MATHEMATICAL LITERACY: PAPER I

Time: 3 hours   150 marks

PLEASE READ THE FOLLOWING INSTRUCTIONS CAREFULLY

1.   This question paper consists of:
   * 11 pages
   * 5 questions
   * **Answer Sheet** of 3 pages
   * 4 Appendices
      – Appendix A – Vodacom Cellphone Statement (Tax invoice)
      – Appendix B – Strip Map
      – Appendix C – Floor plan of classroom
      – Appendix D – Floor plan of the Idols theatre

   Detach the Answer Sheet from the centre of the question paper. Hand it in with your Answer Book.

2.   Ensure that your question paper is complete.

3.   Answer ALL the questions.

4.   Start each question on a new page.

5.   Number the answers exactly as the questions are numbered.

6.   A non-graphical, non-programmable calculator may be used.

7.   ALL necessary calculations must be clearly shown.

8.   Units of measurement must be included where applicable.

9.   Round off all final answers to TWO decimal places, unless otherwise stated OR where the real-life context requires rounding UP or DOWN.

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

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

QUESTION 1

Appendix A shows a copy of a Vodacom cellular phone bill. Use it to answer the questions that follow:

1.1   Write down the date that this account needs to be paid by.   (2)

1.2   Determine what percentage of the total invoice amount does Total Subscription
        Services constitute.   (4)

1.3   Calculate the missing values:

        1.3.1   A   (2)

        1.3.2   B   (2)

        1.3.3   C   (2)

        1.3.4   D   (2)

1.4   With the 'Insurance Excess Buster' a VAT amount of R2,21 is indicated. If VAT is
        14%, show with calculations that the VAT amount is correct.   (2)

1.5   If five international SMSs were sent, then calculate the unit price per SMS,
        excluding VAT.   (2)

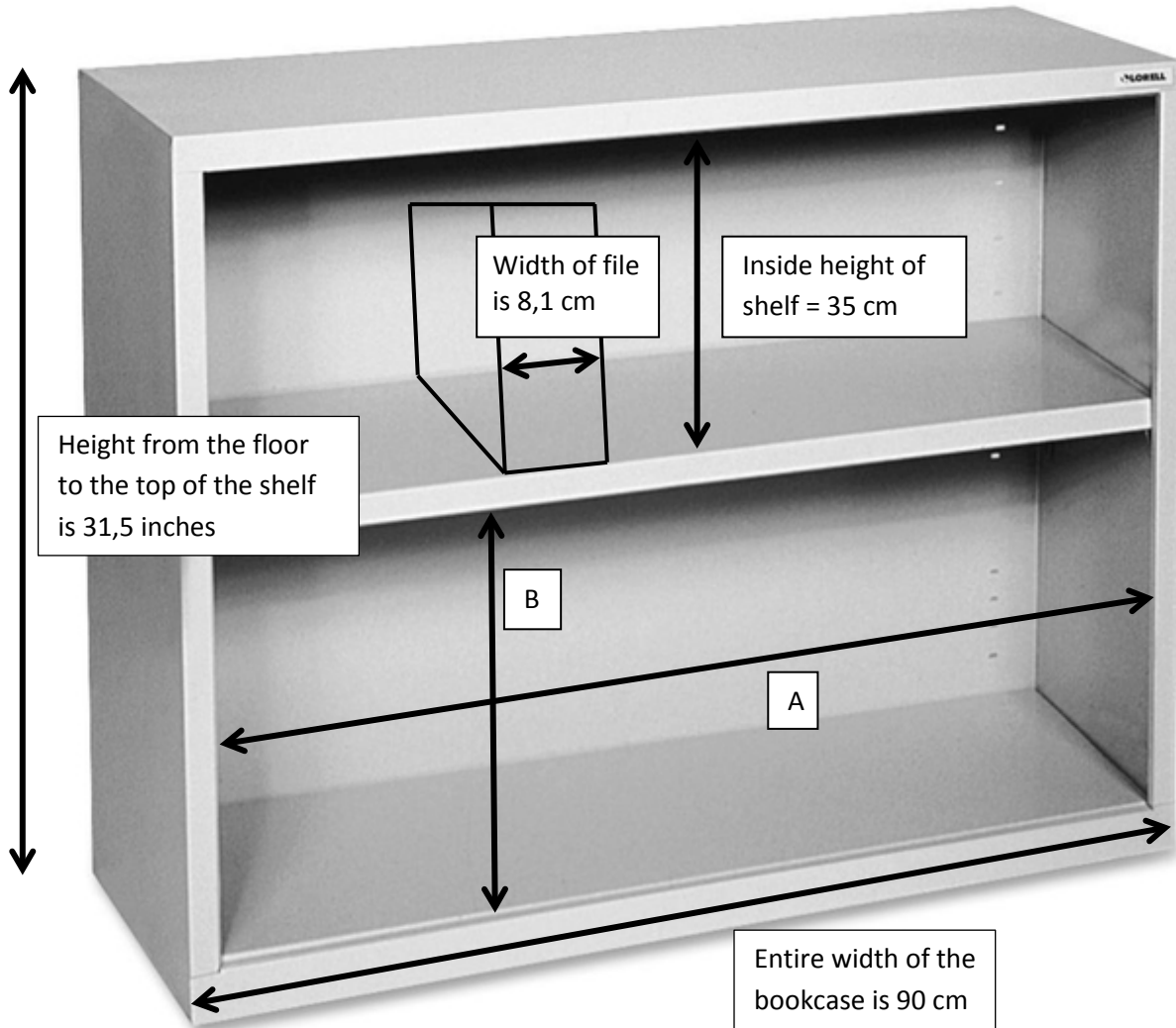1.6   One of the calls made was shown on the itemised bill as indicated below:

Date	Time	Duration	Number dialled	Charge
30/11/2015	15:57:05	00:01:33	27824345117	R2,04

        1.6.1   If the cost of a call is calculated using per-second billing, determine the
                duration of the call in seconds.   (3)

        1.6.2   Determine the rate of the per-second bill in cents for this call.   (3)

                                                                                                      [24]

QUESTION 2

Bobby wants to build a bookcase to store his files. He decides to buy a basic bookcase with two shelves as illustrated below:

Width of file is 8,1 cm

Inside height of shelf = 35 cm

Height from the floor to the top of the shelf is 31,5 inches

B

A

Entire width of the bookcase is 90 cm

[<http://www.overstock.com>]

2.1   Determine A, the inside length of the shelf, if the thickness of the wood on both sides of the shelf is 1 cm each.   (3)

2.2   The average width of a file when placed on the shelf (see picture) is 8,1 cm. Determine the maximum number of files that could fit on one shelf.   (3)

2.3   With the knowledge that 1 inch = 2,54 cm, convert the height (31,5 inches) to the nearest centimetre.   (3)

Width of file 8,1 cm

2.4   The base of the bookcase is made from wood that is 2 cm thick. The middle shelf and the top piece of wood is 1 cm thick. Determine B, the inside height of the bottom shelf.   (4)

2.5   Bobby bought the bookcase at a discounted price because the back board (which covers the entire width and height of the bookcase) was damaged. He decides to replace this board and paint it.

    2.5.1   Calculate the area of the board to the nearest cm^2.   (3)

    2.5.2   Convert the answer in Question 2.5.1 above, to square metres (m^2).   (2)

    2.5.3   How many litres of paint will be required to paint the board if 1 litre of paint covers 6 square metres? Round off your answer to 2 decimal places.   (2)

    2.5.4   Convert your answer in Question 2.5.3 above to millilitres (ml) to show that one can of 500 ml of paint is sufficient to paint the board.   (2)

[22]

QUESTION 3

3.1   A teacher, who lives in Pretoria, has to make her way to Mooi River where she will be presenting a Mathematical Literacy workshop. She uses the strip map found on Appendix B to assist her with her journey from Pretoria to Mooi River (also referred to as Mooirivier).

   3.1.1   What is the distance between Pretoria and Mooirivier?   (2)

   3.1.2   In which direction will the teacher be travelling between Pretoria and Mooirivier?   (2)

   3.1.3   The teacher will be travelling along the N1 between Pretoria and Johannesburg. However, from Johannesburg to Mooirivier, she diverts onto a different national road. What national road will she be travelling on between Johannesburg and Mooirivier?   (2)

   3.1.4   The teacher has a small motor vehicle that has a tank capacity of 35 litres and can travel 13 kilometres on one litre of petrol.

      (a)   How many kilometres can the vehicle travel on a full tank of petrol?   (2)

      (b)   Would she be able to travel from Pretoria to Mooirivier on one tank of petrol?   (2)

3.2   Appendix C is a floor plan of a classroom in a Mooi River school. The school has just received funding to re-tile the floor.

   The students' rectangular tables are each 1,5 m long. Use this and Appendix C to answer the questions that follow.

   3.2.1   Measure the length of the student table in centimetres on the floor plan and write it as 'a' in the ratio below:

      Length of table: ____(a)_____ cm : 1,5 m   (2)

   3.2.2   Determine the value of 'b':

      Length of table: ____(a)_____ cm : ____(b)_____ cm   (2)

   3.2.3   Write the ratio in Question 3.2.2 in unit form, i.e. 1 : … (round off to 2 decimal places)   (2)

   3.2.4   Measure the width (in cm) of the floor of the classroom with a ruler. The shelves are movable so you will need to tile the floor underneath the shelves as well.   (2)

3.2.5 Determine the actual width of the floor in metres using your scale in Question 3.2.3.   (3)

3.2.6 There are 25 chairs that learners can sit on, either at a student table or a kidney table. If the learners are randomly allocated a seat, determine the probability that a learner sits at the kidney table.   (2)

[23]

QUESTION 4

Pollution in our society has become a grave problem. An environmental report published by the World Economic Forum states several concerning facts:

Title of the article: "Oceans to have more plastic than fish by 2050"

The study found that a whopping 32 per cent of all plastic packaging escapes collection systems and finds its way into the oceans.

Currently, 8 million tons of plastic end up in the ocean each year – the equivalent of a dump truck of plastic rubbish every minute.

At current rates, that statistic will have grown to two trucks a minute by 2030, and four a minute by 2050 – by which time there will be as much plastic, by weight, in the oceans as fish.

[Source: <http://www.aljazeera.com/news/>]

4.1   How many years are there from the beginning of 2017 to the end of 2050? (2)

4.2   Determine the equivalent weight for the 32% of plastic packaging that the article speaks about. (2)

4.3   Write 8 million tons in kilograms. (2)

4.4   The article states that 8 million tons (t) of plastic ends up in the ocean per year. If this is true, find the values for **a** and **b** in the table below:

Amount per day	Amount per hour	Amount per minute
a	913,24 t	**b**

(4)

4.5   Determine the approximate weight equivalent of one dump truck currently. (2)

4.6   Hence, determine the total approximate weight equivalent of dump trucks per minute in 2050. (2)

4.7   4.7.1   On the Answer Sheet provided, sketch a graph that represents the amount of plastic that ends up in the ocean (in tons) from 2016 to 2050. (6)

        4.7.2   Determine from your graph the amount of plastic that will end up in the ocean in the year 2040. Write your answer in the space provided below your graph on the Answer Sheet. (2)

4.8   Below are statistics of India's main cities and the percentage increase in air pollution. Use it to answer the following questions:

THE AIR WE BREATHE
Air pollution rise in Indian cities between 2002–10, compared to other nations

60 µgm-3 (micro grams per cubic metre of air) is India's national air quality standard

City	%
Bangalore	34%
Pune	27%
Hyberabad	26.8%
Nagpur	22%
Mumbai	18%
Chennai	13%
Surat	12.5%
Ahmedabad	12%
Kolkata	11.5%
DEHLI	4.2%

Rise in air pollution	
India's neighbours	
Dhaka (Bangladesh)	6.2%
Lahore (Pakistan)	2.3%
Karachi (Pakistan)	2.1%
Elsewhere	
Shangai (China)	13.7%
New York (US)	13.0%
Seoul (S. Korea)	9.5%
London (UK)	5.6%

[Source: <http://planetearthandhumanity.blogspot.co.za>]

4.8.1   Determine the period for which the above data refers.   (2)

4.8.2   Which country (other than India) has the highest increase in air pollution?   (2)

4.8.3   With respect to the increase in air pollution in the cities of India, calculate the following:

     (a)   range   (3)

     (b)   mean   (4)

     (c)   median   (3)

[36]

QUESTION 5

Idols is a television show on the South African television network M-Net. The show is a contest to determine the best young singer in South Africa.

Karabo Mogane won the 11th season of Idols (2015).
In addition to a recording contract with Universal Music South Africa Karabo also won:

[Source: <www.idolsa.dstv.com>]

- R700 000 cash from M-Net, Mzansi Magic and Telkom SA, as well as a SmartBroadband Wireless 50 GB 55 Inch Smart TV, a Huawei B5934G LTE router with a 24-month Repeater Deal 6 and 50 GB + 50 GB Night Surfer (100 GB), as well as a PlayStation 4, worth a total of R41 000 from Telkom SA;
- A R225 900 Ford Fiesta 1.0 Ecoboost Titanium from Ford South Africa;
- From Truworths, fashion to the value of R100 000;
- Microphone equipment from shure to the value of R135 000, including a ulx-d dual wireless digital receiver, with 2 shure beta58 microphones, an in-ear earphone and monitor system, and a flight case to house the equipment, and from Yamaha, R70 000 worth of musical equipment.

5.1   Calculate the total monetary equivalent of all Karabo's prizes, in addition to the recording contract.   (3)

5.2   Karabo decides that he would like to invest his money. He looks at the interest rates of the following accounts at FNB and Standard Bank:

FNB Money on Call Account	
Amount invested (per annum)	Percentage interest rate
R5 000–R19 999	2,75%
R20 000–R29 999	3,95%
R30 000–R39 999	4,00%
R40 000–R49 999	4,05%
R50 000–R59 999	4,10%
R60 000–R69 999	4,15%
R70 000–R79 999	4,20%
R80 000–R89 999	4,25%
R90 000–R99 999	4,30%
R100 000 +	4,65%

Standard Bank MoneyMarket Call Account	
Amount invested (per annum)	Percentage interest rate
R20 000–R99 999	5,25%
R100 000–R249 999	5,65%
R250 000–R499 999	5,65%
R500 000–R999 999	5,65%
R1 000 000–R19 999 999	5,70%
R20 000 000 +	5,75%

[Source: <http://www.standardbank.co.za/& https://www.fnb.co.za/rates/>]

5.2.1   If Karabo decides to invest the R700 000 that he won, which account will earn him the most interest?   (2)

5.2.2   Karabo eventually decides to invest his prize money (R700 000) in the Standard Bank account. Calculate how much money Karabo will have in his account after 2 years.   (5)

5.2.3   Use the graph paper provided in your Answer Sheet (page 3) to draw a graph to represent the FNB Money on Call Account interest rate.   (6)

5.3   5.3.1   If the rate of depreciation is 17% per annum, then calculate how much the
                car that Karabo won will be worth in 2 years' time.   (4)

        5.3.2   If the current average rate of inflation is 9,2% per annum, calculate the cost
                of the same car in 2 years' time.   (4)

        5.3.3   If Karabo sells his car in 2 years' time at the depreciated value, determine
                the difference that he will have to pay in for a new Ford Fiesta.   (2)

5.4   Use Appendix D, which is a floor plan of the theatre layout for the final show in the
        11th season.

        5.4.1   Calculate the number of people able to be seated at tables at the finale if all
                seats are sold and there are 10 people at a table.   (3)

        5.4.2   If each ticket costs R450, determine the total income received.   (2)

5.5   One of the props that they use on the
        Idols stage is a cylindrical platform,
        which is shown alongside.

1,2 m

5 m
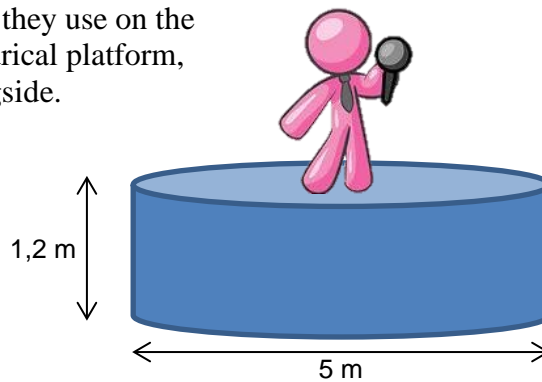
        5.5.1   The Idols set manager would like to cover the top of the circular platform
                with non-slip rubber. Determine the area, rounded off to the nearest square
                metre that needs to be covered.

                You may use the following formula:
                $$\text{Area} = \pi \times r^2 \text{ where } \pi = 3,14$$ (3)

        5.5.2   The sides of the platform need to be painted by a non-reflective black paint.

   (a)   Determine the surface area of the sides of the platform.

                        You may use the following formula:
                        $$\text{Surface Area} = 2 \times \pi \times r \times ht \text{ where } \pi = 3,14$$ (2)

                (b)   The non-reflective paint is sold in 1-litre containers. If a litre of non-
                        reflective paint covers 2,4 m^2, determine how many 1-litre cans of
                        paint they will need.   (3)

5.6   In one of the episodes there were only five contestants left: Terrence, Simphiwe, Bobo, Karabo and Lulu. In order to decide which order they would sing in, the judges devised a wheel that would equally display the five vowels of the alphabet. The wheel looked like the one below. The judges decided to spin the wheel and whichever letter the arrow landed on would represent the winner who had the most letters of that vowel in their name.
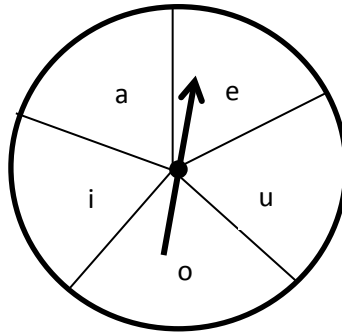
   5.6.1   Determine the probability of the arrow having landed on any of the vowels, in the first spin.   (2)

   5.6.2   Determine the probability, as a percentage, that Karabo sings first.   (4)

[45]

Total: 150 marks