

**456/2**  
**MATHEMATICS**  
**Paper 2**  
**July/Aug. 2019**  
2<sup>1</sup>/<sub>2</sub> hours



*“Together for Mathematics”*

**SECONDARY MATHEMATICS TEACHERS' ASSOCIATION**  
**SMATA 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 any **five** questions from Section **B**.

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

All necessary calculations **must** be done on the same answer booklet provided. Therefore, no paper should be given for rough work.

Graph paper is provided.

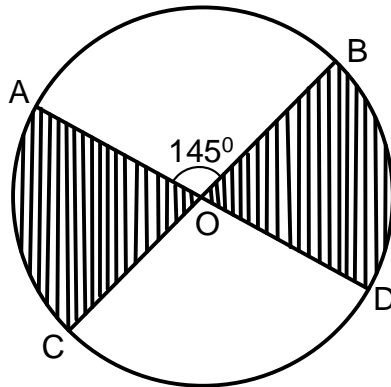
Silent, non-programmable scientific calculators and mathematical tables with a list of formulae may be used.

State the **degree of accuracy** at the end of each question attempted using calculator or mathematical table and indicate **Cal** for calculator or **Tab** for mathematical tables.

## SECTION A: (40 MARKS)

Attempt **all** questions from this section

1. Without using a calculator, find the exact value of  $(0.0625)^{3/4}$  **(04 marks)**
2. A survey of 230 households showed that all of them had a farm or a garden or both. If 170 had gardens and 69 had farms, how many households had a farm and garden? **(04 marks)**
3. A line passes through the points (1, 1) and (-1, 2), Find the coordinates of its  $x$  - intercept. **(04 marks)**
4. Mr. Opolot wants to invest a certain sum of money so that its value after 3 years will be shs. 200,000/=. How much should he invest at 10% per annum compound interest? **(04 marks)**
5. Given that  $h(x) = \frac{1}{2x-8}$ ,  
find; (i)  $h\left(\frac{1}{2}\right)$   
(ii) the value of  $x$  for which  $h(x)$  is meaningless. **(04 marks)**
6. The figure below shows a circular field centre O, in which  $\angle AOB = 145^\circ$  and  $AD = CB = 12$  m. The shaded area is to be filled with rose flowers.



- Calculate the area occupied by the flowers. (Use  $\pi = \frac{22}{7}$ ). **(04 marks)**
7. An electrical machine consumes 20 kilowatts of power every 2 hours. Find how much power in kilowatts, will three such machines consume in 10 hours. **(04 marks)**
  8. Express  $\frac{4}{\sqrt{5}+\sqrt{2}}$  in the form  $a(\sqrt{b} - \sqrt{c})$ . Hence, state the values of  $a$ ,  $b$  and  $c$ . **(04 marks)**

9. Given that  $\mathbf{OA} = \begin{pmatrix} -3 \\ 2 \end{pmatrix}$  and  $\mathbf{AB} = \begin{pmatrix} 9 \\ 6 \end{pmatrix}$ , where O is the origin. Determine;

(i) The position vector of B.

(ii)  $|\mathbf{OB}|$

**(04 marks)**

10. A metal scrap in form of a solid cone of height 14cm and radius 9cm is recast into a solid sphere. Calculate the surface area of the sphere. (Take  $\pi = \frac{22}{7}$ ).

**(04 marks)**

### SECTION B: (60 MARKS)

Attempt any **five** questions from this sections.

11. (a) Three business partners Maseruka, Oguti and Natulinda contributed 600,000, 1,000,000 and 650,000 shillings respectively while starting their business.

(i) Find the ratio of their contributions in its simplest form.

(ii) If the business made a profit of shs. 1,350,000; Find how much Oguti got if the profit was shared in the same ratio as their contributions.

**(05 marks)**

(b) The value V of a diamond is proportional to the square of its weight, W. It is known that a diamond weighing 5 grams is worth sh. 250,000.

(i) write down an expression which relates V and W.

(ii) find the value of a diamond weighing 40 grams.

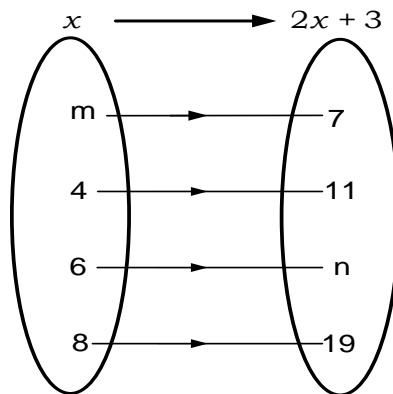
(iii) find the weight of a diamond worth 6,400,000. **(07 marks)**

12. (a) Draw a papygram for the relation “is less than” of the set

$$T = \{-2, 0, 1, 3\}$$

**(02 marks)**

(b) Given that the mapping  $x \longrightarrow 2x+3$ . Find the unknown values in the domain and range below;



**(04 marks)**

(c) Given that  $f(x) = 2\sqrt{x+1}$  and  $g(x) = x^2 - 4$

(i)  $fg(x)$  when  $x = -2$

**(03 marks)**

(ii)  $(gf)^{-1}$

**(03 marks)**

13. In a job interview of 100 applicants, 40 passed the interview. The remainder failed due to lack of at least one of the following three attributes; communication skills (C), presentation skills (P), and experience (E). 15 applicants had only one problem of lack of communication skills, 4 applicants lacked both C and E only. 5 lacked both P and C only. 3 lacked all the 3 attributes. The number of those who lacked only presentation skills were equal to those who lacked experience only.

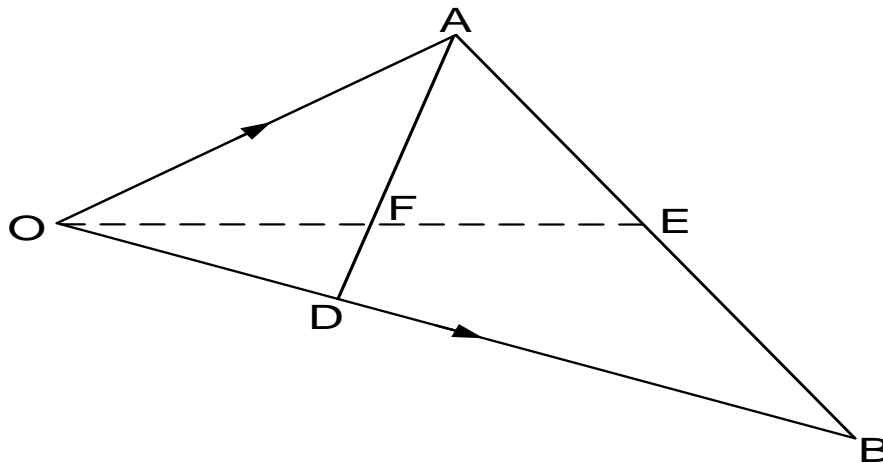
(a) Represent the above information on a venn- diagram?

(b) How many applicants lacked experience only?

(c) If an applicant was selected at random among those who failed the interview, find the probability that he or she lacked only one attribute.

**(12 marks)**

14. In the figure below, E is the mid-point of AB, OD: DB = 2:3 and F is the point of intersection of OE and AD.



Given that  $\mathbf{OA} = \mathbf{a}$  and  $\mathbf{OB} = \mathbf{b}$ .

(a) Express in terms of  $\mathbf{a}$  and  $\mathbf{b}$

(i)  $\mathbf{AD}$

(ii)  $\mathbf{OE}$

(b) Given further that  $\mathbf{AF} = s\mathbf{AD}$  and  $\mathbf{OF} = t\mathbf{OE}$ . Find the values of  $s$  and  $t$ .

(c) Show that points E, F and O are collinear.

**(12 marks)**

15. Town A and B are 80km apart. A bicycle rider leaves town A at 6:00am for town B at a steady speed of  $10\text{kmh}^{-1}$ . Two hours later, a loaded Tukutuku leaves the same town B at a steady speed of  $20\text{km}^{-1}$ , but just after an hour of its journey, the Tukutuku gets a mechanical breakdown, then repaired for 1 hour and thereafter resumes its journey with a new speed of  $40\text{kmh}^{-1}$ . After reaching town B, the Tukutuku offloads for 30 minutes before returning to town A by the same road and arrives at town A at 2:30pm.

(a) Using scales of 2cm: 1 hour and 2cm : 10km, draw on the same axes the distance – time graphs.

(b) Use your graph to determine;

(i) The time and distance from A the Tukutuku overtakes the bicycle rider on its way to town B.

(ii) The time the Tukutuku meets the bicycle rider on its way back.

(c) Find the average speed of the Tukutuku on its way back to town A. **(12 marks)**

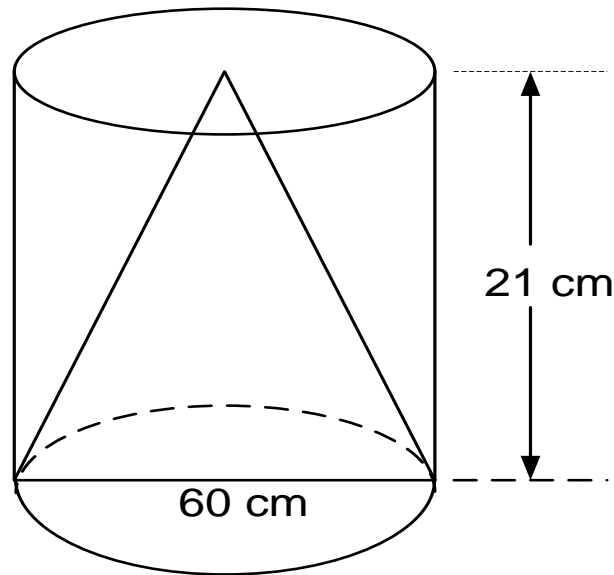
16. (a) The cash price of a solar panel is shs. 200,000. A customer opts to buy the solar panel of Hire purchase terms by paying a deposit of sh. 50,000. Simple interest of 10% p.a is charged on the balance and the customer is required to repay by 24 equal monthly installments, calculate the amount of each installments. **(07 marks)**

(b) The table below is part of the tax table structure for monthly income of employees for the year 2018.

<b>Taxable income (shs)</b>	<b>Tax rate (%)</b>
01- 90,000	10
90001 – 200,000	15
200,001 and above	20

Given that in the year 2018, the tax on Mr. Magambo's income was shs. 29,500. Calculate his monthly income. **(05 marks)**

17. The figure below shows poultry water trough. It consists of a solid cone of height 21cm, welded into the base of a right circular cylinder of the same height. Given the diameter at the base is 60cm.



- (a) Find the;
- Volume of the cylinder
  - The capacity of the trough in litres
- (b) Determine the angle which the slanting edges of the cone make with inner walls of the cylinder.
- (c) Find the outer reflex angle at the apex of the conical solid.

**(12 marks)**

**END**