456/2

Mathematics

Paper 2

Jul. /Aug. 2019

2 ½ Hours

UTEB - JOINT MOCK EXAMINATIONS, 2019

Uganda Certificate of Education

MATHEMATICS

Paper 2

2 Hours 30 minutes

INSTRUCTIONS TO CANDIDATES

- Answer **ALL** questions in section **A** and **NOT** more than five questions from section **B.**
- Any additional question(s) answered will not be marked
- All necessary calculations **MUST** be done on the answer booklet provided. Therefore, no paper should be given for rough work.
- Only silent non-programmable scientific calculators may be used.
- Mathematical tables, graph papers are provided.
- No paper should be given for rough work
- State the degree of accuracy at the end of each answer attempted using a calculator or tables; and indicate **Cal** for calculator, **Tab** for mathematical table

Turn Over

SECTION A: COMPULSORY (40 MARKS)

Attempt **all** questions in this section

1. Express 0.266…….. as a fraction in its lowest form. **(04 Marks)**

2. Use logarithms to evaluate $\frac{24.6}{0.223x132.5}$ **(04 Marks)**

3. Solve for x if $27^{2x-5} = \frac{1}{\sqrt{9^{x+1}}}$ **(04 Marks)**

4. A certain amount of money was shared between Tom, James and John in ratios 2:3:6 respectively. John got Shs.28, 000 more than Tom. How much did James get?

(04 Marks)

5. Find the highest common factor (H.C.F) and the lowest common factor (L.C.M) of 18, 45 and 42. **(04 Marks)**

6. Find the equation of a line passing through the point **P**(-2, 3) and parallel to the line 2x + 3y = 0. **(04 Marks)**

7. Given that $\boldsymbol{a} = \begin{pmatrix} 3 \\ 2 \end{pmatrix}$, $\boldsymbol{b} = \begin{pmatrix} 4 \\ 1 \end{pmatrix}$ and $\boldsymbol{c} = \begin{pmatrix} 0 \\ 7 \end{pmatrix}$, find $|\boldsymbol{a} + 2\boldsymbol{b} - 3\boldsymbol{c}|$.

(04 Marks)

8. Jane deposited Shs.240,000 in a bank that offered a simple interest of 5%. How much did she withdraw from her account after 18 months if she wanted all her money?

(04 Marks)

9. It is given that y varies inversely as the square root of x and that when y = ½, x =100, find the value of y when x = 25. **(04 Marks)**

10. Given that $f(x) = x^2 + 1$ and $g(x) = x - 1$, find the value of x for which $fg(x) = gf(x)$.

(04 Marks)

SECTION B (60 MARKS)

Attempt any five questions from this section

11. Forty students of Kirungo S.S were interviewed to find out how many liked posho (P), rice (R), or matooke(M). 3 liked neither of these foods. It was found that an equal number of students liked matooke and rice. 15 liked both matooke and rice, 26 liked rice, 14 liked rice and posho and 9 liked all the 3 foods.

(a) How many students;

(i) Liked posho

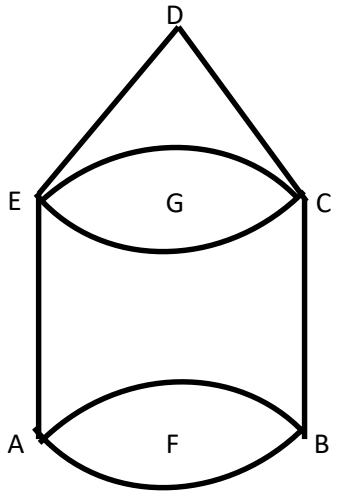
(ii) Did not like posho

(iii) Liked one food

(b) Find the probability that a student chosen at random likes at least two foods.

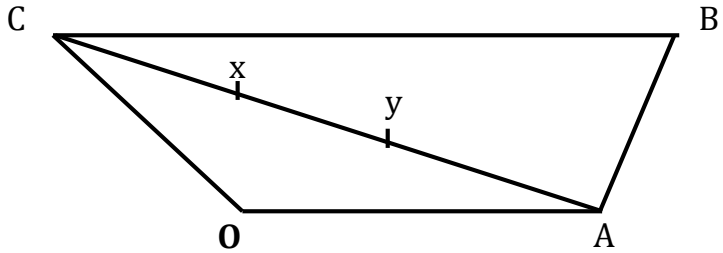
(12 marks)

12. (a) The diagram below shows a giant water tank ABCDE which is made in the shape of a right circular cone mounted on a cylinder. The radius of the cylinder AF = EF = 6M. The slant length of the cone ED = CD = 7.5m and the height of the cylinder BC = AE = 10m. if the water tank has to be painted on the outer surface, calculate the surface area to be painted in m^2 (take $\pi = 3.142$).



(b) Calculate the volume of water needed to fill the tank in m^3. (take $\pi = 3.142$). **(12 marks)**

13. The figure below shows a trapezium OABC OA = ***a***, OC = ***c*** and CB = 3***a***.

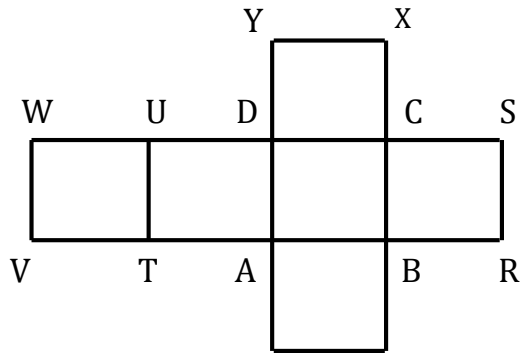


(a) X and Y are points on AC such that AX : XC = 1 : 2 and 4AY = AC. Give the following vectors in terms of ***a*** and ***c***.

(b) Show that O, Y and B are collinear. **(12 Marks)**

Turn Over

14. The figure below shows the net which can be used to make a cube.



The net is folded such that P and T meet at F. Q, R and V meet at E X, S and W meet it at H, U and Y meet at G.

(a) Draw the cube formed (ABCDEFGH).

(b) If VT = TA = AR = BR and length VR = 20cm, calculate;

(i) length DE

(ii) angle between the line DE and plane ABCD.

(iii) angle between ADHE and ABCD.

(iv) surface area of the cube.

(v) Volume of the cube.

(12 Marks)

15. A cyclist P leaves town B at 1:06pm for village A riding nonstop at a steady speed of 15kmh^{-1} and arrives in village A at 3:06pm. Another cyclist Q left village A at noon for town B. From A cyclist Q rode at a steady speed of 20km for 45 minutes. It then rested for 30 minutes and then continued with a steady speed of 15km/h and reached town B at 2:15pm.

(a) Represent the motion of cyclists P and Q on a distance-time graph. (Use a scale of 1cm : 15 minutes on the x-axis, 2cm : 5km on the y-axis).

(b) Use your graph to find;

(i) when did the two cyclists pass each other and how far from B were they at this time.

(ii) How far apart were the two cyclists at 2:00pm.

(12 Marks)

16. (a) The distance in metres of an object varies partly with time t seconds and partly with the square root of time. Given that the distance S = 14 when t =4 and S = 27 when t = 9, write equation connecting S and t.

(b) Find the value of S when t = 64 using the equation above.

(12 Marks)

17. A certain employee earns a gross monthly income of Shs.910, 000. The allowance accruing to him includes:

Housing Shs. 240,000 per year

Head of department Shs.300,000 per annum

Class-teacher Shs.10,000 per month

Water and electricity Shs.180,000 per year

House-master Shs.5,000 per week

He has also three children aged 8 years, 15 years and 18 years and the company gives child allowance for only two according to the age brackets below:

Taxable income (Shs)	Tax rate (Shs)
180,001 – 280,000	10
280,001 – 380,000	15
380,001 – 430,000	25
430,001 – 480,000	30
480,001 and above	45

(a) Help the employee to calculate his;

(i) monthly allowances

(ii) taxable income

(iii) monthly income tax

(b) What percentage of his income goes to tax?

(12 Marks)

End