MATHEMATICAL LITERACY: PAPER I

Time: 3 hours   150 marks

PLEASE READ THE FOLLOWING INSTRUCTIONS CAREFULLY

1.   This question paper consists of:
- 13 pages
- 5 questions
- An Answer Sheet of 3 pages
- An Appendix – Map of Kimberley

2.   Please check that your question paper is complete.

3.   Answer ALL the questions.

4.   Start each question on a new page.

5.   Number your answers exactly as the questions are numbered in the question paper.

6.   ALL working details must be shown.

7.   Round off appropriately according to the context unless specified otherwise.

8.   Approved non-programmable calculators may be used in all questions.

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

10.   Please hand in this question paper.

QUESTION 1

Teddy bears, in the form of plush toys, have been around since the early 20th century. Since then there have been many different bears created and sold. A toy company, D & D Designs, decides to produce a new line of teddy bears that it wishes to market.

1.1   The production of each teddy bear includes:

- Fur: R12,00
- Stuffing: R9,00
- Cotton: R3,00
- Manual labour: Equal to 12% of the total costs of material (fur, stuffing and cotton).

Use the above information to answer the following questions:

1.1.1   Calculate the total cost of materials used to make each teddy bear.   (3)

1.1.2   Calculate the manual labour costs involved in making each bear.   (3)

1.1.3   Calculate the total production cost for making one teddy bear.   (2)

1.1.4   The company decides that they would like to sell these bears for R36,90. Calculate the percentage mark-up on each teddy bear, rounded off to the nearest whole percent.

You may use the following formula:

$$Percentage\ mark\text{-}up = \frac{selling\ price - cost\ price}{cost\ price} \times 100\%$$ (3)

1.2   The company decides that in order to keep up with inflation and still keep the teddy bear affordable, they will increase the price of the teddy bear by 20% every year.

1.2.1   Using the above information, complete the table in your Answer Sheet.   (6)

1.2.2   Use the information from the completed table on your Answer Sheet for Question 1.2.1 to draw a line graph on the grid provided in your Answer Sheet.   (8)

1.3   An additional expense for the production of the teddy bears is the transport costs, which is made up of R270 per 300 teddy bears distributed.

1.3.1   Calculate the unit transport cost per teddy bear, if 300 teddy bears were distributed.   (2)

1.3.2   Calculate the total cost including transport to produce 300 teddy bears.   (3)

[30]

QUESTION 2

2.1   Lerato, who lives in Johannesburg, needs to go to Kimberley and Cape Town for business. She has a 3-hour meeting on Friday in Kimberley and has an appointment on Monday in Cape Town at 18:00. Her appointment should be finished that same evening.

In order to cut costs, Lerato decides to travel by train; below is the schedule for the train.

Cape Town ► Johannesburg		
Premier Class: Deluxe sleepers, restaurant car, lounge.		
Cape Town	depart	06:05 Tuesdays & Saturdays
Beaufort-West	arr/dep	18:45 Tuesdays & Saturdays
Kimberley	arr/dep	03:00 Next day (Wed & Sun)
Johannesburg	arrive	11:03 (Wed & Sun)

Johannesburg ► Cape Town		
Premier Class: Deluxe sleepers, restaurant car, lounge.		
Johannesburg	depart	15:00 Tuesdays & Sundays
Kimberley	arr/dep	23:03 Tuesdays & Sundays
Beaufort-West	arr/dep	07:20 Next day (Wed & Mon)
Cape Town	arrive	16:16 (Wed & Mon)

[Source: <www.southafricalogue.com>]

2.1.1   Use the information above to answer each of the following multiple choice questions:

(a)   On what days do trains depart Johannesburg for Cape Town?

A   Tuesdays & Saturdays
B   Wednesdays & Mondays
C   Tuesdays & Sundays
D   Wednesdays & Sundays   (2)

(b)   On which day will Lerato need to leave Johannesburg so that she spends the minimum time in Kimberley?

A   Wednesday
B   Saturday
C   Sunday
D   Tuesday   (2)

(c)   The train is expected to arrive in Cape Town at …

A   6:16 p.m.
B   4:16 p.m.
C   6:16 a.m.
D   4:16 a.m.   (2)

2.1.2   Use the train schedule to complete the table in your Answer Sheet, which shows the schedule Lerato will need to follow. She wants to spend the minimum amount of time in each town.   (4)

2.2   In the Appendix is a map of Kimberley. Use the map to answer the questions that follow:

        2.2.1   Which suburb of Kimberley is found in grid reference B4?   (2)

        2.2.2   Give the missing directions in the sentence below:

                The Big Hole is situated to the _____(a)_____ of Diamant Park whereas Memorial Road Area is situated to the _____(b)_____ of The Big Hole.   (4)

        2.2.3   (a)   There are two train stations in Kimberley. Write down the grid reference for each of the stations on the map.   (4)

                (b)   Using the scale at the bottom of the map, write down the ratio in the form *cm:km*.   (2)

                (c)   Measure the straight line distance (as the crow flies) between the two train stations (in cm) on the map. A line is drawn between the two stations to assist you.   (2)

2.3   If the distance between the train stations by car is actually 4,2 km and Lerato is driving at an average speed of 56 km/h, determine the time it would take her to get from the one station to the other. Give your answer to the nearest minute.

        You may use the following formula:

$$time = \frac{distance}{speed}$$ (4)

2.4   One of the traffic lights in Kimberley is set with the following specific time limit:

Red: 20 seconds
Amber: 4 seconds
Green: 16 seconds

[Source: <www.freedesignfile.com>]

Calculate the following:

        2.4.1   The probability of the robot being green when Lerato gets there. Give your answer as the simplest fraction.   (3)

        2.4.2   The probability of her having to stop (one should stop at both a red and an amber light), giving your answer to the nearest percentage.   (4)

[35]

QUESTION 3

3.1   The Reconstruction and Development Programme (RDP) is a South African socio-economic policy framework that was implemented by the African National Congress (ANC) government of Nelson Mandela in 1994. Mr Mkhize was given one such house, which looks similar to the one below.


Height of the front wall = 240 cm

Length of house = 710 cm
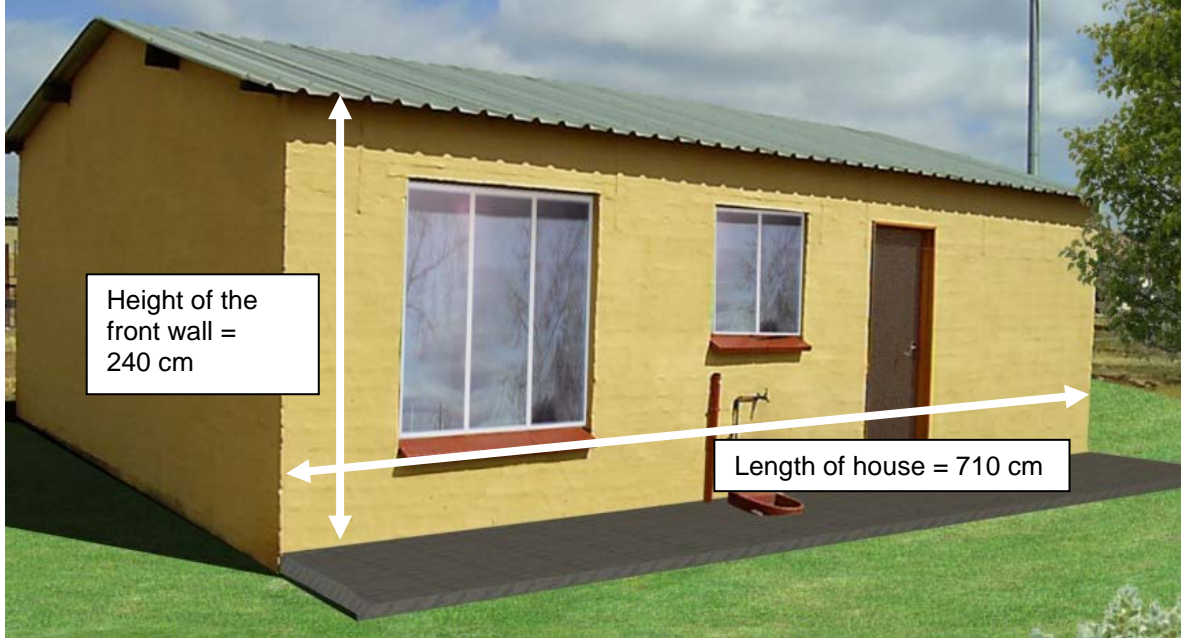
[Source: <www.lowvelder.co.za>]

> The dimensions of the large window is:
> Length: 151,1 cm
> Height: 60" (inches)
>
> The area of the small window is: 9 698,78 cm^2
>
> The area of the door is: 18 900 cm^2

3.1.1   With the knowledge that 1" (inch) = 2,54 cm, convert 60" (inches) to centimetres.   (2)

3.1.2   Hence, determine the area of the large window, giving your answer in cm^2.   (2)
                                Area = length × height

3.1.3   The owner, Mr Mkhize, decides to paint the front of his house a dark brown colour.

        (a)   Calculate the area (in cm^2) that would need to be painted, remembering that the windows and doors would not be painted.   (5)

        (b)   How many 1 litre cans of paint are needed if 1 litre covers 110 000 cm^2?   (3)

        (c)   Determine how much paint is left after Mr Mkhize has painted.   (3)

3.2   A house is positioned in a rectangular yard as illustrated below.
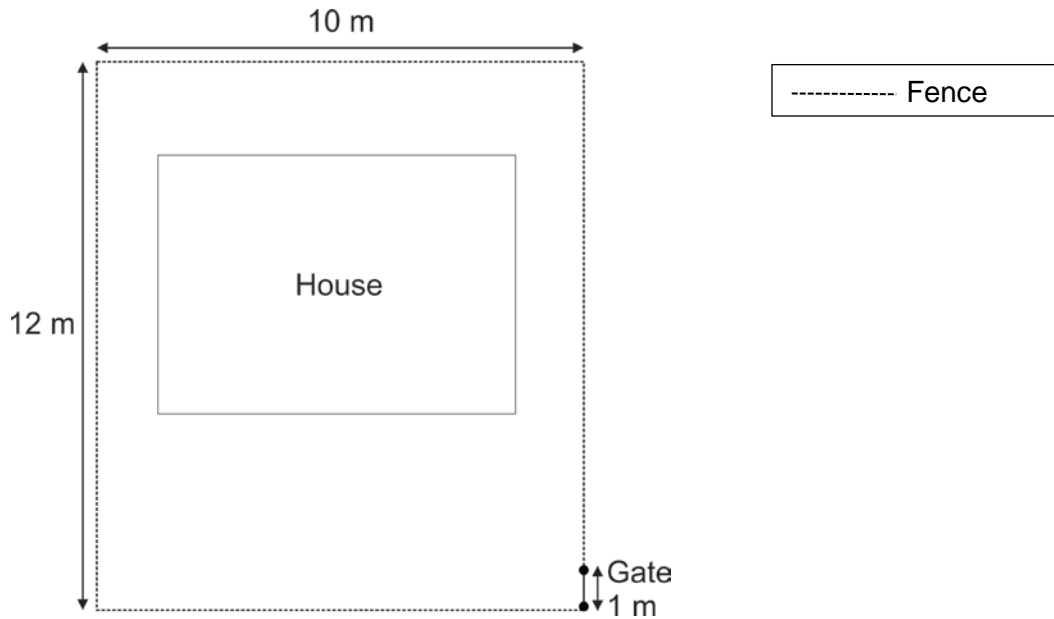
3.2.1   Determine the perimeter of the fence that is erected around the perimeter of the yard (excluding the gate). (3)

Perimeter = 2(length + breadth)

3.2.2   Poles are used to hold the fence up. Complete the following sentence in order to determine how many poles are needed to erect the fence if a pole is needed every meter. A pole is also situated either side of the gate. You need just write down the answers in your Answer Book and not the whole sentence.

'There is a pole on each of the corners. This means that __(a)__ poles are needed for this purpose. Then a further __(b)__ poles are needed between the corner poles for one of the longer sides of the fence. A further __(c)__ poles are needed between the corner poles for one of the shorter sides of the fence. This means that a total of __(d)__ poles will be needed to erect the fence.' (5)

3.2.3   A hole needs to be dug to plant each of the poles in the ground as illustrated below.

Determine the amount of soil (in cm^3) that needs to be dug from the ground in order to make each cylindrical hole if each hole is to be 40 cm deep and has a radius of 10 cm.   (2)

$$\text{Volume of a hole} = \pi \times r^2 \times \text{depth}$$
$$\text{where } \pi = 3,14 \text{ and r} = \text{radius}$$

[25]

QUESTION 4

4.1   Shark attacks are one of the most common fears when swimming in the sea. PETA (People for the Ethical Treatment of Animals) posted the following advertisement in 2012 to raise awareness on the number of shark attacks as opposed to the number of sharks killed for their fins.


[Source: PETA – Maui Dreams Dive Co.]

Use the information above to answer the following questions:

4.1.1   Write 100 million in number format without using the word 'million'.   (2)

4.1.2   Write the number of human deaths to shark deaths as a ratio in its simplest form.   (3)

4.1.3   The figure for the number of sharks that are killed every hour has been blocked out in the advertisement. Calculate this figure, rounding off your answer to the nearest hundred. There were 366 days in the year 2012.   (4)

4.2   The information below shows the average lengths of five large species of shark and the depths at which they prefer to swim.
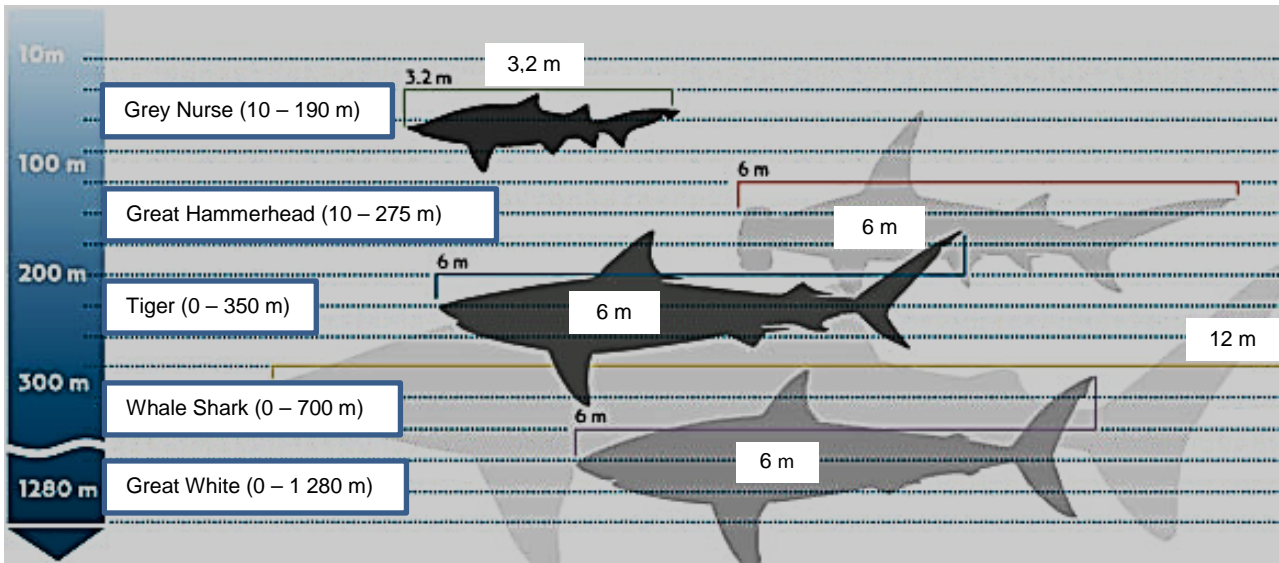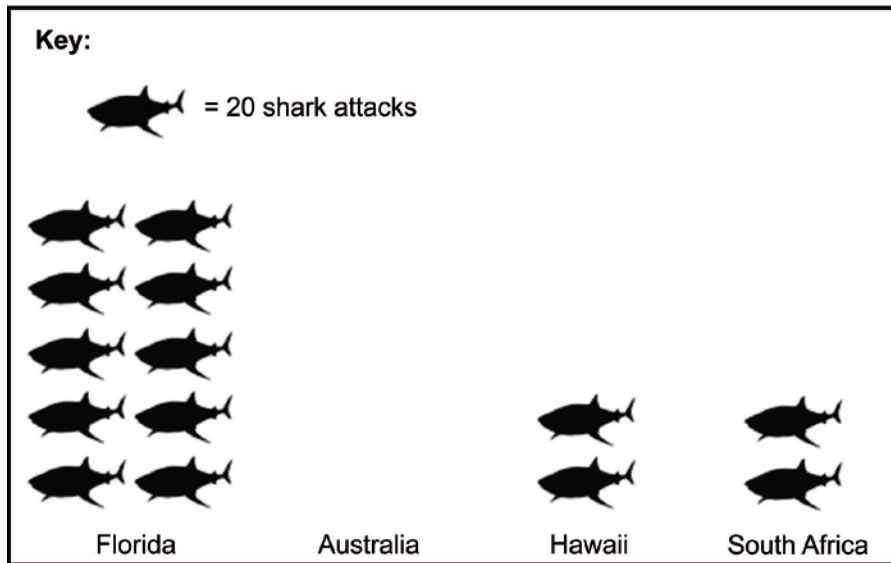

[Source: Australian Geographic]

Use the above data to answer the questions that follow:

4.2.1   State the average length of the Tiger Shark.   (2)

4.2.2   State the maximum depth the Great Hammerhead swims at.   (2)

4.2.3   Despite beliefs that the Great White is the largest shark, this is not true. Which is the largest shark?   (2)

4.2.4   Determine the mode of the average length of the sharks shown above.   (2)

4.3   The following pictograph shows the number of shark attacks over the last 10 years in the top four countries/states.

[Source: Australian Geographic]

Use the above pictograph to answer the following questions:

4.3.1   Determine the number of shark attacks that occurred in Florida over the last 10 years.   (2)

4.3.2   If the number of shark attacks were 130 in Australia, determine how many images of a shark would be in the Australia column.   (3)

4.3.3   If, in the pictograph, the number of shark attacks will have been rounded off to the nearest 20. Give the range of attacks in South Africa that could be illustrated above.   (3)

[25]

QUESTION 5

[Source: <www.studiorokit.com>]   [Source: <www.dailymail.co.uk>]

Cadbury's chocolate was founded in the UK in 1824 by John Cadbury.

The following abridged financial records were extracted from Cadbury for the 2011 financial year:
- Revenue (earnings from sales for the year):   £11 346 002 000.
- Operating income (earnings before tax and interest): £559 432 200.
- Net income (earnings after tax and interest):   £447 545 760.

[Source: Wikipedia]

5.1   Determine the total number of years that Cadbury has been in business to the present year.   (3)

5.2   Write down Cadbury's revenue during 2011 in words.   (2)

5.3   5.3.1   Calculate how many pounds (£) where paid for taxes and interest.   (3)

      5.3.2   Express the amount paid for taxes and interest as a percentage of the operating income before tax and interest during 2011.

$$\text{Percentage paid for taxes and interest} = \frac{\text{taxes and interest}}{\text{operating income before tax}} \times 100\%$$ (3)

5.4   During 2012, Cadbury had a total workforce of 71 657 employees in all of their 50 branches throughout the world.

      5.4.1   If the average monthly salary per employee during 2012 was £1 100, calculate the total salary bill (in pounds) for Cadbury during 2012.   (2)

      5.4.2   Determine the average number of employees at each of the 50 branches. (2)

5.5   Convert the revenue amount of £11 346 002 000 into South African rand using the following exchange rate:

1 ZAR (South African rand) =	0,06 GBP (Great British pound)

(2)

5.6   During October 2014, Cadbury Kenya (the branch of Cadbury in Kenya that supplies the whole of central Africa) announced that they would have to cease all production. As a result, many employees would lose their jobs.

The number of people who would lose their jobs is still unclear; the following newspapers reported the following number of job losses:

[Source: <www.worldatlas.com>]

News24	100
Business Daily	300
Daily Independent	400

5.6.1   Determine the range of the three reported numbers of people who may lose their jobs.   (2)

5.6.2   If each of these newspapers has an equal chance of reporting correctly, state the chance that *Business Daily* reported it correctly. Round off to two decimal places.   (3)

5.7   Cadbury trades on the stock market as Cadbury/Schweppes. The graph below shows the points on the stock market for Cadbury's shares over a period of time.

Cadbury Schweppes
Share price
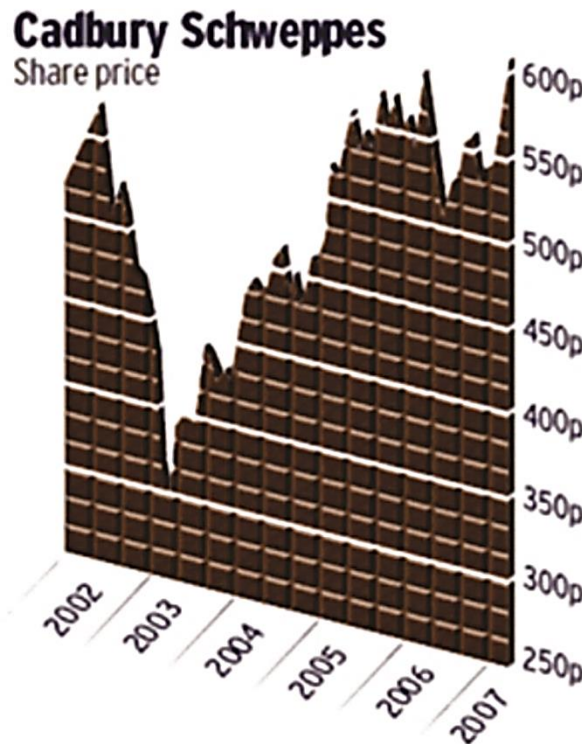
[Source: <www.telegraph.co.uk>]

5.7.1   Identify the year in which the share price reached its lowest point and then write down the number of points.   (4)
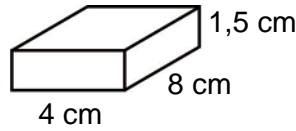
5.7.2   Determine how many points the shares were worth during 2007.   (2)

5.8   A slab of Cadbury chocolate weighs approximately 200 g. A matric dance committee plans to melt the big Cadbury slab to make mini chocolate slabs to sell. The mini slabs are in the shape of rectangular prisms with the following dimensions as shown in the sketch below:

[Source: <www.downeastfood.com>]

5.8.1   Determine (in cm^3) the volume of the mini chocolate slab.

   $$\text{Volume}_{\text{rectangular prism}} = \ell \times b \times h$$ (2)

5.8.2   Determine the mass of one mini slab, in grams, using the following conversion table:

0,8 gram =	1 cm^3

                                                                          (2)

5.8.3   Calculate the number of mini slabs one can get out of one big Cadbury chocolate slab.   (3)

                                                                        [35]

                                                      Total: 150 marks