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MATHEMATICS
Paper 2
July/Aug. 2019
2½ hrs

UGANDA TEACHERS' EXAMINATIONS SCHEME

Uganda Certificate of Education

JOINT MOCK EXAMINATIONS

MATHEMATICS

Paper 2

2 hours 30 minutes

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 shown clearly with the rest of the answers.*
Therefore, no paper should be given for rough work.

Graph papers are provided.

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

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SECTION A: (40 MARKS)

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

1. Solve for x; $\text{Log}_3 (2x + 1) = 2$ (04 marks)

2. A line AB Passing through points $A(-2, n)$ and $B(3, -1)$ is perpendicular to the line $5x - 6y + 24 = 0$; Find the value of n. (04 marks)

3. Calculate the radius in cm of a hemispherical bowl of capacity 2litres. (04 marks)

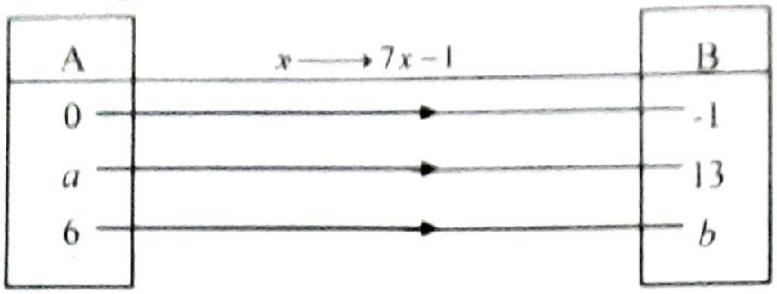
4. Two sets P and F are defined by
   P= {first eight prime numbers}, F={All factors of 30}
   Find: a) $(P \cap F)'$
   b) $n(P \cap F)'$ (04 marks)

5. Determine the equation of line passing through the point (3, 1) which cuts the y-axis 2 units below the origin. (04 marks)

6. A plot of land of area 200km^2 is represented by an area of 8cm^2 on the map. Find the scale of the map. (04 marks)

7. When a laptop is sold at shs. 2,400,000, the seller gets $6\frac{2}{3}\%$ Profit. Calculate the cost price of the laptop. (04 marks)

8. The arrow diagram below shows a relation $x \longrightarrow 7x - 1$ for the domain A and the range B.



Find the values of a and b. (04 marks)

9. A cylindrical pipe of radius 10cm and surface area 440cm^2 used to transport water. Determine its:

a) height,

b) volume. (04 marks)

10. Given two points $P(2, -1)$ and $Q(-6, 14)$. Find:

a) vector $\boldsymbol{PQ}$,

b) $|\boldsymbol{PQ}|$. (04 marks)

SECTION B: (60 MARKS)

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

11 a) Jane, Mary and Cissy shared books in the ratio 3:5:7; Cissy got 10 more books than Mary. Determine the:

(i) total number of books shared by all girls,

(ii) number of books received by Jane. (06 marks)

b) Kato can cultivate a plot of land in 30 days while Wasswa can cultivate the same plot of land in 20 days. If both boys work together without changing the work rate; How long will they take to cultivate this plot of land?

(06 marks)

12. A group of ninety two students was interviewed.
39 could play football (F), 33 could play Tennis (T), 16 could play both F and T, 11 could play both F and V, 13 could play both V and T, 20 could play only Tennis.

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

b) How many students could:
   i) play all of the three games,
   ii) not play any of the above games? (04marks)

c) What is the probability that a student chosen at random could play at most a game mentioned? (02 marks)

13 a) A motorcycle travelling at 80kmh^{-1} is chasing a bicycle 5km away and travelling at 60kmh^{-1}. Calculate the time taken by the motorcycle to catch up with the bicycle and distance covered by the motorcycle by that time. (06 marks)

b) A Fuso left town A for town B at 100kmh^{-1} and at the same time a bus left town A also for B at 150kmh^{-1}. If the bus arrived in town B 18 minutes earlier than a Fuso. Calculate the distance between A and B. (06 marks)

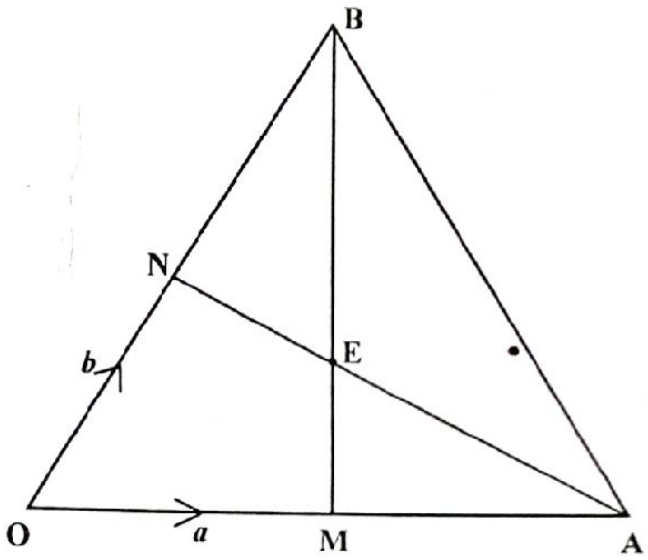
14. Two functions f(x) and $g(x)$ are such that $f^{-1}(x)=\sqrt{3x+2}$ and $g(x)=x-2$.

a) Find:
   i) $f^{-1}\left(\frac{2}{3}\right)$,

   ii) $f(-3)$. (06 marks)

b) Determine the values of x if $fg(x)=\frac{-1}{3}$. (06 marks)

15. In the diagram below, $OA = a$, $OB = b$, M is the mid point of OA, N is on OB such that $3ON = 2NB$. MB and NA meet at E such that $ME = hMB$, and $NE = kNA$.



a) Express the vector ME in terms of

i) a, b and h,

ii) a, b and k. (07 marks)

b) Solve for the scalars h and k. (05 marks)

16. The table below shows the tax structure for employees in acertain country.

Annual taxable income (shs)	Tax rate (%)
01 - 400,000	10.2
Next 200, 000	18.5
Next 300, 000	20.0
Any excess	30.6

An employee earns gross annual imcome of shs 2,154,000 which includes the following allowances.

Rent 10% of the annual gross income.

Transport Shs. 75,000 per month

Family Shs. 423,000 per year

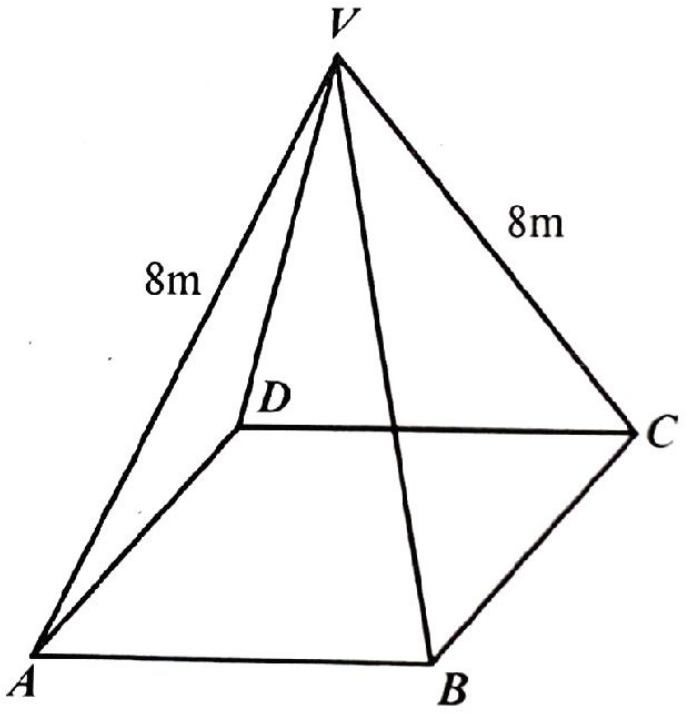
Calculate the employee's annual:

a) taxable income, (05 marks)

b) income tax, (05 marks)

c) net income. (02 marks)

17. The figure below shows a right vertical pyramid *ABCDV* with a square base *ABCD* whose area is $36m^2$.
AV = *BV* = *CV* = *DV* = 8m



Find the

a) Volume of the Pyramid above, (05 marks)

b) total surface area of the pyramid, (04 marks)

c) angle between plane *BCV* and the base. (03 marks)

END