

GRANT  
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PROPOSED MARKING GUIDE

UNNASE MTC 2 UCE 2023

1.

$$\text{let } x = 2.53939\dots \quad \textcircled{1}$$

$$100x = 253.939\dots \quad \textcircled{2}$$

$$\textcircled{2} - \textcircled{1}$$

$$100x = 253.939\dots$$

$$\underline{- \qquad \qquad \qquad}$$

$$x = 2.539\dots$$

$$99x = 251.4$$

$$x = \frac{251.4}{99}$$

$$x = \frac{2514}{990} = \frac{419}{165}$$

$$\therefore 2.53939\dots = \frac{419}{165}$$

04

2.

$$A(3, y) \quad B(0, 7)$$

$$|AB| = 5$$

$$|AB| = \sqrt{(3-0)^2 + (y-7)^2}$$

$$5 = \sqrt{9 + (y-7)^2}$$

$$5^2 = 9 + (y-7)^2$$

$$(y-7)^2 = 16$$

$$y-7 = \pm 4$$

$$y = 7 \pm 4$$

Either  $y = 11$  and or  $y = 3$ .

04

3.

$$\text{i)} 4+x+3+2=18$$

$$x = 18-9$$

$$x = 9.$$

ii)

$$4+9+2$$

$$= 15$$

04

4.  $\frac{10}{100} \times 200,000 = 20,000$

Excess =  $425,500 - 200,000$ .  
 $= 225,500.$

~~15~~/<sub>100</sub>  $\times 225,500 = 33825.$

Commission =  $20,000 + 33825$   
 $= 53825\text{f.}$

D4

5.  $A(-2, 4) \quad B(1, -1)$   $-5(x+2) = 3(y-4)$

$m = \frac{-1-4}{1-(-2)} = -5/3$   $-5x - 10 = 3y - 12$

$m = -5/3$   $-5x + 2 = 3y$

$-5/3 = \frac{y-4}{x+2}$

$y = -5/3x + 2/3$

D4

6.  $f(x) = x^2 - 1$

Let  $x^2 - 1 = y$ .

$y+1 = x^2$

$\therefore f^{-1}(x) = \sqrt{x+1}$

$f^{-1}(8) = \sqrt{8+1}$

$= 3$

D4

7.  $A \quad | \quad B \quad | \quad \frac{Y_A}{1250} = 2^3$

$2x \quad | \quad x \quad | \quad 1250$

$\sqrt{A} = 10,000\text{L}$

$L \cdot S \cdot F = \frac{2x}{x}$

$= 2$

$V \cdot S \cdot F = (L \cdot S \cdot F)^3$

D4

8.

$$\begin{pmatrix} 5 \\ 3 \end{pmatrix} - y \begin{pmatrix} 2 \\ -1 \end{pmatrix} = \begin{pmatrix} -1 \\ x \end{pmatrix}$$

$$5 - 2y = -1$$

$$6 = 2y$$

$$y = 3$$

$$3 + y = x$$

$$3 + 3 = x$$

$$x = 6$$

04

9.

$$241_x = ax^2 + bx + c$$

$$(2x^2) + (4x^1) + (1x^0) = ax^2 + bx + c$$

$$2x^2 + 4x + 1 = ax^2 + bx + c$$

$$a = 2, b = 4, c = 1$$

04

10.

$$T.S.A = 2 [l^2 + l^2 + l^2]$$

$$T.S.A = 2(3l^2)$$

$$180 = 6l^2$$

$$30 = l^2$$

$$l = 5.48 \text{ cm}^*$$

$$l = 5.5 \text{ cm (2 s.f.)}$$

04

### SECTION B.

11 (a)

Number	Standard form	Logarithm
5.147	$5.147 \times 10^0$	0.7116
62.1	$6.21 \times 10^1$	$(1.793) \div 2$ = 0.8966 + 0.7116
0.00409	$4.09 \times 10^{-3}$	1.6082 - 3.6117 3.9965

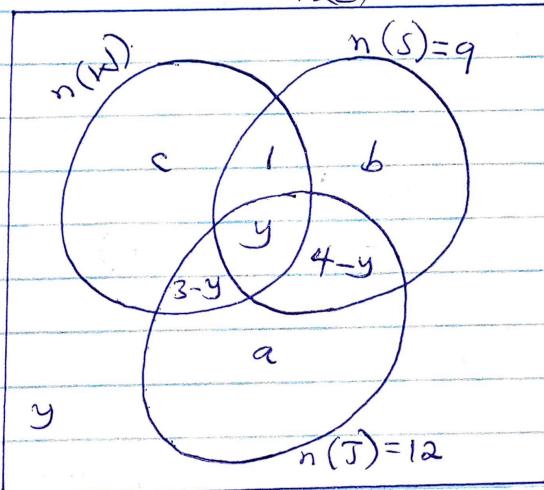
$$\text{Antilog of } 3.9965 = 9.9197 \times 10^3$$

$$= 9919.7$$

$$\begin{aligned}
 b) & \frac{(4-\sqrt{3})(\sqrt{3}+1)}{(\sqrt{3}-1)(\sqrt{3}+1)} \\
 & = \frac{4\sqrt{3} + 4 - 3 - \sqrt{3}}{(\sqrt{3})^2 - 1^2} \\
 & = \frac{3\sqrt{3} + 1}{3-1} \\
 & = \frac{1 + 3\sqrt{3}}{2} \\
 & = \frac{1}{2} + \frac{3\sqrt{3}}{2} \\
 \frac{4-\sqrt{3}}{\sqrt{3}-1} & = \frac{1}{2} + \frac{3}{2}(1.732) \\
 & = 3.098.
 \end{aligned}$$

12

12. a)  $n(E) = 25$



Let the number  
of guests who  
took all the three  
drinks be  $y$

for  $n(J)$  only.

$$a = 12 - (3-y+y+4-y)$$

$$a = 12 - 7 + y$$

$$a = 5 + y$$

for  $n(S)$  only.

$$b = 9 - (1+y+4-y)$$

$$b = 9 - 5$$

$$b = 4$$

for Did not take water.

$$b + 4-y+a+y = 15$$

$$4+4-y+5+y+y=15$$

$$13+y=15$$

$$y=2$$

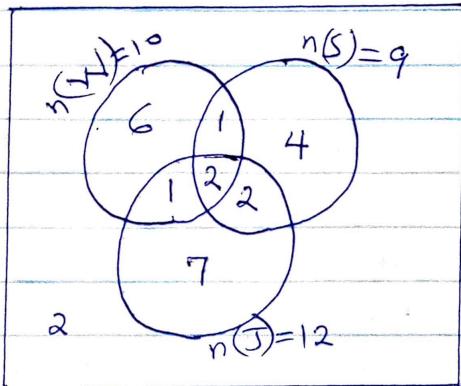
for  $n(E)$

$$n(J) + b + 1 + c + y = 25$$

$$12 + 4 + 1 + c + 2 = 25$$

$$8 + c + 19 = 25$$

$$c = 6.$$



b)

i) 2 guests.

ii) 10 guests.

c)  $1+2+1 = 4$

$$\text{Probability} = \frac{4}{25}$$

12

13. a)  $f(x) = ax + b$  |  $g(-1) = -4$   
 $g(x) = bx - 12$ . |  $f(-3) = -11$

$$-3a + b = -11 \quad \textcircled{1}$$

$$-b - 12 = -4 \quad \textcircled{2}$$

from  $\textcircled{2}$  :  $b = -8$

from  $\textcircled{1}$

$$-3a - 8 = -11$$

$$-3a = -3$$

$$a = 1$$

so  $a = 1, b = -8$

b)

$x$	$x^2 - x$	
-2	$(-2)^2 - (-2) = 6$	
-1	$(-1)^2 - (-1) = 2$	
0	$0^2 - 0 = 0$	
1	$1^2 - 1 = 0$	
2	$2^2 - 2 = 2$	
Domain		Range

Range is  $\{6, 2, 0, 0, 2\}$ .

12

14.

For Cynthia

Mukono to Sironko,  $D=200\text{ km}$ ,  $S=50\text{ kmph}$ 

D	0	50	100	150	200
T	6:30	7:30	8:30	9:30	10:30

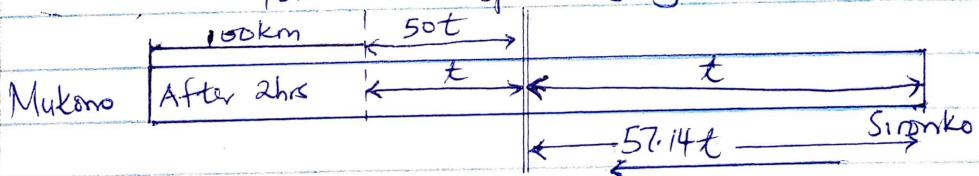
For Betty

Sironko to Mukono

D	0		200
T	8:30		12:00

Total time spent by Betty =  $3\frac{1}{2}$  hrs.

Total time spent by Cynthia = 4 hrs.



$$\text{Speed of Betty} = \frac{200}{3.5}$$

$$= 57.14 \text{ kmph}$$

$$\text{Total distance} = 200\text{ km} = 100 + 50t + 57.14t$$

$$200 = 100 + 50t + 57.14t$$

$$100 = 107.14t$$

$$t = 0.9334 \text{ hr}$$

$$= 56 \text{ minutes}$$

They met after 2 hrs and 56 minutes

$$= 9:26 \text{ am}$$

They met 53.33 km from Sironko

$$57.14t = [57.14 \times 0.9334]$$

ii)

12:00

- 10:30

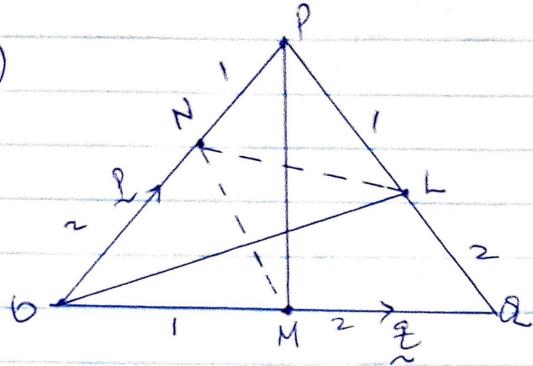
1:30 hrs

or 1 hr and 30 minutes.

12

15.

a)



$$\overrightarrow{OP} = \underline{\rho}, \overrightarrow{OQ} = \underline{\xi}$$

$$PL = \frac{1}{2} LQ$$

$$ON : OP = 2 : 3$$

$$MQ = 2OM$$

i)

$$\overrightarrow{NL} = \overrightarrow{NP} + \overrightarrow{PL}$$

$$= \frac{1}{3} \underline{\rho} + \frac{1}{3} \overrightarrow{PQ}$$

$$= \frac{1}{3} \underline{\rho} + \frac{1}{3} (\underline{\xi} - \underline{\rho})$$

$$= \frac{1}{3} (\underline{\xi} + \underline{\xi} - \underline{\rho})$$

$$= \frac{1}{3} \underline{\xi}$$

$$ii) \overrightarrow{NM} = \overrightarrow{NO} + \overrightarrow{OM}$$

$$= -\frac{2}{3} \underline{\rho} + \frac{1}{3} \underline{\xi}$$

$$= \frac{1}{3} (\underline{\xi} - 2\underline{\rho})$$

b)

$$ON : ML$$

$$\overrightarrow{ON} = \frac{2}{3} \underline{\rho}$$

$$\overrightarrow{ML} = \overrightarrow{MN} + \overrightarrow{NL}$$

$$= \frac{1}{3} (2\underline{\rho} - \underline{\xi}) + \frac{1}{3} \underline{\xi}$$

$$= \frac{1}{3} (2\underline{\rho} - \underline{\xi} + \underline{\xi})$$

$$= \frac{1}{3} (2\underline{\rho})$$

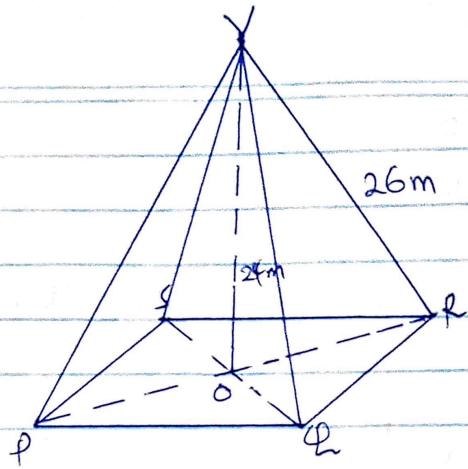
$$= \frac{2}{3} \underline{\rho}$$

$$\overrightarrow{ON} : \overrightarrow{ML} = \frac{\frac{2}{3} \underline{\rho}}{\frac{2}{3} \underline{\rho}} = 1$$

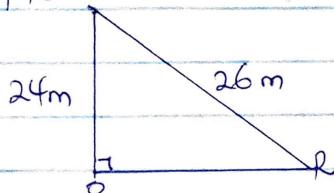
$$\overrightarrow{ON} : \overrightarrow{ML} = 1 : 1$$

12

16.



a)

i)  $\overline{PR}$ 

$$\overline{OR} = \sqrt{(26^2 - 24^2)}$$

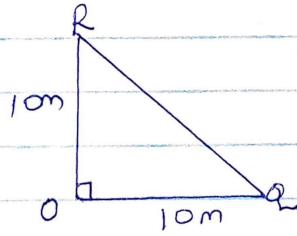
$$= 10\text{m}$$

$$\overline{PR} = 2 \times 10$$

$$\overline{PR} = 20\text{m}.$$

ii)  $\overline{PQ}$ 

$$\overline{PQ} = \overline{QR} = \overline{PS} = \overline{SR}.$$



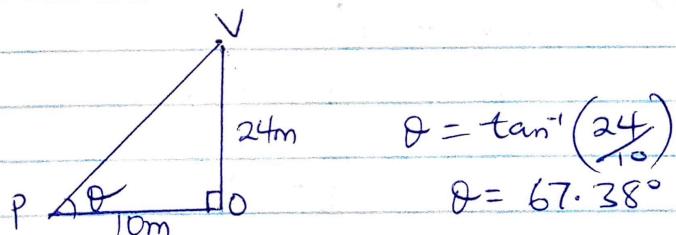
$$\overline{QR} = \sqrt{10^2 + 10^2}$$

$$= \sqrt{200}$$

$$= 14.14\text{m}$$

$$\therefore \overline{PQ} = 14.14\text{m}.$$

b)



$$\theta = \tan^{-1}\left(\frac{24}{10}\right)$$

$$\theta = 67.38^\circ$$

c) Volume =  $\frac{1}{3} \times (\text{base area}) \times \text{height}$ 

$$\Rightarrow \text{base area} = \sqrt{200} \times \sqrt{200} = 200$$

$$= \frac{1}{3} \times 200 \times 24$$

$$= 1600 \text{ m}^3.$$

17. a) Total allowances.

		Shs
i) Marriage	$\frac{5}{100} \times 480,000$	= 200,000
Housing	$\frac{12}{12}$	= 100,000
Insurance		= 45,000
Transport		= 120,000
Children		= 80,000
14yr		= 70,000
18yr		615,000

$$\begin{aligned}\text{Taxable income} &= 4,000,000 - 615,000 \\ &= \text{Shs. } 3,385,000\end{aligned}$$

(ii)

Taxable income	Amount
1,000,000 - 2,000,000	$\frac{15}{100} \times 1,000,000 = 150,000$
2,000,000 - 3,000,000	$\frac{25}{100} \times 1,000,000 = 250,000$
3,000,000 - 4,000,000	$\frac{40}{100} \times 385,000 = 154,000$
Above 4,000,000	554,000

$$\text{Income tax} = \text{Shs. } 554,000$$

b)

$$\begin{aligned}&= \frac{554,000}{4,000,000} \times 100\% \\ &= 13.85\%\end{aligned}$$