MATHS 911

MATHS Exam Paper 3

Mock Examination

LIBERTY

So, this week we are hoping that you are ready for a Mock Examination.

Together with last year's Exemplar, Final Paper and the 2009 Supplementary Paper - you should now have enough resources to ensure that you are fully prepared for the final examination.

We suggest that you set yourself two hours aside to do this paper under examination conditions.

This week we have the first half of the paper and its answers and next week we will conclude with the second half and its answers.

Collect your Paper 3 Lessons every week!!

Guys, both NSC and IEB examinations candidates have the option of writing Paper 3 at the end of the year! Paper 3 covers additional mathematics material and is out of 100 marks. Maths Paper 3 will really set you apart in the job market, and make studying technical subjects at tertiary level easier. We have hooked you up with these lessons - written by IEB Maths Paper 3 examiner Heather Frankiskos.
The Mock Examination this week applies to candidates from both examining bodies. **Give it a go!**

Paper 3

Time: 2 hours

Total marks: 100

Instructions and Information

Read the following carefully before answering the questions.

1. This paper consists of 11 questions. Answer ALL questions.
2. Clearly show ALL calculations, diagrams, graphs etc. which you have used to determine answers.
3. An approved non-scientific (non- programmable and non- graphical) calculator may be used unless stated otherwise.
4. Answers should be rounded to 2 decimals digits, unless stated otherwise.
5. Diagrams are not necessarily drawn to scale.
6. Number your answers accordingly to the numbering system in this question paper.
7. It is in your own interest to work neatly.

Question 1

a) Determine the recursive formula for T_{k+1} of the sequence 3;6;12;24... (2)

b) The recursive formula for a sequence is given as $T_k = 2T_{k-1} + T_{k-2}$, with $T_1 = 1$ and $T_2 = 2$ for $k>2$. Show all working to find the next 3 terms of the sequence. (4)

Question 2

a) A bag contains 3 red cards and 4 blue cards. Two cards are removed at random, without replacement. Find the probability that they are the same colour. (4)

b) A survey was conducted asking 60 people which hand they write with and what colour hair they have. The results are summarised in the table below. (5)

		Handedness		
		Right	**Left**	**Total**
Hair Colour	**Light**	a	b	20
	Dark	c	d	40
	Total	48	12	60

Assuming that which hand you write with and hair colour are independent, find the values for a, b and c. Show all working.

Question 3

Factorials must be evaluated eg: 5! = 120.

Arrangements are formed using all of the digits 1,2,3,4,5, ...9 without repetition.

a) Find the number of arrangements if:

i) there are no restrictions (2)

ii) the number must be even (3)

b) Find the probability that the numbers 1,2 and 9 are next to each other in the arrangement (4)

Question 4

A study was done to determine the effects of sleep deprivation on students ability to solve mathematical problems. A total of 13 people were involved in the study. After the sleep deprivation period, the number of errors made for the same problem given to each participant was recorded as shown below.

Number of hours without sleep (x)	18	18	19	20	20	21	24	24	26	25	26	27	27
Number of errors (y)	8	6	7	8	9	13	12	14	20	21	21	20	23

(a) Discuss the trend of the data collected. (1)

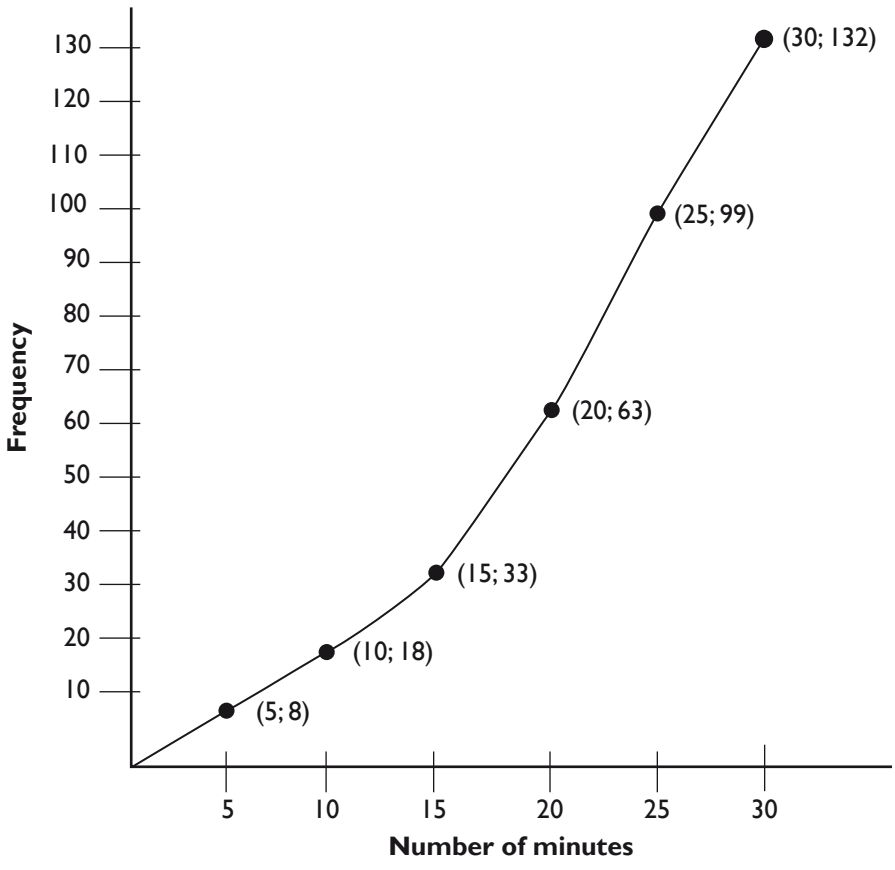
(b) Determine, with the use of your calculator, the linear regression equation of the line of best fit. (4)

(c) Use (b) to determine how many errors a student would make after 23 hours of sleep deprivation. (2)

(d) Determine the correlation coefficient for the function found in (b) above. Interpret this result. (3)

Question 5

132 Grade 12 students were asked how many minutes they spend on FACEBOOK and/or MIXit per day. The data are shown in the Ogive below.



(a) Draw a Histogram of this data. (3)

(b) Determine the median interval for this data. (2)

(c) Determine the estimated mean number of minutes. (3)

(d) Give the estimated standard deviation for the data. (2)

(e) Determine the inter-quartile range of this data. Show all your working. (3)

(f) By referring to the Ogive or the histogram state whether the distribution is positively or negatively skewed. (2)

Question 6

It is known that when data are represented by a normal distribution curve:

Approximately 68% of the data are within one standard deviation of the mean

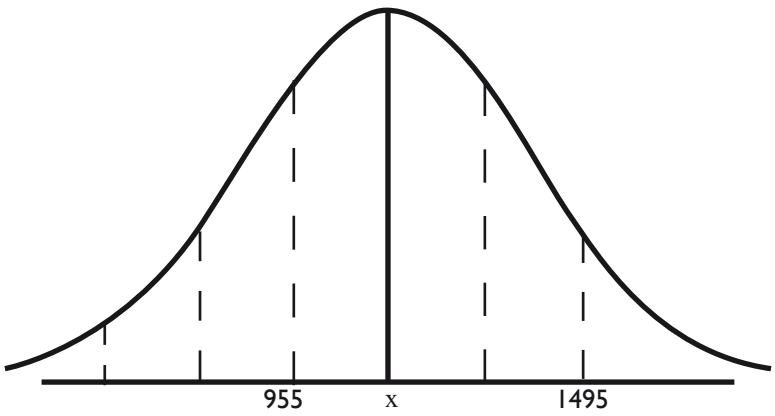
Approximately 96% of the data are within two standard deviations of the mean.

Approximately 99,7% of the data is within 3 standard deviations of the mean.

In a recent year, students entering a local University had a mean entrance examination score of x, with a standard deviation of s. The distribution was normal.

One student achieved a score of 955, and this was exactly one standard deviation below the mean. Another student achieved a score of 1495 and this was exactly two standard deviations above the mean.

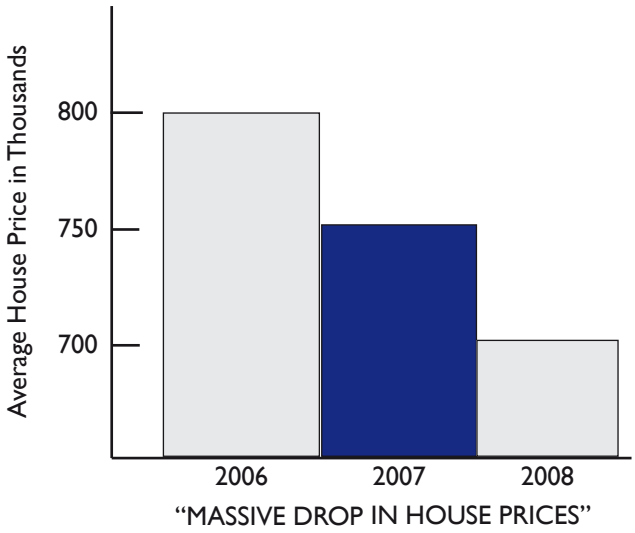
a) Copy the Normal Distribution curve onto your script and use it as an aid to determine the values of the mean x, and the standard deviation s. (4)



b) What percentage of students' scores fall between 955 and 1495? (2)

Question 7

7.1. The following graph is misleading. Identify the fault, and make a suggestion that would make it convey the truth. (3)



7.2. Write down the correct letter for this Multiple Choice question: (2)

An analyst is conducting a satisfaction survey, sampling from a list of 4000 new car buyers. The list includes 1000 buyers of cars of type A,B,C and D. He selects a sample of 400 car buyers, by randomly sampling 100 buyers of each brand.

Is this an example of a simple random sample?

a) Yes, each buyer in the sample was randomly selected.

b) Yes, because each buyer had an equal chance of being sampled.

c) No, because every possible 400 buyer sample did not have an equal chance of being chosen.

d) No, because car buyers of four brands were represented.

Question 8

O is the circle centre

MQ = 30cm

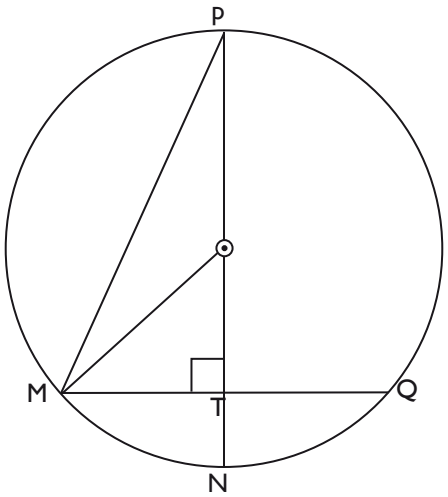
ON ⊥ MQ

If TN = x and OT = 2x

find:

a) the length of OM in terms of x (2)

b) the value of x, correct to 2 decimal digits (4)



Question 9

a) Complete the statement below by filling in the missing word (s) so that the statement is correct:

The exterior angle of a triangle is equal to... (1)

b) In the figure O is the centre of the circle and

DB = DF

AF, BE and BF are straight lines

$\hat{F} = 20°$

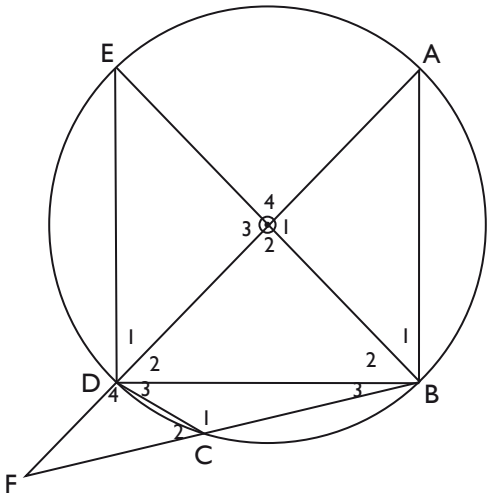
Find, with reasons, the magnitude of the following angles:

i) $\hat{D}_2$ (4)

ii) $\hat{A}$ (4)

iii) $\hat{O}_2$ (2)

iv) $\hat{C}_1$ (2)



Question 10

FK is a tangent to the circle with centre O

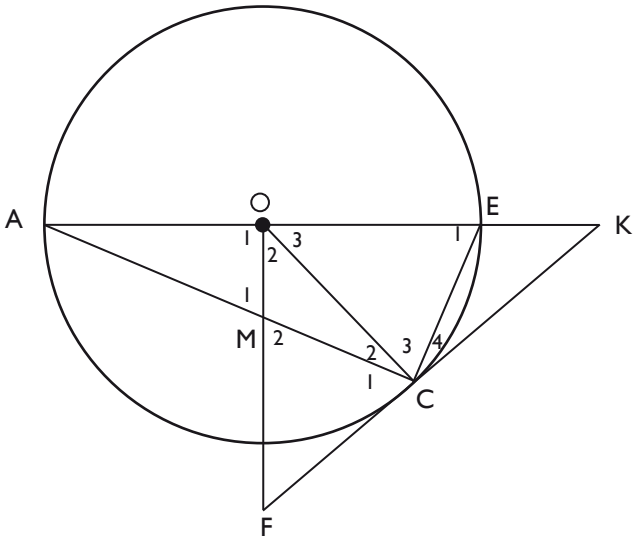
FO ⊥ AK

Prove that:

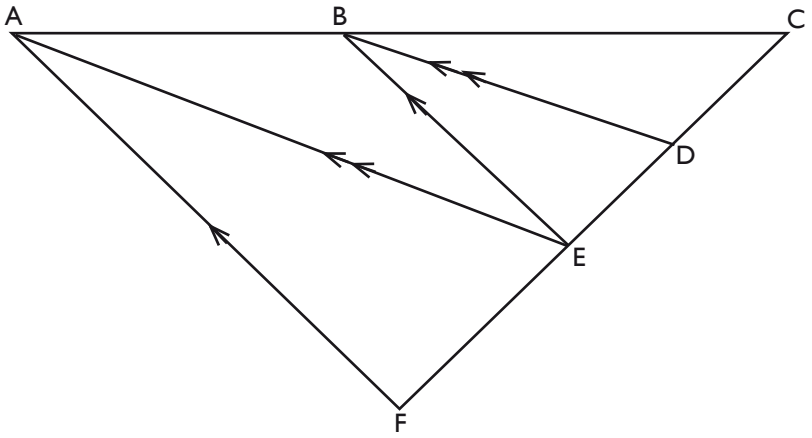
a) $\Delta AOM \,|||\, \Delta ACE$ (6)

b) OMCE is cyclic (3)

c) $KC^2 = AK.KE$ (4)



Question 11



In Δ AFC, AF || BE and AE || BD

$\frac{ED}{DC} = \frac{5}{3}$

Determine, with reasons, the values of

a) $\frac{FE}{EC}$ (4)

b) $\frac{FE}{DC}$ (4)