MATHEMATICAL LITERACY: PAPER II

Time: 3 hours   150 marks

PLEASE READ THE FOLLOWING INSTRUCTIONS CAREFULLY

1.   This question paper consists of:
   - A question paper of 10 pages and five questions
   - One Answer Sheet
   - Appendix with eight Annexures
     - **Annexure 1 = 2015 Calendar**
     - **Annexure 2 = Load-shedding Schedule and Areas**
     - **Annexure 3 = Electricity Usage per Appliance**
     - **Annexure 4 = Graph showing Megawatts (Winter and Summer Electricity Profile)**
     - **Annexure 5 = Mini Golf Course Plan**
     - **Annexure 6 = Graphs of Quotes**
     - **Annexure 7 = Graphed Quotes for 2 Wedding Venues**
     - **Annexure 8 = Portion of Mr Nkomo's Investment**

   Please check that your question paper is complete.

2.   Answer all the questions.

3.   It is strongly suggested that all working details be shown.

4.   Round off appropriately according to the context unless stated otherwise.

5.   Approved (non-programmable and non-graphical) calculators may be used in all questions.

6.   It is in your own interest to write legibly and present your work neatly.

7.   Maps and diagrams are not necessarily drawn to scale, unless stated otherwise.

8.   **Please start each of the five questions on a new page.**

QUESTION 1

Mpho needed various items from different shops. She decided to go to Gateway Shopping Centre.

She went on 25 April 2015. She arrived at 1:15 p.m. and left at 6:55 p.m.

While shopping, there was Stage 2 load-shedding.

Refer to **Annexures 1 and 2** in order to answer the questions that follow.

1.1   Determine how long Mpho was able to shop for before the electricity was switched off.   (5)

1.2   Determine for how many hours and minutes Mpho was still able to shop once the electricity was switched back on.   (4)

1.3   Mpho saw a dress that she loved was on sale. It normally cost R249,99 and was now selling for R199,99. Calculate the percentage discount that she would receive if she bought the dress.   (4)

1.4   At another shop, there was a pair of shoes selling for R123,50. This already included the 35% discount. Calculate the price of the shoes before they were discounted.   (3)

1.5   One of the shops in the mall was having a competition. You had to throw a dart at a board. If your dart landed on a WIN sector, you would win a gift. The maximum number of re-throws you could have is 2. The board is divided into 12 equal sectors.

   Mpho was feeling lucky, so she gave it a try.

       1.5.1   Determine the likelihood she had of throwing the dart on 'THROW AGAIN' if she threw it only once. Write your answer as a fraction.   (2)

1.5.2   Calculate the percentage probability of Mpho winning a prize on her first throw. Round your answer to the nearest whole number.   (4)
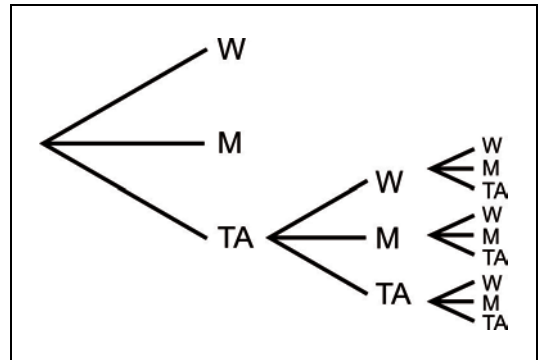
1.5.3   In the first hour that the shop ran this competition, only 4 out of the 32 customers who threw a dart, won a prize. If 40 customers throw a dart in the second hour, how many of them could the shop expect to win?   (4)

1.5.4   Which tree diagram below accurately represents this competition?
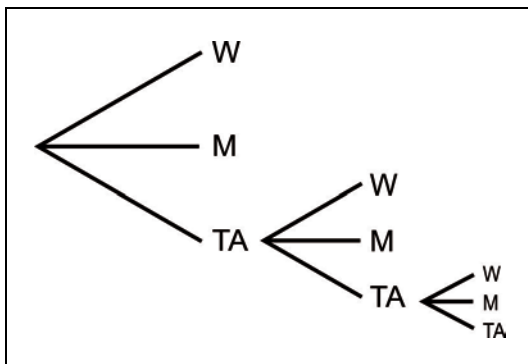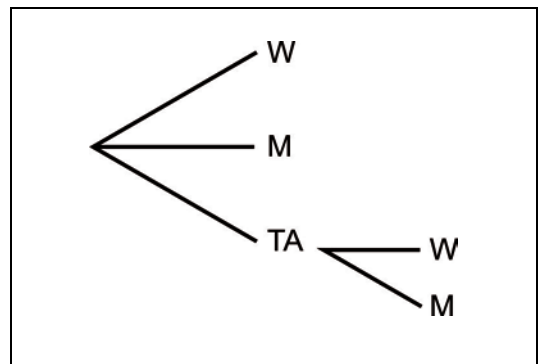
TREE DIAGRAM 1
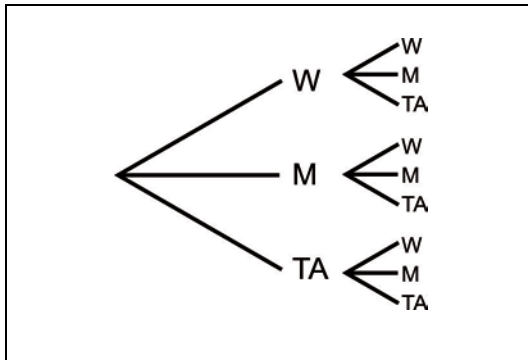
TREE DIAGRAM 2

TREE DIAGRAM 3

TREE DIAGRAM 4

Key:

W   =   Win
M   =   Missed
TA =   Throw again   (2)

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QUESTION 2

2.1   The Brink family has noticed that they use a lot of electricity. The table below shows their average electricity consumption for certain household items for one week.

By referring to the information given in the table below and the information given on **Annexures 3A and 3B**, calculate the missing values in the table below. Show your working where necessary.

Assume they use the maximum number of kilowatts per item listed

Item	Number of times it is used per day	Average time per use	Average number of kilowatts used per minute (to 5 decimal places)	Average number of kilowatts used in total per week
Toaster	3	4 minutes	1.0 ÷ 60 = 0.01667	0.01667 × 12 × 7 = 0.2 kWh × 7 = 1.4 kWh
Television	1	5 hours	–	(a)
Kettle	9	3 minutes	(b)	4.725 kWh
Swimming pool pump	1	(c)	–	210 kWh
Fridge	(d)	24 hours	–	84 kWh

(13)

2.2   Refer to **Annexure 4**, showing a graph illustrating the difference between the average amount of electricity consumed in one day in both summer and winter.

> **1 megawatt = 1 000 kilowatts**

Use the graph to answer the following questions:

2.2.1   Approximately how many kilowatts of electricity are used at 7 p.m. during winter?   (2)

2.2.2   Calculate the percentage increase in the consumption of electricity between 5 a.m. and 7 a.m. during summer. Round off to 2 decimal places.   (5)

2.2.3   Determine the range of megawatts used during winter in one day.   (3)

2.2.4   During **Stage 1** load-shedding, a minimum of 1 000 megawatts needs to be 'shed'. According to *www.eskom.co.za/dsm*, the average household energy consumption is 1 100 kilowatts per month.

If a month consists of 30 days and load-shedding occurs in a residential area, calculate how many houses need to be without electricity, for two and a half hours, in order to meet the required 1 000 megawatts.   (8)

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QUESTION 3

Jim lives on a farm and wants to build a mini golf course for his children.

**Annexure 5** shows the basic plan he is going to follow. He has kept it as simple as possible.

He will use specially cut pieces of wood to build the mini golf course and then lay a special green mat over the surface of each piece of wood.

Refer to **Annexure 5** to answer the following questions.

3.1   Measure the lengths of all the individual pieces of wood **on Annexure 5** that make up Holes 1, 2, 5, 6, 7 and 9. What do you notice?   (2)

3.2   If the actual length of Hole 1 is 2,7 m, show by means of a calculation that the scale given is accurate.   (3)

3.3   Jim chose this plan because it only consists of 4 design variations. List the 4 variations by listing the designs that are similar. (Ignore the placement of the holes.)

        E.g.   Design 1: Holes 1, 2 …
               Design 2: Holes ….
               ….   (4)

3.4   Jim will put a border, made of wood, around each completed design to prevent the ball rolling off.

        The actual dimensions for Hole 6 are shown below:
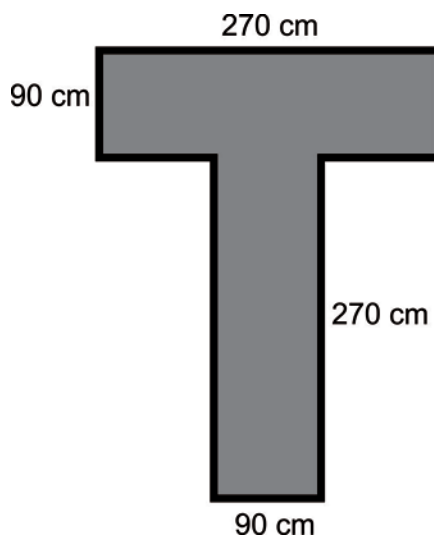
        Show that Jim will need approximately 13 m of wood for the border of Hole 6.   (6)

3.5   Below is a picture of the mat-like surface that Jim will place on top of the wooden surface.

The width of the mat is 90 cm.

The total surface area that will be covered with the mat, for all the holes **except Hole 4**, is 267 300 cm^2.

3.5.1   By referring to **Annexure 5**, show by means of calculations that the total surface area that will be covered with mat including Hole 4 is just over 30 m^2.   (7)

3.5.2   The mat that Jim will use costs R115 per m^2, excluding VAT of 14%. Calculate the total cost of purchasing the mat including VAT.   (4)

3.6   The scale of the plan shown in **Annexure 5** is 1:60. If Jim wanted to make the diagrams look bigger, would he increase the scale or decrease the scale of the plan? Justify your answer by showing a calculation with the new increased or decreased scale.   (4)

3.7   While Jim was searching the internet for quotes, he came across the following:

[Source: Excerpt from <http://www.citygolf-uk.com>]

Jim did not know that the United Kingdom also have a Value Added Tax (VAT) system.

Determine whether their VAT is higher or lower than South Africa's 14% VAT. Show all calculations.   (5)

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QUESTION 4

Nkosi and Sindiswa are getting married. They have received quotes from 4 different wedding venues as shown below:

- **Venue 1** charges R450 per head
- **Venue 2** charges R300 per head but also charges a set fee of R10 000 for the use of the venue
- **Venue 3** has a price breakdown as follows:

Number of Guests	Total Cost
0 – 50	R20 000
51 – 100	R40 000
101 – 150	R60 000
150 or more	R60 000 + R200 per guest over 150 guests

- **Venue 4** charges R250 per head, a venue hire of R13 750 and a non-refundable deposit of R6 250. If the event is not cancelled, the R6 250 will be used to pay for the first 25 guests, which is the minimum number of guests that are charged for.

4.1   Write down an equation that represents the costs involved with Venue 2.   (3)

4.2   Refer to **Annexure 6**. Each of the 4 quotes has been graphically illustrated. Match each graph to the correct venue.

    I.e.   Graph 1 = Venue ?
                Graph 2 = Venue ? etc.   (4)

4.3   Nkosi and Sindiswa have narrowed their choices down to two venues. The quotes for these two venues are plotted on the same set of axis on **Annexure 7**, which must be referred to when completing the following paragraph. You need just write the missing word(s) or number(s) in your Answer Booklet.

    Nkosi would like a small wedding and thus he is happy to invite only 50 guests. The cheapest venue for the 50 guests is … 4.3.1 … Sindiswa wants a bigger wedding and she was planning to invite about 200 people, and as such, the cheapest venue to use would be … 4.3.2 …

    Sindiswa's father is only prepared to spend R50 000 on the venue, and as such, they can only have a maximum of … 4.3.3 … people at their wedding. However, Sindiswa really wants her wedding at 'Views', and as such, she may only have a maximum of … 4.3.4 … people at her wedding.   (4)

4.4   Knowing that his daughter would get married one day, Sindiswa's father, Mr Nkomo, invested a lump sum of money many years ago. A portion of that investment is shown on **Annexure 8**.

    4.4.1   What type of interest is Mr Nkomo getting, simple or compound? How do you know this?   (2)

    4.4.2   Calculate the missing values (a) to (c) in the table.   (5)

    4.4.3   The table shows a portion of the investment for 25 months. Calculate the amount of interest, in rand, which Mr Nkomo received over that 25-month period.   (3)

    4.4.4   Calculate the interest rate, as a percentage correct to one decimal place, which he is receiving per year.   (5)

    4.4.5   By means of trial and error, determine approximately the number of years it would take Mr Nkomo's investment to reach R45 000.   (4)

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QUESTION 5

The job fields listed below are currently some of the top earning jobs in South Africa. This is based on data collected from 2013 to 2014. All salaries quoted are annual salaries.

- Actuary – R598 055 ($51,186 USD)
- Computer and Information Systems Managers – R587 230 ($50,276 USD)
- Lawyers – R643 440 to R672 000 ($55,089 – $57,534 USD)
- Airline Pilot/Flight Engineer – R695 800 ($59,572 USD)
- Software Engineers – R1,2 million ($102,740 USD)

[Sources: <SalaryExplorer.com>, <MallGuide.co.za>, <Maxum.co.za>, <MoneyWeb.co.za>, <PayScale.com>, <Wikipedia.org>, *Bureau of Labor Statistics* - See more at: <http://afkinsider.com/59779/best-paying-jobs-south-africa/#sthash.KiCFiGJS.dpuf>]

Refer to the salaries listed above when answering the following:

5.1   Calculate the mean average monthly salary of these 5 jobs. Use the mean value for the field given as a range. Round your answer to the nearest R100.   (8)

5.2   Determine the rand/dollar exchange rate at the time these figures were published.   (3)

5.3   Determine the monthly range of the salaries shown above.   (5)

5.4   On the Answer Sheet provided, draw a bar graph illustrating the average South African monthly salaries listed below, from highest to lowest.

Teacher/Education	19 302 ZAR
Hair Stylist	5 500 ZAR
Fitness Instructor	5 925 ZAR
Disc Jockey	24 000 ZAR
Cartoonist/Animator	10 000 ZAR
Police Officer	18 783 ZAR

[Source: <http://www.salaryexplorer.com>]

(10)

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Total: 150 marks