9/36

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

041 BASIC MATHEMATICS
(For both School and Private Candidates)

Time: 3Hours **27th October 2008 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).

This paper consists of 8 printed pages

SECTION A (60 marks)

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

1. (a) Find the product of the L.C.M. and G.C.F of 40, 120, and 240.

(b) Round off each of the following numbers to one decimal place

$L = 20.354$

$M = 40.842$

$N = 10.789$

(c) Use the results obtained in 1 (b) above to find the value of X, given that

$X = \frac{LM}{N}$. **(6 marks)**

2. (a) By using the properties of exponents, simplify the expression

$\frac{2^{18} - 2^{15} + 7}{2^{15} + 1}$. (Do not use tables).

(b) Solve for x in the logarithmic equation $2\log x = \log 4 + \log(2x - 3)$.

(6 marks)

3. (a) If $(2^{x-1})(3^{y+1}) = (3^4)(2^5)$ find

(i) $x + y$

(ii) $\frac{y}{x}$.

(b) Students test results on three subjects: Mathematics, Physics and Chemistry show that 20 passed Chemistry, 5 passed all the three subjects, 12 passed Mathematics and Physics and 16 passed Mathematics and Chemistry. Each student passed at least two subjects.

(i) Draw a well labeled Venn diagram to represent these results.
(ii) How many students passed Physics and Chemistry?
(iii) How many students did the test? **(6 marks)**

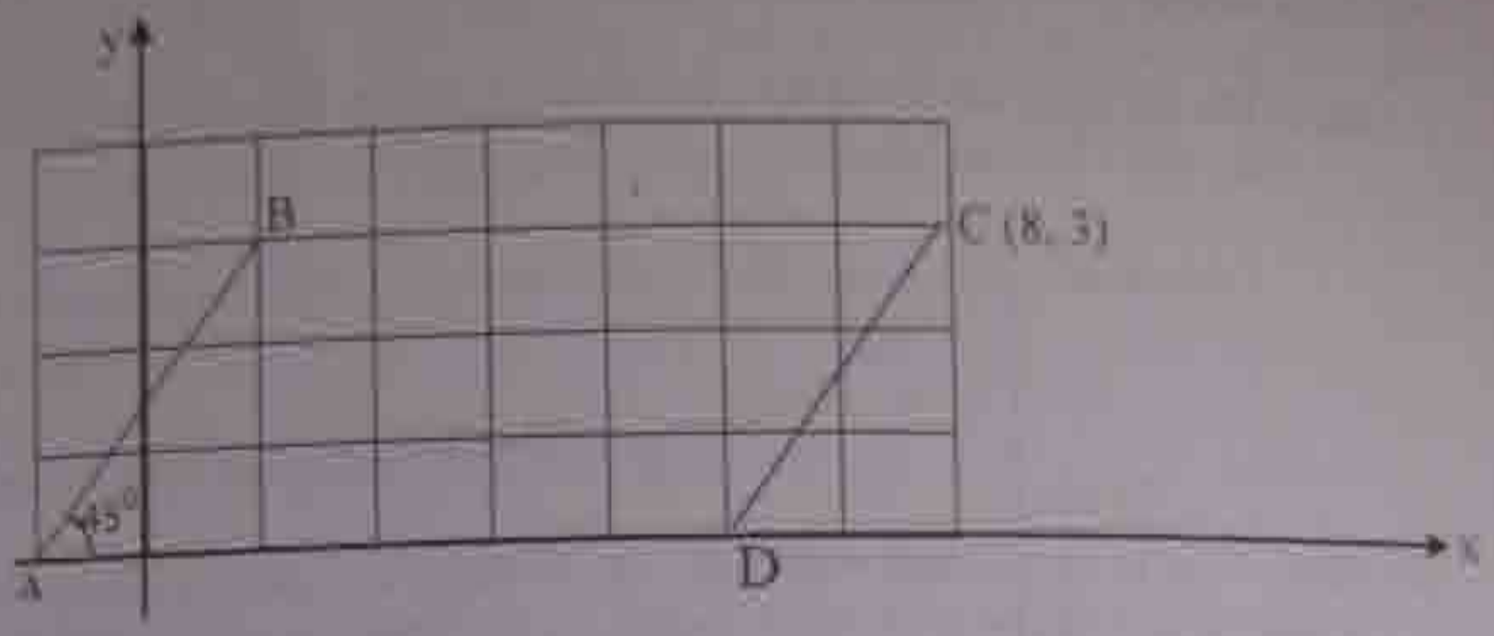
4. (a) Solve the following Simultaneous equations.

$$\begin{cases} x = 4 - \frac{3y}{2} \\ -3x + \frac{y}{2} = 1 \end{cases}$$

(b) If $\bar{A}$ and $\bar{B}$ are two vectors such that $\bar{A} = 2i + 5j$ and $\bar{B} = -4i + j$.
Find the position vector $\overrightarrow{OM}$ where M is the midpoint of $\overrightarrow{AB}$.

(6 marks)

5. (a) Find the area and the perimeter of a parallelogram ABCD given in the figure below if $\angle BAD = 45^\circ$.



(b) The ratio of the area of two similar triangles is 1:4. Find the ratio of their corresponding sides. **(6 marks)**

6. The value V of a diamond is proportional to the square of its weight W. It is known that a diamond weighing 10 grams is worth shs. 200,000/=.

(a) Write down an expression which relates V and W.
(b) Find the value of a diamond weighing 30 grams.
(c) Find the weight of a diamond worth shs. 5,000,000/=. **(6 marks)**

7. (a) Sixty people working 8 hours a day take 4 days to cultivate a village farm. How long will it take twenty people to cultivate the same farm if they work 15 hours a day?

(b) Neema bought a tray of eggs (containing 30 eggs) for shs. 2,000/=. She boiled the eggs using a litre of kerosene costing shs. 400/=, and sold each egg at a price of shs.100/= each. Find her percentage profit. **(6 marks)**

8. (a) Write down the next two terms in the sequence $\frac{1}{2}, \frac{2}{3}, \frac{3}{5}, \frac{5}{8}, \frac{8}{13}, \ldots\ldots$

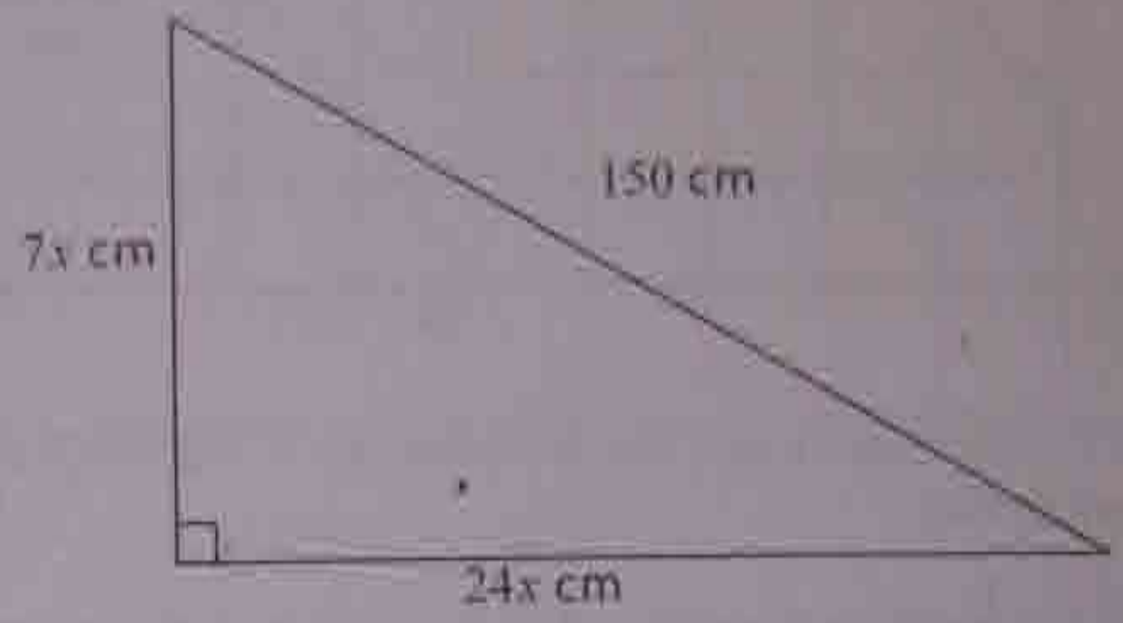
(b) (i) The n^{th} term of an AP is $12 - 4n$. find the first term and the common difference.

(ii) In an AP the 1^{st} term is -10, the 15^{th} term is 11 and the last term is 41. Find the sum of all the terms in the progression.

(c) The 5^{th} term of a GP is 8, the third term is 4 and the sum of the first ten terms is positive. Find the first term, the common ratio and the sum of the first ten terms. **(6 marks)**

9. (a) To find the height of a tower a surveyor sets up his theodolite 100 m from the base of the tower. He finds that the angle of elevation to the top of the tower is 30°. If the instrument is 1.5 m above the ground, what is the height of the tower?

(b) The right angled triangle in the diagram below has sides of length $7x$ cm, $24x$ cm and 150 cm.

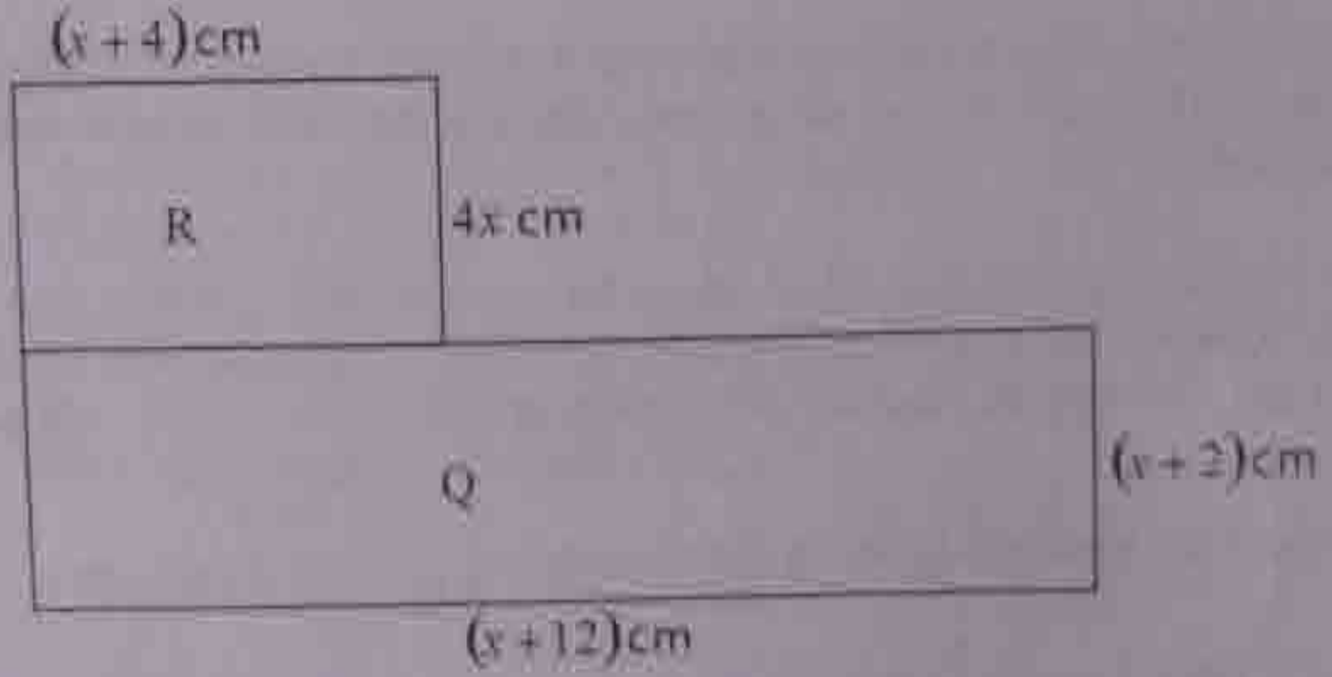


(i) Find the value of x.

(ii) Calculate the area of the triangle.

(6 marks)

10. Study the following diagram carefully and answer the questions that follow.



(a) (i) Write down an expression for the area of rectangle R.

(ii) Show that the total area of rectangles R and Q is $(5x^2 + 30x + 24)\ cm^2$.

(b) If the total area of R and Q is $64cm^2$, calculate the value of x correct to 1 decimal place.

(6 marks)

SECTION B (40 marks)

Answer four (4) questions from this section.

11 A shopkeeper buys two types of sugar: white sugar and brown sugar. The white sugar is sold at shs. 40,000/= per bag and the brown sugar is sold at shs. 60,000/= per bag. He has shs. 1,500,000/= available and decides to buy at least 30 bags altogether. He has also decided that at least one third of the bags should be brown sugar. He buys x bags of white sugar and y bags of brown sugar.

(a) Write down three (3) inequalities which will summarize the above information.

(b) Represent these inequalities graphically.

(c) The shopkeeper makes a profit of shs. 10,000/= from a bag of white sugar and shs. 20,000/= from a bag of brown sugar. Assuming he can sell his entire stock, how many bags of each type he should buy to maximize his profit? Find that profit. **(10 marks)**

12. (a) The age at which a child first walked (to the nearest month) was recorded for eight (8) children. The results were 12,10,16,19,10,12,12 and 13. Calculate the Mean, Mode and Median of the data.

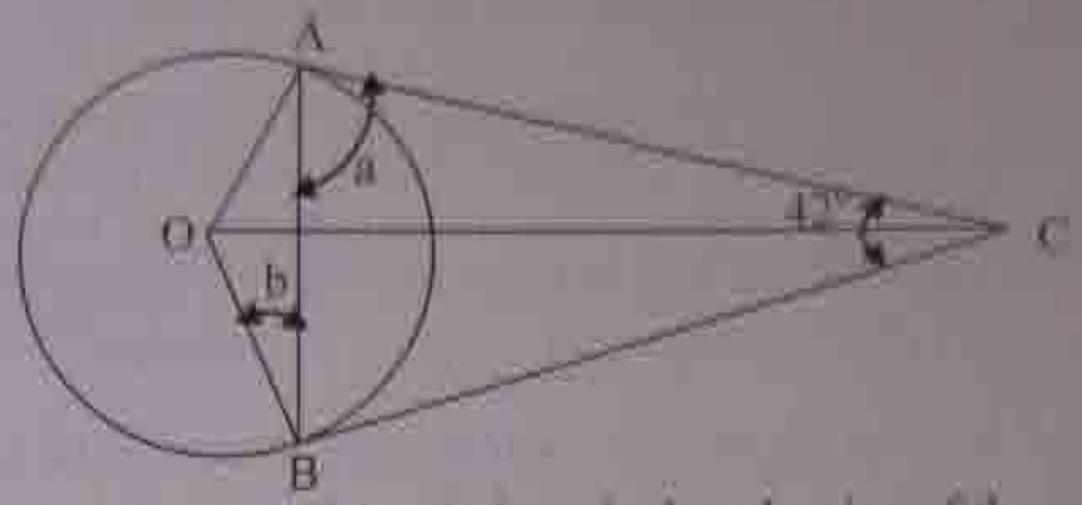
(b) A survey was made on the number of people attending conferences on one particular week. A random sample of 100 conference centres was taken and the results were as follows:

Number of people attending conference	150-154	155-159	160-164	165-169	170-174
Number of conference centres	8	16	43	29	4

(i) Draw a histogram and a cumulative frequency curve to represent these results.

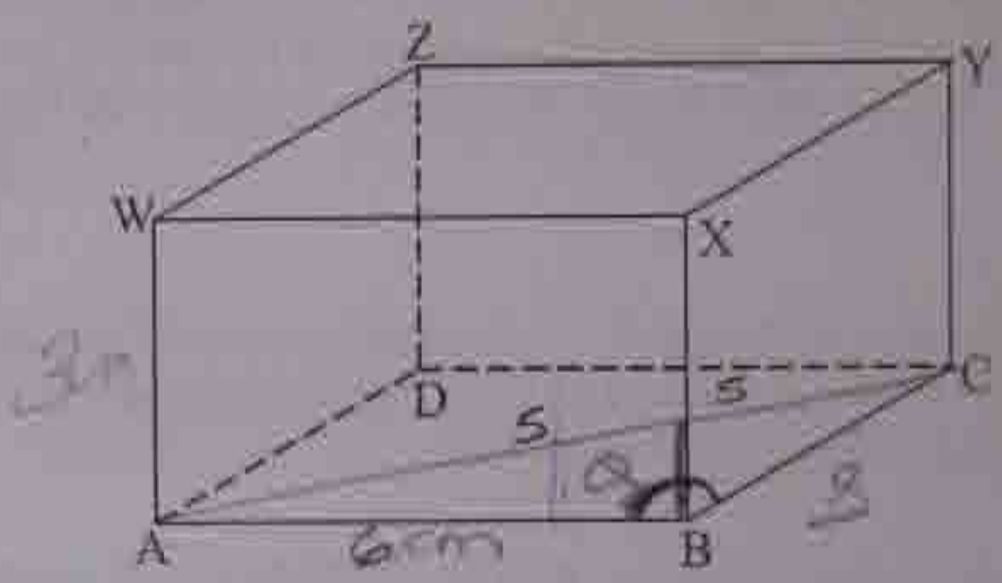
(ii) Estimate the median of this data from the cumulative frequency curve in 12 (b)(i) above. **(10 marks)**

13. (a) The two tangents AC and BC to the circle drawn below meet at C.



If O is the center of the circle, calculate the size of the angles marked *a* and *b*.

(b) A rectangular box with top WXYZ and base ABCD has AB = 6 cm, BC = 8 cm, and WA = 3 cm.



Calculate the
(i) length of AC
(ii) angle between WC and AC.

(c) A ship sails from port *P* to a distance 7 km on a bearing of 306°, and then a further 11 km on a bearing of 170° to arrive at *X*. Calculate the distance from *P* to *X*. **(10 marks)**

14. At the beginning of August 2008, Nguvumjwa Secondary School started up a school project shop with a capital of Tshs. 1,800,000/=. The school project manager made the following transactions:

On August 6th she bought some stationeries for the shop worth Tshs. 180,000/=.
On August 9th she sold goods to the students worth Tshs. 270,000/=,
On August 11th she bought soft drinks for the shop from IPP Company worth Tshs. 630,000/=.
On August 13th she sold foodstuffs to teachers worth Tshs. 450,000/=,
On August 15th she sold foodstuffs to villagers worth Tshs. 360,000/=.
On August 17th she bought loaves of bread for the shop worth Tshs. 450,000/=.
On 19th paid transport charges Tshs. 50,000/= and the shop management paid wages to the shop manager Tshs. 90,000/= on August 28th.

(a) Enter these transactions in a cash book.

(b) Bring down the balance at the end of August 28th 2008.

(10 marks)

15. (a) R is the point (1, 2). It is translated onto the point S by the vector $\begin{pmatrix} 3 \\ -4 \end{pmatrix}$.

Write down
(i) the coordinates of S

(ii) the vectors which translates S onto R.

(b) The matrix $\begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix}$ represents a single transformation.

(i) Describe fully this transformation.

(ii) Find the coordinates of the image of the point (5, 3) after this transformation.

(c) If M_2 denotes a reflection in the y-axis and R_{180} a rotation about the origin through an angle of 180° for any point (x, y).

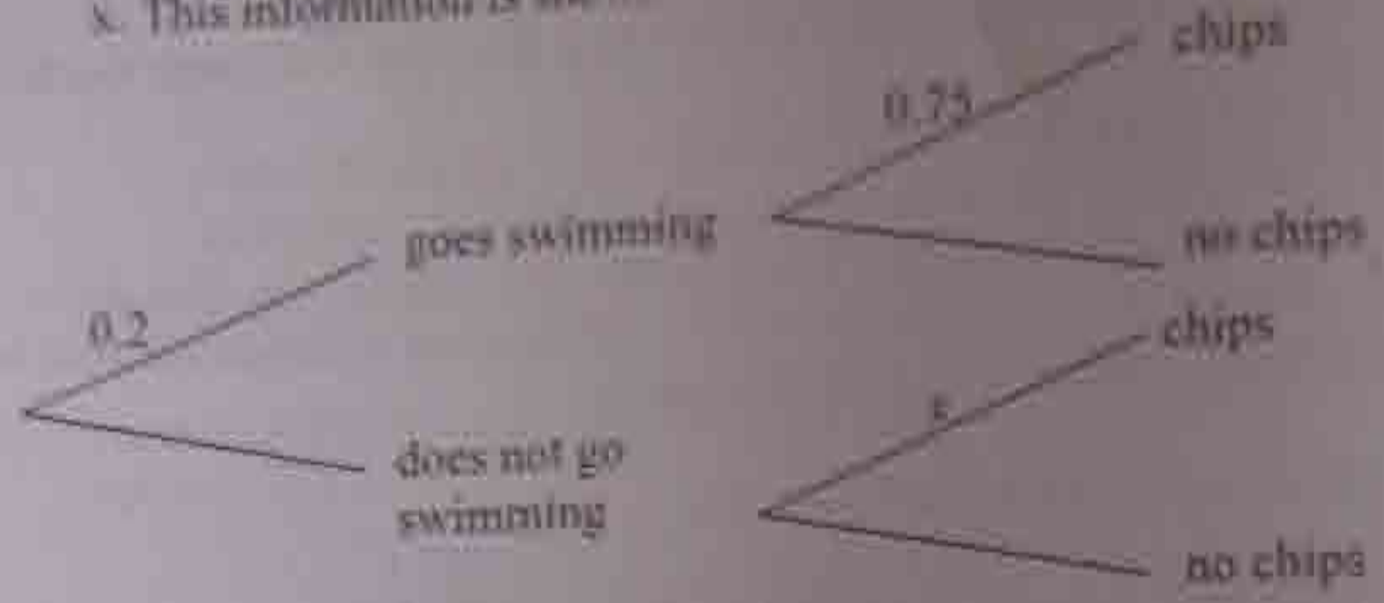
(i) Find $R_{180}M_2(x, y)$ and $M_2R_{180}(x, y)$.
(ii) Is $R_{180}M_2$ commutative? Give a reason.

(10 marks)

16. (a) The numbers 1 to 20 are each written on a card, the 20 cards are then mixed together. One card is chosen at random from the pack.

Find the probability that the number on the card is
(i) even
(ii) a factor of 24
(iii) prime

(b) The probability that Joti goes swimming on any day is 0.2. On a day when he goes swimming, the probability that he has chips for supper is 0.75. On a day when he does not go swimming the probability that he has chips for supper is x. This information is shown on the following tree diagram.



The probability that Joti has chips for supper on any day is 0.5.

(i) Find x.
(ii) Suppose that Joti has chips for supper, find the probability that he went swimming that day.

(c) The function f is defined by $f : x \to ax + b$, for $x \in \mathbb{R}$, where a and b are constants. It is given that $f(2) = 1$ and $f(5) = 7$.

(i) Find the value of a and b.
(ii) Solve the equation $f = f(x) = 0$. **(10 marks)**