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

041 **BASIC MATHEMATICS**
(For Both School and Private Candidates)

Time: 3 Hours ***Monday*, October 10, 2005 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.
3. **All** necessary working and answers for each question done must be shown clearly.
4. Mathematical tables and graph papers may be used unless otherwise stated.
5. You are advised to spend **not** more than **two (2)** hours on section A.
6. Electronic calculators are **not** allowed in the examination room.
7. Cellular phones are **not** allowed in the examination room.
8. Write your **Examination Number** on every page of your answer booklet(s).

CPB This paper consists of *6* printed pages.

SECTION A (60 marks)

Answer all questions in this section showing all necessary workings and answers.

1. (a) Simplify $\frac{0.3754 \times 17.85}{0.00042 \times 9.33}$ and give your answer in four significant figures. **(4 marks)**

   (b) Change $0.0\dot{1}$ into a fraction. **(2 marks)**

2.

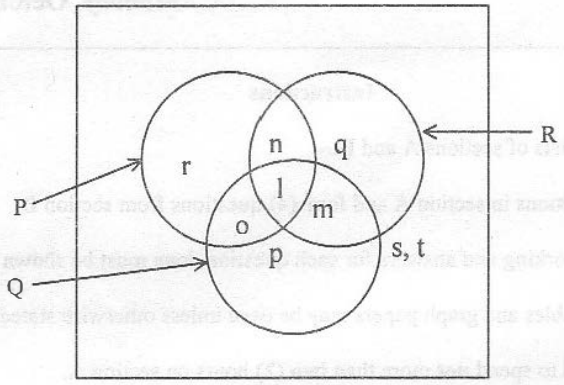

Figure 1

From the above figure, answer the following questions.

(a) List down numbers of $(P \cup Q)'$ **(2 marks)**

(b) Find $n(P \cup Q \cup R)'$ **(2 marks)**

(c) Find $n(Q \cup R) - n(P \cap R)$ **(2 marks)**

3. If $\underline{u} = 4\underline{i} + 6\underline{j}$ and $\underline{v} = \frac{1}{2}\underline{i} - 3\underline{j}$; find:

(a) $\underline{w}$ for which $\underline{w} = \frac{1}{2}\underline{u} - 2\underline{v}$. **(2 marks)**

(b) $|\underline{w}|$ correct to two decimal places. **(2 marks)**

(c) the angle that $\underline{w}$ makes with the positive direction of x - axis to the nearest degree. **(2 marks)**

4. (a) Solvefor x if $\left(4^{(x+3)}\right)\left(16^{x}\right) = 8^{3x}$ **(3 marks)**

(b) Iflog a = 1.3010; log b = 1.4771 and log C = 1.7782,

Calculate $\log\sqrt{\frac{a^2b}{c^2}}$ **(3 marks)**

5. (a) AOP is the diameter of a circle with centre O.

Given that ABC is a straight line and angle $Q\hat{B}C = 81°$. Calculate the value of angle $P\hat{A}Q$. **(3 marks)**

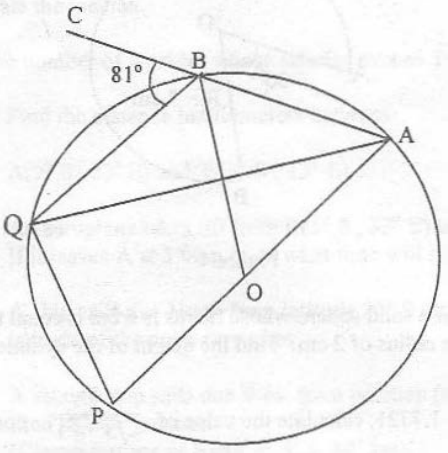

Figure 2

(b) With reference to figure 3 below, calculate the length of segment $\overline{CE}$. **(3 marks)**

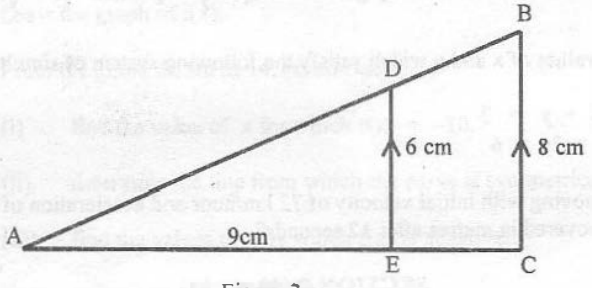

Figure 3

6. The 4^{th}, 6^{th} and 9^{th} terms of an arithmetical progression (A.P.) forms the first three terms of a geometric progression. If the first term of the A.P. is 3, determine the **(3 marks)**

(a) common difference of the arithmetical progression.

(b) common ratio of the geometrical progression. **(3 marks)**

7. Both lines "r" and "s" pass through the point (k, 9). Line "r" has a slope of $-\frac{1}{3}$ and passes through the point (5, –3). Determine the:

(a) value of k. **(2 marks)**

(b) equation of "s" in standard form of $ax + by + c = 0$, if its x - intercept is –14 **(2 marks)**

(c) equation of line "t" perpendicular to line "r" which passes through the point (k, 9) in form of $y = mx + c$. **(2 marks)**

8. (a) Figure 4 shows that AO = OB = 7 cm, < AOB = 36° and O is the centre of the circle. Calculate the perimeter of the figure. **(3 marks)**

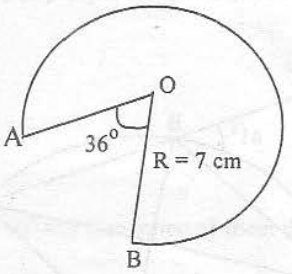

Figure 4

(b) The surface area of a solid sphere whose radius is 6 cm is equal to the surface area of a solid right cylinder with radius of 2 cm. Find the height of the cylinder. **(3 marks)**

9. (a) Given that $\sqrt{3} = 1.7321$, calculate the value of $\frac{2}{\sqrt{3}-1}$ correct to 4 decimal places. **(2 marks)**

(b) Determine the values of x and y given that $\frac{1}{x}+\frac{1}{y}=\frac{3}{2}$ when $\frac{1}{x^2}+\frac{1}{y^2}=\frac{5}{4}$. **(4 marks)**

10. (a) Find the values of x and y which satisfy the following system of simultaneous equations

$$\begin{cases} 2x + y = 3 \\ x^2 - 2y = 6 \end{cases}$$ **(3 marks)**

(b) A car is moving with initial velocity of 72 km/hour and acceleration of 4 m/s^2. What is the distance covered in metres after 12 seconds? **(3 marks)**

SECTION B (40 marks)

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

11. A certain secondary school intends to buy two types of Basic Mathematics reference books. The school wants between 10 and 15 books (inclusive) of author A which cost 8,000/= each. Books from author B cost 10,000/= each. If the school has 240,000/=, what is the maximum number of books can the school buy? **(10 marks)**

12. The following frequency distribution table shows the monthly salaries for 33 workers in a certain company.

Salary (Tsh.)	20000 - 29000	30000 - 39000	40000 - 49000	50000 - 59000	60000 - 69000
Number of workers	1	4	6	10	8

Salary (Tsh.)	70000 - 79,000	80000 - 89000
Number of workers	2	2

(a) By taking the class mark of the class interval 50000 - 59000 as the assumed mean, calculate the mean salary. **(4 marks)**

(b) What is the mode for this distribution? **(2 marks)**

(c) Calculate the median. **(2 marks)**

(d) Find the number of workers whose salaries exceed Tsh. 69,500/=. **(2 marks)**

13. (a) (i) Find the distance in kilometers between

A(9° S , 33° E) and B(5° S , 33° E). **($2\frac{1}{2}$ marks)**

(ii) An aeroplane takes off from B(5° S , 33° E) to C(5° S , 39° E) at a speed of 332 km/h. If it leaves A at 3:00 p.m. at what time will it arrive at C airport? **($2\frac{1}{2}$ marks)**

(b) (i) A ship sails due North from latitude 20° S for a distance of 1440 km. Find the latitude of the point it reaches. **($2\frac{1}{2}$ marks)**

(ii) A second ship sails due West from position (60° N , 5° W) for a distance of 1200 km. Find its new position. **($2\frac{1}{2}$ marks)**
(Circumference of Earth = 4×10^4 km).

14. It has been specified that $f(x) = 2x^2 - 5x - 3$ ranges from $x = -2$ to $x = 4$.

(a) Draw the graph of f(x). **(6 marks)**

(b) From the graph drawn in 14. (a) above;

(i) find the value of x for which $f(x) = -10$.

(ii) determine the line from which the curve is symmetrical.

(iii) find the values of x by which f(x) is negative.

(iv) solve the equation $2x^2 - 5x - 3 = 0$. **(4 marks)**

15. (a) A two digit number is written using the numbers 2, 3 and 4 without repetition.

Find the probability that the number is:

(i) even.

(ii) less than 30. **(4 marks)**

(b) A family has four children. By using a tree diagram, find the probability that the family has:

(i) all boys.

(ii) two boys and two girls. **(4 marks)**

(c) Find the probability that a number selected at random from the numbers $-3, -2, 0, 3, 4$ and 6 will be a solution set of the equation $x^2 - x - 6 = 0$. **(2 marks)**

16. (a) Given that $A = \begin{pmatrix} 4 & -3 \\ 1 & -2 \end{pmatrix}$, $B = \begin{pmatrix} 3 & 2 \\ -4 & 0 \end{pmatrix}$ and $C = \begin{pmatrix} -1 & 3 \\ 5 & -2 \end{pmatrix}$;

find $|3A - 2B + C|$. **(3 marks)**

(b) Solve for x and y in:

$$\begin{pmatrix} x \\ 3 \end{pmatrix} = \begin{pmatrix} 2 \\ x+y \end{pmatrix}.$$ **(2 marks)**

(c) A point (x, y) is rotated through 90° and then reflected about the line y = x. Find:

(i) a single matrix for this double transformation.

(ii) the image of the point (3, 6) under this double transformation. **(5 marks)**