basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL
SENIOR CERTIFICATE

GRADE 12

MATHEMATICAL LITERACY P2

FEBRUARY/MARCH 2012

MARKS: 150

TIME: 3 hours

This question paper consists of 12 pages and 3 annexures.

INSTRUCTIONS AND INFORMATION

1. This question paper consists of FIVE questions. Answer ALL the questions.

2. Answer QUESTION 5.1.3 on the attached ANNEXURE C. Write your centre number and examination number in the spaces provided on the ANNEXURE and hand in the ANNEXURE with your ANSWER BOOK.

3. Number the answers correctly according to the numbering system used in this question paper.

4. Start EACH question on a NEW page.

5. You may use an approved calculator (non-programmable and non-graphical), unless stated otherwise.

6. Show ALL the calculations clearly.

7. Round ALL the final answers off to TWO decimal places, unless stated otherwise.

8. Indicate units of measurement, where applicable.

9. Write neatly and legibly.

QUESTION 1

1.1 | Mr Gys and his friends are planning on going camping one weekend. They will use a tent, as shown in the picture below. The base of the tent is rectangular with a length of 380 cm and a width of 265 cm.

They need to buy a groundsheet to place underneath the tent. (A groundsheet is a single piece of thick plastic which is placed on the ground underneath the base of the tent.)

Length

Breadth
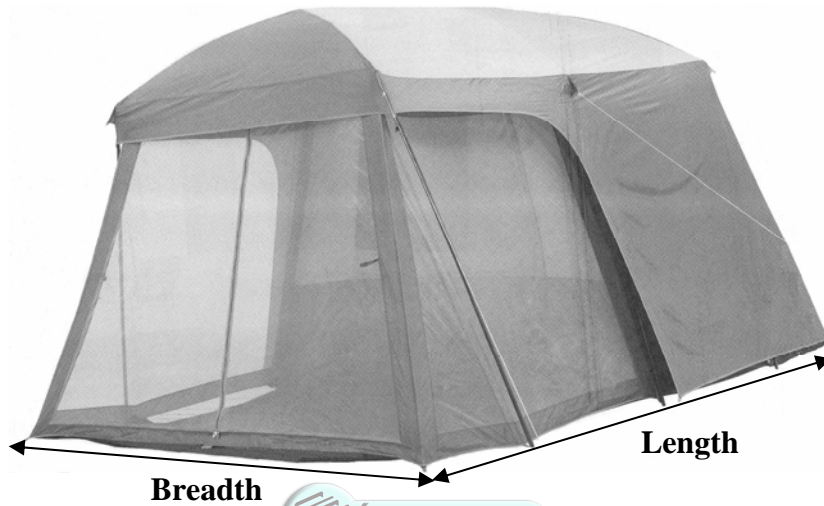
1.1.1 Determine the scale used if the width of the tent in the picture is 45 mm. Give the scale in the form:

1 : ... (3)

1.1.2 Rolls of the thick plastic are sold as follows:

- 2 m wide plastic costing R20,99 per metre, including VAT
- 6 m wide plastic costing R44,99 per metre, including VAT

These rolls of plastic are sold in metre lengths only.

Alternatively, sheets of plastic can be cut to order and cost R12,24 per square metre, excluding VAT. VAT is value-added tax calculated at 14%.

Use the formula: **Area of rectangle = length × breadth**

Calculate the cost of the groundsheet for the tent if the most economical option is to be chosen. (9)

1.2 | To help them in planning when to go camping, they used 24-hour meteograms to see what the weather conditions would be like.

(A meteogram is a graph of the predicted weather conditions for a certain period of time. It shows the temperature fluctuations, the cloud conditions and the possibilities of rain.)

The meteograms on ANNEXURE A show the predicted weather for two days.

Use the meteograms on ANNEXURE A to answer the following questions:

1.2.1 Give an estimation of the period of time on Day 1 that the predicted temperature will fall below 0 °C. (2)

1.2.2 Estimate the maximum temperature on Day 2 and the time at which the temperature on Day 2 was at its maximum. (2)

1.2.3 During which time interval was the predicted temperature on Day 1 lower than the predicted temperature on Day 2? (2)

1.2.4 Use the range of the temperatures for the two days to determine on which one of the two days you would suggest they should go camping. Explain your answer by showing ALL calculations. (6)

1.3 | They went fishing during their camping trip and recorded the mass (in grams) of the eleven fish they caught, as shown below.

| 1 513 | 875 | 3 025 | 912 | 1 809 | 1 513 |
| 1 003 | 1 794 | 1 628 | 958 | 1 052 | |

The following are statistical measures relating to the above data:

Lower quartile = 958 g
Upper quartile = 1 794 g
Median = 1 513 g
Mean = 1 462 g

1.3.1 Determine the number of fish caught having a mass between the lower and upper quartiles. (2)

1.3.2 Which ONE of the following measures of central tendency (median, mean or mode) will change, if a twelfth fish with a mass of 1 462 g was also caught? (2)

**[28]**

QUESTION 2

2.1   The principal of the local school asked Lihle to take over the running of the school tuck shop. He wanted to show Lihle that the annual profit from the tuck shop increases each year. TABLE 1 below shows the profit of the tuck shop for the last five years.

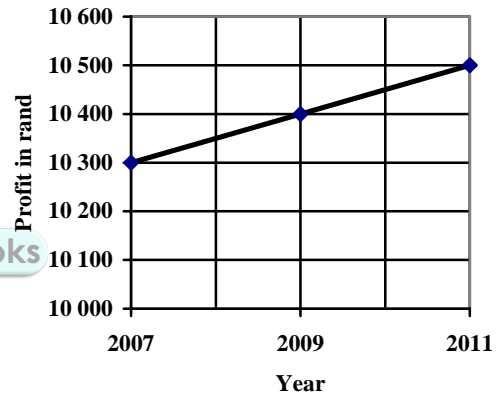**TABLE 1: Profit from the school tuck shop over the last five years**

YEAR	2007	2008	2009	2010	2011
PROFIT IN RAND	10 300	10 200	10 400	10 400	10 500

The data in TABLE 1 can be represented as indicated in the graphs below.

GRAPH A:
ANNUAL PROFIT OF THE TUCKSHOP
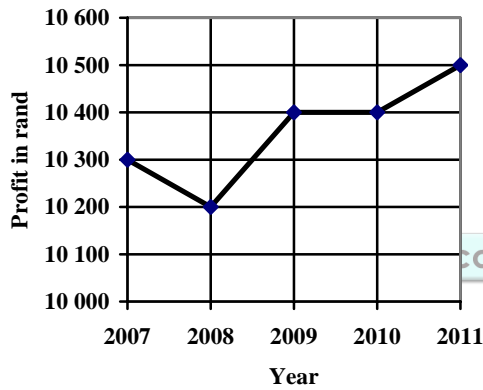
GRAPH B:
ANNUAL PROFIT OF THE TUCKSHOP

2.1.1   Explain why the two graphs have different shapes.   (2)

2.1.2   Identify and explain which ONE of the two graphs the principal would use to show Lihle that the annual profits have increased.   (3)

2.2 | On the opening day of the tuck shop, Lihle decided to give free diluted juice (either 200 mℓ or 140 mℓ) to the first few customers.

For this free offer, she used 1 200 mℓ of concentrated (undiluted) juice which had to be mixed with water in the ratio of 1 : 8 to make the diluted juice.

2.2.1   She has a cylindrical container with a diameter of 20 cm and a height of 35 cm.

Show whether this container is big enough for mixing the juice.

Use the formula:

Volume = $\pi \times$ **(radius)**$^2 \times$ **height**, using $\pi = 3{,}14$ and $1 \text{ mℓ} = 1 \text{ cm}^3$ (6)

2.2.2   The first 40 customers will each receive 200 mℓ of free juice. Calculate the number of customers who will receive 140 mℓ of free juice.   (5)

2.2.3   Write down a formula that could be used to calculate how many learners will receive 140 mℓ of free juice, if x number of learners received 200 mℓ of free juice.   (2)

[18]

ÉcoleBooks

QUESTION 3

3.1

Discipline is a serious problem in many South African schools.

Mr Khan, the principal of ABC High School, kept a record of the transgressions (breaking of school rules) committed by the Grade 10 to 12 learners at his school during the first term of 2011.

TABLE 2:   Record of transgressions committed during the first term of 2011 at ABC High School

CATEGORY	GRADE 10	GRADE 11	GRADE 12	TOTAL
A	405	328	287	1 020
B	173	201	86	460
C	156	187	216	559
D	18	17	14	49
E	288	167	98	553
F	189	128	98	415
TOTAL	1 229	1 028	799	3 056

Key to different categories of transgressions:
A: Arriving late
B: Smoking
C: Copying assessment tasks
D: Possession of illegal substances (that is alcohol, drugs, et cetera)
E: Absent without a valid reason
F: Other

3.1.1   Name any TWO transgressions that could be named under Category F.   (2)

3.1.2   Mr Khan stated: 'The percentage of the total number of learners caught copying during the first term of 2011 increased by more than 5% from Grade 10 to Grade 11 to Grade 12.'

Verify whether his statement is correct and give TWO possible reasons for this increase in copying.   (9)

3.1.3   Identify a possible trend relating to the number of transgressions from Grade 10 to Grade 12. Give reasons for this possible trend.   (3)

3.1.4   What type of graphical representation would best illustrate the information given in TABLE 2? Motivate your answer.   (2)

3.2 Mr Abel and Mrs Botha, the class teachers (register teachers) of Grade 12 A and Grade 12 B respectively, provided information (shown in TABLE 3 below) about the number of learners who arrived late during the first term of 2011.

TABLE 3: Number of learners who arrived late during the first term of 2011

	NUMBER OF LEARNERS IN EACH CLASS	TOTAL NUMBER OF LEARNERS ARRIVING LATE	TOTAL NUMBER OF SCHOOL DAYS
Grade 12 A	28	115	50
Grade 12 B	42	172	

Mr Abel claims that a greater percentage of learners from Grade 12B arrive later than learners from Grade 12A.

Determine, by calculation, if Mr Abel's claim is valid. Give possible reasons for Mr Abel's claim.

Use the formula:

Percentage of learners arriving late daily

$$= \frac{\text{Total number of learners arriving late}}{\text{Total number of school days} \times \text{number of learners in a class}} \times 100\%$$

(4)

3.3 Mr Abel noted that two learners in his class (Tom and Zara) regularly arrive late. The school day at ABC High School starts at 07:35, followed by a five-minute assembly. Each period is 45 minutes long. Mr Abel diligently recorded (shown in TABLE 4 below) the arrival times of the two learners for ten days.

TABLE 4: Times for ten days that Tom and Zara arrived at school

	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7	DAY 8	DAY 9	DAY 10
Tom	07:39	07:33	07:42	07:59	07:28	08:28	07:30		07:45	No time
Zara	08:08	07:51	07:39	07:32	07:56	07:42	08:02	07:15	07:46	07:34

3.3.1 On Day 8, Tom arrived at school at the start of period 2. Calculate his arrival time at the school. (2)

3.3.2 Give a possible explanation why no time was recorded for Tom on Day 10. (2)

3.3.3 Determine the average number of minutes Zara arrived late at school. (6)

[30]

QUESTION 4

4.1

> Mrs Nkosi lives in the centre of Pretoria and works in Sandton. She travels to work by car, covering approximately 65 km each way. She works a five-day week and presently a colleague travels with her to work.
>
> Mrs Nkosi pays an average of R650,00 per week for petrol. The general maintenance of her car is 35 cents per kilometre. Her colleague pays her R330,00 per week as her contribution towards the travelling costs.
>
> Mrs Nkosi has to be at work by 08:15 daily.
> It takes her between $1\frac{1}{2}$ hours and $2\frac{1}{2}$ hours to travel to work, depending on the traffic.

4.1.1   Determine the latest time that Mrs Nkosi should leave home to ensure that she always arrives at work on time.   (2)

4.1.2   Calculate Mrs Nkosi's total expenses to and from work for a 22-day working month.   (6)

4.2

> Mrs Nkosi decides to use the Gautrain to travel between Pretoria and Sandton. (The Gautrain is a rapid rail link between Pretoria and Johannesburg.)
>
> Passengers are able to make the trip between Pretoria station and Sandton station in 42 minutes, which includes three 1-minute stops at other stations along the way.
>
> The train route and the train fares are given on ANNEXURE B.

Calculate the distance, in kilometres, travelled by the Gautrain between Pretoria station and Sandton station if it travels at an average speed of 85,8 km/h.

Use the formula: **Average speed $= \dfrac{\textbf{Distance}}{\textbf{Time}}$**   (4)

4.3 | Mrs Nkosi has the option of using the 'Pay-As-You-Go' payment system or using a '35-Day Pass'.

The Gautrain fares in rand are given on ANNEXURE B.

It would cost her R150,00 per month for petrol to travel from her home to the station and back. Parking at the station would cost R10,00 per day. The Gaubus (shuttle bus service) between Sandton station and her workplace costs R6,00.

4.3.1   How much money would Mrs Nkosi save if she decides to buy a '35-Day Pass' rather than use the 'Pay-As-You-Go' system?   (6)

4.3.2   Mrs Nkosi's daughter travelled from Pretoria station to another destination using the Gautrain and paid R43,00 on the 'Pay-As-You-Go' system for the trip.

Later in the day, she used the Gautrain to travel to a second destination.

The total cost of travelling to these two destinations was R70,00.

Name her TWO destinations.   (3)

4.3.3   Determine the difference in total expenses if Mrs Nkosi used a '35-Day Pass' to travel to work for 22 days, rather than using her car.   (8)

4.3.4   Explain, stating at least TWO financial reasons, whether Mrs Nkosi should use the Gautrain to travel to work.   (3)

[32]

QUESTION 5

5.1

Peggy is the owner of the Tasty Sandwich Company.
Her weekly expenses are: • Rent   R520,00 • Water and electricity   R390,00 • Wages   25% of the total weekly expenses • Other   R140,00
The cost of the ingredients and packaging is R4,00 per sandwich.

5.1.1   (a)   Calculate her total weekly expenses.   (5)

        (b)   Write down a formula that Peggy could use to calculate her total costs (in rand) per week for producing x number of sandwiches in the form:

Total costs (in rand) per week = …   (2)

        (c)   Peggy's total costs for making sandwiches in one week amounted to R2 400. How many sandwiches were made?   (4)

5.1.2

Peggy uses the following formula to calculate the total production cost (in rand) per sandwich:
$$P = \left(\frac{1\,400}{x}\right) + 4$$
where **P** = total production cost (in rand) per sandwich   **x** = number of sandwiches produced per week
TABLE 5: Cost of producing one sandwich

Number of sandwiches (x) produced per week	0	100	200	400	700	**B**
Total cost (**P**) of producing one sandwich (in rand)	**A**	18	11	7,50	6	2

       Calculate the missing values **A** and **B**. Explain the meaning of each of these calculated values.   (5)

5.1.3   Draw a curved line on the grid on ANNEXURE C to show the relationship between the total cost of producing one sandwich and the number of sandwiches produced per week.   (5)

5.1.4   Peggy calculated that the total cost per sandwich could vary from R6,00 to R29,00.

        Calculate how many sandwiches she would produce if the total cost per sandwich is:
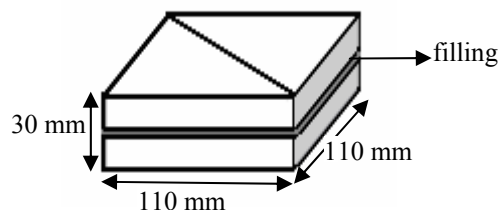
        (a)   A minimum   (1)

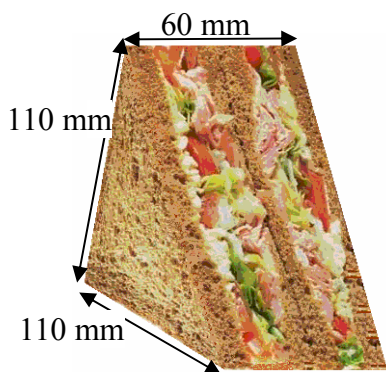   (b)   A maximum   (3)

5.2   The sandwiches are made from two square slices of bread with a filling between them.

Each side of the sandwich is 110 mm long and it is 30 mm thick.

Each square sandwich is cut diagonally to form two triangular pieces which are stacked next to each other. They are then packed in a box shaped like a triangular prism, as shown below.

Two triangular sandwiches placed next to each other

The packed triangular sandwiches

The dimensions of the box are 5% greater than the dimensions of the sandwich. A rectangular sticker with the Tasty Sandwich Company logo is pasted onto the diagonal side of the sandwich box.

5.2.1   (a)   Determine the diagonal length, rounded off to the nearest cm, of the sandwich.

Use the formula:
$$\mathbf{d} = \sqrt{2} \times \mathbf{s}, \text{ where}$$
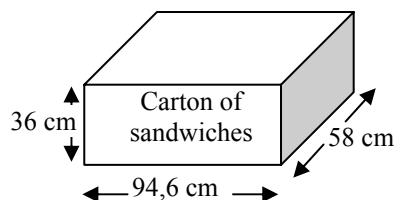**d** = length of the diagonal side of the sandwich
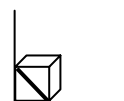**s** = length of the side of the sandwich   (2)

       (b)   The ratio of the length of the sticker to the length of the diagonal side of the box is 2 : 3. Calculate the length of the sticker.   (3)

5.2.2   The boxed sandwiches need to be packed into a rectangular carton that is 94,6 cm long, 58 cm wide and 36 cm high.

The sandwiches will be packed upright, as indicated in the sketch below.

Determine the maximum number of boxed sandwiches that can be packed into ONE carton. Clearly show ALL workings.   (12)

[42]

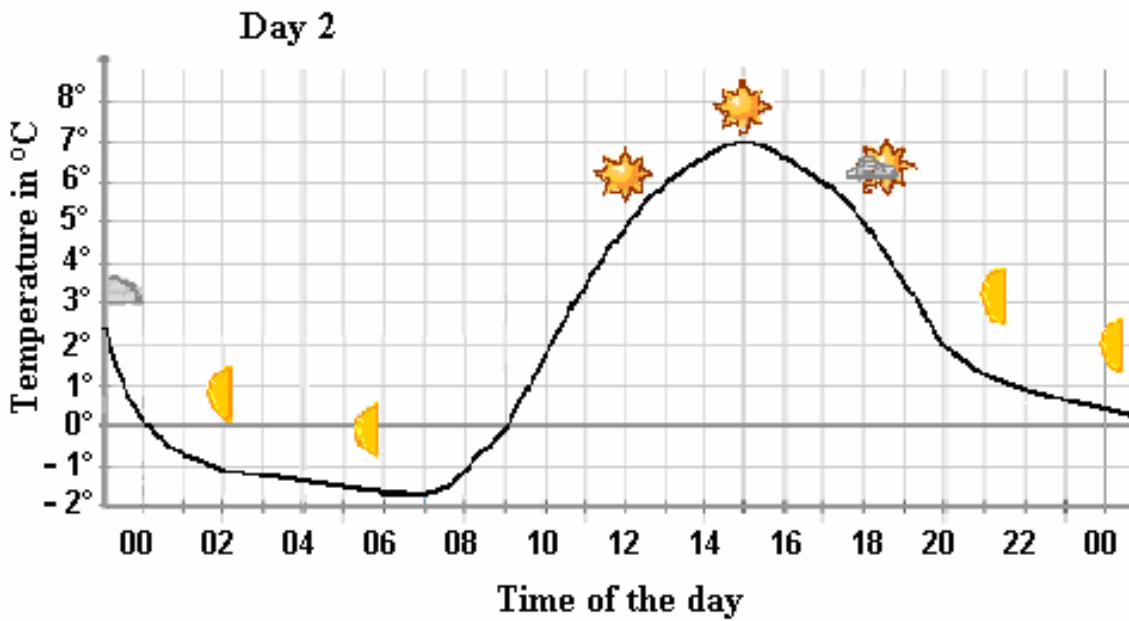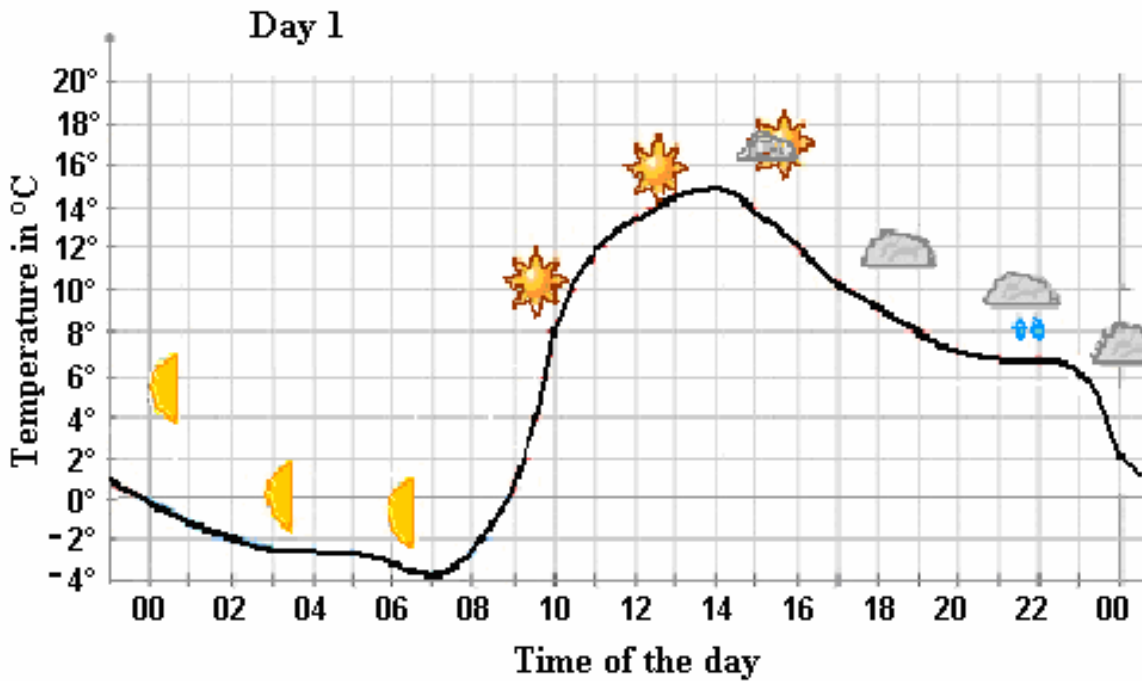**TOTAL: 150**

ANNEXURE A

QUESTION 1.2

METEOGRAMS FOR DAY 1 AND DAY 2

Day 1
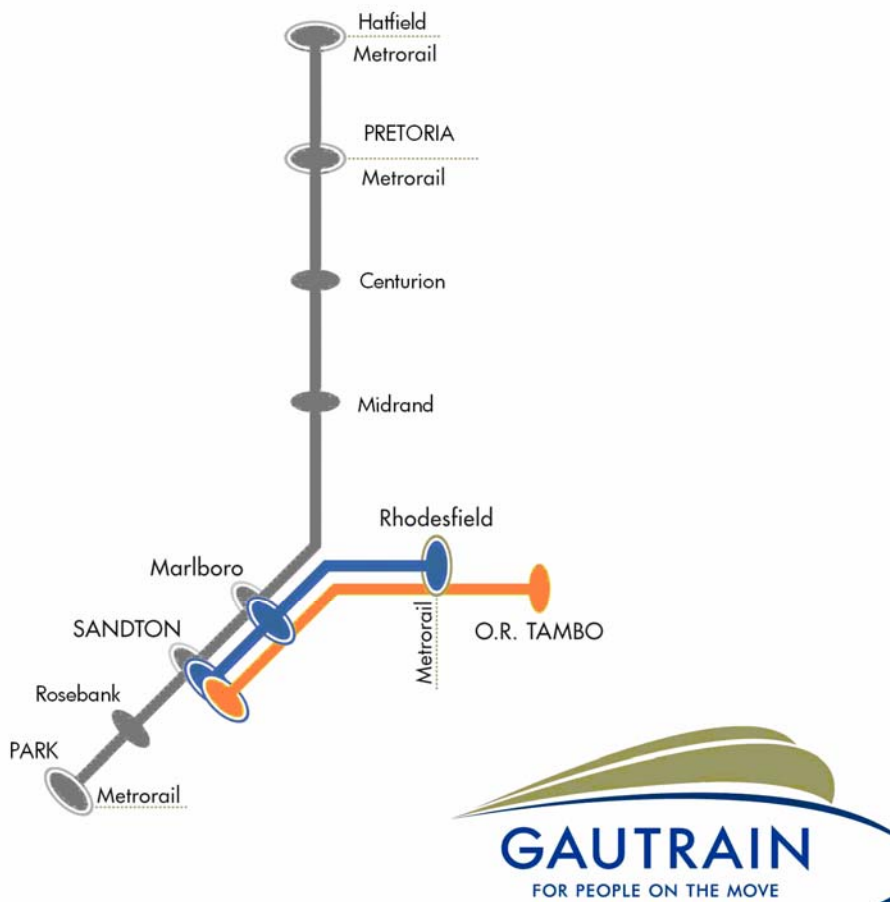

Day 2

Half-moon	**Sunny**	**Partially cloudy**
Cloudy	**Cloudy with showers of rain**	

[Source: www.yr.no]

ANNEXURE B

QUESTION 4.2

QUESTION 4.3: TRAIN FARES IN RAND

Pay-As-You-Go (If you are an occasional user. Single trip fares.)

	Hatfield	Pretoria	Centurion	Midrand	Marlboro	Sandton	Rosebank	Park	Rhodesfield
Hatfield		19,00	24,00	35,00	40,00	43,00	46,00	49,00	46,00
Pretoria	19,00		22,00	29,00	38,00	41,00	43,00	46,00	44,00
Centurion	24,00	22,00		24,00	29,00	36,00	38,00	40,00	38,00
Midrand	35,00	29,00	24,00		22,00	24,00	26,00	29,00	27,00
Marlboro	40,00	38,00	29,00	22,00		19,00	21,00	24,00	22,00
Sandton	43,00	41,00	36,00	24,00	19,00		19,00	21,00	25,00
Rosebank	46,00	43,00	38,00	26,00	21,00	19,00		19,00	27,00
Park	49,00	46,00	40,00	29,00	24,00	21,00	19,00		29,00
Rhodesfield	46,00	44,00	38,00	27,00	22,00	25,00	27,00	29,00	

35-Day Pass (Means you have 35 days to make the 22 return trips.)

	Hatfield	Pretoria	Centurion	Midrand	Marlboro	Sandton	Rosebank	Park	Rhodesfield
Hatfield		674,00	836,00	1 236,00	1 423,00	1 525,00	1 612,00	1 715,00	1 633,00
Pretoria	674,00		758,00	1 019,00	1 335,00	1 435,00	1 515,00	1 618,00	1 535,00
Centurion	836,00	758,00		857,00	1 022,00	1 253,00	1 331,00	1 425,00	1 350,00
Midrand	1 236,00	1 019,00	857,00		762,00	853,00	923,00	1 006,00	939,00
Marlboro	1 423,00	1 335,00	1 022,00	762,00		686,00	756,00	839,00	772,00
Sandton	1 525,00	1 435,00	1 253,00	853,00	686,00		665,00	749,00	863,00
Rosebank	1 612,00	1 515,00	1 331,00	923,00	756,00	665,00		679,00	933,00
Park	1 715,00	1 618,00	1 425,00	1 006,00	839,00	749,00	679,00		1 016,00
Rhodesfield	1 633,00	1 535,00	1 350,00	939,00	772,00	863,00	933,00	1 016,00	

Mathematical Literacy/P2   DBE/Feb.– Mar. 2012

NSC

ANNEXURE C

CENTRE NUMBER:

EXAMINATION NUMBER:

QUESTION 5.1.3

RELATIONSHIP BETWEEN THE TOTAL COST OF PRODUCING ONE SANDWICH AND THE NUMBER OF SANDWICHES PRODUCED PER WEEK

Number of sandwiches produced per week

(y-axis: Total cost (in rand) of producing one sandwich, 0 to 20)
(x-axis: 0 to 800)