MINISTRY OF EDUCATION AND HIGHER EDUCATION

FORM FOUR EXAMS, 2010

MATHEMATICS

P/LAND NATIONAL EXAMINATION BOARD

Name …….

School …… Roll Number …….

Punt land state of Somalia
Ministry of Education
Puntland National Exam board

Mathematics Examination
June 2010

Time: 2 hours + 10 min for reading

This paper consists 11 printer pages including the cover page
Count them now. Inform the invigilator if there are any missing

Section A: Multiple choice questions = 10 marks
Section b: Structured questions = 90 marks

- **ALL questions in section B must be answered and written on this paper in the space provided**
- **No extra paper is allowed**
- **No calculator is allowed**
- **Every mistake cross out the incorrect answer and write your correct answer clearly**

USE THIS BAGE FOR YOUR ROUGH WORKING

IT WILL NOT BE MARKED

Section A: Multiple choice questions (10 marks)

For each question in Section A, **Circle** the correct answer **(each question 1mark)**

If you change your mind cross out the answer you have wrongly chosen and clearly Circle the correct answer, if you marked two answers you will NOT receive a mark for that question
For each question in Section A, there is ONLY one correct answer

1. $2^x = 32$ the value of x is equal to
   a) 8 b) 16 c) 5 d) 0

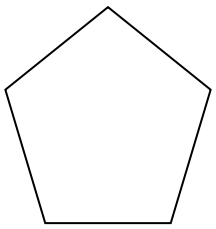
2. If the universal set is {1, 3, 4, 6, 8, 10 } then the complement of {1, 4, 10} is
   a) {1, 3, 4} b) {2, 5, 7, 9} c) {3, 6, 8} d) {2, 3, 6, 7, 8}

3. $\frac{d}{dx}(\mathbf{Sinx})$ is equal to
   a) - cosx b) cosx c) secx d) cosecx

4. ${}^4C_3$ is equal to
   a) 12 b) 4 c) 3 d) 4!X3!

5. If $f(x) = \frac{2x-7}{3}$ then **f(2)** is
   a) 1 b) 4 c) -3 d) -1

6. The **size** on an interior angle of a **regular** pentagon is
   a) 108° b) 106° c) 107° d) 109°



7. The determinant of the matrix $\begin{pmatrix} -2 & 4 \\ 8 & -4 \end{pmatrix}$ is
   a) 40 b) 24 c) – 24 d) – 40

8. $\int \sec^2 x\,dx$ is equal to
   a) tanx b) Sinx c) Cosx d) Secx

9. $\frac{3}{2}\pi$ radian is equal to
   a) 180º b) 90 º c) 270 º d) 45º

10. The **Mood** of this data 4, 5, 6, 2, 4, 5, 9, 4, 11, 2 is
    a) 5 b) 11 c) 2 d) 4

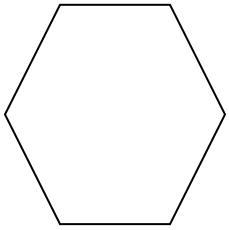
Section B: structured Questions (90 marks)

Answer ALL question in this section in the space provided

You must show ALL your working and answer below the question. Marks will be given for the correct working even though you may have wrong answer.

Question 1

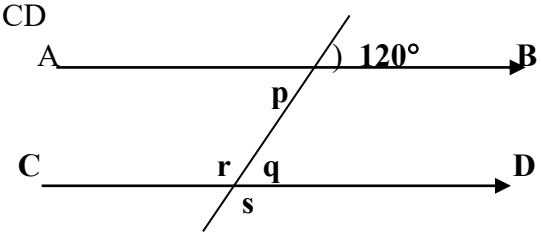
a) Calculate the size of an **interior** angle of a regular **Hexagon** (2marks)



b) In the figure below line AB is parallel to the line CD (4marks)

Find:

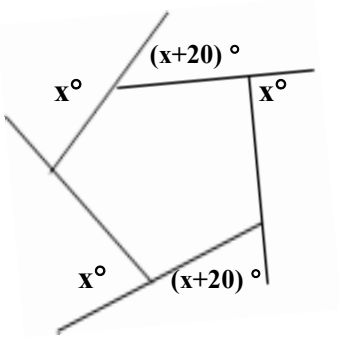
i) the size of angles **p, q, r** and **s**



p = ……. **q = ……**

r = …… **s = …….**

c) Find the value of x in the pentagon shown right (3marks)



Question 2

Given that matrix $A=\begin{pmatrix} 1 & 3 \\ -2 & 5 \end{pmatrix}$ and matrix $B=\begin{pmatrix} 4 & 2 \\ -3 & 1 \end{pmatrix}$

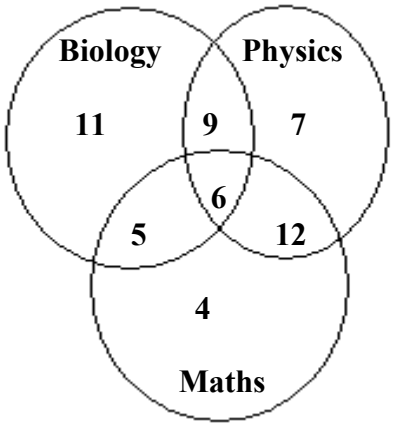
Calculate

a) Find $\mathbf{A^{-1}}$ the inverse of A (3marks)

b) Find B^2 (3marks)

Question 3

Look at the Venn diagram which represents a group of students studying **Maths, Physics and Biology.**



Answer the following questions

i) How many study **ALL** three subjects? **Ans: ……(1marks)**

ii) How many study **Math** only? **Ans: ……(1marks)**

iii) How many study only **Physics and Maths**? **Ans: ……(1marks)**

Question 4

Vector $P = \begin{pmatrix} -4 \\ 3 \end{pmatrix}$ and $q = \begin{pmatrix} 2 \\ 4 \end{pmatrix}$ Find

a) **|p|** the length of vector **p** (2marks)

b) Find **½ q + p** (2marks)

Question 5
The table below shows the distribution of 40 students Mathematics test scores.

a) Complete the table (4marks)

Score	Frequency f	Mid interval x	Fx
$0 \leq x < 20$	4	10	*4x10= 40*
$20 \leq x < 40$	16		
$40 \leq x < 60$	14		
$60 \leq x < 80$	2	70	*70x2 = 140*
$80 \leq x < 100$	4		
	***Total** = ...*		***Total** = ……*

ii) State the model class …… **(1mark)**

iii) Calculate the mean marks (3marks)

Question 6
The velocity of an object moving in a straight path after **t** seconds is given by $\mathbf{V(t) = 8t - 3t^2 - 2\ m/s}$
Calculate:
a) The velocity when t = 2 **(2marks)**

b) The acceleration of the object after 3 seconds **(2marks)**

c) The distance covered by the object between **t = 1 sec** and **t = 3sec** **(3marks)**

Question 7

Given that A is the point $(2,3)$,B is the point $(6,11)$. Calculate

a) The gradient of the line AB **(2marks)**

b) The equation of the line AB **(3marks)**

Question 8

Two dice are rolled. The sum of the two numbers on both dice is recorded in the following table.

+	1	2	3	4	5	6
1	2					
2						
3			6			9
4						
5					10	
6						

a) Fill in the missing values in the table. (4marks)

b) Find the probability of getting a **sum of 7** (2marks)

Question 9

a) Find the gradient of the curve **$y = x^3 - 3x$ at $x = 0$** **(2marks)**

b) Find the maximum and minimum points of the **$y = x^3 - 3x$** **(4marks)**
(hint: use second defferentiation test)

c) Evaluate

$$\lim_{x \to 3} 3x^2 - 5x + 11$$

(3marks)

Question 10

If $g(x) = \frac{3x + 6}{4}$ and $f(x) = 2x + 1$

a) Evaluate **g(2)**. **(2marks)**

b) Find **$g^{-1}(x)$** inverse of **g(x)** **(2marks)**

10 c) Find **gf(x)** **(2marks)**

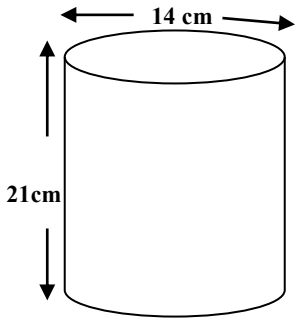
Question 11

If $y = 8x^2$ is an equation of a **parabola**. Find

a) The **Focus** of the parabola **(2marks)**

b) The equation of the **directrix** **(2marks)**

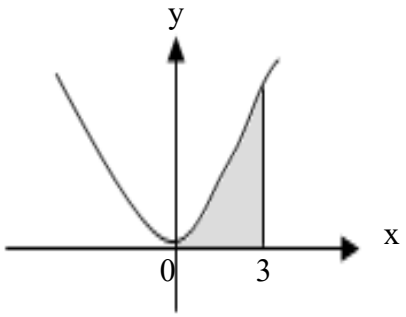
c) Find the **surface area** of the **open-top cylinder** shown below. **(4marks)**



d) Find the **Volume** of the cylinder **(3marks)**

Question 12

Find the area enclosed between the curve $y = x^2$, **X-axis** and the lines **x= 0** and **x= 3** **(3mark)**



Question 13

a) Prove the identity $\text{Cot}\theta\text{Sec}\theta \equiv \text{Cosec}\theta$ **(2marks)**

b) Find the irrational value of **Sin75°** **(hint: use Sin75° = Sin(45°+ 30°)** **(3marks)**

(given: Sin55° = Cos45° $= \frac{1}{\sqrt{2}}$, **Sin30°** $= \frac{1}{2}$ **and Cos30°** $= \frac{\sqrt{3}}{2}$**)**

Question 14

Simplify the following complex numbers

a) $(3 + 2i) + (-2 + 3i)$ **(2marks)**

b) $(3 + 2i) \times (-2 + 3i)$ **(2marks)**

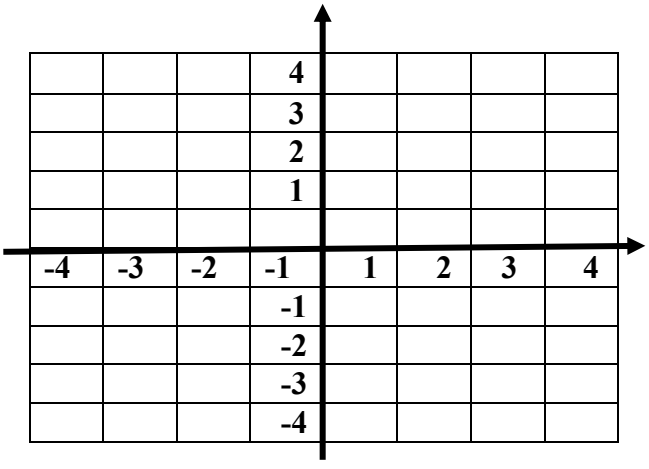
Question 15

a) Complete the table below for values of $y = 2 + x - x^2$

x	- 2	- 1	0	1	2	3
Y			2			-4

(2mark)

b) Using the point in the table, draw the graph of $y = 2 + x - x^2$ on the gird below. **(2 marks)**



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