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MATHEMATICS
Paper 2
June./July.2022
2½ hours

KAGADI JOINT MOCK EXAMINATIONS CONSULT

Uganda Certificate of Education

MATHEMATICS

Paper 2

2 hours 30minutes

INSTRUCTIONS TO CANDIDATES:

Answer **all** *questions in section* **A** *and any* **five** *questions from section* **B**.

Any additional question(s) answered will **not** *be marked.*

All *necessary calculations must be done in the answer booklet(s) provided. Therefore, no paper should be given for rough work.*

Graph paper is provided.

Silent, non – programmable scientific calculators and mathematical tables with a list of formulae may be used.

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SECTION A: (40MARKS)

Answer **all** *questions in this section.*

1. Express 150 and 216 each as a product of its prime factors and hence find their highest common factor (*HCF*). *(04marks)*

2. Express 3.20303…… in the form of $3\frac{x}{y}$, where x and y are integers. *(04marks)*

3. Given that $125_n = 221_{six}$, find the base n. *(04marks)*

4. Given that $\boldsymbol{c} = \begin{pmatrix} 6 \\ 0 \end{pmatrix}$ and $\boldsymbol{d} = \begin{pmatrix} 4 \\ 1 \end{pmatrix}$. Find the magnitude of $4\boldsymbol{d} - \boldsymbol{c}$. *(04marks)*

5. The capacities of two similar bottles are 300ml and 8100 ml . If the height of larger bottle is 12cm, find the height of the smaller one. *(04marks)*

6. Rationalize: $\frac{2}{3-\sqrt{5}}$. *(04marks)*

7. The quantity P varies directly as Q and inversely as the square of y. Give that $y = 50$, $Q = 100$ and $P = 80$, find y when $Q = 320$ and $P = 100$. (*04marks)*

8. A map is drawn to scale of 1**:**400000. Calculate the area in km^2, represented by a rectangle 2cm by 4.2cm. *(04marks)*

9. Determine the equation of the line though $A(2 , 3)$ which is perpendicular to the line whose equation is $5y + 4x = 20$. *(04marks)*

10. Kato bought a bicycle at Shs 345000 at the beginning of 2015.The bicycle depreciates at a rate of 15% per annum . If Kato sold the bicycle at a loss of 30% at the beginning of 2018, determine the price at which he sold the bicycle. *(04marks)*

SECTION B : (60MARKS)

Answer any **five** *questions from this section.* **All** *questions carry equal marks.*

11. Two towns **A** and **B** are 200km a part. A taxi leaves **B** at 9:00am and travels towards **A** at an average speed of 50km/hr. One and a half hours later,the lorry leaves from **A** and travels towards **B** at an average speed of 40km/hr.

(a) On the same axes, draw a distance – time graph for each vehicle, use 2cm to represent 20km on vertical axis and 2cm to represent 1 hour on a horizontal axis .

(05marks)

(b) From your graph, determine the;

(i) time when the two vehicles met. *(02marks)*

(ii) distance from **B** when the two vehicles met. *(02marks)*

(iii) difference in their time of arrival *(03marks)*

12. (a) Given that $f(x) = \frac{2x-a}{b-x}$, $f(2) = -1$ and $f(0) = 1$.

Find the;

(i) values of a and b. *(04marks)*

(ii) value of x for which $f(x)$ is undefined. *(02marks)*

(b) Functions h and g are defined by $h(y) = \frac{y}{y-5}$ and $g(y) = 2y + 5$.

Find:

(i) $gh(10)$ *(03marks)*

(ii) $h^{-1}(6)$ *(03marks)*

13. On our head teacher's birth day 71 guests were asked which type of drinks they each prefer among Novida (*N*) , Wine (*W*) and Fanta (*F*).
It was found out that an equal number of guest preferred *N* and *W*. 10 guests preferred *N* and *F*, 11 guests prefer *F* and *W* while 6 preferred *N* and *W* only. 26 preferred *F* and 5 preferred *N* only. The number of guests who preferred *F* only doubles those who preferred *W* only.

(a) Represent the above information on a Venn −diagram. *(06marks)*

(b) Find the number of guests who;

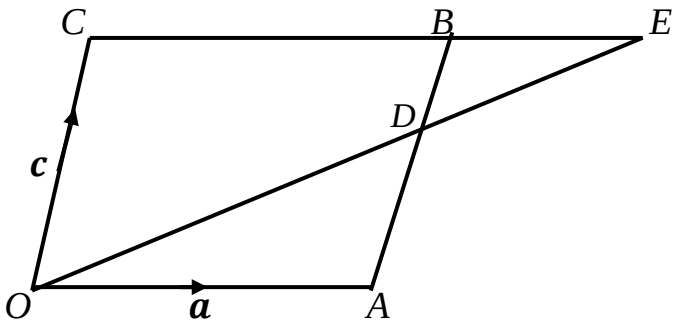
(i) preferred *W* only. *(02marks)*

(ii) did not like any of the three drinks. *(02marks)*

Turn Over

(c) If a guest is chosen at random from the group. Find the probability that he/she preferred at most one drink. *(02marks)*

14. The diagram shows a parallelogram ***OABC*** with ***OA*** = ***a*** and ***OC***= ***c***. *D* is a point on *AB* such that *AD* **:** *DB* = 2**:**1. *OD* produced meets *CB* produced at *E*. ***DE*** = *h****OD*** and ***BE*** = *k****CB***.



Find;

(i) ***BE*** in terms of ***a*** and *k* *(03marks)*

(ii) ***DE*** in terms of ***a*** , ***c*** and *h* *(03marks)*

(iii) the values of *h* and *k*. *(06marks)*

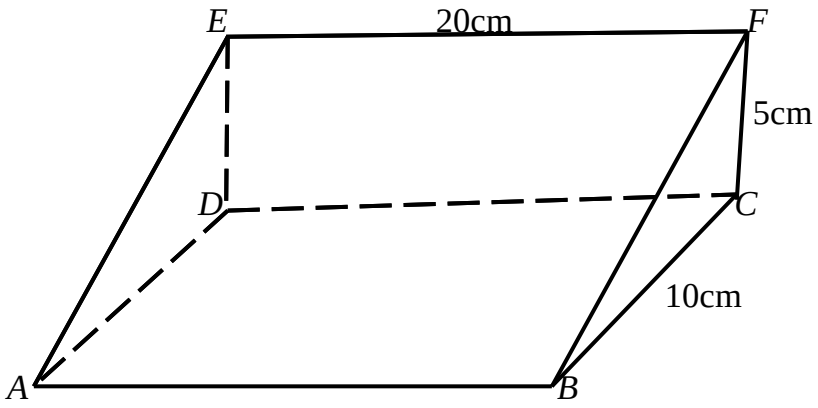
15. A quantity *P* is partly constant and partly varies as the cube of *Q*. When *Q* = 1, *P* = 5 and when *Q* = 2 , *P* = 19.
Find the;

(a) equation connecting *P* and *Q*. *(08marks)*

(b) value of *P* when *Q* = 10. *(02marks)*

(c) value of *Q* when *P* = 253. *(02marks)*

16. The figure below shows awedge with arectangular base *ABCD* and avertical rectangular face *DCFE* with *EF* = 20cm , *BC* = 10cm and *FC* = 5cm.



Find the lengths;

(i) *BF* *(02marks)*

(ii) *AF* *(03marks)*

(b) Calculate the angle between;

(i) *AF* and the plane *ABCD*. *(02marks)*

(ii) planes ABFE and the base ABCD. *(03marks)*

(c) Volume of the wedge. *(02marks)*

17. (a) A motorcycle is being sold in cash or hire purchase. The cash value is Shs 1935000. On hire purchase , a 45% down payment of the cash value is made and followed by equal monthly installments of 8.5% of the cash value for 9 months. Calculate the money saved when one buys in cash rather than hire purchase. *(05marks)*

(b) The income tax rates of a certain country are shown below.

Taxable income (shs)	Rate (%)
01 - 200,000	6
200,001 – 500,000	13
500,001 – 900,000	20
900,000 and above	30

(i) Calculate the income tax an employee pays if the employee's taxable income is Shs 1,170,000.

(ii) Given that employees un taxable allowances is Shs 140750 . Find the employee's net income. *(07marks)*

END