MICHAELHOUSE

Mathematics Department

A BLOCK MATHEMATICAL LITERACY
TRIALS EXAMINATION – Paper 1
29th AUGUST 2016

Examiner: Miss L. Hardie
Moderator: Mr A. van Wyk
Time: 3 hours
Marks: 150

PLEASE READ THE INSTRUCTIONS CAREFULLY

1. This question paper consists of 8 pages. Please check that your paper is complete.
2. Remember to write your name on the Answer Booklet which has the appendices A, B, C and D attached at the back.
3. Read the questions carefully.
4. Number your answers exactly as the questions are numbered.
5. You may use an approved non-programmable and non-graphical calculator, unless otherwise stated.
6. Round off your answers to **2 decimal digits** where necessary, unless otherwise stated.
7. All the necessary working details must be clearly shown.
8. It is in your interest to write legibly and to present your work neatly.

Do not write here:

Question 1	Question 2	Question 3	Question 4	Question 5	Total
32	34	18	31	35	**150**

QUESTION 1

Refer to the utility bill in **Appendix A** in order to answer the following questions:

1.1 Give the name and address of the person who is being billed for these services. (2)

1.2 List THREE services that are being invoiced on this bill. (2)

1.3 State the market value of the property as a number and in words. (2)

1.4 State the date that a payment was made on this account using the format: 1 May 2013. (2)

1.5 A payment was made in order to cover the previous month's balance. The owner paid less than the balance owed. How much less did he pay and what happened to the shortfall? (2)

1.6 On 02/06, an amount of R2 201,50 is listed as "Rates Residential". This is the monthly rates amount and is calculated as follows:

$$Monthly\ Rates\ amount = \boldsymbol{x}\% \times Rateable\ value\ of\ property \div 12$$

Calculate the percentage used by the Msunduzi Municipality (marked as $\boldsymbol{x}$ in the above formula). (4)

1.7 Regrettably when the homeowner opened the utility bill, some of the information was ripped off the page.

1.7.1 The current electricity reading is given as 7012 units and the usage was 1948 units. Calculate the previous month's reading. (2)

1.7.2 The total for Electricity Consumption is given as R1 799,44. This includes VAT. Calculate the VAT that was charged (VAT charged at 14%). (2)

1.7.3 Most of the amount charged for electricity before VAT is not visible, but the cents value of ".46" is still visible. Calculate the value that was charged for electricity before VAT. (2)

1.8 Due to the current drought affecting the country, homeowners are encouraged to reduce their water usage by 15%. How many units would this homeowner be using if they reduced their water by 15%? (3)

1.9 The homeowner's neighbour uses 51 kℓ and he paid R1 075,61 (including VAT) for his water consumption. The new water rates below are about to be implemented. Calculate how much more the neighbour would pay for using 51 kℓ using the new rates below. These rates do not yet have VAT added.

0 – 6 kℓ (i.e the first 6 kℓ)	: R8,73 per kℓ
7 – 30 kℓ (i.e the next 24 kℓ)	: R17,61 per kℓ
31 – 60 kℓ	: R25,99 per kℓ
61 kℓ and over	: R30,34 per kℓ

(9)

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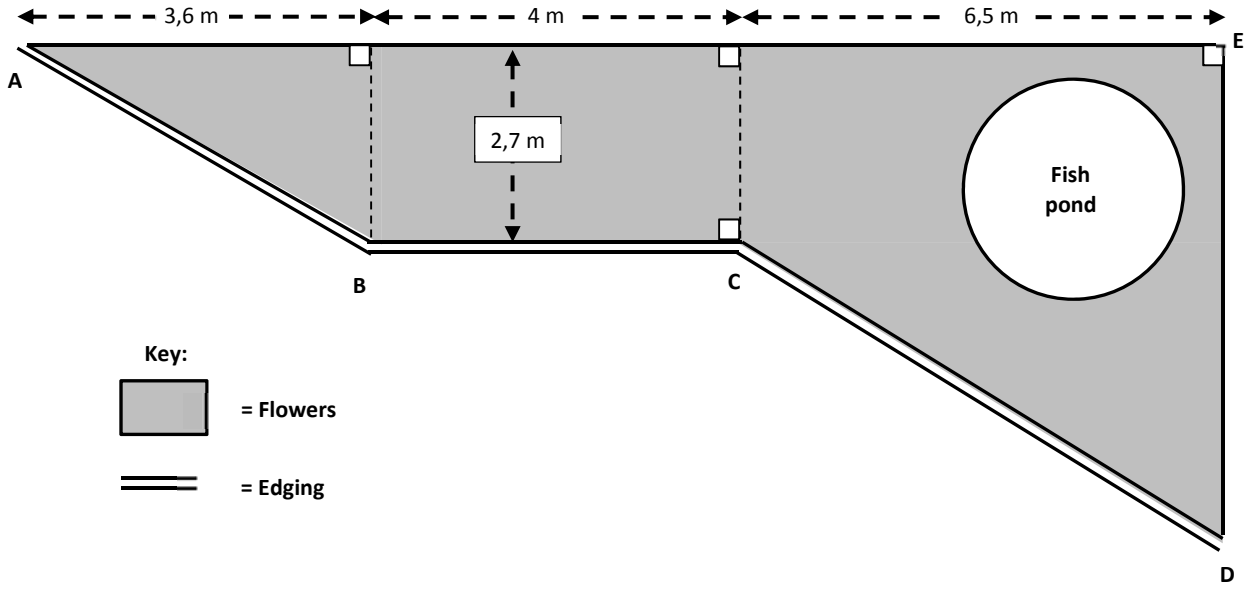
QUESTION 2

The following formulas might be useful in answering the questions below:

$$\textbf{Area of rectangle} = l \times b \qquad \textbf{Area of triangle} = \frac{1}{2} \times b \times h \qquad \textbf{Area of circle} = \pi \times r^2$$
$$\textbf{Theorem of Pythagoras}: a^2 = b^2 + c^2 \qquad \textbf{Perimeter of circle} = 2 \times \pi \times r$$
$$\textbf{Volume of prism} = Area\ of\ base \times length\ of\ prism$$
$$\textbf{Surface Area of closed prism} = 2 \times Area\ of\ base + perimeter\ of\ base \times length\ of\ prism$$

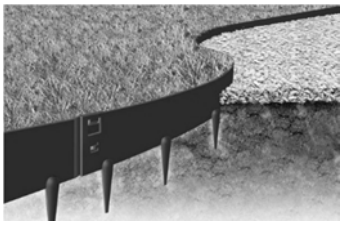
James is getting his garden ready for spring. His garden is situated in the corner of his property and has the following layout. The point marked **E** is located at the corner of the property and the edges marked **AE** and **ED** are along two of the fences.



2.1 Calculate the length of **AE**. (2)

2.2 Using the theorem of Pythagoras, show that the edge marked **AB** has a length of 4,5 m. (3)

2.3 James is planning to put some edging along the border of the garden from **A** to **B** to **C** to **D**.



The edging comes in a roll that is 16 m long.

He wants to use the entire roll and lay it from **A** to **D** without cutting it.

Calculate the length **CD** using the values from the diagram and the value in question 2.2. (3)

2.4 Using your answer to question 2.3, calculate the length **DE**. (4)

2.5 The fish pond has a diameter of 300 cm. Calculate the area taken up by the fish pond in m^2. (4)

2.6 Calculate the total area covered by the flowers in the garden. Answer in m^2. (9)

2.7 He will be putting a layer of compost across the entire area that will be covered by flowers in order to get the soil ready to plant. It will be 3 cm thick.

Compost is sold in bags. Each bag contains 20 litres of compost.

2.7.1 Calculate the volume of compost needed to cover the flower area to a height of 3 cm. Answer in cm^3.
Remember that 10 m^2 = 100 000 cm^2.

(4)

2.7.2 Knowing that 1 mℓ = 1 cm^3, use your answer from question 2.7.1 to calculate the number of bags of compost that will need to be purchased. (5)

[34]

QUESTION 3

Recently, Sonia decided to visit friends in Kokstad. She printed a map of the area from Google Maps as her phone was in for repairs. Refer to the map in **Appendix B** to answer the following questions.

3.1 Sonia was planning to drive from Richmond to Kokstad. Clearly indicate the route that you think that she would have taken on **Appendix B**. (2)

3.2 Based on the route which you indicated in question 3.1, give written directions for her journey, i.e. "Starting in Richmond…" (4)

3.3 Use the scale at the bottom right corner of the map to calculate the scale of the map. Your answer should be in the form "1 : …" and should be rounded to the nearest ten thousand. (4)

3.4 She had just passed Waschbank when her car's fuel light came on! This meant that she had 7 litres of fuel left in the fuel tank. Unfortunately Waschbank did not have a fuel station open and so she decided to press on to Kokstad.

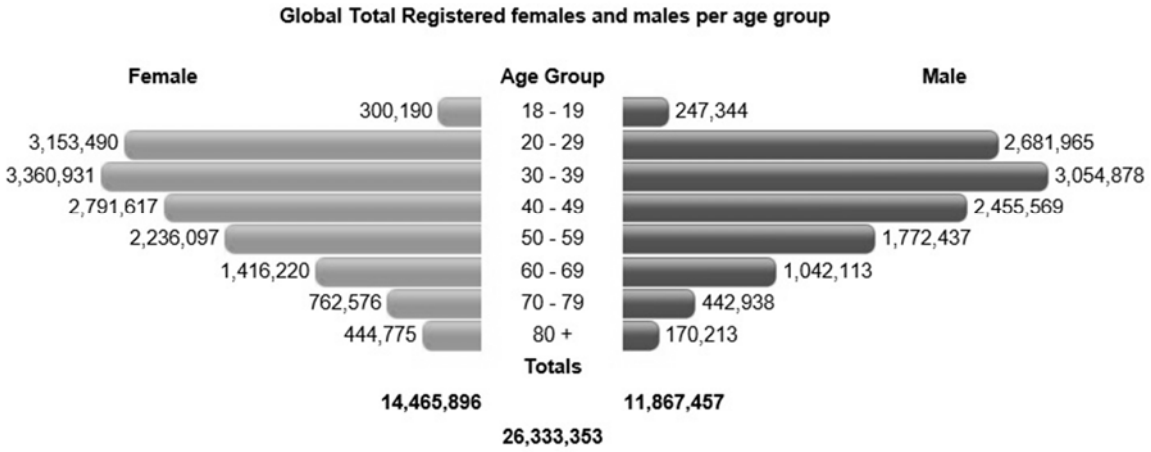
3.4.1 Use the bar scale at the bottom right of the map and your ruler to calculate the distance along the road which she still had to travel to get to Kokstad. Answer to the nearest km. (4)

3.4.2 Her car uses fuel at a rate of 8ℓ per 100 km. Using your answer to question 3.4.1, calculate whether she would be able to make it to Kokstad or not. (4)

[18]

QUESTION 4

In the recent Local Government Elections, the registration statistics in each province were recorded. Here is a summary of the registered voters as at 1 June 2016:



4.1 Which age group had the most registered voters? (2)

4.2 Calculate the percentage decrease in registrations between males aged 30 – 39 and males aged 40 – 49. (4)

4.3 What percentage of the total registered voters are female? (3)

4.4 Write the number of registered 20 – 29 aged female voters in words. (2)

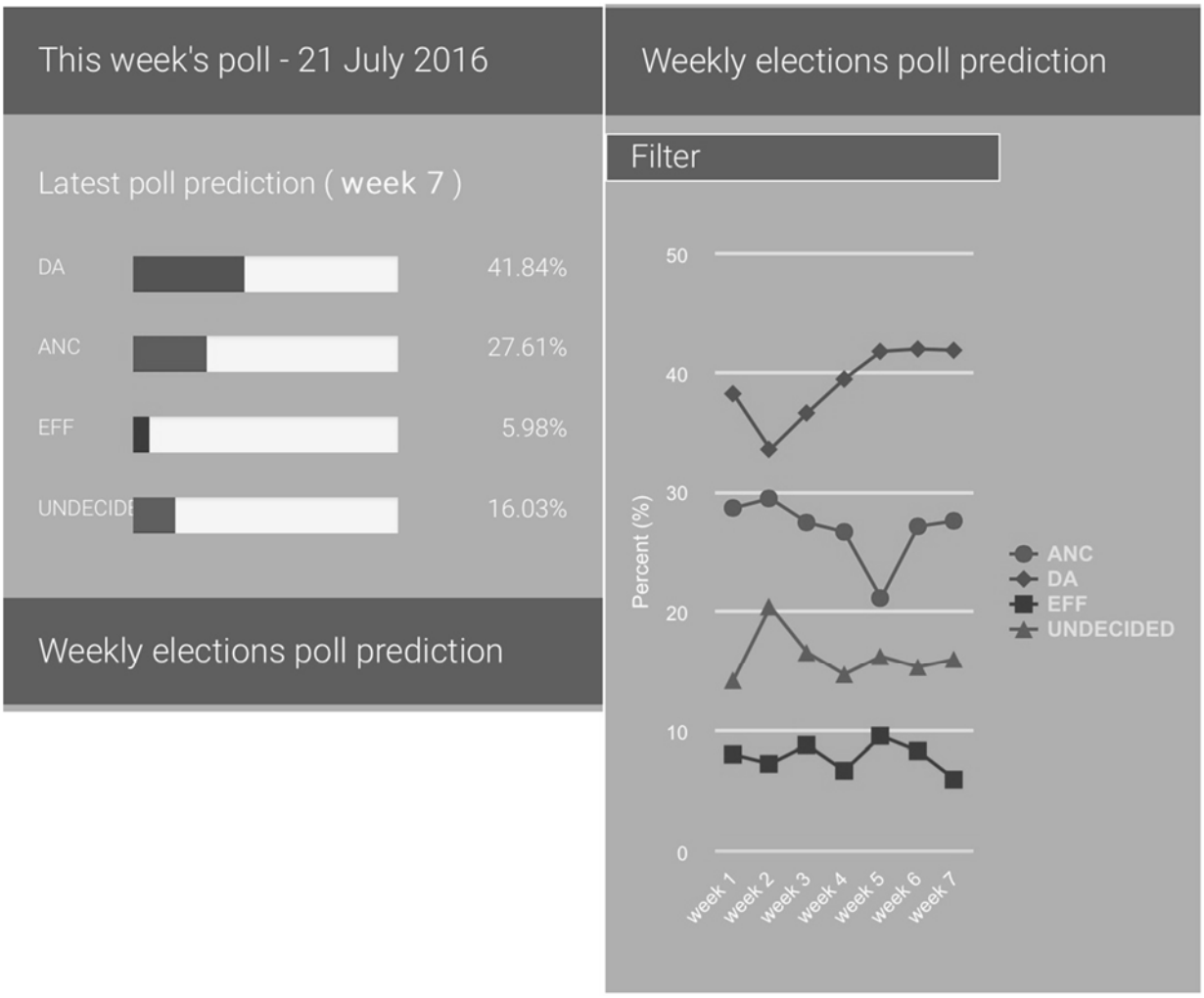
4.5 After rounding the number of registered 20 – 29 aged male voters to the nearest 100 000, write the number with the word "million" behind it. (2)

4.6 Calculate the probability that any registered voter selected at random would be:

4.6.1 A female aged 50 – 59. Write your answer as a decimal to 4 decimal places. (3)

4.6.2 A male who is at least 60 years old. Write your answer as a percentage rounded to 1 decimal place. (4)

4.7 A municipal area in the Eastern Cape takes a weekly survey of voters' choices. The results of that survey for the week of 21 July 2016 are shown below. Use it to answer the questions which follow:



4.7.1 Which political party showed the highest increase between weeks 5 and 6? How can we see this easily from the graph? (2)

4.7.2 Which week had the lowest percentage of people voting for the EFF party, and what was the approximate percentage that week? (2)

4.7.3 Calculate the mean of the percentages of people voting for the political parties that are listed in the "Latest poll prediction (week 7)" (3)

4.7.4 Use the values in the "Latest poll prediction (week 7)" to prove the following statement:

"Some of the political parties that people are voting for are NOT shown in the results of the poll" (4)

[31]

QUESTION

The recent Olympic games in Brazil turned up some interesting concepts.

5.1 According to BBC.com, the percentage of sports that women could participate in has changed over the years as follows. Plot the values in the table below on the axes supplied in **Appendix C** joining the points with a broken-line graph: (5)

Year	% of sports
1900	21
1912	22
1928	23
1952	38
1976	64
1984	74
2000	97
2016	100

5.2 Referring to the graph which you plotted in question 5.1:

5.2.1 State any trends which you see in the graph in words. (2)

5.2.2 Will the values keep increasing in future games? Give a reason for your answer. (2)

5.3 The website BBC.com also had a graphic which showed the fastest speed in several sports relative to each other. Part of this graphic is shown on **Appendix D**. Use it to answer the following questions:

5.3.1 The scale at the bottom of the map starts at 15 mph and the world record for single sculls, of 21 mph, is indicated with a vertical dashed line. Calculate the size of each small division on the scale in mph. (2)

5.3.2 The world record for cycling is 47,9 mph and has been removed from the graphic. Indicate on the graphic where it would occur. Mark this with an **A**. (2)

5.4 The world record speed for a sprinter is held by Usain Bolt. Calculate the number of seconds that it would take him to run 100 m. Answer to 2 decimal places.

("mph" stands for "miles per hour". 1 mile = 1,6 km) (6)

5.5 Equestrian is the most expensive event to participate in. According to BBC.com "you need access to a thoroughbred horse which can cost £6 million". The current exchange rate for Pounds (£) to Rands is: R1 = £0,056. Use it to convert £6 million to the nearest whole number of Rands. (3)

5.6 An athletics fan was hoping to see the 100 m sprint final in person in Rio after seeing the London 2012 final on television. So he put R12 000 in an account that compounded annually at a rate of 13% p.a. for 3 years.

5.6.1 Calculate the total value in that account after 3 years. (4)

5.6.2 Tickets to the 100m final went on sale at a price of $300. Calculate the percentage change in the price from London 2012 (where tickets for the 100m final cost $1 100). (3)

5.6.3 A return flight to Rio for the Olympic games cost R11 454 and the exchange rate at the time of purchase of the tickets for the sprint final was $1 = R14,73. Using your answer to question 5.6.1 and the information in question 5.6.2, calculate whether the fan had saved enough money for the airfare and the Olympic sprint ticket. (4)

5.6.4 List TWO other items that this sprint fan would need to budget for when considering a trip to watch the 100 m final in Rio. (2)

[35]

Total: [150]