



DEPARTMENT OF
EDUCATION

UPPER SECONDARY
SCHOOL CERTIFICATE
EXAMINATIONS

ADVANCE
MATHEMATICS

PAPER 2

Friday

28th October 2011

Time allowed:

2 hours 30 minutes

(8:00am – 10:30 am)

NO EXTRA TIME

(NO OTHER TIME)

Candidates are advised to fully
utilise the allocated time

MA2

INSTRUCTIONS TO CANDIDATES

To be read by the external invigilator to all candidates

1. The code of this Advanced Mathematics is **3**.
2. There are **3** printed pages in the question booklet and **6 printed** pages in the answer booklet. The **1 page formula sheet** is inserted in the question booklet.
3. The answer booklet is enclosed in the centre of this booklet. Take out the answer booklet now.
4. Check that you have the correct number of pages.
5. Write your 10 -digit candidate number, your name and your school name in the spaces provided in the answer booklet.
6. This paper contains 10 Short Answer Questions worth 5 marks each.

Total : 50 marks

Answer **ALL** questions.

7. Calculators, rulers and protractors are allowed.
8. Answer all questions on the answer sheet. Answers on any other paper including rough work paper and the question paper **will not be marked**
9. ALL working must be shown step by step to get full marks. Students may lose marks for writing down final answers only.
10. Enough space has been allocated for the answer to every question. Questions must be answered in spaces as allocated. Answers all over the answer booklet may not be marked.
11. Rubbers and Correctional Fluid are not allowed on the answer sheet. Where you have made an error, cross out all the working and start again on a new line.
12. Graphical Calculators are not permitted.

**PENALTY FOR CHEATING OR ASSISTING TO CHEAT IN
NATIONAL EXAMINATIONS IS NON-CERTIFICATION.**

**DO NOT TURN OVER THE PAGE AND DO NOT WRITE
UNTIL YOU ARE TOLD TO START.**

QUESTION 1

If $U = \{\text{Positive whole numbers } \leq 12\}$ be the universal set.

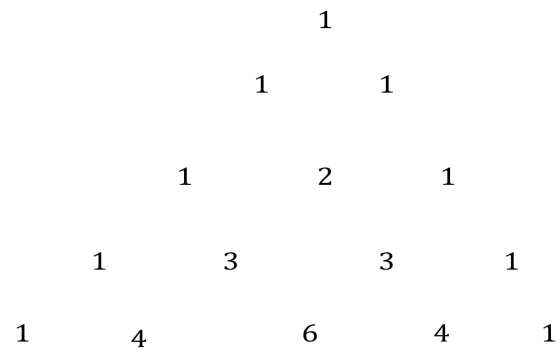
$A = \{\text{Positive primes } \leq 12\}$

$B = \{\text{Positive factors of } 12\}$

- a) List the elements of sets A and B (2 marks)
- b) Show the sets A, B and U on a Venn diagram. (1 mark)
- c) List the elements not in A or A' . (2 marks)

QUESTION 2

This triangle of numbers is called Pascal's triangle



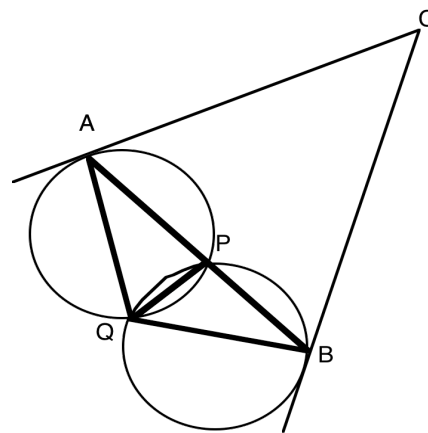
- a) Write the next two rows of Pascal's triangle. (2 marks)
- b) Hence write down the binomial expression for: (3 marks)
 - i. $(x + y)^3$
 - ii. $(p + q)^4$
 - iii. $(p - q)^4$

QUESTION 3

- a) Fill in the missing words.

The angle between a tangent and a chord through the point of contact is equal to the angle _____ by the chord in the alternate segment. (1 mark)

- b) Two circles intersect at points P and Q. Line APB is drawn through P. The tangents at A and B meet at C.



If $\angle ABC = \beta^\circ$ and $\angle BAC = \alpha^\circ$, find expression in terms of α and β for

- i. $\angle PQB$ (2 marks)
- ii. $\angle PQA$ (1 mark)
- iii. $\angle AQB$ (1 mark)

QUESTION 4

An aircraft flies 500 km on a bearing of 100° to point A and then flies 600 km on a bearing of 160° to point B.

- a) Sketch the aircraft's flight from point A to point B. (1 mark)
- b) Find the distance from starting point to finishing point. (2 marks)
- c) Find the bearing from starting point to finishing point. (2 marks)

QUESTION 5

(5 marks)

For the following frequency distribution, construct the cumulative distribution (cumulating from the lower end), draw the corresponding cumulative frequency graph and use the graph to estimate the median.

Distribution of Aid Posts per Province, 2010	
No. of Aid Posts	No. of Provinces
Less than 20	1
20 to less than 40	2
40 to less than 60	2
60 to less than 80	3
80 to less than 100	5
100 to less than 120	3
120 to less than 140	2
140 or more	1
TOTAL	19

QUESTION 6

Given the function $y = \frac{1}{3}x(x^2 - 9)$.

- a) Locate stationary points.
(Leave answer in surd form) (2 marks)
- b) Of the points in a) above, show which is maximum and which is minimum.
(1 mark)
- c) Sketch the graph, clearly indicating the y intercept and the turning points.
(2 marks)

QUESTION 7

(5 marks)

Solve for x in the equation

$$\frac{1}{2}x = \left(1 - \frac{3}{4}x\right)^{0.5}$$

QUESTION 8

(5 marks)

Solve the simultaneous equations for x and y .

$$\log_2 x + \log_2 y = 2$$

$$\log_2 x - \log_2 y = 0$$

QUESTION 9

(5 marks)

Find constants a and b , given that the polynomial

$$P(x) = x^3 + ax^2 - bx - 10 \text{ is divisible by } (x + 1) \text{ and } (x - 2).$$

QUESTION 10

Consider the function $f(x) = |x - 3| + 1$.

- a) State the domain and the range of the function.
(2 marks)
- b) Sketch the graph of $y = f(x)$.
(3 marks)

END OF EXAMINATION