## UNEB U.C.E MATHEMATICS (PAPER 2) 2006

## SECTION A

1. Simplify

(i) 
$$1\frac{1}{4} + 2\frac{1}{2} - 1\frac{3}{4}$$
  
(ii)  $2\frac{1}{2} \times 3\frac{2}{3} \div 1\frac{5}{6}$ 

$$\frac{x^2}{2} = \frac{4}{x}$$

2. Solve for **x** in

3. An examination is marked out of 130 marks. If Rita obtained 60% in the examination, how many marks did she get out of 130?

4. Given that  $\mathbf{P} = \{ (x, y): 2x - 3y \# 6 \}$  and  $\mathbf{Q} = \{ (x, y): x + y < 0 \}$ , show by shading the unwanted region, the region representing **P**#**Q**.

22.60

5. Use logarithm tables to evaluate  $47.80 \times 0.329$  correct to 2 decimal places.

6. Evaluate 5600 + 80,000, leaving your answer in the form  $\mathbf{a} \ge 10^{n}$  where  $1 \# \mathbf{a} < 10$  and  $\mathbf{n}$  is an integer.

7. In a homework marked out of 20, a group of pupils obtained the following marks: 15, 20, 18, 17, 8, 18, 16, 20, 18, 17, 12 and 19. Find the mode and median marks.

8. Under an enlargement of scale factor 3, the image of the point  $\mathbf{P}(0, 3)$  is  $\mathbf{P}'(4, 5)$ . Find the coordinates of the centre of enlargement.

9. Express 0.38 as a fraction in its simplest form.

10. A fair die is tossed only once and the number which appears on its top face noted. what is the probability of a top face showing

(i) A number greater than 4?

(ii) An odd number or prime number?

## **SECTION B**

11. Draw graphs  $y = 2x^2 + 3x - 3$  and y - 7x + 3 = 0 for -3 # x # 3 using a scale of 1cm: 2 units for the vertical axis and 1 cm: 0.5 units for the horizontal axis. Using your graph find the:

a) Point of intersection of the line and the curve,

b) Gradient of the curve between the points of intersection of the line and the curve.

12. a) At a certain point on the level ground the angle of elevation of the top of a tower,  $\mathbf{T}$  is 28<sup>0</sup>. At another point 100 meters away from the first point, the angle of elevation is 35<sup>0</sup>. Find the two expressions for the height of the tower hence find the height of the tower and give your answer to the nearest meter.

b) If  $\cos x = -0.634$  for  $90^0 < x < 270^0$ , find the two possible values of **x**.

13. A helicopter left Kampala at 0600hours and flew on a bearing of  $090^{0}$ , at a velocity of 300 km per hour. It landed at Nairobi airport at 0830 hours. At exactly 0900 hours, it left Nairobi airport and flew on a bearing of  $340^{0}$ , at the same original velocity. It then landed at Kitgum Airstrip at 1200 hours. Using graphical construction and a scale of 1cm: 100km, find the:

a) distance of kitgum from Kampala,

b) bearing of Kampala from kitgum.

14. Two cars **A** and **B** start off from rest at the same time moving in the same direction on a straight road. The speeds of the two cars in  $ms^{-1}$  are shown in the table below:

t (s)	0	2	4	6	8	10	12
speed of car A (ms <sup>-1</sup> )	0	4.5	9.0	13.5	18.0	22.5	27.0
speed of car B (ms <sup>-1</sup> )	0	2.0	5.0	10.5	23.0	27.0	28.5

Using a suitable scale, draw on the same axes the velocity time graphs of cars A and B.

From your graph find the:

a) Time when the two cars have equal speed and the magnitude of that speed.

b) Difference in speed after a period of 9 seconds,

c) Distance covered by car A by way of estimating the area under the curve described by car A for the 12 seconds.

15. **OAB** is a triangle, **OA** = **a**, and **OB** = **b**. points **C** and **E** are points on lines  $\overline{OA}$  and  $\overline{AB}$  such that they divide the lines  $\overline{OA}$  and  $\overline{AB}$  in the ratios 1:2 and respectively. Point **D** lies on **OE** such that  $\overline{OD} = 2\overline{DE}$ 

TRIANGLE

a) Find the vectors **AB**, **OE** and **CB** in terms of vectors **a** and **b**.

b) Show that the points **B**, **D** and **C** lie on a straight line.

16. A man earns a gross annual income of shs10,500,000. He is entitled to the following monthly allowances:

Children	shs15,000 for each child aged 12 and below. shs12,000 for each child between age 13 and 18 inclusive
Lunc	shs60,000
Transport	shs110,000
Medical	<sup>1/</sup> <sub>10</sub> th of gross monthly income
Marriage	$\frac{1}{25}$ th of gross monthly income.
Housing	<sup>1/</sup> <sub>100</sub> <sup>th</sup> of gross annual income

The man is married with five children of whom two are aged 12 and below, the other two aged 21 and 24 and the other aged 17.

The following tax structure is applicable on the taxable income in excess of shs30,000.

Taxable income (shs)Rate (% ages)

00001 - 30,000	Free
30,001 - 130,000	8.0
130,001 - 260,000	14.5
260,001 - 380,000	23.0
380,001 - 490,000	28.5
490,001 - 590,000	35.0
590,001 and above	42.5

(NB: A month has 30 days and a year 360 days)

Calculate:

- a) The man's
- (i) Total monthly allowances,
- (ii) Monthly taxable income,
- (iii) Monthly income tax.
- b) The percentage of his gross annual that goes to tax.
- 17. FIGURE

The figure above (in thick, heavy lines) shows a lamp shed **ABCD** bounded by circles of radii 15 cm and 25cm. the slanting side **AB** is 30 cm.

If the lamp shed was cut from an original figure **OABCD**, of a complete cone, calculate the:

- a) (i) slanting length of the cone **OAB**,
- (ii)the angle formed by producing CD and BA to O.
- b) (i) vertical height of the lamp shed,
- (ii) volume of the lamp shed.