GRADE 11 EXAMINATION
NOVEMBER 2007

MATHEMATICS PAPER III
(LO3 AND LO4)

Time: 2 hours 100 marks

PLEASE READ THE FOLLOWING INSTRUCTIONS CAREFULLY

1. This question paper consists of 9 pages and a Formula Sheet. Please check that your paper is complete.
2. Read the questions carefully.
3. Answer all the questions.
4. Number your answers exactly as the questions are numbered.
5. You may use an approved non-programmable and non-graphical calculator, unless otherwise stated.
6. Round off your answers to two decimal digits where necessary.
7. All the necessary working details must be clearly shown.
8. It is in your own interest to write legibly and to present your work neatly.

SECTION A

QUESTION 1

(a) A group of 10 000 people were tested for colour-blindness and the results are shown in the table below.

	Male	**Female**	**Total**
Colour-blind	393	15	408
Normal	4 517	5 075	9 592
Total	4 910	5 090	10 000

(1) If a person is chosen at random, what is the probability that the person is a colour-blind male? (2)

(2) Does the evidence support the statement that colour-blindness is independent of gender? Motivate your answer. (3)

(b) A bag contains 3 red and 2 white balls. A second bag contains 5 red and 4 white balls. A bag is chosen at random and a ball is taken from it.

(1) Draw a tree diagram to show all the possible outcomes. (4)

(2) Using your diagram, determine the possibility of the chosen ball being red. (5)

14 marks

QUESTION 2

At Jabula College there are 126 pupils in Grade 11. Of these pupils 44 take AP Mathematics, 112 take Mathematics and 90 take Biology. All the pupils who take AP Mathematics also take Mathematics. 80 pupils take Mathematics and Biology and 30 pupils do AP Mathematics and Biology.
Let A represent AP Mathematics, M Mathematics and B Biology.

(a) Draw a Venn diagram to illustrate the given information. (8)

(b) If a learner is chosen at random, determine:

(1) The probability of a learner doing none of the subjects? (2)

(2) The probability that a student takes Mathematics but not Biology. (2)

(3) The probability that a student does Mathematics or Biology? (2)

(4) $P(M \cap B)$ (3)

17 marks

QUESTION 3

Sixty Grade 8 boys and girls were asked to run 50 metres and their times were recorded.

Boys	7,4	7,6	7,8	7,9	8,0	8,0	8,1	8,1	8,2	8,3	8,3	8,5	8,6	8,8	8,8
	7,6	7,8	7,9	8,0	8,0	8,1	8,1	8,2	8,2	8,3	8,3	8,5	8,6	8,8	9,1
Girls	8,1	8,3	8,3	8,4	8,4	8,5	8,5	8,5	8,6	8,8	8,9	8,9	9,0	9,5	9,7
	8,2	8,3	8,4	8,4	8,4	8,5	8,5	8,5	8,6	8,8	8,9	9,0	9,3	9,7	9,7

(a) Johnny says: "All boys run faster than girls."
Jill says: "Some boys run faster than girls."

Using the above data, discuss the truth of both statements. (4)

(b) Consider the data for the girls.
The girls who ran a time of 9,7 s are removed from the sample.
How would this affect the following (if at all)?
- Mean
- Median
- Mode

Motivate your answers without doing Mathematical Calculations. (6)

10 marks

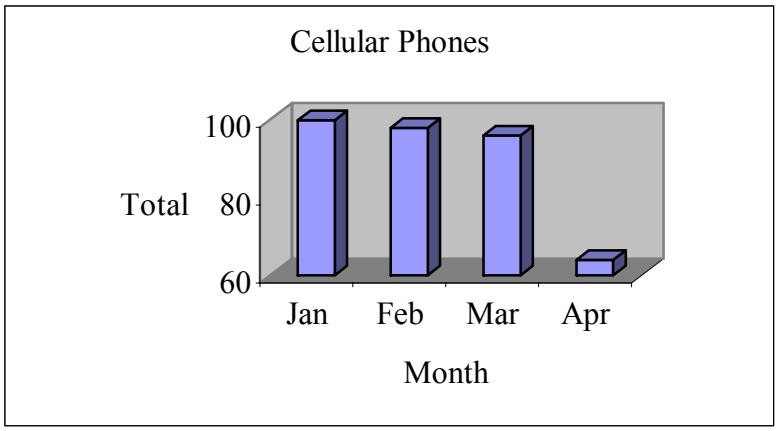
QUESTION 4

RR Private School has had a major problem with theft over the past two years.
They recorded the data in the table below for the first term of 2007 from 15 January up to 5 April.

	January	February	March	April
Number of Cellular phones stolen	100	98	96	64

The data was represented in a bar graph and released to the parents.
Refer to **Graph I** below.

Graph I



The Headmaster of the School received two letters after the information was released.

Mrs A congratulated the School on their success in minimising the theft of cellular phones.

Mr B commented that the school used a very misleading time-line.

Using the information supplied comment on the validity of **both** letters. (You need to explain how Mrs A was misled and how Mr B recognised the misleading information.) (6)

6 marks

SECTION B

QUESTION 5

Refer to the given diagram (not drawn to scale).

For both diagrams, write down all the missing dimensions and angles and state whether they are similar or not.

You need not give reasons for your answers.

Diagram I

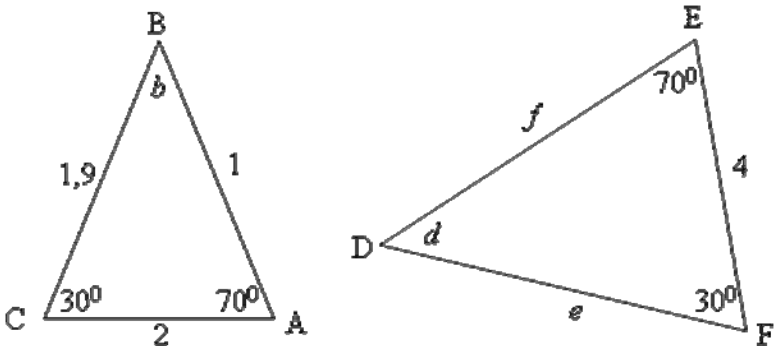
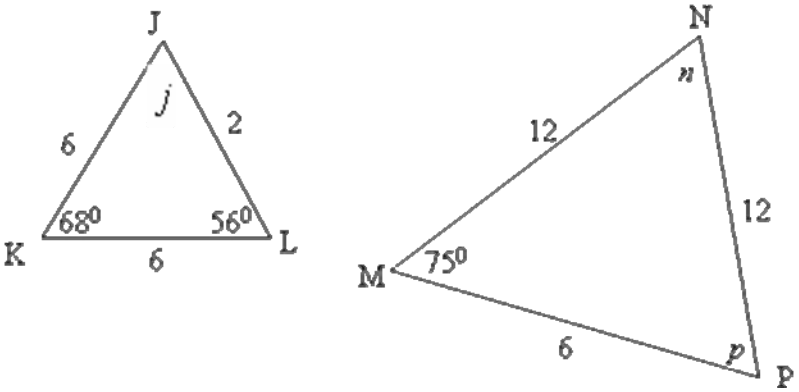


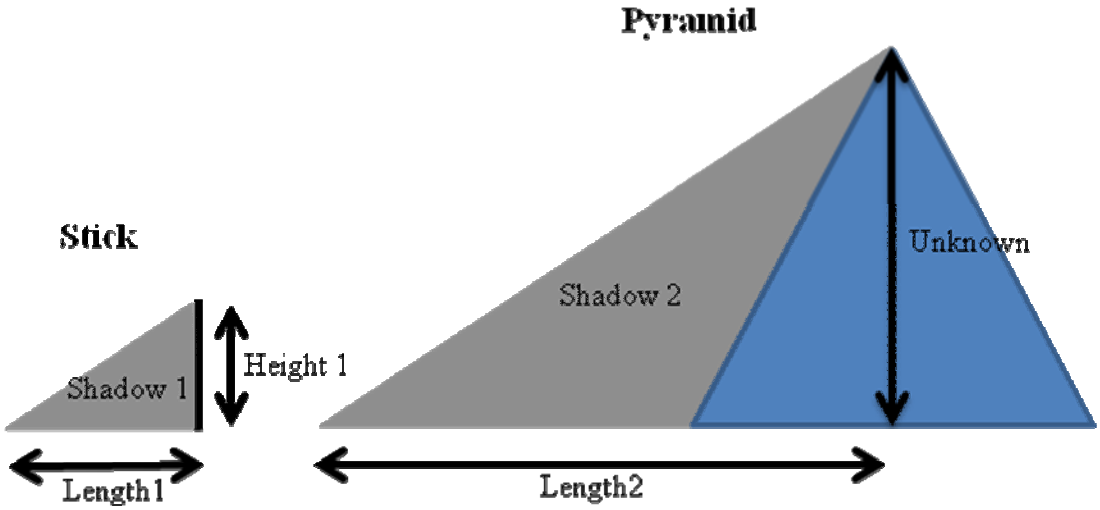
Diagram II



6 marks

QUESTION 6

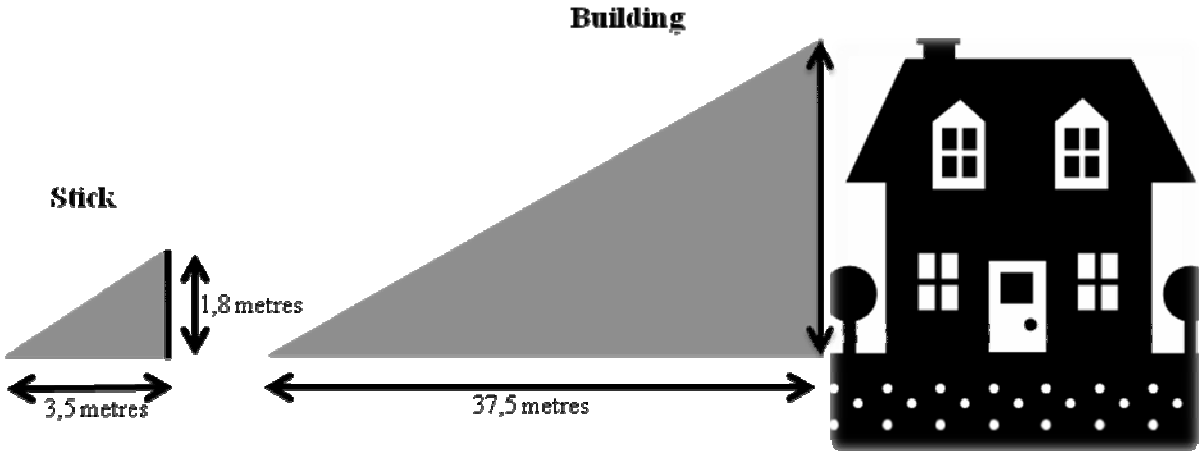
In Egypt, thousands of years ago, the Egyptians used the concept of similarity to determine the heights of their pyramids. Refer to the diagram below.



A stick of known height (Height 1) was placed in the ground. The length of the shadow of the stick (Length 1) and the pyramid (Length 2) were measured. The height of the pyramid (Unknown) was determined using the formula:

$$\frac{Unknown}{Length\ 2} = \frac{Height\ 1}{Length\ 1}$$

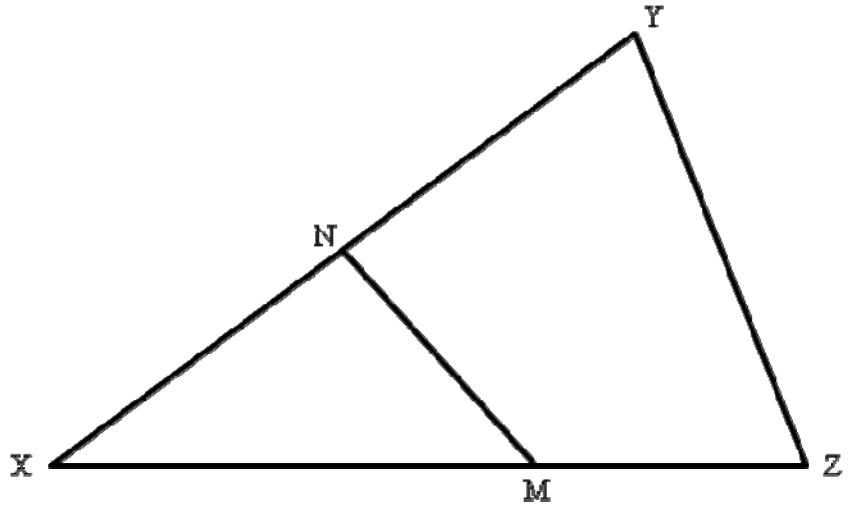
Refer to the diagram below. Using the same method as described above, determine the height of the building.



4 marks

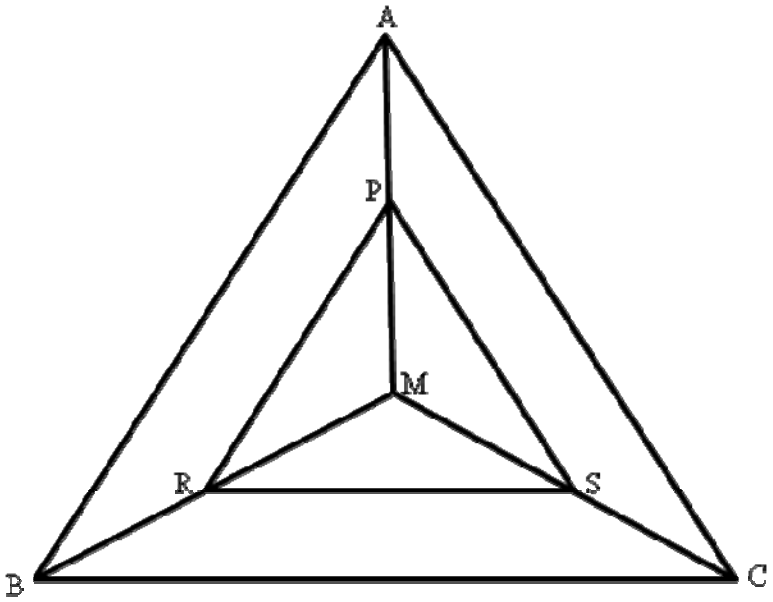
QUESTION 7

(a) Refer to the figure.
Given: NY = 46, YZ = 36, MZ = 24, XM = 12 and XN = NM = 8 units.



Name two triangles and prove them similar. (4)

(b) Refer to the figure.
PR || AB and RS || BC.

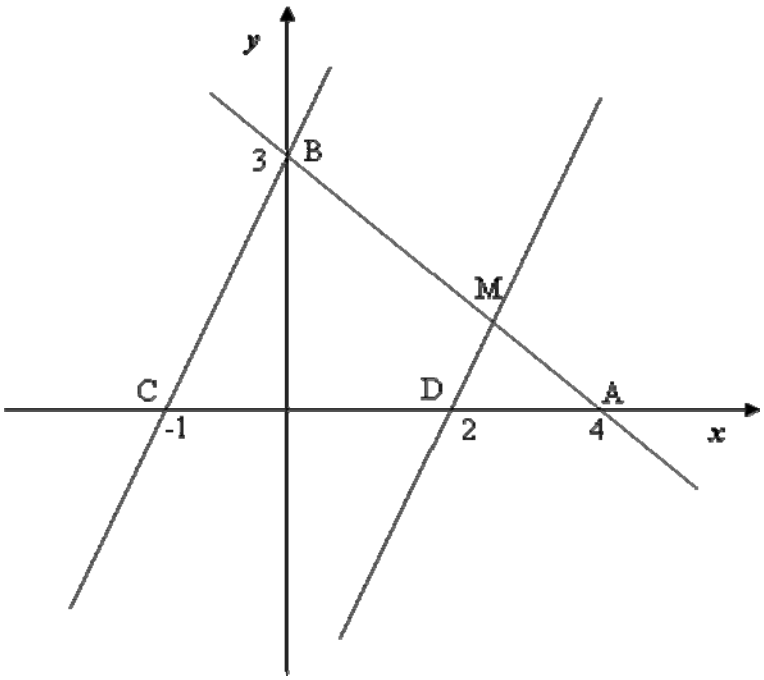


Prove that PS || AC. (6)

10 marks

QUESTION 8

Two lines BC and BA form ΔABC as shown in the diagram. A third line DM is drawn intersecting BA at M.
The coordinates of M are given as M (2,4 ; 1,2).



(a) Write down the lengths of AD and CD. (2)

(b) Determine the lengths of AM and MB. (4)

(c) Hence, determine the following ratios:

(i) $\frac{AM}{MB}$ (1)

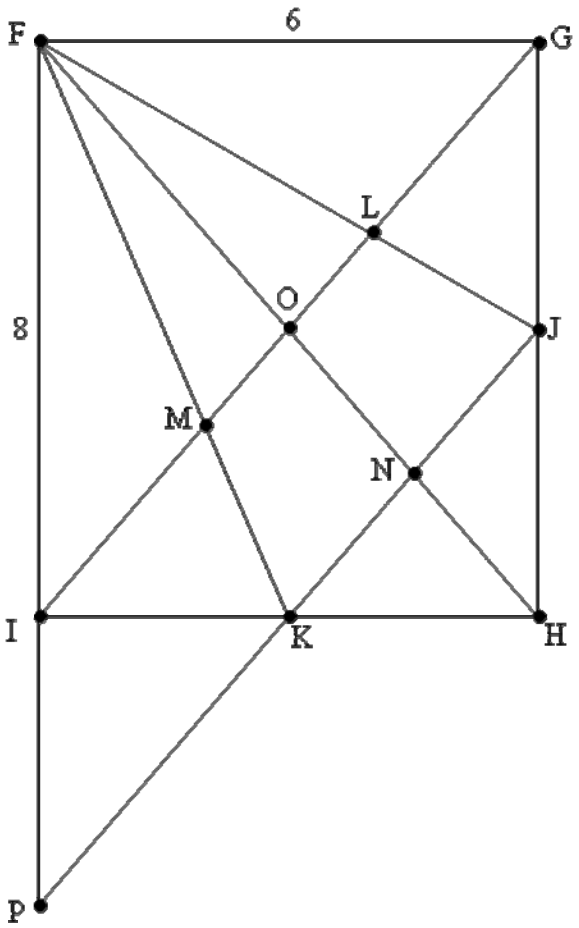
(ii) $\frac{AD}{DC}$ (1)

(d) What conclusion can you draw from your results in (c)(i) and (c)(ii) regarding line MD?
Write down a reason to substantiate your answer. (2)

10 marks

QUESTION 9

Refer to the figure. FGHI is a rectangle with diagonals FH and GI drawn in.
J and K are the midpoints of GH and HI respectively. JNKP is a straight line.
FG = 6 units and FI = 8 units.



(a) Prove: JK || GI. (3)

(b) Why is FH = 10 units? Motivate your answer. (2)

(c) Show that ON = 2,5 units. (3)

(d) Determine the length of IP. (3)

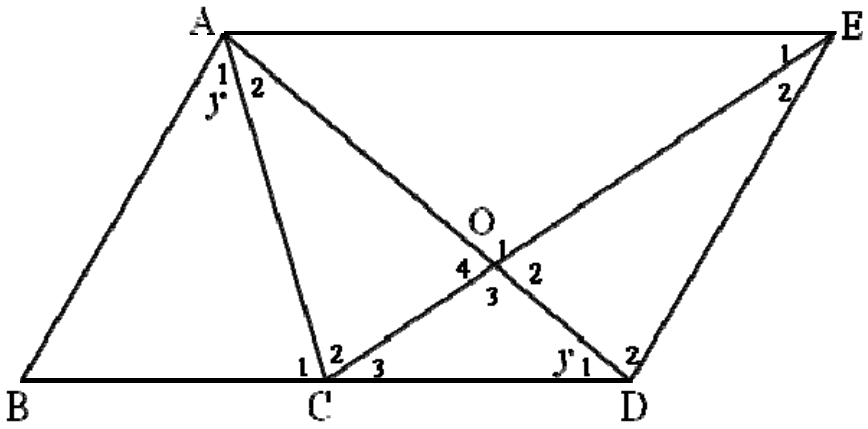
11 marks

QUESTION 10

Refer to the diagram. ABDE is a parallelogram with C the midpoint of BD.

AO = 6 cm
OD = 3 cm
CD = 4 cm

$\hat{A}_1 = \hat{D}_1 = y$



(a) Name a triangle similar to ΔCOD. (2)

(b) Prove: (1) $\Delta DBA \| \Delta AED$ (3)

(2) $\Delta ABC \| \Delta DBA$ (3)

(c) Hence, determine the lengths of AB and AC. (4)

12 marks