



NATIONAL SENIOR CERTIFICATE EXAMINATION
NOVEMBER 2013

MATHEMATICAL LITERACY: PAPER II

Time: 3 hours

150 marks

PLEASE READ THE FOLLOWING INSTRUCTIONS CAREFULLY

1. This question paper consists of:

- A question paper of 15 pages
- Five questions
- Appendix A

Please check that your question paper is complete.

2. Answer all the questions.

3. It is strongly suggested that all working details be shown.

4. Where necessary round off all answers to two decimal places.

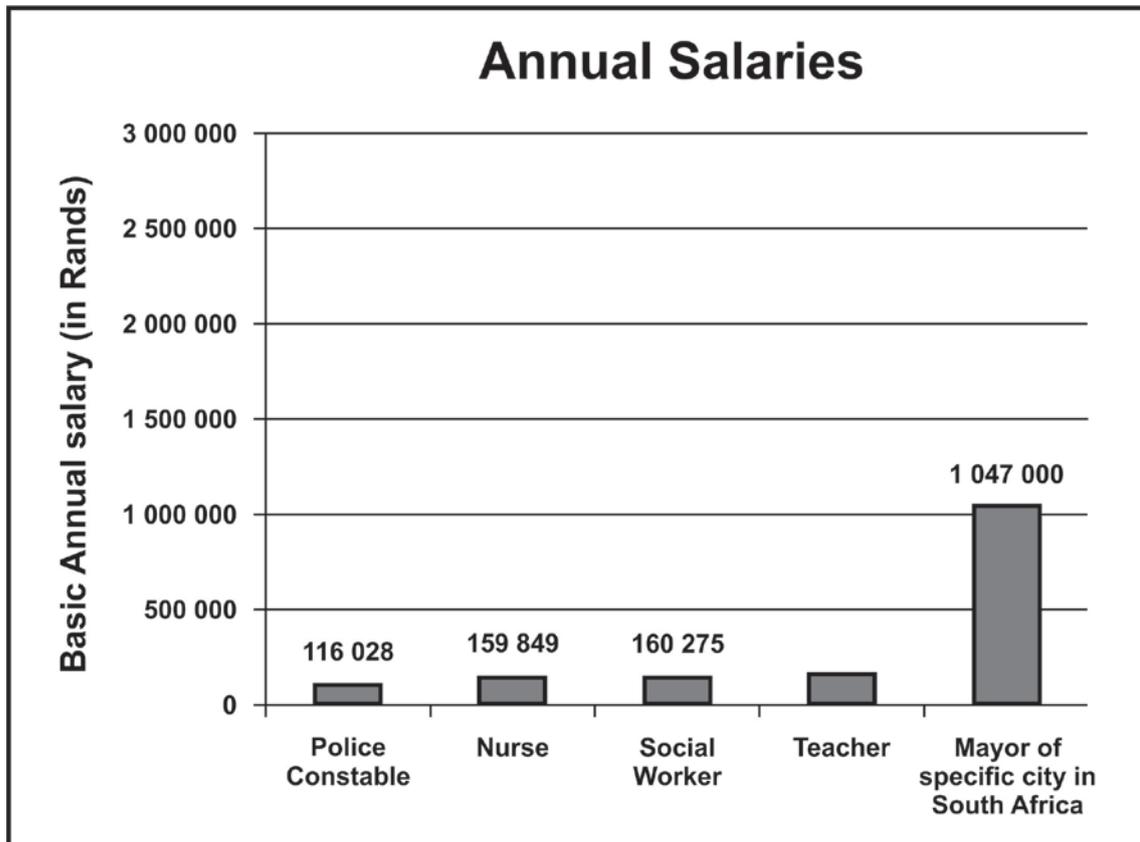
5. Approved non-programmable calculators may be used in all questions.

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

7. Maps and diagrams are not necessarily drawn to scale, unless otherwise stated.

QUESTION 1

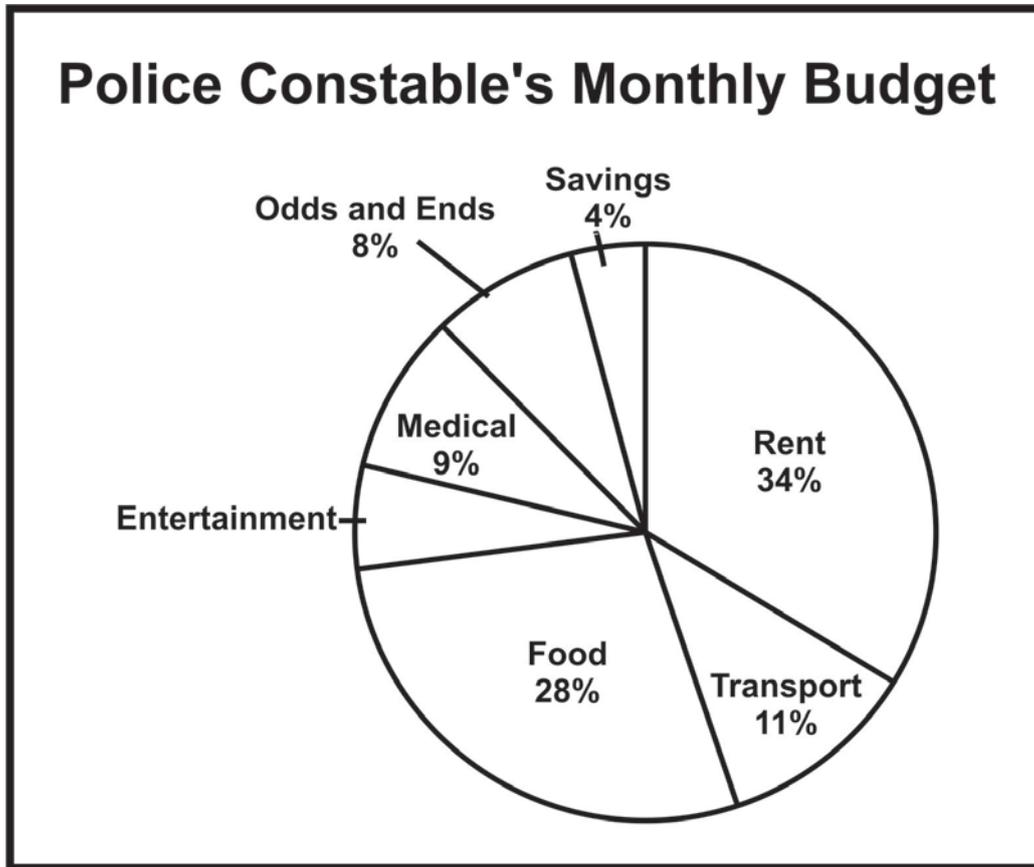
1.1 The graph below indicates annual salaries that are paid to certain professions and positions held in government.



[Source: *YOU*, 6 September 2012]

- 1.1.1 Calculate the difference in the monthly salary between a nurse and that of the mayor. (4)
- 1.1.2 A teacher with four years' tertiary education earns 149,7208% of the salary earned by a police constable. Calculate how much this teacher earns every month (round your answer to the nearest rand). (4)
- 1.1.3 Determine how many months (rounded off to one decimal place) a social worker would need to work in order to earn the same amount of money earned in one month by the mayor. (3)

1.2 After paying tax, a police constable has R8 881,91 paid into his bank account every month. The pie chart below illustrates the break-down of a specific constable's monthly expenses. The figures shown have been rounded to the nearest whole percent.



- 1.2.1 Determine how much money (rounded to the nearest Rand), the constable pays for rent each month. (2)
- 1.2.2 Calculate, to the nearest degree, the angle formed by the sector representing entertainment. (4)

- 1.3 A teacher who is close to retirement (aged 65 years old), earns a taxable income* of R165 525 a year. Using the table below, calculate how much tax this particular teacher will pay every month.

RATES OF TAX		(2012/2013)
Individuals		
Tax Bracket	Taxable income (R)	Rates of tax (R)
1	0 – 160 000	18% of each R1
2	160 001 – 250 000	28 800 + 25% of the amount above 160 000
3	250 001 – 346 000	51 300 + 30% of the amount above 250 000
4	346 001 – 484 000	80 100 + 35% of the amount above 346 000
5	484 001 – 617 000	128 400 + 38% of the amount above 484 000
6	617 001 and above	178 940 + 40% of the amount above 617 000
Tax rebates (individuals)		
Primary rebate		R11 440
Secondary rebate (65 years and older)		Additional rebate R6 390

- * The 'Taxable Income' is the portion of a salary that tax is calculated on.
- A *tax rebate* (for individuals) is an amount of money that is deducted after the annual tax has been calculated. It is like a credit that the state provides, or a subsidy, that helps to reduce the total amount of tax that a person has to pay. A rebate is *deducted or subtracted from the amount of tax that has to be paid*. In other words it is a reduction in tax. A secondary and tertiary rebate is a *further* amount that has to be deducted over and above the primary rebate.

(8)

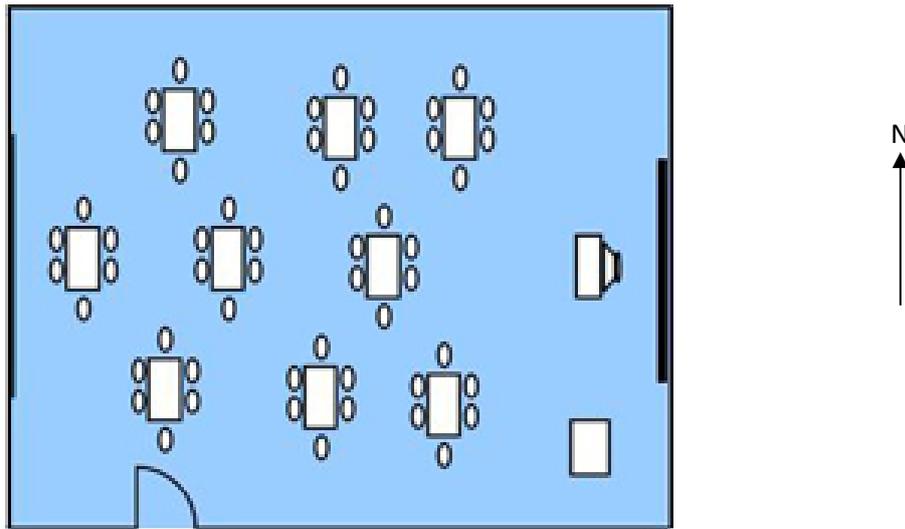
[Source: <www.sars.co.za>]

[25]

QUESTION 2

2.1 In order to improve the Mathematical Literacy marks at a specific school, a teacher takes a group of learners away for a week-end of study. The learners stay in a hotel and they work in a conference room which is one of the hotel's facilities. The plan of the conference room is shown below.

2.1.1 Determine the scale of the plan if the length of the room is 12 metres. Write your answer, rounded off to the nearest whole number, in the form 1: _____.



2.1.2 Using the scale (from your answer in Question 2.1.1 above), determine the breadth of the room, rounded off to the nearest metre.

2.1.3 As a favour to the hotel, the learners agree to paint only the southern wall, not the door, of the conference room in a pale blue colour. Ntuli measures the height of the door and reports it to be 200 cm. Paul says the door is 900 mm wide. Christine measures the height of the wall (from the floor to the ceiling) to be 2,7 m.

Not knowing how much paint to buy, another learner goes online and discovers that one should plan to use one gallon of paint for every 350 square feet.

The learners have been told that:

- 1 gallon = 3,79 litres
- 1 square foot = 0,09 square metres

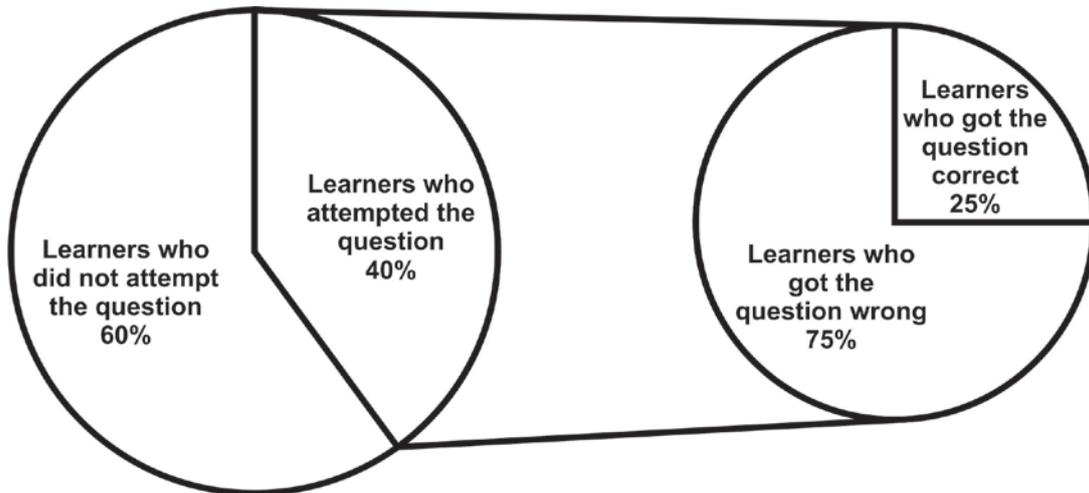
Evidence maintains that only one 5 litre can of paint will be needed to paint the southern wall (excluding the door). With the use of calculations, show whether he is correct or not in his assumption.

2.2 During the weekend of study the teacher gives the class several difficult problems. One of the problems asked the learners to list a set of 5 values in which the mean, mode and median were the same number. The following were given as a guideline:

- The lowest number is 5
- The range is 7
- Only the number 9 is repeated

2.2.1 List the correct numbers in ascending order. (7)

2.2.2 Only 40% of the class attempted the question. Of these learners who attempted the question, 3 learners got the question correct. How many learners were in the class? (4)



2.3 Collin got a year mark of 77%. Collin uses the table below to help him calculate what percentage he needs for the November Paper 2, in order to get a final mark of 80%, presuming he gets 90% for Paper 1.

Item	%	Converted mark
Year Mark	77%	77 / 100
November Examination – Paper 1	90%	<u> A </u> / 150
November Examination – Paper 2	D	<u> C </u> / 150
FINAL MARK FOR THE YEAR	80%	<u> B </u> / 400

Showing all working, calculate the missing values:

2.3.1 A (2)

2.3.2 B (2)

2.3.3 C (2)

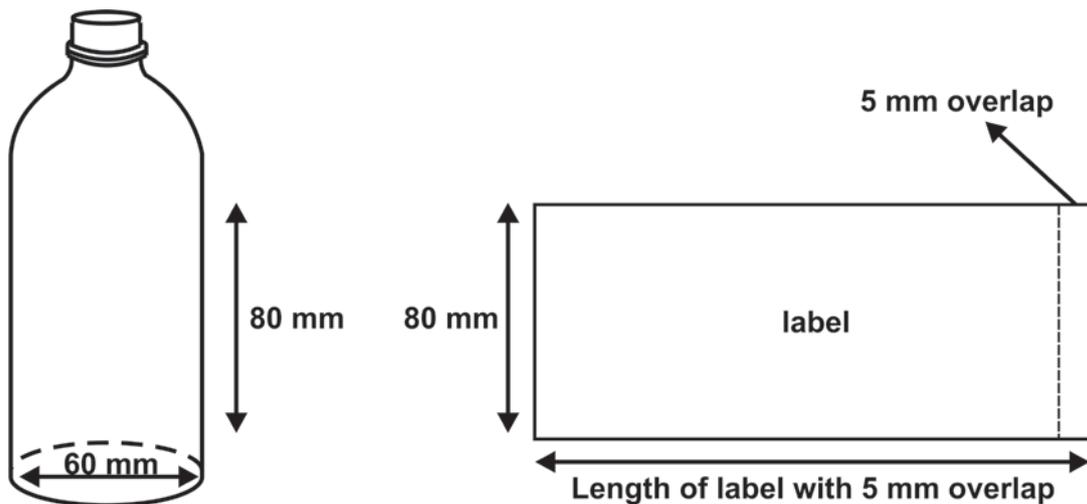
2.3.4 D (2)

[35]

QUESTION 3

At a school fete, a group of learners, under the leadership of Matthew, decide that they are going to make juice and sell it in little plastic bottles each containing 350 ml of juice.

- 3.1 In order to make the juice they must mix concentrated syrup with water in the ratio of 1:5. How much juice (mixture of concentrate and water) will a 2-litre bottle of concentrated syrup make? (Give your answer in ml.) (3)
- 3.2 The learners decide to stick a label, with a width of 80 mm, around the 350 ml plastic bottles, with the label having a 5 mm overlap as illustrated in the diagram below. The diameter of the plastic bottle is 60 mm.



- 3.2.1 Determine the length of the label required for each plastic bottle. The following formula may be used:

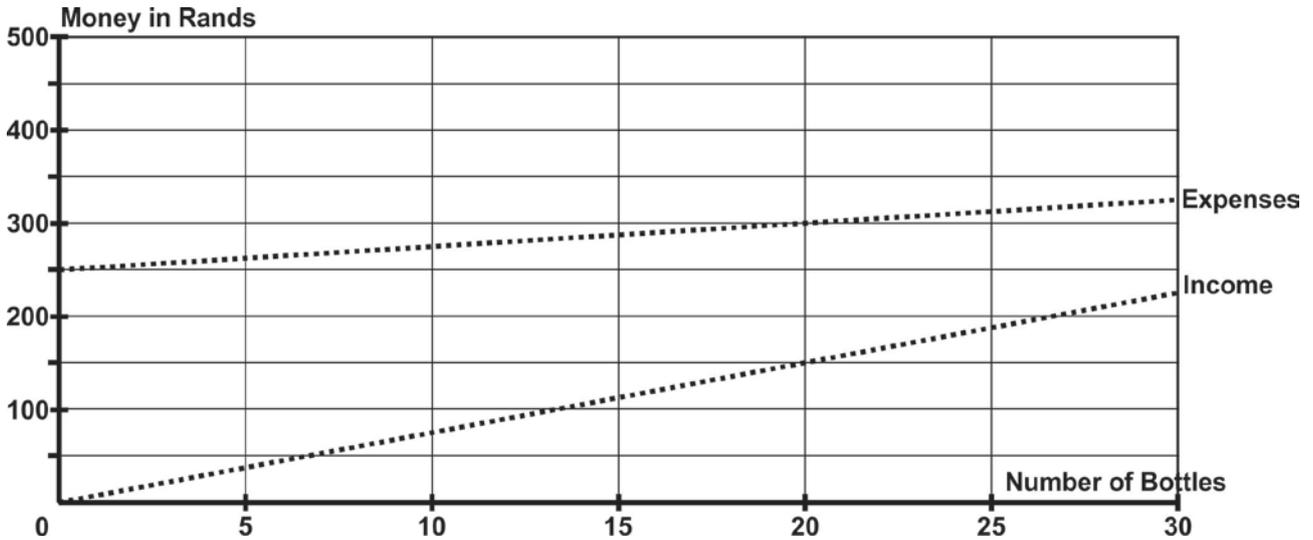
$$\text{Circumference of a circle} = \pi \times \text{diameter (let } \pi = 3,14) \tag{3}$$

- 3.2.2 The labels are printed on rolls of sticky paper that come in lengths of 5 m and a breadth of 1 m. Show, with calculations, that the learners will require 2 rolls of sticky paper if 600 labels are needed. (6)

- 3.2.3 Calculate the minimum height of the bottle, rounding off your answer to the appropriate whole mm, if it has to contain 350 ml of juice. The following formula may be used:

$$\begin{aligned} \text{Volume of Cylinder} &= \pi \times (\text{radius})^2 \times \text{height} && \text{Let } \pi = 3,14 \\ 1 \text{ cm}^3 &= 1 \text{ ml} \end{aligned} \tag{4}$$

3.3 On the set of axes below are graphs indicating both the income and expenditure for the number of bottles of cool drink made and sold.



3.3.1 Derive a formula which can be used to determine the income received for the sale of cool drinks. (Let b represent the number of bottles of cool drink sold). (3)

3.3.2 Using the graph, explain how one can tell that the learners made a loss if they made and sold 10 bottles of cool drink. (2)

3.3.3 The equation used to determine the cost of producing the number of cool drinks is:

$$\text{Cost of producing a particular number of bottles of cool drink} = R250 + (R2,50 \times b)$$

Where b represents the number of cool drink bottles

(a) How much profit is made if 50 bottles of cool drink are made and sold? (4)

(b) Determine the significance about this number of 50 bottles. (2)

[27]

QUESTION 4

Many Grade 12 learners who have turned 18 dream of owning their very own car. Jordan is one such learner. He likes a little car that is very economical and it also comes with an automatic transmission.



- 4.1 This car is advertised as being able to travel 100 km with only 5,5 litres of petrol. Although the vehicle has a fuel tank capacity of 35 litres, it is advisable to fill up as soon as the tank is 85% empty.

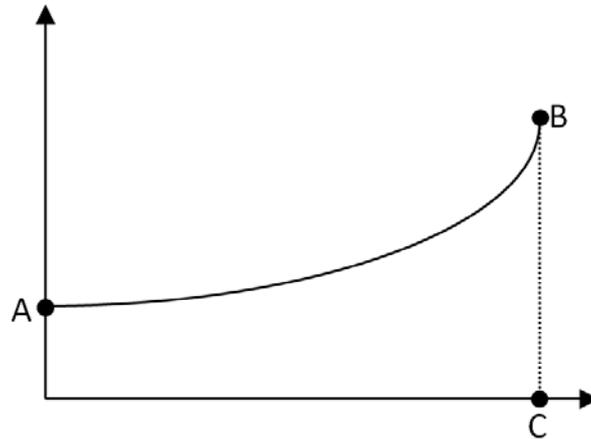
Jordan lives in Johannesburg and wants to take a trip to Durban. Jordan tells his friends he can travel the entire route without having to fill up with fuel on route.

With the aid of the strip chart, 'Route map from Pretoria to Durban', which appears on Appendix A, and the information given above, show whether Jordan will/will not have to refuel before his tank has used up 85% of its fuel. (7)

- 4.2 4.2.1 The cash price of the vehicle is R129 657,00. However, Jordan's parents do not have that amount of money and so decide to buy the car on hire purchase. Jordan's parents have R50 000 to pay as a deposit. The salesman calculates that if they pay R50 000 deposit, they will only need to pay a further R1 634,29 a month for the next 5 years. Calculate the total amount that Jordan's parents will pay towards the vehicle. (4)

4.2.2 Jordan tells his parents there is a better way of buying the vehicle. He believes that his parents should rather invest the R50 000 in a bank which offers 4,5% p.a. interest, compounded monthly.

- (a) Consider the graph below which illustrates what happens to the investment of R50 000 over the 5 years.



Each letter (A, B and C) on the graph above is represented by one of the following statements. Link each letter to a statement. E.g. A – 7

- 1 – the cost of the vehicle
 - 2 – the total amount after the 5 years, including the interest
 - 3 – the initial investment of R50 000
 - 4 – 50 months
 - 5 – the total amount after the 5 years, excluding the interest
 - 6 – the period of time the money was invested for
- (3)

- (b) Using the formula below calculate the final amount, including the interest:

$$A = P(1+i)^n$$

Where: **A** represents the final amount, including the interest
P represents the amount deposited
i represents the appropriate interest rate
n represents the number of times the interest is calculated

(4)

- (c) Jordan tells his parents that they should buy the car as follows:

- Do not pay a deposit of R50 000, but rather invest the R50 000 as described above.
- Pay R2 137,60 a month for 5 years.
- After paying the final payment of R2 137,60, then pay the R50 000.

Although this does seem more expensive, Jordan claims the interest earned over the 5 years will make this a cheaper option. Using calculations verify whether Jordan's claim is true or not.

(5)

- (d) Draw a graph showing all relevant information if the R50 000 was invested using **simple** interest at a rate of 4,5% per year for 5 years.

The relevant information required on the graph should include:

- the labels on the set of axes
- the initial amount that was invested
- the point indicating the 5 years
- the total amount after 5 years
- the line (curved or straight) showing how the money increased over time

You may need to use the following formula:

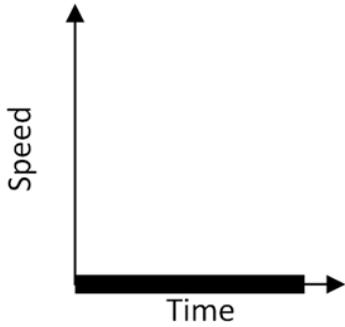
$$A = P(1 + i.n)$$

Where: **A** represents the final amount, including the interest,
P represents the amount deposited
i represents the appropriate interest rate
n represents the number of times the interest is calculated

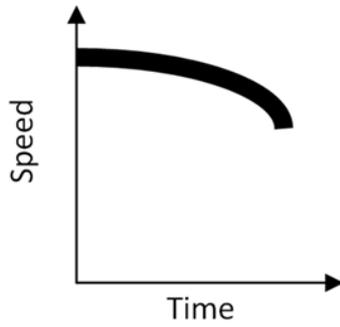
(7)

4.3 Below are graphs which illustrate different phases of a journey as Jordan travels from home to school on a particular day. The graphs are NOT drawn to scale.

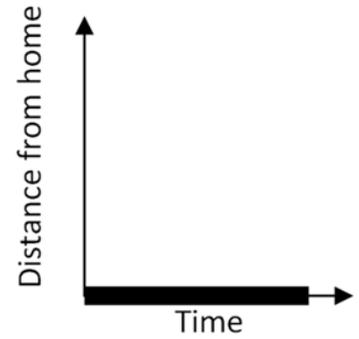
Graph 1



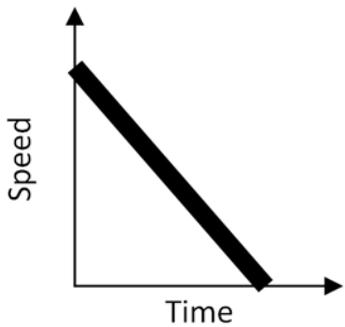
Graph 2



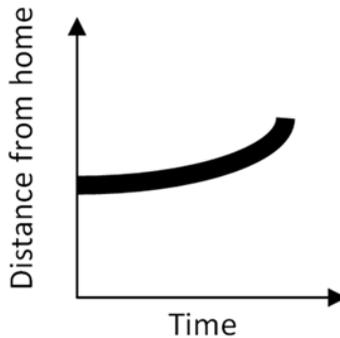
Graph 3



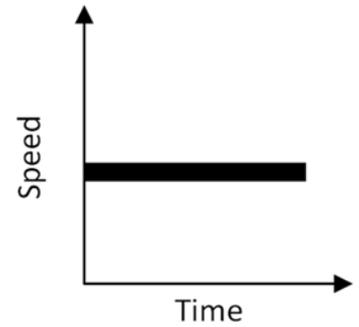
Graph 4



Graph 5



Graph 6



Link each of the following statements with ONE of the graphs above. Just write down the statement number and the graph number, e.g. Statement 7 – Graph 10.

Statement 1 – Jordan starts the car at home, but waits patiently for his mom to get into the car.

Statement 2 – He maintains the speed limit of 60 km/h.

Statement 3 – Jordan approaches a robot and decelerates by removing his foot off the accelerator. (The car does not slow down at a constant rate.)

Statement 4 – Jordan waits patiently at a robot.

(4)

4.4 When Jordan bought his car, he had to decide what colour his vehicle would be. According to DuPont Automotive's Colour Popularity Report, the top three popular colours account for more than 50% of new cars manufactured. Below is a chart highlighting the top ten most popular car colours.

COLOUR		PERCENTAGE OF NEW CARS
Silver	20.2%	
White	18.4%	
Black	11.6%	
Med/Dark Grey	11.5%	
Light Brown	8.8%	
Med/Dark Blue	8.5%	
Medium Red	6.9%	
Med/Dark Green	5.3%	
Bright Red	3.8%	
Dark Red	0.9%	

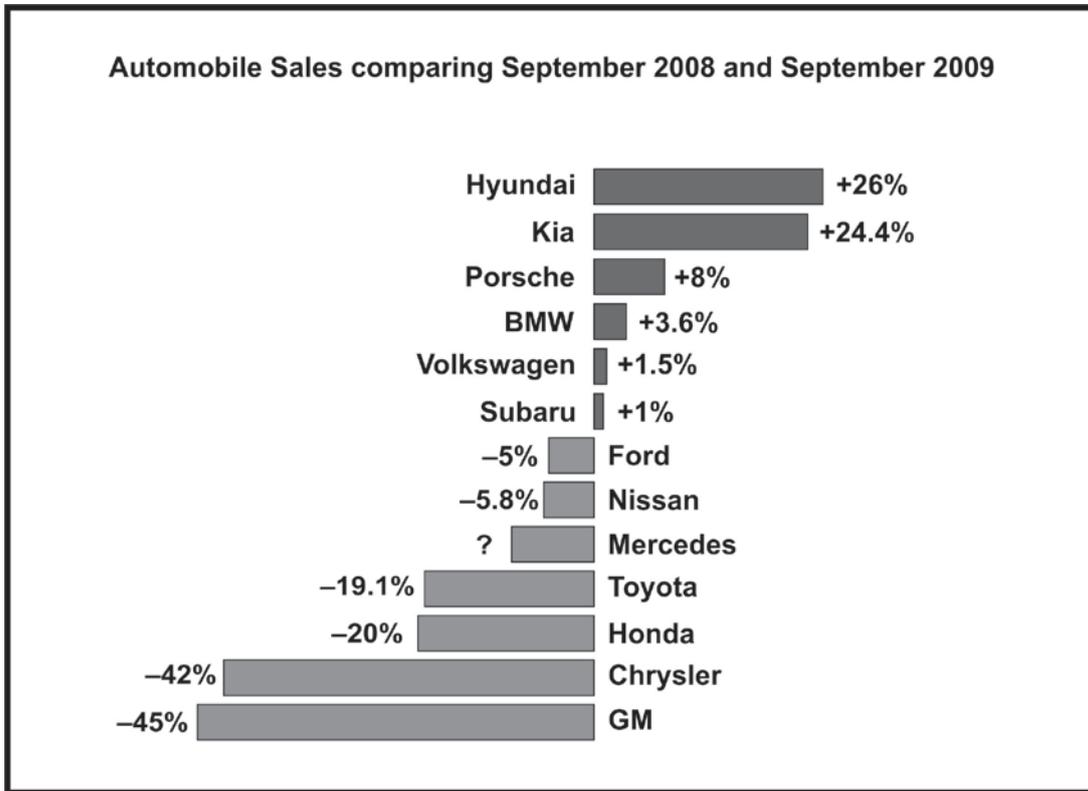
[Source: DuPont Automotive]

What is the probability of the next car manufactured being:

4.4.1 either white or black? (Write your answer as a fraction.) (3)

4.4.2 none of the top ten popular colours? (Write your answer as a percentage.) (3)

4.5 The motor industry can be unpredictable. The graph below shows a sales comparison of some popular brands of motor vehicles between September 2008 and September 2009. For example, from the graph, Hyundai sales increased by 26% from September 2008 to September 2009.

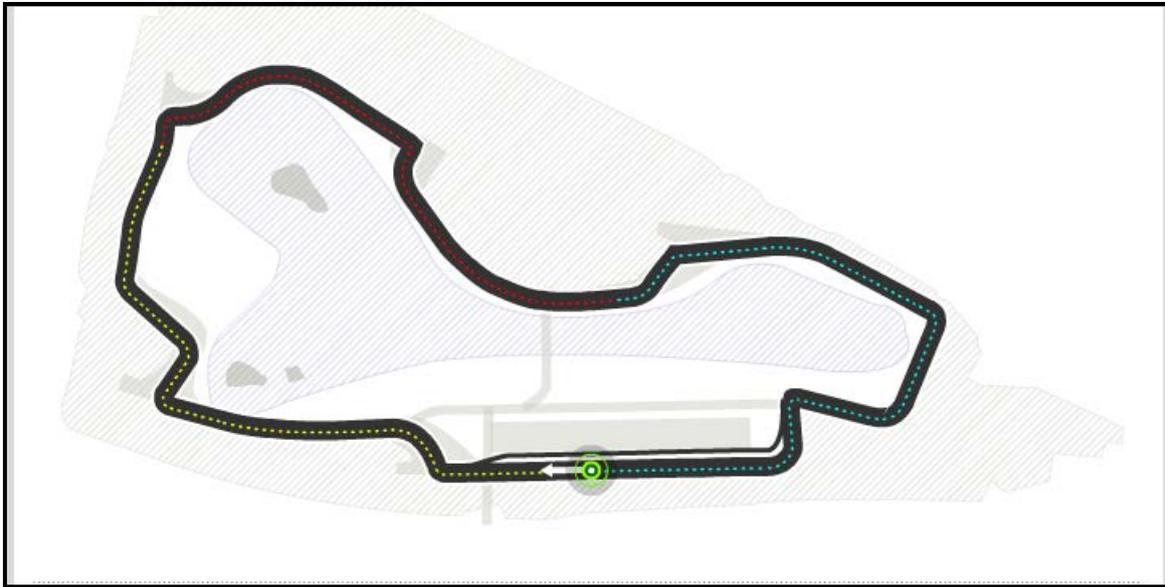


4.5.1 Calculate the range of sale differences (as a percentage) between Hyundai and GM. (3)

4.5.2 By means of calculations, show that Mercedes had a drop of more than 9% in sales in September 2009 if the average (mean) sales for all the vehicles shown above had an average (mean) sale decrease of 6,31%. (6)
[49]

QUESTION 5

The Formula 1 Quantas Australian Grand Prix was held in Melbourne during March 2012. Below is a sketch of the track, known as Albert Park.



The record for the fastest lap on this track is held by M. Schumacher who completed the one lap (which is 5,303 km) in a time of 1 minute 24 seconds.

- 5.1 Convert Schumacher's lap record of 1 minute 24 seconds to seconds. (2)
- 5.2 Determine Schumacher's average speed for his record lap. Round off your answer to the nearest km/h. You may want to use the formula:

$$\text{distance} = \text{speed} \times \text{time} \tag{3}$$
- 5.3 The distance of the entire race is 307,574 km.
 - 5.3.1 How many laps was the race? (2)
 - 5.3.2 If Schumacher managed to maintain his record speed throughout the race, then calculate how long the race would have taken Schumacher to complete (excluding any stops or detours for tyre changing). Write your answer in hours, minutes and seconds. (3)
- 5.4 The track is 5,303 km long and the average width of the track is 14 m. The cost of tar is R150 per square metre (R150/m²). Determine how much it would cost to tar the race track. (4)

[14]

Total: 150 marks