456/2

MATHEMATICS

PAPER 2

JULY / AUGUST 2017

2½ HOURS

ASSOCIATION OF SECONDARY SCHOOLS HEADTEACHERS UNION (ASSHU)
NTUNGAMO

UGANDA CERTIFICATE OF EDUCATION

456 /2 MATHEMATICS

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2½ HOURS

INSTRUCTIONS TO CANDIDATES

✓ Answer all the questions in Section A and any 5 (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 answer.
✓ Graph paper is provided.
✓ Silent/Non programmable scientific calculators and mathematical tables with a list of formulae may be used.

SECTION A (40 MARKS)

1. Express 5.25454…. as a fraction in its simplest form. *(04 mks)*

2. Given that $f(x) = \dfrac{1}{ax+8}$ and $f(3) = \dfrac{1}{14}$, find the value of a. *(04 mks)*

3. A line of gradient 3 passes through point A(2, 3), find the equation of a parallel line to this line passing through (-1, -3). *(04 mks)*

4. The height of the cone and its radius were doubled. If the volume of the cone was $176cm^3$ before the increase, find the new volume. *(04 mks)*

5. Three sets are defined by:
   A = { all prime numbers less than 20}
   B = { all triangle numbers less than 20}
   C = {all odd numbers divisible by 3 and less than 20}
   List the members of all sets and find n(A n B n C). *(04 mks)*

6. A map is drawn to a scale of 1:50,000. Find the area in cm^2 on a map of a field with actual area of $6000m^2$. *(04 mks)*

7. Mr. Kato bought a spacio car for shs. 16,500,000. If it depreciates at a rate of 10% per annum, calculate; the value of the car after 3 years. *(04 mks)*

8. Two lines are such that AB is parallel to CD. Vector $AB = \begin{pmatrix} 1 \\ 2 \end{pmatrix}$, C (2, 3) and CD is

   3 times AB, find the position vector of D. *(04 mks)*

9. The diagram below shows the net of the pyramid. *(04 mks)*
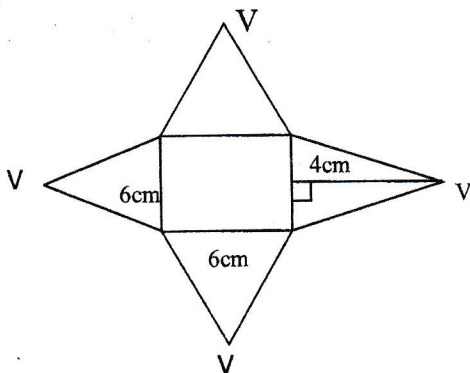
(i)   Draw the pyramid.

(ii)   Find the height of the pyramid.

10.   The heaps of rice are of similar shape and contain 128 kg and 250kg of rice respectively. If the height of the bigger heap is 70cm, find the height of the smaller one.   *(04 mks)*

SECTION B:

Answer any five questions from this Section. All questions carry equal marks.

11.   120 students were asked to write down which of the three types of fruits Banana(B), Pineapple(P) and Mangoes(M) they like, 9 did not like any of these fruits. 92 like bananas, 87 like pineapples and 79 like mangoes, 75 like bananas and pineapples, 68 like pineapples and mangoes and 72 like mangoes and bananas.

  (a) (i)   Represent the information above on a Venn diagram.

        (ii)   Find the number of students who like all.

  (b)   Find how many like

       (i)   Only bananas

       (ii)   More than one of these types of fruits.

  (c) Find the probability that a student like two types of fruits.

                                                       (12 mks)

12(a) Without using tables, solve the equation:

$$\log(5x - 4) = \log(x + 1) + \log 4$$

  (b) Use logarithms tables to evaluate:

$$\frac{0.6327 \, x\sqrt[3]{2,834}}{2.918}$$

                                                        (12 mks)

13.   In a race a tortoise sets off at 10 O'clock am and runs at 2km/hr constantly until the end of the race. It takes him 3 hrs. A hare sets off on the same race at 11 O'clock at a constant speed of 15km/hr. He stops after 20 minutes and falls asleep for 1½ hours. He then sets off again at 15km/hr until the end of the race. One the same axes, draw distance time graphs of this race for the hare and for the tortoise. Use it to answer these questions. (Use a scale of 1cm $\equiv$ 20 minutes and 1cm $\equiv$ 1km)

  (a)   At what times does the hare overtake the tortoise?

(b)   What is the average speed of the hare for the whole race in km/hr?

(c)   Who wins the race and by how many metres?   *(12 mks)*

14.
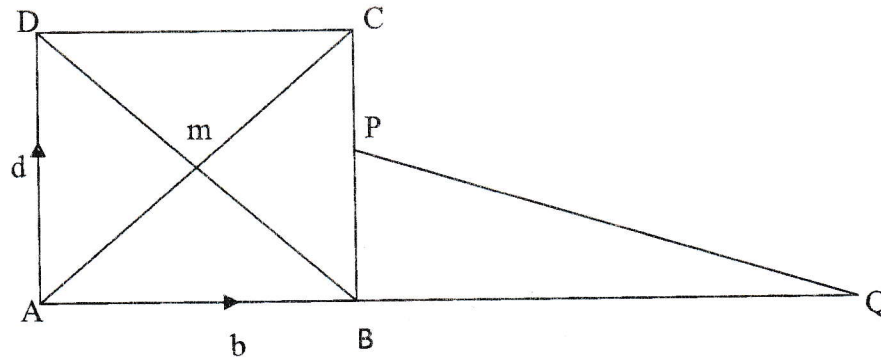
In the above diagram, ABCD is a square with centre M. $2\overline{BC} = 3\overline{PC}$, $AQ = 2AB$,
AB = b and AD = d

(a)   Express in terms of b and d: AC, BD, BP, AP, PQ.   *(10 mks)*

(b)   Show that the points M, P and Q are collinear. State the ratio MP : PQ.   *(02 mks)*

15(a)   If f(x) = 4x and g(x) = 7x − 3, find h(x) such that $h^{-1}(x) = fg^{-1}(x)$

(b)   Given that $f(x) = 3(2x - 1)$, find

(i)   f(11)

(ii)   the value of x such that f(x) = -6

(c)   Given $f(x) = \frac{1}{2}(10 - 3x)$, find the range corresponding to the domain {1, -3, 5, -6}.*(12 mks)*

16(a) A business máde of gross profit of shs. 5,400,000; 20% of the gross profit was paid in taxes.
       70% of the remainder was spent on rent, wages and loan repayment in the ratio 2:3:4
       respectively. Calculate:
       (i)   the amount paid as taxes   *(03 mks)*
       (ii)   the amount spent on rent, wages and loan repayment.   *(01 mk)*
       (iii)   The amount of rent paid.   *(02 mks)*
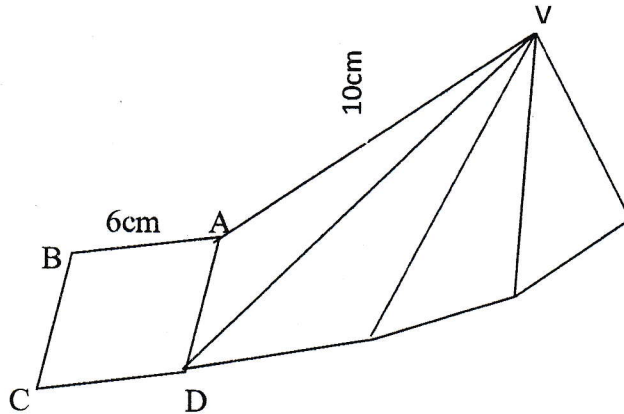   (iv)   The net profit as the percentage of the gross profit. *(03 mks)*
    (b) Given that 420 Us dollars are equivalent to Ug shs. 399,000. Find;
         (i)   the rate of exchange
         (ii)   the equivalent of U sh. 1,500,000 in US dollars.   *(03 mks)*

17. The figure shows a net which can be folded to form a right pyramid VABCD where ABCD is a square base. $\overline{AB} = 6cm$ and $\overline{VA} = 10cm$

(a) Sketch the pyramid VABCD and mark the point m the intersection of the diagonals $\overline{AC}$ and $\overline{BD}$ of the square base. *(02 mks)*

(b) Calculate the lengths $\overline{AM}$ and $\overline{VA}$ *(07 mks)*

(c) Determine the angle of inclination of the face VAB to the base ABCD. *(03 mks)*

END