



NATIONAL SENIOR CERTIFICATE EXAMINATION  
NOVEMBER 2008

## **MATHEMATICAL LITERACY: PAPER II**

### **MARKING GUIDELINES**

Time: 3 hours

150 marks

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**These marking guidelines are prepared for use by examiners and sub-examiners, all of whom are required to attend a standardisation meeting to ensure that the guidelines are consistently interpreted and applied in the marking of candidates' scripts.**

**The IEB will not enter into any discussions or correspondence about any marking guidelines. It is acknowledged that there may be different views about some matters of emphasis or detail in the guidelines. It is also recognised that, without the benefit of attendance at a standardisation meeting, there may be different interpretations of the application of the marking guidelines.**

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**Explanation of symbols:****√a – this is a mark awarded for accuracy****√m – this is a mark awarded for using the correct method****√ca – this is a mark awarded for using continued accuracy****QUESTION 1**

1.1

$$\begin{aligned}
 1.1.1 \quad \text{Running Cost (c/km)} &= (9,22 \times R10,40)\sqrt{a} + 16,71 \text{ c/km } \sqrt{a} + 11,26 \text{ c/km } \sqrt{a} \\
 &= 95,888 + 16,71 \text{ c/km} + 11,26 \text{ c/km} \\
 &= 123,86 \text{ c/km } \sqrt{ca}
 \end{aligned}
 \tag{4}$$

$$1.1.2 \quad \text{Fixed Cost (c/km)} = 157 \text{ c/km } \sqrt{a}$$

$$\begin{aligned}
 \therefore \text{Total cost of operating the car} &= 123,86 \text{ c/km} + 157 \text{ c/km} \\
 &= 280,86 \text{ c/km } \sqrt{ca}
 \end{aligned}
 \tag{2}$$

$$\begin{aligned}
 1.1.3 \quad \text{Operating cost for 500 km} &= 280,86 \text{ c/km} \times 500 \text{ km } \sqrt{m} \\
 &= 140\,430 \text{ c } \sqrt{ca} \\
 &= R1\,404,30 \sqrt{m}
 \end{aligned}
 \tag{3}$$

1.2

1.2.1 The cost of operating the car on a journey is dependent on the distance travelled during the journey. i.e. Operating Cost is the dependent variable  $\sqrt{a}$  and distance travelled is the independent variable.  $\sqrt{a}$  (2)

1.2.2 If the distance travelled is 0 km, then there will be no operating cost.  $\sqrt{a}$  (1)

1.2.3 The cost of operating Anna's car is 280,86 c/km. So, for every 1 km that Anna travels, the operating cost of the car increases by  $\approx R2,81$ . As such, the graph is a straight line with a constant increase of R2,81 for every 1 km.  $\sqrt{\sqrt{a}}$  (2)

1.2.4 Operating cost (cents/km) = 280,86 c/km  $\sqrt{a}$   $\times$  distance travelled (km)  $\sqrt{m}$   
**OR**  
 Operating cost (Rand/km) = R2,81/km  $\sqrt{a}$   $\times$  distance travelled (km)  $\sqrt{m}$  (2)

**16 marks**

**QUESTION 2**

2.1  $R150,00$  ✓a (1)

2.2

2.2.1 From the graph: Income received from 5 necklaces =  $R150,00$  ✓m **OR**  
 $\therefore$  Income per necklace =  $R150,00 \div 5$  ✓ca  
 $= R30,00$  (2)

2.2.2 From the graph: Expenditure of making 5 necklaces =  $R200,00$  ✓m

$\rightarrow$  Cost of materials for 5 necklaces =  $R200,00 - R150,00$  (rental) ✓m  
 $= R50,00$

$\therefore$  Cost of making 1 necklace =  $R50,00 \div 5$  ✓m ✓ca  
 $= R10,00$  (4)

2.3

2.3.1 Let the number of necklaces sold be  $n$ .  
 $\rightarrow$  Monthly Income (Rand) =  $R30,00 \times n$  ✓a ✓ structure (2)

2.3.2 Let the number of necklaces sold be  $n$   
 $\rightarrow$  Monthly Expenditure (Rand) =  $R150,00$  ✓a +  $(R10,00 \times n)$  ✓a ✓ structure (3)

2.3.3 At the break even point: Income = Expenditure  
 $\therefore R30,00 \times n = R150,00 + R10,00 \times n$  ✓m  
 $R30,00 \times n - R10,00 \times n = R150,00$  ✓m  
 $R20,00 \times n = R150,00$   
 $n = R150 \div R20,00$  ✓m  
 $= 7,5$   
 $= 8$  full necklaces ✓ca (4)

2.4 Monthly break even amount = 8 necklaces  $\times$   $R30,00$  per necklace  
 $= R240,00$  ✓a

Break even amount + 50% profit =  $R240,00 + 50\% \times R240,00$   
 $= R240,00 + R120,00$   
 $= R360,00$  ✓ca

$\therefore$  No. of necklaces needed to make 50% profit =  $R360,00 \div R30,00$  ✓m  
 $= 12$  necklaces ✓ca (4)

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| <b>20 marks</b> |
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**QUESTION 3**

3.1

$$3.1.1 \quad \text{Distance} = 106 \text{ km} + 128 \text{ km} + 56 \text{ km} + 7 \text{ km} \checkmark m = 297 \text{ km} \checkmark a \quad (2)$$

$$3.1.2 \quad \text{Consumption rate} = 8,5 \text{ litres/100 km}$$

$$\begin{aligned} \text{Total distance of the return trip} &= 297 \text{ km} \times 2 \\ &= 594 \text{ km} \checkmark a \end{aligned}$$

$$\begin{aligned} \rightarrow \text{Litres of petrol needed for the trip} &= \frac{8,5 \text{ litres}}{100 \text{ km}} \times 594 \text{ km} \checkmark m \\ &= 50,49 \text{ litres} \checkmark ca \end{aligned}$$

Price of petrol = R10,40 per litre

$$\begin{aligned} \therefore \text{Amount spent on petrol for the trip} &= R10,40 / P \times 50,49 P \\ &\approx R525,00 \\ &\text{(rounded off to the nearest Rand)} \\ &\text{(accurate} = R525,10) \end{aligned} \quad (5)$$

3.2

$$3.2.1 \quad \text{Amount to be exchanged} = R2\,500,00$$

$$\begin{aligned} \text{Commission fee} &= (1,7\% \times R2\,500,00) \checkmark a \text{ (minimum fee of R45,00)} \\ &= R42,50 \checkmark a \end{aligned}$$

$$\therefore \text{Commission fee} = R45,00 \checkmark ca$$

$$\begin{aligned} \text{Actual amount exchanged} &= R2\,500,00 - R45,00 \\ &= R2\,455,00 \checkmark ca \end{aligned}$$

Exchange Rate into Pula:  $P1,00 = R1,22$

$$\begin{aligned} \rightarrow R2\,455,00 &= (P1,00 \div R1,22 \checkmark a) \times R2\,455,00 \checkmark m \\ &= P2\,012,30 \checkmark ca \\ &\text{(rounded off to two decimal places)} \end{aligned} \quad (7)$$

3.2.2

(a) There is a minimum commission fee of R45,00. So, until the amount being exchanged is big enough so that 1,7% of the amount being exchanged is more than R45,00, the commission fee will remain R45,00 for any exchange below this amount.  $\checkmark \checkmark$  (2)

(b) The commission fee increases at a rate of 1,7% of the amount being exchanged  $\checkmark$ . This is a constant increase of R0,017  $\checkmark$  per every R1,00 being exchanged or R1,70 per every R100,00 exchanged. (2)

(c)

- (i) Point 'C' represents the point at which the transaction fee for exchanging Rand becomes more than the minimum fee of R45,00. (1)

- (ii) **Method 1:** Fee = 1,7% × amount being exchanged

$$R45,01 = 0,017 \times \text{amount being exchanged} \checkmark a$$

$$R45,01 \div 0,017 = \text{amount being exchanged} \checkmark m$$

$$R2\ 647,65 = \text{amount being exchanged}$$

$$\therefore \text{Amount being exchanged} \approx R2\ 650,00 \checkmark ca$$

(rounded off to the nearest R10,00)

This means that if you exchange  $\approx R2\ 650$  or more then the fee becomes more than R45,00.

- Method 2:** Trial and improvement by substituting values from the graph. (3)

|                 |
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| <b>22 marks</b> |
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**QUESTION 4**

4.1  $AB^2 + BC^2 = (1,25 \text{ m})^2$  **✓m**

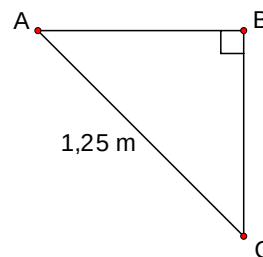
Since  $AB = BC$ :  $2 \times AB^2 = 1,5625 \text{ m}^2$  **✓m**

$$AB^2 = \frac{1,5625 \text{ m}^2}{2}$$

$$= 0,78125 \text{ m}^2$$
 **✓ca**

$$\therefore AB = \sqrt{0,78125 \text{ m}^2}$$
 **✓m ✓ca**

$$= 0,884 \text{ m given}$$



(5)

4.2

4.2.1 Volume of a triangular prism = area of the base (1)  $\times$  height of the prism

(1) Area of the base:

$$\text{Area of a triangular base} = \frac{1}{2} \times \text{base} \times \text{height}$$

- Value 1 of 0,884 m represents the length of the base of the triangle. **✓a**
- Value 2 of 0,884 m represents the height of the triangle. **✓a**

(2) Height of the prism:

- Value 3 of '0,15 m' represents the thickness (height) of the triangular concrete portion of the floor. **✓a**

$\therefore$  The method used by the builder and the solution are both correct. **✓ca** (4)

4.2.2 **Part 1 & Part 3:**

$$\begin{aligned} \text{Total volume of Part 1 \& Part 3} &= 0,06 \text{ m}^3 \times 2 \text{ } \mathbf{\check{m}} \\ &= 0,12 \text{ m}^3 \mathbf{\check{a}} \end{aligned}$$

**Part 2:**

$$\begin{aligned} \text{Volume of the concrete floor for Part 2 (a)} &= 0,884 \text{ m} \times 1,250 \text{ m} \times 0,15 \text{ m } \mathbf{\check{m}} \\ &= 0,16575 \text{ m}^3 \mathbf{\check{ca}} \end{aligned}$$

$\therefore$  Total volume of concrete needed for the floor

$$= 0,12 \text{ m}^3 + 0,16575 \text{ m}^3 \text{ } \mathbf{\check{m}}$$

$$= 0,28575 \text{ m}^3$$

$$\approx 0,3 \text{ m}^3$$

(rounded off to one decimal place)

(6)

4.3

$$\begin{aligned} 4.3.1 \text{ Total area of the walls} &= (1,250 \text{ m} \times 3) \mathbf{\check{a}} \times 0,490 \text{ m } \mathbf{\check{a}} \\ &= 3,75 \text{ m} \times 0,490 \text{ m} \\ &= 1,8375 \text{ m}^2 \mathbf{\check{ca}} \end{aligned}$$

$$\text{Paint coverage: } 3 \text{ m}^2 = 1 \text{ litre}$$

$$\rightarrow 1 \text{ m}^2 = 1 \text{ litre} \div 3$$

$$1,8375 \text{ m}^2 = 1 \text{ litre} \div 3 \times 1,8375 \mathbf{\check{m}}$$

$$= 0,6 \text{ litre } \mathbf{\check{ca}} \quad (\text{rounded off to one decimal place})$$

So, the builder will need to buy a 1 litre tin of paint. **✓ca** (6)

4.3.2 Height of one section:

Height = 490 mm

$$= 5 \text{ bricks} \checkmark a (450 \text{ mm}) + 4 \text{ gaps of mortar (40 mm)}$$

Length of one section:

Length of one section = 1,250 m

$$= 6 \text{ bricks} \checkmark a (1\,200 \text{ mm}) + 5 \text{ gaps of mortar (50 mm)}$$

$$\rightarrow \text{No. of bricks in one section} = 5 \times 6 \checkmark m \\ = 30 \checkmark ca$$

$$\therefore \text{Total no. of bricks in all three sections} = 30 \times 3 \checkmark m \\ = 90 \checkmark ca \quad (6)$$

## 4.4

4.4.1 Inflation refers the average change in the price of goods or services from one year to the next.  $\checkmark a \checkmark a$  (2)

4.4.2 Cement bricks have become more expensive.  $\checkmark a$   
 i.e. from 2004 – 2005 bricks increased by 16,4%, from 2005 – 2006 by 6,3% and from 2006 – 2007 by 5,1%.  $\checkmark a$   
 Even though the graph may be decreasing, this signifies a slower rate of increase and not a negative rate of increase.  $\checkmark a$  (3)

## 4.4.3 December 2007:

$$\begin{aligned} \text{Price of bricks} &= R8\,700,00 + (5,1\% \times R8\,700,00) \checkmark a \checkmark m \\ &= R8\,700,00 + R443,70 \\ &= R9\,143,70 \checkmark ca \end{aligned}$$

December 2008:

$$\begin{aligned} \text{Price of bricks} &= R9\,143,70 + (7\% \times R9\,143,70) \checkmark m \\ &= R9\,143,70 + R640,06 \\ &= R9\,783,76 \checkmark ca \end{aligned} \quad (5)$$

**OR**

December 2007:

$$\begin{aligned} \text{Price of bricks} &= R8\,700,00 \times 105,1\% \checkmark a \checkmark m \\ &= R9\,143,70 \checkmark ca \end{aligned}$$

December 2008:

$$\begin{aligned} \text{Price of bricks} &= R9\,143,70 \times 107\% \checkmark m \\ &= R9\,783,76 \checkmark ca \end{aligned}$$

**OR**

$$\begin{aligned} \text{Price of bricks in Dec 2008} &= R8\,700,00 \times 105,1\% \checkmark a \checkmark m \times 107\% \checkmark a \checkmark m \\ &= R9\,783,76 \checkmark ca \end{aligned}$$

**37 marks**

**QUESTION 5**

5.1

5.1.1

- (a) There are outliers in the data set – i.e. 125 kg and 142 kg. As such, the mean mass will be unrealistically high. (2)

(b)

49 58 64 65 69 70 71 72 73 74 75 78 98 98 125 142

Median average = 72,5 kg ✓m✓m ✓a

In terms of where it is positioned in the data set, the median is representative of the majority of the values in the data set. As such, it is a representative average for the group. ✓ca (4)

5.1.2

- (a) 
$$\begin{aligned} \text{BMI (kg/m}^2\text{)} &= \frac{75 \text{ kg}}{[1,78 \text{ m}]^2} \quad \checkmark\checkmark\checkmark\text{a} \\ &= \frac{75 \text{ kg}}{3,1684 \text{ m}^2} \\ &= 23,7 \text{ kg/m}^2 \quad \checkmark\text{ca} \\ &\text{(rounded off to one decimal place)} \end{aligned} \quad (3)$$

- (b) 
$$\begin{aligned} 24,1 \text{ kg/m}^2 &= \frac{55 \text{ kg}}{[\text{height (m)}]^2} \quad \checkmark\text{a} \\ [\text{Height (m)}]^2 &= \frac{55 \text{ kg}}{24,1 \text{ kg/m}^2} \quad \checkmark\text{m} \\ &= 2,4066 \text{ m}^2 \quad \text{(rounded off to three decimal places)} \\ \therefore \text{Height (m)} &= \sqrt{2,4066 \text{ m}^2} \quad \checkmark\text{m} \\ &= 1,55 \text{ m} \quad \checkmark\text{ca} \end{aligned} \quad (4)$$

**OR**

By trial and improvement – i.e. Substituting values into the BMI formula.

5.1.3 Females:

$$\begin{aligned} \text{Mean BMI} &= 314 \text{ kg/m}^2 \checkmark\text{a} \div 10 \quad \checkmark\text{m} \\ &= 31,4 \text{ kg/m}^2 \quad \checkmark\text{ca} \end{aligned}$$

Males:

$$\begin{aligned} \text{Mean BMI} &= 155,5 \text{ kg/m}^2 \checkmark\text{a} \div 6 \\ &= 25,9 \text{ kg/m}^2 \quad \checkmark\text{ca} \end{aligned}$$

So, while the mean BMI for males falls into the 'Overweight' category ✓, the mean BMI for females falls into the 'Obese' category ✓. Overall, the male group is healthier than the female group. (7)

- 5.1.4 (a) Total females = 10  
Total females in the 'normal weight' category = 4

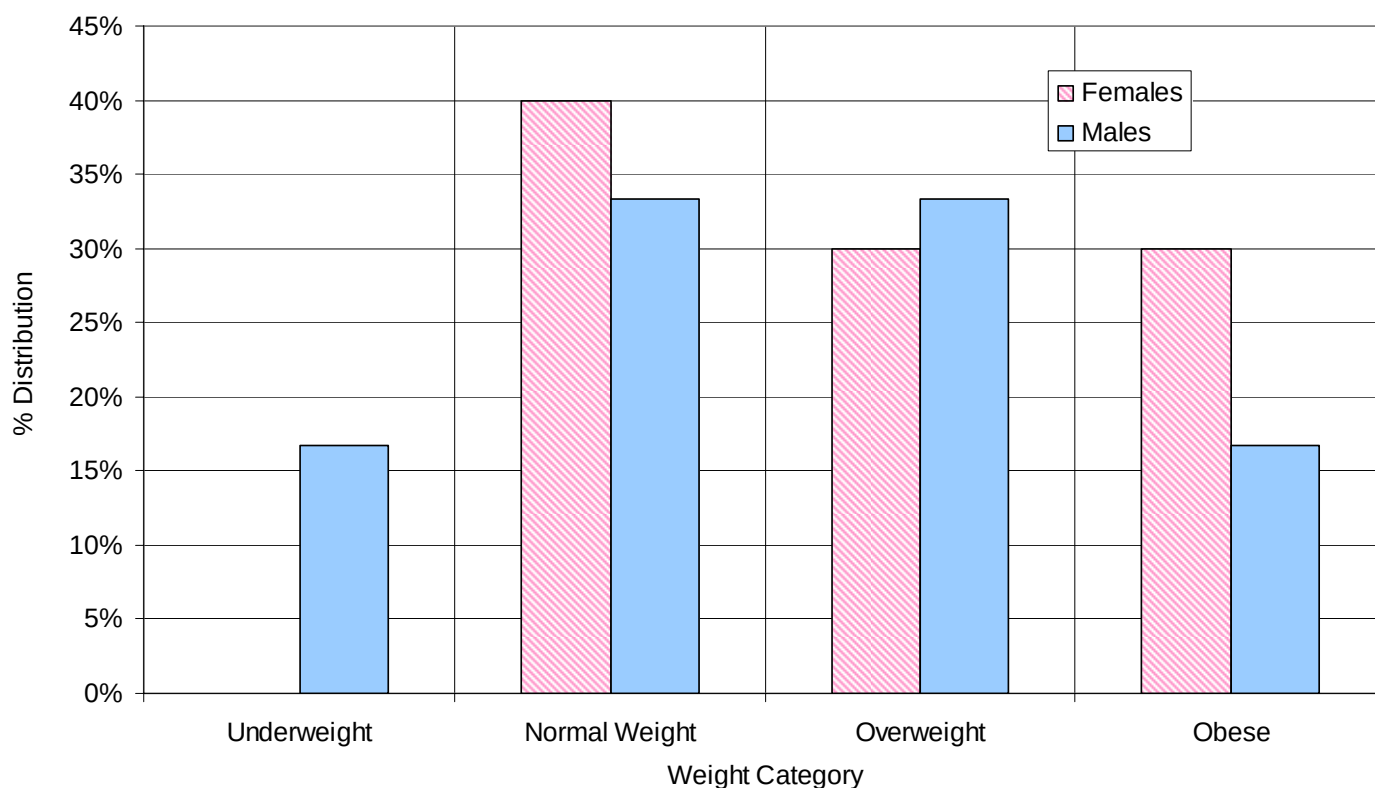
$$\therefore \% \text{ females in the normal weight category} = (4 \div 10) \times 100\% \checkmark m \\ = 40\% \checkmark a \quad (2)$$

- (b) There are a different number of males and females in the data.  $\checkmark$  It is not possible to compare the values for males and females until we have converted them to being out of the same unit.  $\checkmark$  (2)

(c)

(i)

% of Females and Males in Each Weight Category



$\checkmark\checkmark$  for appropriate labels

$\checkmark\checkmark\checkmark\checkmark$  for accurately representing the data

(6)

(ii) Possible answers:

- More females than males fall into the Normal Weight category than males.
- Significantly more females than males are obese.
- Significantly more males than females are underweight.
- Slightly more males than females are overweight.

$\checkmark a \checkmark a$

(2)

5.2

5.2.1

- (a) A boy who has a BMI-for-age ratio that puts him on the 25<sup>th</sup> percentile means that his weight-for-age ratio is similar to 25% ( $\frac{1}{4}$ ) of all other children. In other words out of 100 children he will have a similar age-for-weight ratio as 25 of the children.  $\sqrt{a}$  (2)

- (b) With this BMI-for-age ratio, the boy lies on the 85<sup>th</sup> percentile.  $\sqrt{a}$   
This means he is part of the 15% of the population of boys between 2 and 20 years who have this BMI-for-age ratio.

$$\begin{aligned}\rightarrow \text{No. of boys out of 100} &= 15\% \times 100 \text{ boys } \sqrt{m} \\ &= 15 \text{ boys } \sqrt{ca}\end{aligned}\quad (3)$$

$$\begin{aligned}5.2.2 \quad \text{BMI (kg/m}^2\text{)} &= \frac{78 \text{ kg}}{[1,6 \text{ m}]^2} \sqrt{a} \\ &= 30,5 \text{ kg/m}^2 \sqrt{ca} \text{ (rounded off to one decimal place)}\end{aligned}$$

This puts Martin above the 95<sup>th</sup> percentile.  $\sqrt{ca}$   
 $\therefore$  Martin is overweight.  $\sqrt{ca}$  (4)

5.3

5.3.1 Students with normal weight status = 6 378

Students with potential problem with weight =  $918 + 1\,468 + 390 = 2\,776$

$$\begin{aligned}\% \text{ normal} &= 6\,378 \div (6\,378 + 2\,776) \sqrt{a} \times 100\% \sqrt{m} \\ &= 6\,378 \div 9\,154 \times 100\% \\ &= 69,7\% \sqrt{ca} \quad \text{(rounded off to one decimal place)}\end{aligned}$$

$$\therefore \% \text{ with a potential problem} = 100\% - 69,7\% = 30,3\% \sqrt{ca}$$

Based on these figures, with almost 30% of the students surveyed having some or other problem with weight, it would seem that there is some issue behavioural risk relating to weight amongst students.  $\sqrt{ca}$  (5)

5.3.2

- (a) Total obese males in KZN = 9  $\checkmark a$   
 Total students surveyed = 4 212 + 4 942 = 9 154  $\checkmark a$

$$\therefore \text{Likelihood of selecting an obese male from KZN} = \frac{9}{9\,154} \checkmark m \quad (3)$$

- (b) Total overweight students in Mpumulanga = 43 (males) + 141 (females)  $\checkmark a$   
 $= 184 \checkmark a$

$$\text{Total students surveyed} = 9\,154 \checkmark a$$

→ Likelihood of selecting an overweight student from Mpumulanga =

$$\frac{184}{9\,154} \times 100\% = 2,010\% \checkmark m$$

(rounded off to three decimal places)

∴ No. of students out of a sample of 70 who might be overweight and from Mpumulanga:

$$= 2,010\% \times 70 \checkmark m$$

$$= 1,407 \text{ (rounded off to three decimal places)}$$

$$\approx 2 \text{ students } \checkmark ca$$

**OR**

Total students surveyed: Overweight students from Mpumulanga

$$\rightarrow 9\,154 \checkmark a : 184 \checkmark m \checkmark a$$

$$\rightarrow 70 : 184 \div 9\,154 \times 70 \checkmark \checkmark m$$

$$= 1,408$$

$$\approx 2 \text{ students } \checkmark ca$$

(6)

|                 |
|-----------------|
| <b>55 marks</b> |
|-----------------|

**Total: 150 marks**