basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

**NATIONAL
SENIOR CERTIFICATE**

GRADE 12

MATHEMATICAL LITERACY P2

NOVEMBER 2012

MARKS: 150

TIME: 3 hours

This question paper consists of 15 pages and 3 annexures.

Please turn over

INSTRUCTIONS AND INFORMATION

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

2.   Answer QUESTION 3.1.2(c), QUESTION 3.2.3 and QUESTION 4.2.2 on the attached ANNEXURES. Write your examination number and centre number in the spaces provided on the ANNEXURES and hand in the ANNEXURES 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 calculations clearly.

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

8.   Indicate units of measurement, where applicable.

9.   Maps and diagrams are NOT necessarily drawn to scale, unless stated otherwise.

10. Write neatly and legibly.
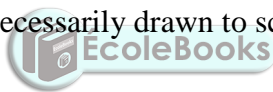
QUESTION 1

1.1 The Nel family lives in Klerksdorp in North West. They travelled by car to George in the Western Cape for a holiday. A map of South Africa is provided below.

MAP OF SOUTH AFRICA SHOWING THE NATIONAL ROADS

KEY: **N1–N12**, **N17** represent national roads.

Use the map above to answer the following questions.

1.1.1   In which general direction is George from Klerksdorp?   (2)

1.1.2   Identify the national road that passes through only ONE province.   (2)

1.1.3   The family travelled along the N12 to Kimberley. When they reached Kimberley, they took a wrong turn and found themselves travelling on the N8 towards Bloemfontein.

Describe TWO possible routes, without turning back to Kimberley, that the family could follow to travel from Bloemfontein to George. Name the national roads and any relevant towns in the description of the two routes.   (4)

1.2 | The Nel family (two adults and two children) were on holiday for nearly one week.

- They left home after breakfast on Saturday morning and arrived at the guesthouse in time for supper.
- On Sunday and Wednesday they ate all their meals at the guesthouse.
- On Monday they visited a game park.
- On Tuesday they went on a nature walk.
- On Thursday they went on a boat cruise.
- They left George after breakfast on Friday and returned to Klerksdorp.

TABLE 1: The Nel family's holiday costs

	ITEM	COST*
1	**Accommodation only**	R1 050 per day per family
2	**Meals at the guesthouse:**	
	Breakfast	R60 per person per day
	Lunch	R90 per person per day
	Supper	R120 per person per day
3	**Travelling costs:**	
	Long distance driving (to and from Klerksdorp) and meal costs en route	R1 602,86 for the return trip
	Local driving (in and around George)	R513,60 for the duration of the holiday
4	**Entertainment costs:**	
	Nature walk, including breakfast	R120 per adult and R100 per child
	Visit to the game park, including lunch	R200 per person
	Boat cruise, including supper	R200 per adult and R150 per child
	Other entertainment	R2 000
	*All the costs above include value-added tax (VAT).	

Use the information above to answer the following questions.

1.2.1   Determine the total amount that they paid for accommodation.   (2)

1.2.2   (a)   Write down an equation that could be used to calculate the total cost of meals eaten at the guesthouse in the form:

   Total cost (in rand) = ...   (3)

   (b)   Use TABLE 1 and the equation obtained in QUESTION 1.2.2(a) to calculate the total cost of the meals that they ate at the guesthouse if they ate THREE meals daily.   (4)

1.2.3   Mr Nel stated that the total cost of the holiday was less than R20 000. Verify whether or not Mr Nel's statement is correct. ALL calculations must be shown.   (9)

[26]

QUESTION 2

2.1 | On 14 February 2012 there was a queue of customers waiting to eat at Danny's Diner, a popular eating place in Matatiele.
The time (in minutes) that 16 of Danny's customers had to wait in the queue is given below:

| 30 | 15 | 45 | 36 | **A** | 40 | 34 | **B** |
| **B** | 42 | 26 | 32 | 38 | 35 | 41 | 28 |

B is a value greater than 20.

2.1.1 The range of the waiting times was 37 minutes and the mean (average) waiting time was 34 minutes.

(a) Calculate the missing value **A**, the longest waiting time. (2)

(b) Hence, calculate the value of **B**. (4)

(c) Hence, determine the median waiting time. (3)

2.1.2 The lower quartile and the upper quartile of the waiting times are 27 minutes and 41,5 minutes respectively.

How many of the 16 customers had to wait in the queue for a shorter time than the lower quartile? (2)

2.1.3 Danny's previous records, for 16 customers on 7 February 2012, showed that the median, range and the mean (average) of the waiting times were 10 minutes, 5 minutes and 10 minutes respectively.

Compare the statistical measures relating to the waiting times on 7 and 14 February and then identify TWO possible reasons to explain the difference in these waiting times. (4)

2.2 | The pie chart below shows the percentage of customers who ordered different meals at Danny's Diner on 14 February 2012.

**Percentage of customers who
ordered different meals**
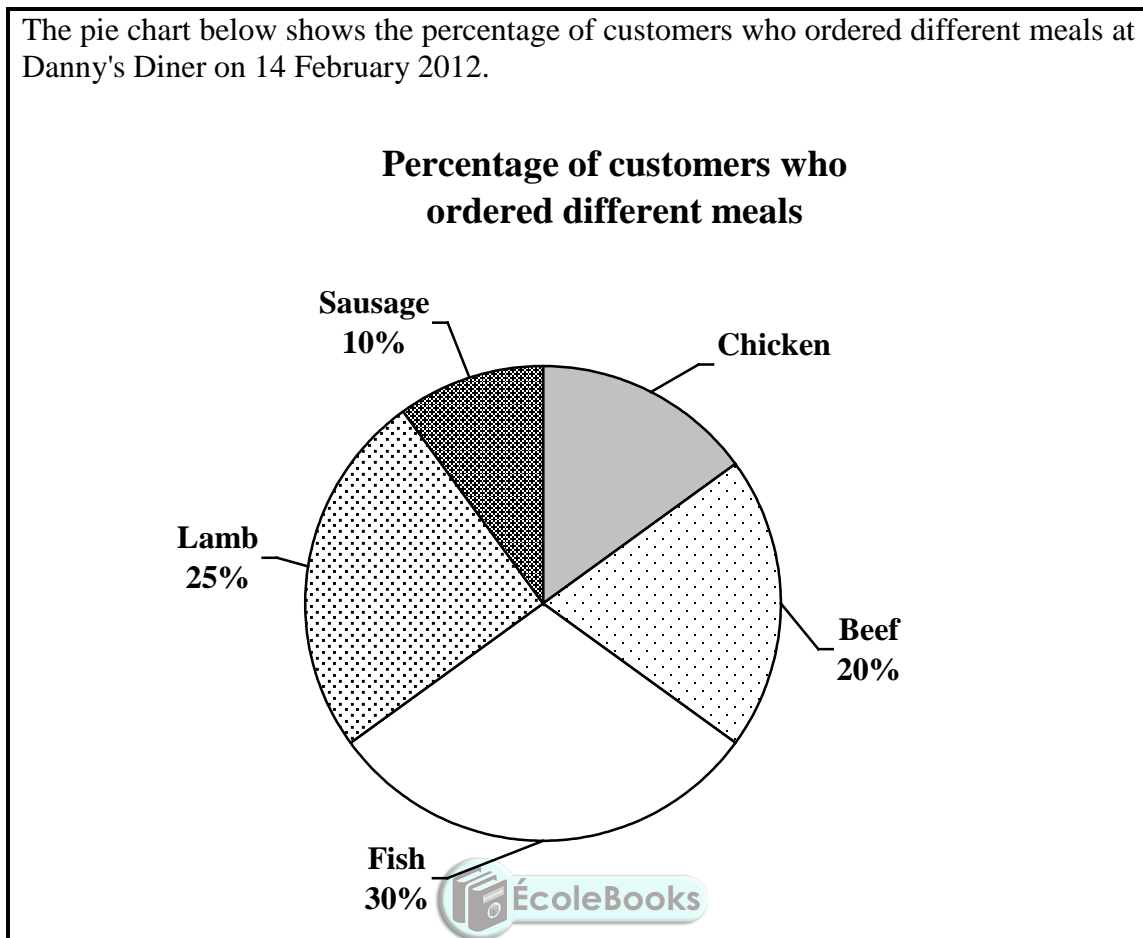
2.2.1   If 40 customers ordered beef meals, determine how many customers ordered chicken meals. (4)

2.2.2   A customer is randomly selected. What is the probability that the customer would NOT have ordered a lamb meal? (2)

2.3 | Danny bought a braai drum to cater for those customers who wanted 'shisanyama' or grilled meat. The braai drum is made by cutting a cylindrical drum in half and placing it on a stand, as shown in the picture below.

The **semi-cylindrical braai drum** has a diameter of 572 mm and a volume of 108 ℓ.

A **rectangular metal grid** with dimensions 1% greater than the dimensions of the braai drum is fitted on top.

H = Height of the drum

D = Diameter of the drum

The following formulae may be used:

Volume of a cylinder $= \pi \times (\text{radius})^2 \times (\text{height})$ where $\pi = 3,14$

Area of a rectangle = length $\times$ breadth

$1ℓ = 1\ 000\ 000\ \text{mm}^3 = 0,001\ \text{m}^3$

2.3.1 | Danny filled $\frac{1}{3}$ of the base of the drum with sand.
Give TWO practical reasons why sand was placed in the braai drum. (4)

2.3.2 | Calculate the length (in mm) of the rectangular metal grid. Show ALL your calculations. (9)

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QUESTION 3

Longhorn Heights High School needs R7 000,00 to buy a new computer. The finance committee decides to sell raffle tickets to raise funds. A food hamper donated by one of the school's suppliers will be the prize in the raffle.

A raffle is a way of raising funds by selling numbered tickets. A ticket is randomly drawn and the lucky ticket holder wins a prize.

3.1   The committee decides to sell the raffle tickets at R2,00 each. The tickets will be divided evenly amongst a number of ticket sellers.

      3.1.1   Write down a formula that can be used to calculate the number of tickets to be given to each ticket seller in the form:

          Number of R2,00 tickets per seller = …   (2)

      3.1.2   TABLE 2 below shows the relationship between the number of ticket sellers and the number of tickets to be sold by each seller.

      TABLE 2: Sale of R2,00 raffle tickets

Number of ticket sellers	**P**	20	25	35	50	100	125	140
Number of tickets per seller	250	175	140	100	70	35	**Q**	25

      (a)   Identify the type of proportion represented in TABLE 2 above.   (1)

      (b)   Calculate the missing values **P** and **Q**.   (4)

      (c)   Use the information in TABLE 2 or the formula obtained in QUESTION 3.1.1 to draw a curve on ANNEXURE A to represent the number of ticket sellers and the number of tickets sold by each seller.   (4)

3.2   The finance committee changed their plan and decided to sell the tickets at R5,00 each instead.

      3.2.1   Give a possible reason why they made this decision.   (2)

      3.2.2   State ONE possible disadvantage of increasing the price of the tickets.   (2)

      3.2.3   On ANNEXURE A, draw another curve representing the number of ticket sellers and the number of R5,00 tickets sold by each seller. Show ALL the necessary calculations.   (8)

      3.2.4   Use your graph, or otherwise, to calculate the difference between the number of R2,00 and R5,00 tickets that must be sold by 70 ticket sellers, assuming the ticket sellers sell all their tickets.   (3)

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QUESTION 4

A local airline company uses three types of aircraft for its domestic and international flights, namely Jetstreams, Sukhois and Avros.

Below is a picture of the Jetstream aircraft as well as a table showing information on the three types of aircraft.

Length of the Jetstream

TABLE 3: Information on the three types of aircraft

TYPE OF AIRCRAFT	JETSTREAM	SUKHOI	AVRO
Maximum number of passengers	29	37	83
Length	19,25 m	26,34 m	28,69 m
Wing span*	18,29 m	20,04 m	21,21 m
Height	5,74 m	6,75 m	8,61 m
Fuel capacity (in kg)**	2 600 kg	5 000 kg	9 362 kg
Maximum operating altitude***	25 000 ft (feet)	37 000 ft (feet)	35 000 ft (feet)
Maximum cruising speed****	500 km/h	800 km/h	780 km/h

[Source: *Skyway*, November 2011]

*   The distance from the tip of the left wing to the tip of the right wing
**   The mass of the fuel in the tank
***   The recommended maximum height that the aircraft should fly at for best fuel efficiency
****The maximum average speed that the aircraft flies at its maximum height

4.1   Use TABLE 3, which is also given on ANNEXURE B, to answer the following.

4.1.1   Mr September flew from Johannesburg to Polokwane along with 37 other passengers.

In which aircraft was he travelling? Explain your answer.   (3)

4.1.2   The length of the Jetstream in the picture is 9,9 cm, while its actual length is 19,25 m.

Determine the scale (rounded off to the nearest 10) of the picture in the form **1: …**   (4)

4.1.3   A **nautical mile** is a unit of measurement based on the circumference of the earth.

               1 nautical mile   = 1,1507 miles

                             = 6 076 feet

                             = 1,852 kilometres

         Calculate the maximum operating altitude (to the nearest nautical mile) of the Jetstream.   (3)

4.1.4   Ms Bobe travelled in an aircraft that covered a distance of 510 km in 39 minutes. Determine, showing ALL calculations, in which ONE of the three aircraft she could have been travelling.

         The following formula may be used:

         Distance = average cruising speed $\times$ time   (4)

4.1.5   Determine the fuel capacity (to the nearest litre) of the Avro aircraft.

         Use the formula:

$$\textbf{Fuel capacity (in litres)} = \frac{\textbf{fuel capacity (in kg)}}{\textbf{820 g}}$$

      (3)

4.2 | The table below shows the schedule of flights between Johannesburg and Polokwane.

TABLE 4: Schedule of South African Airways flights between Johannesburg and Polokwane

FLIGHT NUMBER	ROUTE	DEPARTURE TIME	ARRIVAL TIME	OPERATING DAYS
SA 8801	JNB–POL	06:35	07:25	1 2 3 4 5
SA 8802	POL–JNB	07:55	08:50	1 2 3 4 5
SA 8809	JNB–POL	11:40	12:40	1 2 3 4 5 6
SA 8809	JNB–POL	11:40	12:30	7
SA 8810	POL–JNB	13:00	14:05	1 2 3 4 5 6
SA 8810	POL–JNB	13:00	13:55	7
SA 8817	JNB–POL	13:15	14:05	1 2 3 4 5 6 7
SA 8818	POL–JNB	14:25	15:20	1 2 3 4 5 6 7
SA 8815	JNB–POL	16:30	17:20	1 2 3 4 5 7
SA 8816	POL–JNB	17:45	18:40	1 2 3 4 5 7

[Source: *Skyways*, November 2011]

KEY: JNB = Johannesburg; POL = Polokwane
1 = Monday   2 = Tuesday   3 = Wednesday   4 = Thursday   5 = Friday
6 = Saturday   7 = Sunday

Use TABLE 4 above to answer the following questions.

4.2.1 Mr Likobe has to fly from Johannesburg to Polokwane on a Thursday to attend a business meeting that starts at exactly 13:00 and finishes at exactly 15:30. He needs to be present for the full duration of the meeting. He has to attend a 1-hour meeting at 08:30 with a client in his office in Johannesburg before his flight. His office is 30 minutes' drive from the OR Tambo International Airport in Johannesburg. The meeting venue in Polokwane is a 5-minute drive from the airport.

Passengers need to check in at the airport at least 1 hour before the departure time of their flight.

Which flight numbers should he book for his trip if he has to return to Johannesburg on the same day? (3)

4.2.2 On ANNEXURE B a line graph representing the number of flights available daily for the Johannesburg-to-Nelspruit route has been drawn.

(a) Use ANNEXURE B and the information in TABLE 4 above to draw a line graph representing the number of flights available daily for the Johannesburg-to-Polokwane route. (4)

(b) Use the line graphs on ANNEXURE B to determine on which day each route has the lowest number of flights available. Give ONE reason why there are fewer flights on this particular day. (3)
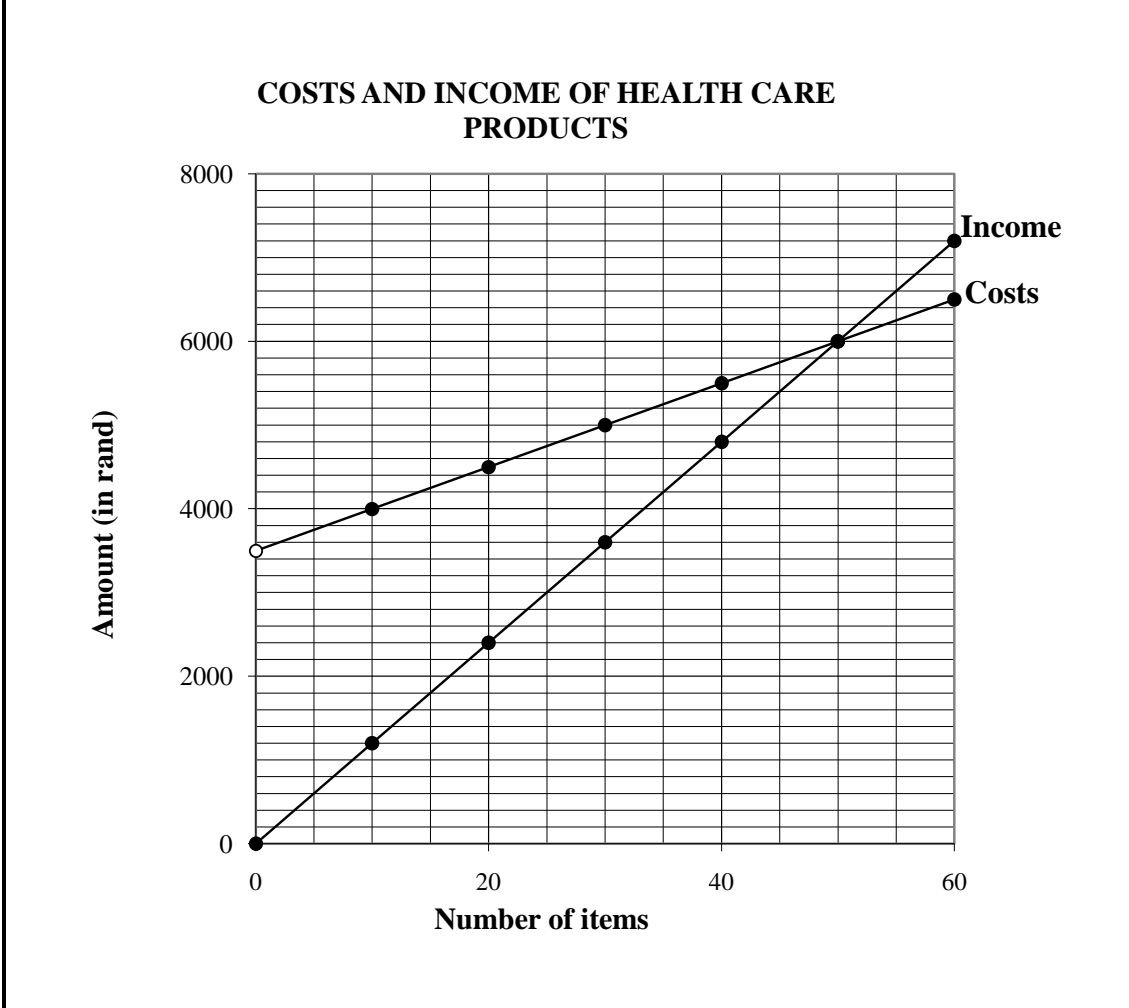
[27]

QUESTION 5

5.1   Mr Stanford owns a company that sells health care products. The company pays R50 per item plus R3 500 for shipping and packaging. They sell the items at R120 each.

The graph below shows the company's costs and income according to the number of items sold.

COSTS AND INCOME OF HEALTH CARE PRODUCTS

5.1.1   Use the graph above to determine the exact number of items sold that will give a loss of R1 400.   (3)

5.1.2   Mr Stanford stated that the company would break even if 40 items were sold at R137,50 each.

Verify whether Mr Stanford's statement is correct or not. Show ALL the necessary calculations.   (4)

5.2 | Mr Stanford employed eight salespersons in his company.

He budgeted R300 000 for bonuses at the end of 2010 for his salespersons. He allocated the bonuses according to each salesperson's contribution to the total sales for the year.

TABLE 5 below shows the total annual sales of health care products for each salesperson during 2010 and 2011 with some information omitted.

TABLE 5: Total annual sales of health care products during 2010 and 2011

NAME OF SALESPERSON	2010		2011	
	SALES (IN THOUSANDS OF RANDS)	SALES AS A PERCENTAGE	SALES (IN THOUSANDS OF RANDS)	SALES AS A PERCENTAGE
Carl	350	7	440	8
Themba	750	**K**	715	13
Mabel	1 050	21	1 320	24
Vanessa	**L**	17	935	17
Henry	800	16	1 100	20
Vivesh	900	**M**	660	12
Peter	200	4	220	4
Cindy	100	2	110	2
TOTAL	**N**	**100**	**5 500**	**100**

Use the information above to answer the following questions.

5.2.1 | Calculate the missing values **N**, **K** and **L**. | (7)

5.2.2 | Vivesh received a bonus of R50 000 in 2010. The other salespeople objected and claimed that he should have received less than this amount.

Verify, showing ALL the necessary calculations, whether this objection was valid or not. | (5)

5.2.3

> For 2011 Mr Stanford decided to allocate 6,5% of the total sales to bonuses and that each salesperson would be paid a basic bonus as shown in TABLE 6 below.
>
> The remaining budgeted amount for bonuses would then be shared equally amongst all the salespersons.
>
> **TABLE 6: Basic bonus structure for 2011**
>
> | CATEGORY | AMOUNT IN RAND |
> |---|---|
> | Sales up to and including 10% | 10 000 |
> | Sales of more than 10% up to and including 20% | 50 000 |
> | Sales of more than 20% | 100 000 |

(a) Use TABLE 5 and TABLE 6 on ANNEXURE C to determine Henry's basic bonus. (2)

(b) Verify, showing ALL calculations, whether Mabel's total bonus is more than R104 000. (8)

5.3   Mr Stanford was given the following graph by his sales director showing the percentage sales for each salesperson in 2011 and 2012.

PERCENTAGE SALES IN 2011 AND 2012
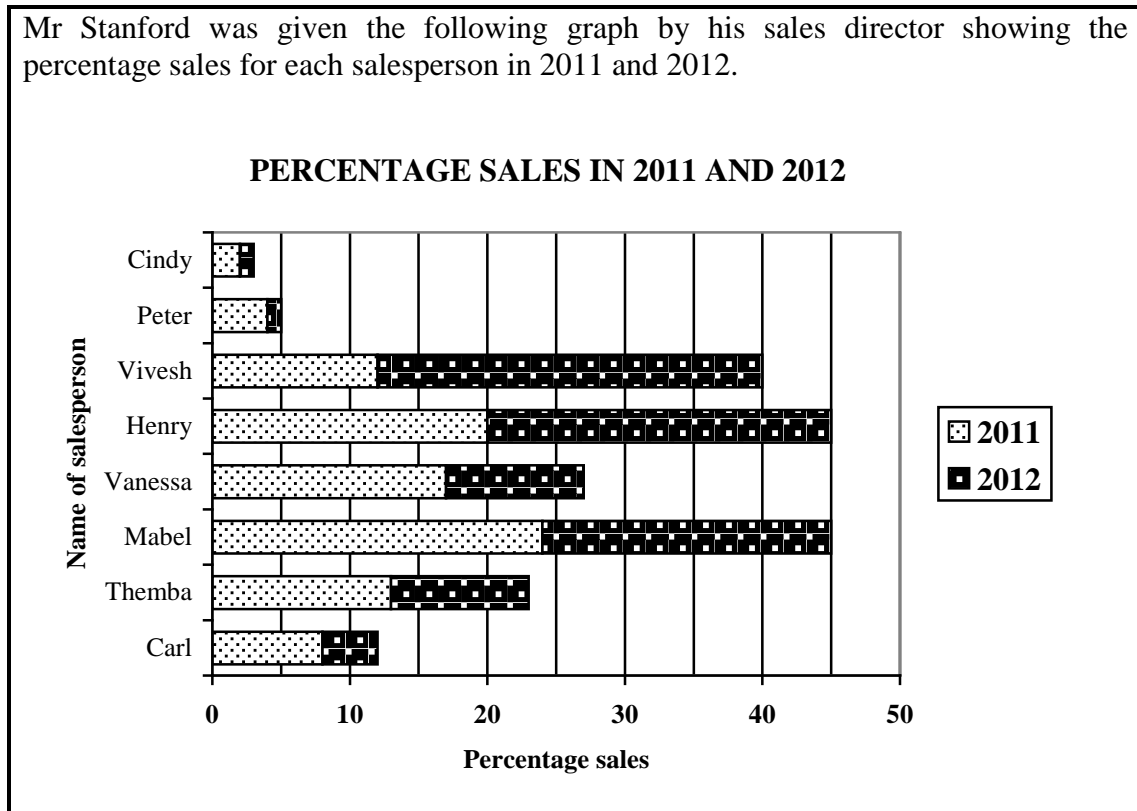
5.3.1   Interpret the change in the percentage sales for Vivesh from 2011 to 2012.   (2)

5.3.2   After he looked at the graph, Mr Stanford identified Henry and Mabel as the two top salespeople for 2012 with sales of 45% each.

What errors did Mr Stanford make in his interpretation of the graph? Explain your answer.   (4)

5.3.3   Name TWO other types of graphs that the sales director could have used so that Mr Stanford would not misinterpret the graph so easily.   (2)
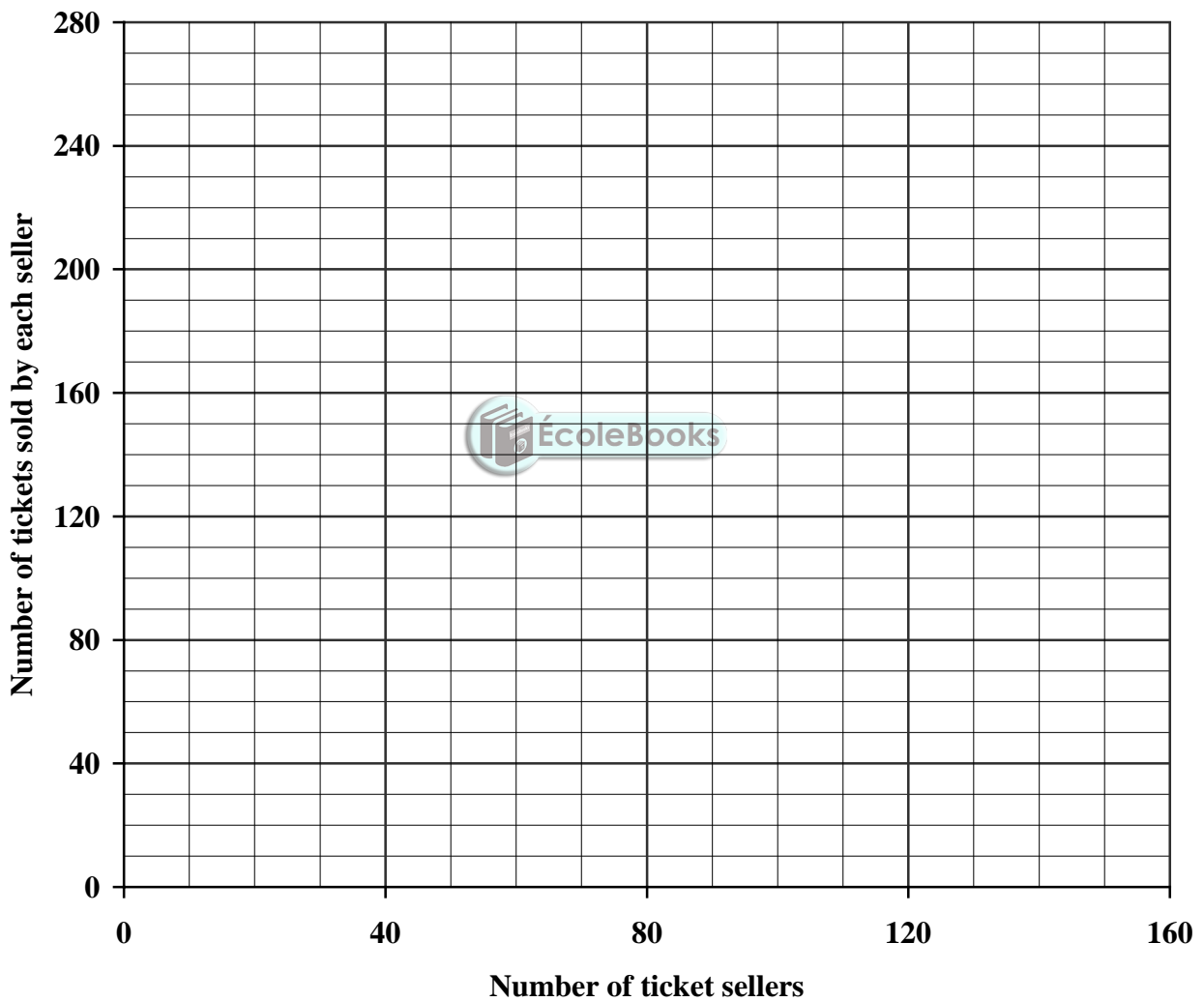
[37]

TOTAL: 150

CENTRE NUMBER:

EXAMINATION NUMBER:

ANNEXURE A

QUESTION 3.1.2(c) and QUESTION 3.2.3

SALE OF RAFFLE TICKETS

Number of tickets sold by each seller

280

240

200

160

120

80

40

0

0   40   80   120   160

Number of ticket sellers

CENTRE NUMBER:

EXAMINATION NUMBER:

ANNEXURE B

QUESTION 4.1

TABLE 3: Information on the three types of aircraft

TYPE OF AIRCRAFT	JETSTREAM	SUKHOI	AVRO
Maximum number of passengers	29	37	83
Length	19,25 m	26,34 m	28,69 m
Wingspan*	18,29 m	20,04 m	21,21 m
Height	5,74 m	6,75 m	8,61 m
Fuel capacity (in kg)**	2 600 kg	5 000 kg	9 362 kg
Maximum operating altitude***	25 000 ft (feet)	37 000 ft (feet)	35 000 ft (feet)
Maximum cruising speed****	500 km/h	800 km/h	780 km/h

[Source*: Skyway*, November 2011]

QUESTION 4.2.2

NUMBER OF FLIGHTS AVAILABLE PER DAY
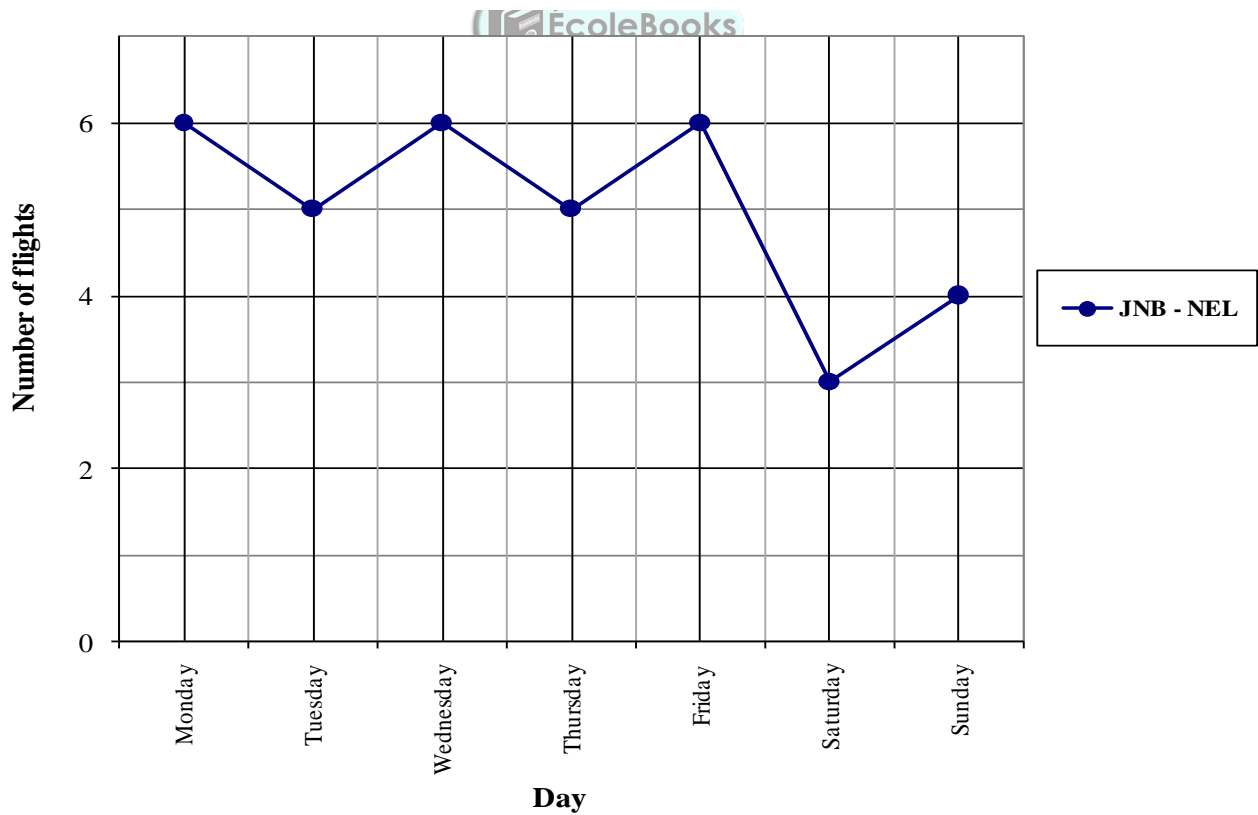
NOTE: **THIS IS AN INFORMATION SHEET ONLY. DO NOT ANSWER QUESTION 5.2 ON THIS ANNEXURE AND DO NOT HAND IT IN.**

ANNEXURE C: INFORMATION SHEET

QUESTION 5.2

TABLE 5: Total annual sales of health care products during 2010 and 2011

NAME OF SALESPERSON	2010		2011	
	SALES (IN THOUSANDS OF RANDS)	SALES AS A PERCENTAGE	SALES (IN THOUSANDS OF RANDS)	SALES AS A PERCENTAGE
Carl	350	7	440	8
Themba	750	**K**	715	13
Mabel	1 050	21	1 320	24
Vanessa	**L**	17	935	17
Henry	800	16	1 100	20
Vivesh	900	**M**	660	12
Peter	200	4	220	4
Cindy	100	2	110	2
TOTAL	**N**	**100**	**5 500**	**100**

QUESTION 5.2.3(a)

TABLE 6: Basic bonus structure for 2011

CATEGORY	AMOUNT IN RAND
Sales up to and including 10%	10 000
Sales of more than 10% up to and including 20%	50 000
Sales of more than 20%	100 000