

Candidate's Examination Number

PRESIDENT'S OFFICE, REGIONAL ADMINISTRATION AND LOCAL GOVERNMENT

KATAVI REGION

CERTIFICATE OF SECONDARY EDUCATION EXAMINATION

041

BASIC MATHEMATICS

Time: 3:00 Hours

22nd May, 2018

INSTRUCTIONS

1. This paper consists of two sections A and B with a total of **sixteen** (16) questions.
2. Answer **all** questions in section A and **four** (4) questions from section B. Each question in section A carries **six** (06) marks whereas in section B, each question carries **ten** (10) marks.
3. All necessary working and answers for each question done must be shown clearly.
4. **All** writing must be in blue or black ink except drawings which must be in pencil.
5. Mathematical tables may be used.
6. Calculators, cellular phones and any unauthorized materials are **not** allowed in the examination room.
7. Write your **examination number** on every page at the top right corner of your answer booklet (s)/sheet (s).

THE EXAMINER'S USE ONLY		
QUESTION NUMBER	SCORE	EXAMINER'S INITIALS
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
TOTAL SCORE		

SECTION A (60 Marks)Answer **all** questions in this section.

1. (a) If $p = 6.4 \times 10^4$ and $q = 3.2 \times 10^5$, find the value of:

(i) $p + q$

(ii) $p \times q$

- (b) Simplify:

$$\frac{27^{n+3} - 6 \times 3^{3n+3}}{3^n \times 9^{n+2}}$$

2. (a) Use logarithmic table to evaluate:

$$\sqrt{\frac{0.864^3 \times 43.7}{3.26}}$$

- (b) Simplify the expression:

$$\frac{5}{\sqrt{11} - 3} \div \frac{\sqrt{2}}{\sqrt{22} + 3\sqrt{2}}$$

3. (a) Given vectors $\underline{a} = -i + 3j$, $\underline{b} = 5i - 2j$ and $\underline{c} = 3\underline{a} + 4\underline{b}$, find a unit vector in the direction of vector $\underline{c}$.

- (b) Find the equation of the line passing at point (6,6) and it is perpendicular to the line that crosses the x -axis at $x = 3$ and y -axis at $x = -4$.

4. (a) The areas of two circles are in the ratio 16:9, find the radius of a small circle when the radius of the larger circle is 6cm.

- (b) The sides of a rectangle are in the ratio 3:5. If the perimeter of this rectangle is 800cm. Find the dimensions of the rectangle.

5. (a) In a class of 42 students, 31 students study history and 26 students study physics. Use Venn diagram or otherwise, find the number of students who study physics only.

- (b) Find the value of $\frac{\sin 150^\circ \cos 315^\circ}{\tan 15^\circ}$ without using mathematical table.

6. (a) The power (p) used in an electric circuit is directly proportional to the square of the current (I) when the current is 8 Ampere (A), the power used was 640 watt (w).

- (i) Write down equation relating the power (p) and the current (I).

- (ii) Calculate the current (I) when the circuit uses 360 watts (w).

- (b) Four people can eat 2 bags of rice, each weighing 10 kg in 12 days. How many people can eat 6 bags of rice of the same weight in 18 days?
7. (a) If the third term of a geometric progression is 100 and the sixth term is 800, find the fifth term and the sum of the first two terms.
- (b) How many integers are there between 14 and 100 which are divisible by 17?
8. (a) If $a\sqrt{\frac{x^2 - n}{m}} = \frac{a^2}{b}$, write x as a subject of the formula.
- (b) Factorize:
- (i) $4 - (3x - 1)^2$ and
- (ii) $16x^2 + xy - 15y^2$.
9. (a) Solve the equation $\sqrt{x^2 - 7} = 7 + x$.
- (b) An alloy consists of three metals A, B and C . In the proportion $A:B = 3:5$ and $B:C = 7:6$. Calculate the proportional of $A:C$.
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 **four** (04) questions from this section.

11. The number of units of protein and starch contained in each of two types of food A and B are shown in the table below:

Types of food	Units of protein per kg	Units of starch per kg	Cost per kg
A	8	10	400/=
B	12	6	500/=
Minimum daily requirement	32	22	

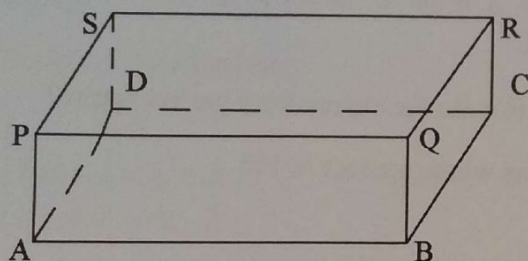
What is the cheapest way of satisfying the minimum daily requirements?

12. The heights 50 plants recorded by a certain researcher are given below. Heights are in centimetres (cm).

56 82 70 69 72 37 28 96 52 88

41 42 50 40 51 56 48 79 29 30

66 90 99 49 77 66 61 64 97 84



- (i) The length AC and
- (ii) The angle between PC and AC .

(e) Expenses

15. (a) Find the inverse and identity matrix of

$$A = \begin{pmatrix} 0 & 4 \\ -2 & 5 \end{pmatrix}$$

- (b) Determine the matrix
- A
- from the equation.

$$\begin{pmatrix} 5 & 3 \\ 4 & 5 \end{pmatrix} - 2A = \begin{pmatrix} -2 & 1 \\ 3 & 5 \end{pmatrix}$$

- (c) Given triangle with vertices
- $A(0,0)$
- ,
- $B(3,0)$
- and
- $C(3,1)$
- , find its image under:

(i) A translation by vector $(2,3)$ and(ii) The enlargement matrix $\begin{pmatrix} 2 & 0 \\ 0 & 2 \end{pmatrix}$.

- (d) Sketch the triangle and the image of part
- C
- (i) and (ii) on the same pairs of axes a comments on their sizes.

16. (a) The function
- f
- is defined as:

$$f(x) = \begin{cases} x & \text{if } x > 2 \\ 2 & \text{if } -2 < x \leq 2 \\ x + 4 & \text{if } x \leq -2 \end{cases}$$

(i) Sketch the graph of $f(x)$ and(ii) Determine the domain and range of $f(x)$.

- (b) Given that
- $f(x) = \frac{5x+7}{x+2}$
- , find
- $f^{-1}(x)$
- .

- (c) If the probability that Issa will pass mathematics is 0.3 and the probability that he will pass Biology is 0.5, find the probability that:

(i) He will pass both subjects and

(ii) He will fail both subjects.