship between the *average daily rates* and the *percentage
occupancy* in Ubud for the year to date (YTD) Sep. 2014 to YTD Sep 2015.     (4)

9.3     Explain why both graphs have a gap between 2014 and YTD September 2014.     (4)

**[12]**

## AVERAGE DAILY RATES AND OCCUPANCY FOR DIFFERENT REGIONS FROM 2010 TO SEP. 2015
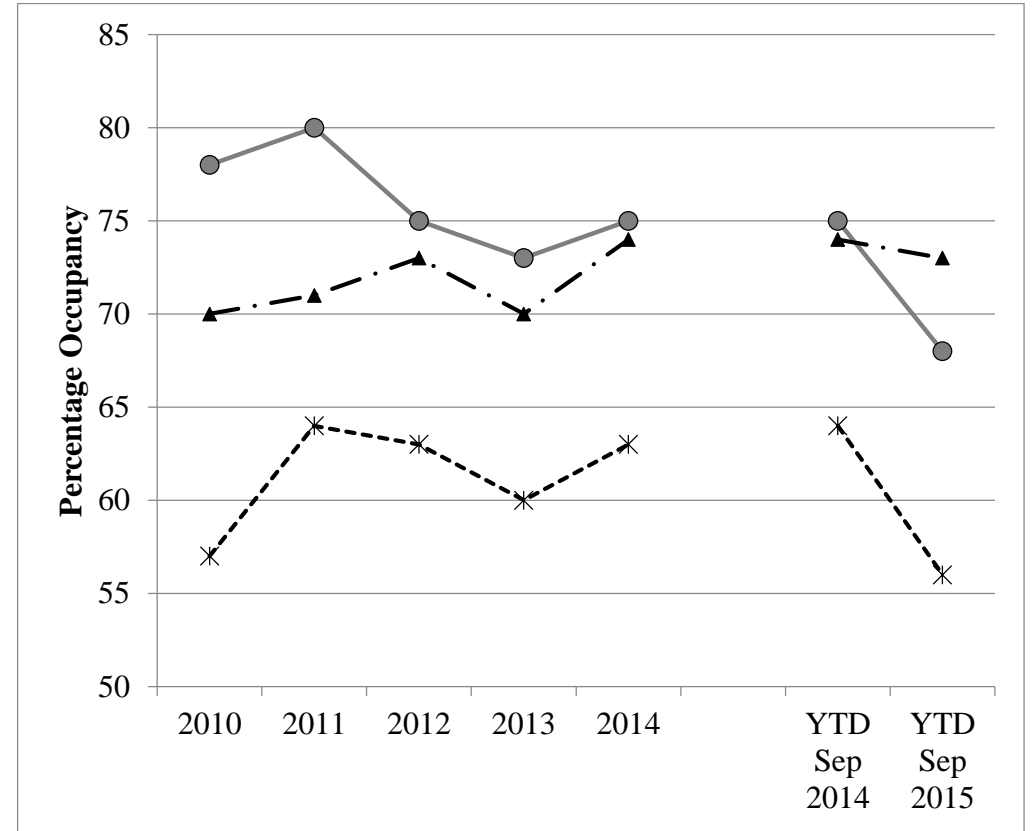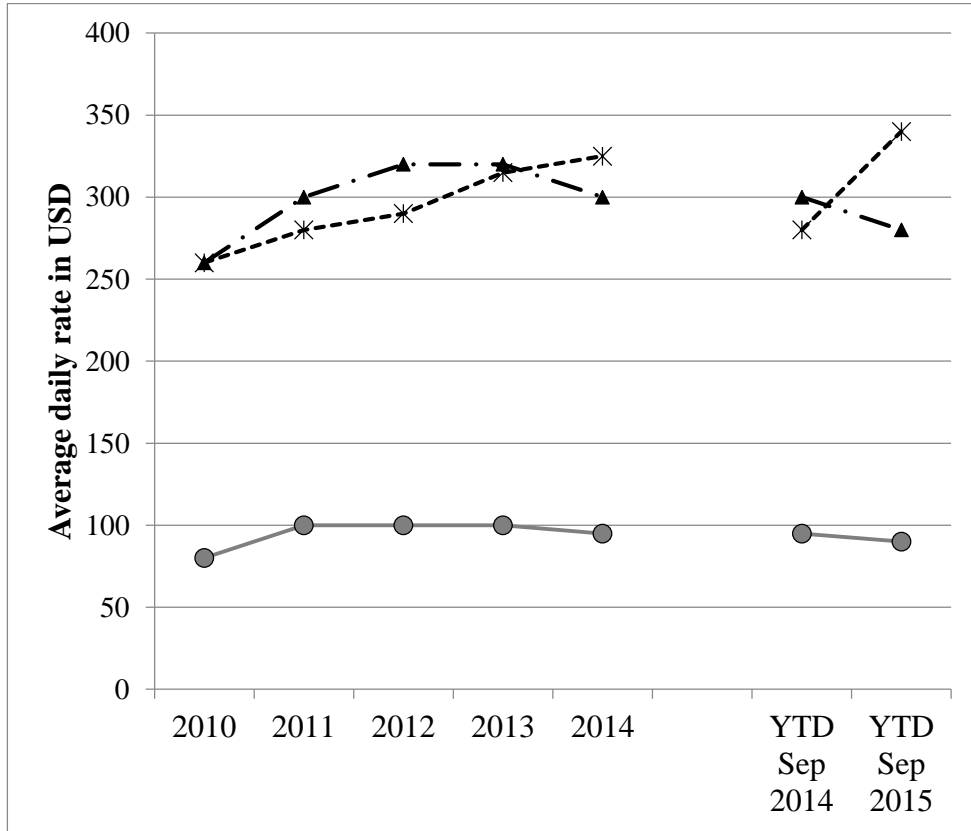


YTD means Year To Date

**Questions 10 and 11 must be done according to the time allocated. Do not look at past questions or answers. Answer it as if you are busy writing a test.**
**Study the correct solutions to the questions you had wrong. Work through it again.**

**QUESTION 10 – you get 35 minutes to answer this question.**

10.1 | TABLE 8 shows the types of voting stations (VSs) used during the 2016 local government elections in South Africa.

**TABLE 8: TYPES OF VOTING STATIONS**

| PROVINCE | VSs | PERMANENT | TEMPORARY | MOBILE |
|---|---|---|---|---|
| Eastern Cape | **4 699** | 4 535 | 161 | 3 |
| Free State | **1 531** | 1 342 | 189 | 0 |
| Gauteng | **2 716** | 2 389 | 327 | 0 |
| KwaZulu-Natal | **4 792** | 4 647 | 133 | 12 |
| Limpopo | **3 111** | 2 966 | **145** | 0 |
| Mpumalanga | **1 744** | 1 650 | 82 | 12 |
| North West | **1 723** | 1 605 | 115 | 3 |
| Northern Cape | **710** | 684 | 26 | 0 |
| Western Cape | **1 586** | 1 534 | 50 | 2 |
| TOTAL | 22 612 | 21 352 | 1 228 | 32 |

[Source: www.elections.org.za]

10.1.1   Name a type of instrument used to collect this data.   (2)

10.1.2   State the province which has the most voting stations.   (2)

10.1.3   Determine the mean number of voting stations (VSs) in South Africa.   (3)

10.1.4   Write down the modal number of mobile voting stations in South Africa.   (2)

10.1.5   Determine the total number of temporary VSs as a percentage of the total number of VSs in South Africa.   (3)
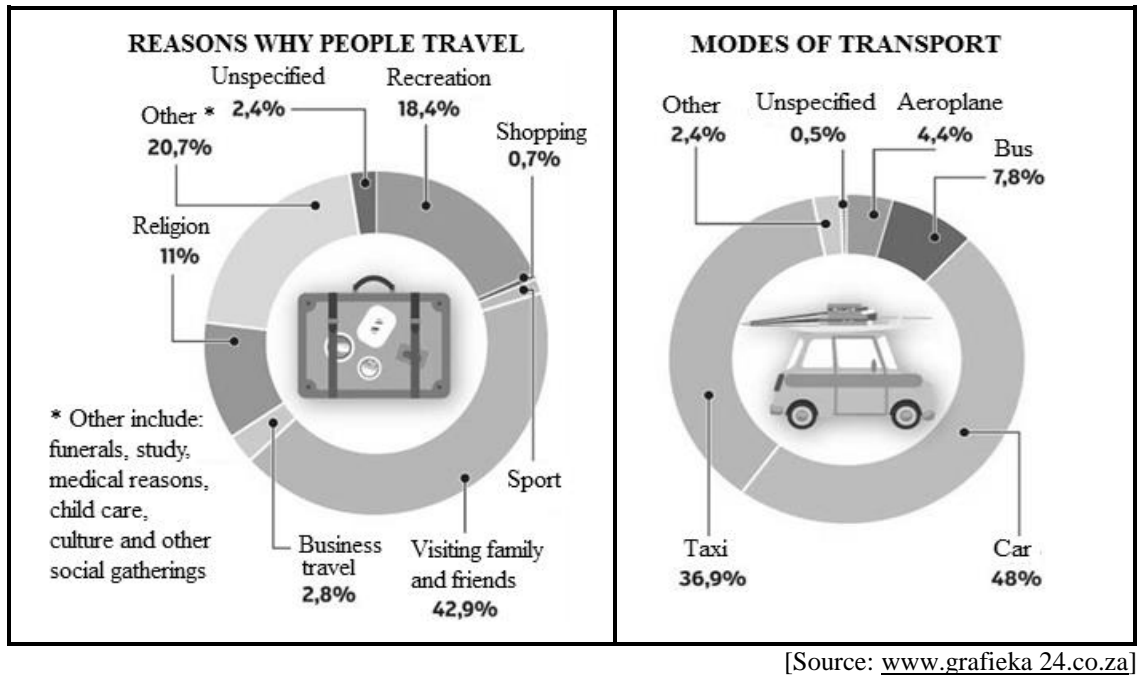
10.1.6   Show how the value of 145 was calculated.   (2)

10.1.7   The bar graph on the ANSWER SHEET shows the total number of voting stations.

On the same ANSWER SHEET, the first three bars are drawn showing the permanent voting stations.

Fill in the remaining bar graphs showing the permanent voting stations.   (6)

10.2 | The TWO pie charts below show why and how people in South Africa travel.



REASONS WHY PEOPLE TRAVEL

Unspecified 2,4%
Recreation 18,4%
Other * 20,7%
Shopping 0,7%
Religion 11%
* Other include: funerals, study, medical reasons, child care, culture and other social gatherings
Business travel 2,8%
Visiting family and friends 42,9%
Sport

MODES OF TRANSPORT

Other 2,4%
Unspecified 0,5%
Aeroplane 4,4%
Bus 7,8%
Taxi 36,9%
Car 48%

[Source: www.grafieka 24.co.za]

Study the TWO pie charts above and answer the questions that follow.

10.2.1 Calculate the percentage of people whose reason for travel is sport. (2)

10.2.2 Which mode of transport is used by most people? (2)

10.2.3 A total of 542 267 people took part in this survey.

Calculate the number of people who travel to visit family and friends. (2)

**[26]**

**ANSWER SHEET**

**QUESTION 10.1.7**

### Types of voting stations used during the 2016 local government elections



KEY:
- Total voting stations
- Permanent voting stations

Number of voting stations (y-axis): 0, 500, 1000, 1500, 2000, 2500, 3000, 3500, 4000, 4500, 5000

Provinces (x-axis): Eastern Cape, Free State, Gauteng, Kwazulu-Natal, Limpopo, Mpumalanga, North West, Northern Cape, Western Cape
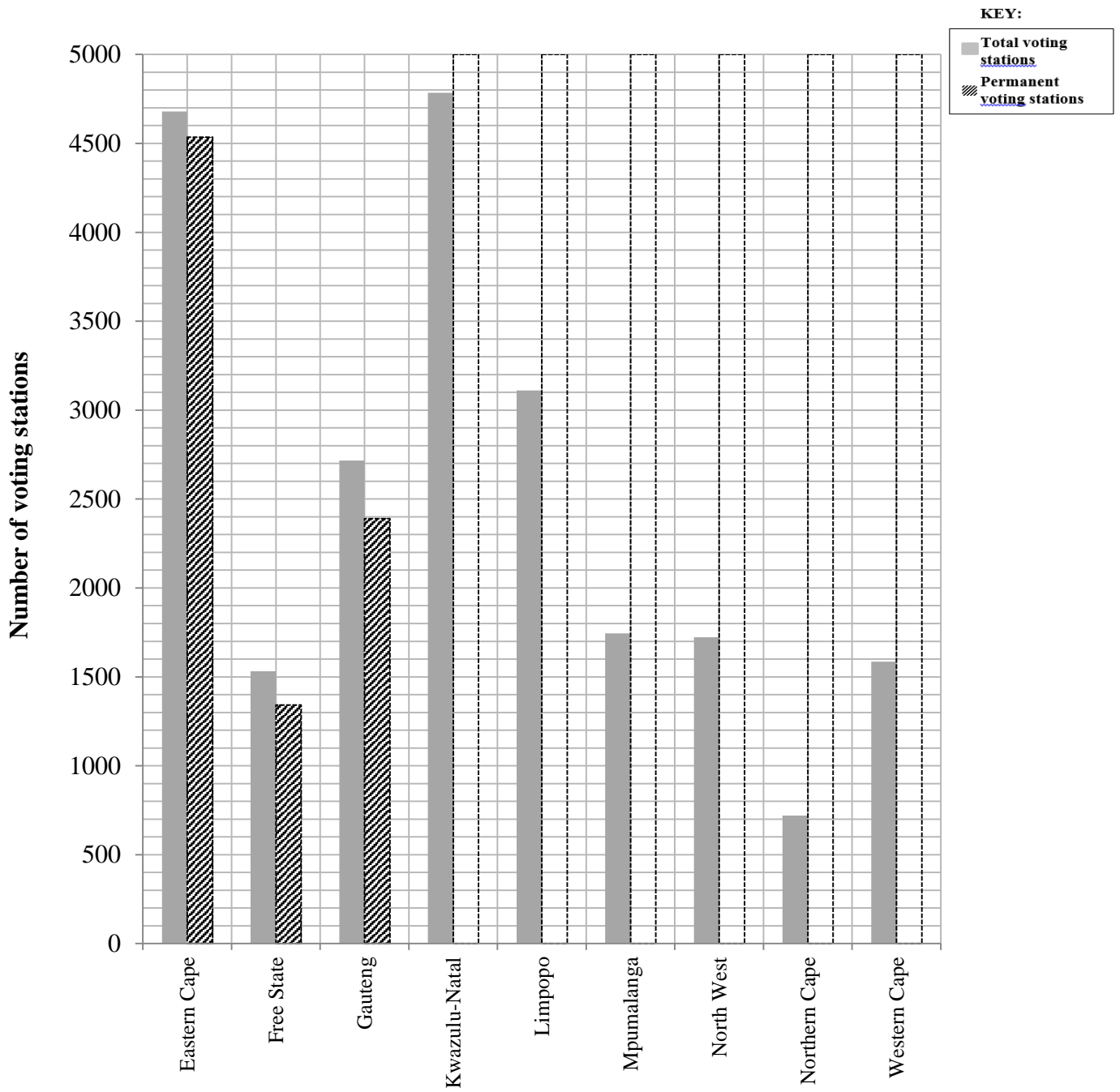
**QUESTION 11 – you get 40 minutesto answer this question.**

11.1 | According to the SARS data for December 2017, South Africa's 148 266 millionaires earn between R1 million and R2 million per annum.

The number of millionaires increased by 5,0065% compared to the previous year. The total annual taxable income for ALL the millionaires was R287,24 billion.

[Source: *SARS Statistics*, released December 2017]

Use the information above to answer the questions that follow.

11.1.1 It was stated that the mean monthly income per millionaire is exactly R161 000.

Verify, with calculations, whether this statement is CORRECT. (5)

11.1.2 Calculate the number of millionaires in South Africa in the previous year (2016). (3)

11.2 | TABLE 9 on ANNEXURE D shows the top marginal tax rate for individuals in the G20 countries. This table provides present and past data of the top marginal tax rates. It was updated in January 2019.
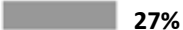
Use the information in ANNEXURE D to answer the questions that follow.

11.2.1 Name the country that has the biggest range between 2019 and the past top marginal tax rates. (2)

11.2.2 Use the 2019 top marginal tax rate and answer the following questions:

(a) Determine quartile 2 (2)

(b) The interquartile range is given as 12.

Verify, showing ALL calculations, whether the given interquartile range is CORRECT. (4)

11.3 | The Republic of South Africa (RSA) conducts household censuses to collect information. The next census will take place in 2021.

Census information regarding household size is shown below.

**HOUSEHOLD SIZE**

| HOUSEHOLD SIZE | CENSUS 1996 | CENSUS 2001 | CENSUS 2011 |
|---|---|---|---|
| One | 16% | 19% | 27% |
| Two | 17% | 18% | 19% |
| Three | 15% | 15% | 15% |
| Four | 15% | 15% | 14% |
| Five or more | 36% | 33% | 25% |
| **Total number of households** | **8,7 million** | **10,8 million** | **14,5 million** |

[Source: statssa.gov.za]

**NOTE:**
- A census is an official count or survey.
- According to Stats SA, a household consists of a single person or a group of people who live together for at least four nights a week, who eat together and who share resources.

Use the data above to answer the questions that follow.

11.3.1 Determine the percentage increase in the total number of households from 2001 to 2011. (3)

11.3.2 State which household size matches EACH of the following trends:

(a) Increased every year, but only by a small percentage (2)

(b) Remained constant in every census from 1996 to 2011 (2)

11.3.3 It was stated that the percentage of households with five or more persons decreased from 2001 to 2011, therefore the number of households with five or more persons **decreased** by 0,060 million.

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

11.3.4 Explain why the percentages for the 1996 census do not add up to 100%. (2)

**[33]**

**ANNEXURE D**

**QUESTION 11.2**

**TABLE 9: TOP MARGINAL TAX RATES FOR INDIVIDUALS IN THE G20 COUNTRIES**

| COUNTRY | UNIT % | |
| --- | --- | --- |
| | **2019** | **PREVIOUS** |
| Japan | 55,95 | 55,95 |
| Netherlands | 52,00 | 52 |
| Germany | 47,50 | 47,5 |
| Australia | 45,00 | 45 |
| China | 45,00 | 45 |
| France | 45,00 | 45 |
| South Africa | 45,00 | 45 |
| Spain | 45,00 | 45 |
| United Kingdom | 45,00 | 45 |
| Italy | 43,00 | 43 |
| South Korea | 40,00 | 40 |
| Switzerland | 40,00 | 40 |
| United States of America | 37,00 | 39,6 |
| India | 35,88 | 35,54 |
| Argentina | 35,00 | 35 |
| Mexico | 35,00 | 35 |
| Turkey | 35,00 | 35 |
| Canada | 33,00 | 33 |
| Indonesia | 30,00 | 30 |
| Brazil | 27,50 | 27,5 |
| Singapore | 22,00 | 22 |
| Russia | 13,00 | 13 |
| Saudi Arabia | 0,00 | 0 |