THE UNITED REPUBLIC OF TANZANIA
NATIONAL EXAMINATIONS COUNCIL
CERTIFICATE OF SECONDARY EDUCATION EXAMINATION

041 **BASIC MATHEMATICS**

(For School Candidates Only)

Time: 3 Hours **Tuesday, 05th November 2013 a.m.**

Instructions

1. This paper consists of sections A and B.
2. Answer **all** questions in section A and **four (4)** questions from section B. Each question in section A carries **six (6)** marks while each question in section B carries **ten (10)** marks.
3. All necessary working and answers for each question attempted must be shown clearly.
4. Mathematical tables may be used.
5. The following constants may be used:
   (a) The radius of the earth $R = 6370km$
   (b) $\pi = \frac{22}{7}$
6. Calculators and cellular phones are **not** allowed in the examination room.
7. Write your **Examination Number** on every page of your answer booklet(s).

SECTION A (60 Marks)

Answer **all** questions in this section.

1. (a) A shopkeeper sold 292 t-shirts at the price of sh. 6950. Estimate how much money she got.

   (b) Express $0.9\dot{6}$ in the form $\frac{a}{b}$ where a and b are integers such that $b \neq 0$.

2. (a) If $\log y + 2\log(3x+1) = 1$, express y in terms of x.

   (b) Simplify $\frac{\sqrt{7}}{\sqrt{7}+\sqrt{5}}$ by rationalizing the denominator.

3. (a) If $m * n = m + 4n$, find x given that $3 * (x * 1) = 27$.

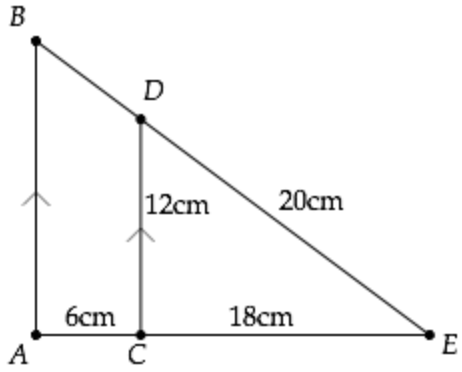
   (b) There are 48 men at a meeting of whom 24 are teachers, 36 are parents and 16 are both teachers and parents. By using a Venn diagram, find the number of men who are neither teachers nor parents.

4. (a) Find the direction cosines of $\underline{C} = 9\underline{i} + 12\underline{j}$, hence show that the sum of the squares of these direction cosines is one.

   (b) Find the equation of the line through the points $(4,6)$ and the midpoint of $(2,4)$ and $(10,4)$.

5. (a) The length of two sides of a triangle are $16cm$ and $20cm$. Find the area of the triangle if the included angle is $30°$.

   (b) In the figure below, calculate the length BD:



6. (a) A bus travels $240km$ using 16 litres of diesel. How many litres of diesel are needed to drive $90km$?

(b) If y^2 varies directly to $x-1$ and inversely to $x+d$ and if $x=2$, $d=4$ for $y=1$, then find x when $y=2$ and $d=1$.

7. (a) A radio is bought for sh 400,000 and sold for sh 500,000. Find:
(i) The profit made
(ii) The percentage profit.

(b) Find the time in which sh 300,000 will earn an interest of sh 60,000 if the interest rate is 10% per annum.

8. (a) The first term of an arithmetic progression is 12 and the common difference is 10.
Find the n^{th} term.

(b) Find the amount of money accumulated at the end of 2 years after investing 500,000 shillings at a compound interest rate of 10% annually.

9. (a) A ladder leans against a wall. If the ladder reaches $12m$ up the wall and its foot is $9m$ from the base of the wall, find the length of the ladder.

(b) Given that A and B are complementary angles and $\sin A = \frac{3}{5}$, find $\tan B$ (Leave your answer as an improper fraction).

10. (a) What must be added to $x^2 + 8x$ to make the expression a perfect square?

(b) Find two consecutive odd numbers whose product is 195.

SECTION B (40 Marks)

Answer any **four (4)** questions from this section.

11. (a) Solve by graphical method the following system of simultaneous equations:
$4x + y = 6$
$5x + 2y = 9$

(b) A farm is to be planted with sorghum and maize while observing the following constraints:

	Sorghum	Maize	Maximum total
Days labour per hectare	4	2	20
Labour cost per hectare	1400	1200	8400
Cost of fertilizer per hectare (shs)	600	800	4800

If sorghum yields a profit of 800,000 shillings per hectare while maize yields 600,000 shillings per hectare, how many hectares should be planted with each crop for maximum profit?

12. Carefully study the frequency distribution table which shows the marks of 100 students in a Physics examination.

Marks	41 - 50	51 - 60	61 - 70	71 - 80	81 - 90	91 - 100
Number of Students	10	22	34	25	7	2

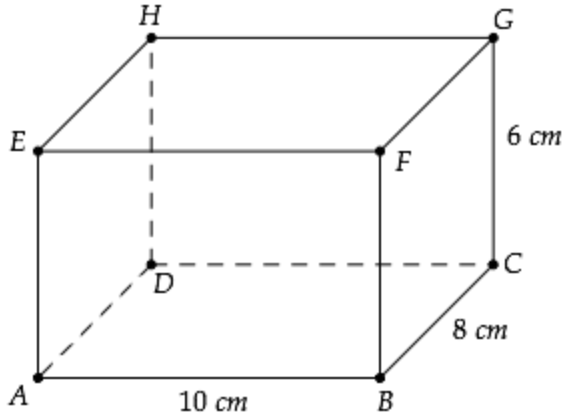
Calculate

(a) the mean given the assumed mean is 75.5,

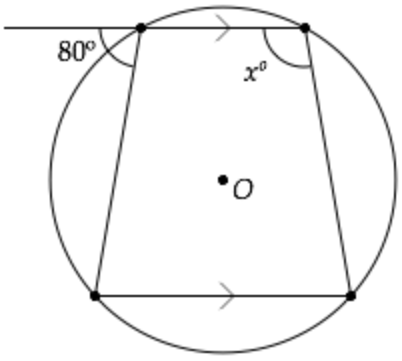
(b) the median in two decimal places,

(c) the mode in two decimal places.

13. (a) The figure below shows a rectangular prism in which $AB = 10cm$, $BC = 8cm$ and Calculate the length of DF (Leave your answer in surd form)



(b) If O is the centre of a circle given below, find the value of x.



(c) Calculate the circumference of a small circle, in kilometres, along the parallel of latitude $30°N$ (Leave your answer in surd form).

14. Mr. Chapakazi commenced business on 1st June, 2011 with capital in cash 5,500,000/=

June 2 Bought goods by Cash 2,000,000/=
3 Bought furniture for Cash 600,000/=
7 Sold goods for Cash 2,000,000/=
11 Cash purchases 700,000/=
13 Paid Rent for Cash 2,000,000/=
16 Cash Sales 950,000/=
20 Paid Transport for Cash 80,000/=
22 Sold goods for cash 250,000/=
26 Paid salaries for Cash 160,000=

Record the above transactions in the cash account, balance them and extract the Trial Balance.

15. (a) Given $A = \begin{pmatrix} 2 & 6 \\ 4 & 8 \end{pmatrix}$ find A^{-1}.

(b) Use the results obtained in part (a) to find the point of intersection of the following system of simultaneous equations:
$2x + 6y = 22$
$4x + 8y = 32$

(c) Find the image of the point obtained in part (b) above under a rotation $90°$ anticlockwise.

16. (a) A die and a coin are tossed together. What is the probability of getting a tail and an even number?

(b) Draw the graph of the inverse of $R = \{(x,y) : y \geq 0 \text{ and } y \leq x\}$. Find its domain and range.

(c) Without using a table of values, draw the graph of $y = x^2 - 4x + 2$ and use it to solve the equation $x^2 - 4x = 5$.