UNEB U.C.E MATHEMATICS (PAPER 2) 2005

SECTION A

1. Find the highest common factor (**HCF**) of 18, 45 and 42.

2. When thirty times a number is increased by 32, the result in equal to twice the square of the number. Find the number.

3. If the exchange rate for a French France to a pound sterling is **£**1 = 9.00 francs and **£**1 - $1.53 (American dollars), find how many American dollars one would get in exchange for 1,000 francs.

4. In the diagram below, **O** is the centre of the circle. $\overline{AB}$ and $\overline{CB}$ are tangents to the circle. Angle **ABC** = 54^0.

CIRCLE

Find angle **ADC**.

5. The representative fraction of a amp is $\frac{1}{250,000}$

Find the area of a lake in (km^2) which is represented on the map by an area of $4.6cm^2$.

6. If $135_n = 75_{ten}$, find the value of n.

7. Use matrix method to solve the pair of simultaneous equations:

2x - y = 8,

4x - 3y = 14.

8. In the figure below, $\overline{AB}$ =6cm, $\overline{ED}$ = 2cm, $\overline{CD}$ = 4cm and $\overline{CE}$ =5cm.

FIGURE

If $\overline{ED}$ is parallel to $\overline{AB}$, find length $\overline{AE}$

9. A far coin with one side showing court of arms (**A**) and other side showing a cow (**C**) is tossed twice. Find the probability that at least a cow (**C**) will show up in the two tosses.

10. The angle of elevation of the top of a flag pole to a policeman of height 1.7 m is 20^0. If the policeman is standing at a distance of 16m from the pole on level ground, find the approximate height of the flag pole, correct to 2 significant figures.

SECTION B

11. Mr. Lwanga and Mr. Okot were each given Uganda shillings 980,000 at the beginning of 1999. Mr. Lwanga exchanged his money to united states dollars and then banked it on his foreign currency account at a compound interest rate of 2% per annum, while Mr. Okot banked his money without exchanging it, at a compound interest rate of 12% per annum. The exchange rates in 1999 and 2000 were ug.shs1, 250 and ug.shs1, 500 to a dollar respectively. If Mr. Okot withdrew shs120, 000 at the end of 2000.

(i) Calculate the amount of money (in ug.shs) each man had in the bank at the end of 2000.

(ii) Who had more money and by how much?

12. Two cyclists $\mathbf{C_1}$ and $\mathbf{C_2}$ begin traveling at the same time from town **A** to town **B,** 18km apart. $\mathbf{C_1}$ travels at a steady speed of 15km h^{-1} faster than that of cyclist $\mathbf{C_2}$ who also travels at a steady speed. When $\mathbf{C_1}$ has covered half

the distance, he delays for half an hour, after which he travels at a speed 20% less his original speed. He arrives in town **B** is minutes earlier than cyclist $\mathbf{C_2}$.

(i) Determine the speeds of the two cyclists, $\mathbf{C_1}$ and $\mathbf{C_2}$.

(ii) If cyclist $\mathbf{C_2}$ started from town B while $\mathbf{C_1}$at the same time started from town A and all the two travel non-stop, determine the distance from town A where the two cyclists will meet. After how long will they meet?

13. Using suitable scales, plot on the same axes the graphs of $y = 2x^2$ and for -2# x # 3. Use your graphs to estimate the solutions of the equations:

(i) $4x^2 - 5x - 10 = 0$,

(ii) $6x^2 + 10x - 30 = 0$.

Correct to 2 decimal places.

14. Town **B** is 100km away from town **A** on bearing of 135^0. Town **D** is on a bearing of 090^0 from town **B**, 124 km apart. Town **C** 160km away from town **D** is on bearing 030^0 from **D**.

a) Using a scale of 1 cm to represent 20 km, make an accurate drawing to show the relative positions and distances of towns **A, B, C** and **D**.

b) Determine The

(i) Shortest distance and bearing of town **C** from town **A**.

(ii) Distance and bearing of town **B** from town **C.**

15. a)(i) Find the images of the points **A**(1, 4), **B**(1, 1) and **C**(2, 1) of a triangle **ABC** under a transformation *l* whose matrix is $\begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix}$

(ii)Plot triangle **ABC** and its image **A' B' C'** on the same graph. Describe the matrix transformation *l*. hence deduce the matrix transformation which would map triangle **A' B' C'** onto triangle **ABC**.

b) triangle **A' B' C'** is mapped onto triangle **A'' B'' C''** by matrix transformation **M** = $\begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}$

(i) Find the coordinates of **A'' B'' C''**.

(ii) Plot **A'' B'' C''** on the same graph in (a)(ii) above. Use your graph to describe a single transformation that will map triangle **ABC** onto triangle **A'' B'' C''**. Hence find the single matrix transformation which maps triangle **ABC** onto **A'' B'' C''**.

16. in a triangle **OAB**, **OA** = **a, OB = b**. a point **L** is on the side **AB** and **M** on the side **OB**. **OL** and **AM** meet at **S**. $\overline{AS} = \overline{SM}$ and **OS** = $^{3}/_{4}$ **OL**.

Given that **OM** = **xOB** and **AL** = **yAB**, express the vectors,

(i) **AM** and **OS** in terms of **a, b** and **x**.

(ii) **OL** and **OS** in terms of **a, b** and **y**.

Hence find **x** and **y.**

17. The figure below shows part of a solid right circular cone whose original height was 20 cm before part of its top was cut off. The radius of the bas is 12 cm and that of the top is 8 cm. a circular hole of radius 8 cm was drilled through the centre of the solid as shown:

CONE

Calculate the volume of the remaining solid. $[Use\ \pi = 3.142]$