

CHRISTIAN SOCIAL SERVICE COMMISSION
MATHEMATICS - FORM TWO

043

2026

A PROPOSED MARKING GUIDE

1(a)

Length of ropes are 140 cm, 168 cm and 210 cm.

Then,

2	140	168	210
2	70	84	105
2	35	42	105
3	35	21	105
5	35	7	35
7	7	7	7
	1	1	1

$$\text{GCF} = 2 \times 7 = 14 \text{ cm.}$$

Then

Number of pieces of 140 cm rope.

$$\frac{140}{14} = 10 \text{ pieces.}$$

Number of pieces of 168 cm rope

$$\frac{168}{14} = 12 \text{ pieces}$$

Number of pieces of 210 cm

$$\frac{210}{14} = 15 \text{ pieces.}$$

(05 marks)

Then

$$\text{Total number of pieces } 10 + 12 + 15 = 37.$$

∴ The greatest possible length is 14 cm, also he can get 37 smaller pieces of rope.

16)

Given

$$A = 0.2222\ldots \Rightarrow A = 0.\dot{2}$$

Then convert $0.\dot{2}$ into fraction.

$$A = 0.\dot{2}$$

$$10A = 2.\dot{2}$$

$$10A - A = 2.\dot{2} - 0.\dot{2}$$

$$9A = 2$$

$$\frac{9}{9} \quad \frac{2}{9}$$

$$A = \frac{2}{9}$$

Then,

$$B = 0.\dot{0}4$$

$$100B = 4.\dot{0}4$$

$$99B = 4$$

$$\frac{99}{99} \quad \frac{4}{99}$$

$$B = \frac{4}{99}$$

Required

$$A^2 = B(A+1)$$

$$\left(\frac{2}{9}\right)^2 = \frac{4}{99} \left(\frac{2}{9} + 1\right)$$

$$\therefore \frac{4}{81} = \frac{4}{81} \text{ hence shown. (05 marks)}$$

20)

Given

4.13 to nearest whole number

$$4.13 \approx 4$$

$$63.74 \approx 64 \text{ (2 significant figure)}$$

$$675.999891 \approx 676.000 \text{ (thousandths)}$$

$$\therefore 4.13 \times \sqrt{675.999891 \times (63.74)^{-1/2}}$$

$$= 4 \times \sqrt{676 \times (64)^{-1/2}}$$

$$2(a) = 4 \times 26 \times \frac{1}{8}$$

$$= 13.$$

(i) In nearest ones
 $13 \approx 10$ (02 marks)

(ii) Standard form
 $13 \approx 1.3 \times 10^1$ (02 marks)

2(b)

Given
 Monthly salary Tsh $(4.25 \times 10^5 \log_2 2^2)$.
 $= 425000 \times 2 = 850,000$

Step 1, Money spent on car fuel
 $\frac{1}{5} \times 850,000 = 170,000$

Step 2, Remaining salary.
 $850,000 - 170,000 = 680,000$

Step 3, Money spent in food.
 Half of remaining $= \frac{1}{2} \times 680,000$
 $= 340,000$

Step 4, Remaining after food,
 $680,000 - 340,000 = 340,000$

Step 5, Money spent on miscellaneous expenses.
 Half of the rest $= \frac{1}{2} \times 340,000$
 $= 170,000$

Step 6, Monthly saving,
 Remaining $= 340,000 - 170,000$
 $= 170,000$

(i): His Monthly saving is Tsh 170,000 =
 (03 marks)

2(b)

(ii) $170,0001$ is not irrational number, because irrational number is written as non-terminating and non-repeating decimal, but $170,0001$ is not non-terminating and repeating decimal. (0.2 marks)

3(a)

Given

$$\log 2 = 0.30103,$$

$$\log_2 2^5 \left(\frac{1}{5} \log 3 \right) = 5 \times \frac{1}{5} \log 3 = \log 3 = 0.47712.$$

$$5 \log (\sqrt[5]{5}) = 5 \log 5^{1/5} = 5 \times \frac{1}{5} \log 5 = \log 5 = 0.69897$$

Required

$$(i) \log 90 = \log(9 \times 10) = \log(3^2 \times 2 \times 5).$$

$$\begin{aligned} \log(3^2 \times 2 \times 5) &= \log 3^2 + \log 2 + \log 5 \\ &= 2 \log 3 + \log 2 + \log 5. \end{aligned}$$

$$= 2 \times 0.47712 + 1$$

$$= 2 \times 0.30103 + 0.47712 + 0.69897$$

$$\log 90 = 1.95424$$

$$\therefore \log 90 = 1.95424.$$

(0.25 marks)

$$(ii) \frac{1}{5} \log \left(\frac{\sqrt{6}}{5} \right)^5 = \log \frac{\sqrt{6}}{5} = \log (\sqrt{6} \div 5)$$

$$\text{Ans} = 5^5 = \log 6^{1/2} - \log 5 = \frac{1}{2} \log 6 - \log 5$$

$$= \frac{1}{2} \log(2 \times 3) - \log 5$$

$$= \frac{1}{2} \log 2 + \frac{1}{2} \log 3 - \log 5$$

$$= \frac{1}{2} \times 0.30103 + \frac{1}{2} \times 0.47712 - 0.69897$$

$$= -0.309895.$$

$$\therefore \frac{1}{5} \log \left(\frac{\sqrt{6}}{5} \right)^5 = -0.309895. \quad (2.5 \text{ marks})$$

(0.4)

36)

Given

$$1^{\text{st}} \text{ rate} = 3\sqrt[3]{81} \text{ tones per day}$$

$$2^{\text{nd}} \text{ rate} = 2\sqrt[3]{24} \text{ tons per day}$$

Then simplify

$$3\sqrt[3]{81} = \sqrt[3]{3 \times 3 \times 3 \times 3} = 3\sqrt[3]{3} \text{ tons per day}$$

$$2\sqrt[3]{24} = \sqrt[3]{2 \times 2 \times 2 \times 3} = 4\sqrt[3]{3}$$

Then, total rate

$$= 3\sqrt[3]{3} + 4\sqrt[3]{3} = 7\sqrt[3]{3}$$

(i) $\therefore$ The total amount of plaster per day is $7\sqrt[3]{3}$ tons.

(2.5 marks)

(ii) Then difference

$$D = \text{Total amount} - \text{Amount to compare}$$

$$= 7\sqrt[3]{3} - 6\sqrt[3]{3} = \sqrt[3]{3}$$

$$D = 3^{\frac{1}{3}}$$

Then into logarithmic form

Recall,

$$a = b^c \Rightarrow \log_b a = c$$

So,

$$D = 3^{\frac{1}{3}} \Rightarrow \log_3 D = \frac{1}{3}$$

$\therefore D = 3^{\frac{1}{3}}$ in logarithmic form is

$$\log_3 D = \frac{1}{3}$$

(2.5 marks)

or.

4@

Given,

$$A = \{x: -5 < x \leq 5\} = \{-4, -3, -2, -1, 0, 1, 2, 3, 4, 5\}$$

$$B = \{x: -6 \leq x < 3\} = \{-6, -5, -4, -3, -2, -1, 0, 1, 2\}$$

Then

$$A \cap B = \{-4, -3, -2, -1, 0, 1, 2\}$$

$$\therefore A \cap B = \{-5 < x < 3\}. \quad (04 \text{ marks})$$

(b)

Let $A = \{\text{All students in a school}\}$.

$B = \{\text{Access to study Biology}\}$.

$P = \{\text{Access to study Physics}\}$.

Given, $n(A) = 390$, $n(B) = 230$, $n(P) = 210$

$$n(B \cup P)' = 80$$

(i) $n(P \cap B)$

from

$$n(A) = n(P \cup B) + n(B \cup P)'$$

$$390 = n(P \cup B) + 80$$

$$n(B \cup P) = 310$$

Then

$$n(B \cup P) = n(B) + n(P) - n(B \cap P)$$

$$310 = 230 + 210 - n(B \cap P)$$

$$n(B \cap P) = 130$$

$\therefore$ Both students to study physics and biology is 130.

(03 marks)

4 (b)

(ii) only one of these subjects.

$$n(B) = n(B \cap P) + n(B \cap P')$$

$$230 = 130 + n(B \cap P')$$

$$n(B \cap P') = 100 \text{ only Biology}$$

$$n(P) = n(B \cap P) + n(B' \cap P)$$

$$210 = 130 + n(B' \cap P)$$

$$n(B' \cap P) = 80 \text{ physics only.}$$

Then, Total = $100 + 80 = 180$ students.

$\therefore$ Students who take only one subject are 180 students.

(03 marks)

5 (a)

Given

Five years ago.

$$\text{Samuel : Fuma} = 5 : 4,$$

Ten years later

$$\text{Samuel : Fuma} = 10 : 9.$$

Let S be Samuel

F be Fuma

$$\frac{S-5}{F-5} = \frac{5}{4}, \quad 4S-20 = 5F-25$$

$$= 4S-5F = -5 \quad \text{--- (i)}$$

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Then Ten years.

$$\frac{S+10}{J+10} = \frac{10}{9}$$

$$= 9S+90 = 10J+100$$

$$= 9S-10J = 10 \quad \text{---(i)}$$

Then

solve the equations.

$$4S-5J = -5 \quad \text{---(ii)}$$

$$9S-10J = 10 \quad \text{---(i)}$$

$$S = 20, J = 17$$

$\therefore$ Samuel's present age is 20 years
and Jume's present age is 17 years.

(05 Marks)

5(b)

Given

$$2a-b = -3$$

$$6a-5b$$

$$-2a-b = -18a+15b$$

Express a in term b,

$$\frac{26a}{20} = \frac{16b}{20}$$

$$a = \frac{4b}{5}$$

Then

Express b in term of a

$$b = \frac{5a}{4}$$

5(b)

Then required,

$$5a:2b = \frac{5a}{2b}$$

$$= \frac{5(\frac{4b}{5})}{\frac{5}{5}}$$

$$2(\frac{5}{4}a)$$

$$\frac{b}{a} = \frac{5}{4}$$

$$= \frac{5a}{2b} = \frac{20}{10}$$

$$= \frac{5a}{2b} = \frac{2}{1}$$

$$\therefore 5a:2b = 2:1$$

(05 marks)

6(a)

$$\text{Given } 9a^2 - 4b^2$$

Its factorization,

$$a^2 - b^2 = (a+b)(a-b)$$

$$9a^2 - 4b^2 = (3a-2b)(3a+2b)$$

Then,

$$\begin{cases} 9a^2 - 4b^2 = 0 & \Rightarrow (3a-2b)(3a+2b) = 0 \text{ (i)} \\ 3a+2b = -7 & \Rightarrow 3a+2b = -7 \text{ (ii)} \end{cases}$$

from eqn.

$$(3a-2b) = 0, \quad 3a = 2b \text{ (ii)}$$

Then substitute eqn (ii) into equation (i).

6(a)

$$= (2b) + 2b = -7$$

$$b = \frac{-7}{4}$$

Then

$$3a = 2b$$

$$a = \frac{2(-\frac{7}{4})}{3}$$

$$a = \frac{-7}{6}$$

∴ Therefore a is $-\frac{7}{6}$ and b is $-\frac{7}{4}$.

(4 marks)

(b)

(i)

Given the equation,

$$T = \sqrt{\frac{3a}{5b^2} - \frac{2}{3b^2}}$$

$$= T^2 = \left(\sqrt{\frac{3a}{5b^2} - \frac{2}{3b^2}} \right)^2$$

Required to the subject

$$= T^2 = \frac{3a}{5b^2} - \frac{2}{3b^2}$$

Common denominator is $15b^2$

$$T^2 = \frac{9a}{15b^2} - \frac{10}{15b^2}$$

$$T^2 = \frac{9a - 10}{15b^2}$$

$$\frac{15b^2 T^2}{15b^2} = \frac{9a - 10}{15b^2}$$

Then

$$\sqrt{b^2} = \sqrt{\frac{9a - 10}{15T^2}}$$

$$b = \pm \sqrt{\frac{9a - 10}{15T^2}}$$

$$\therefore b = \pm \sqrt{\frac{9a - 10}{15T^2}}$$

(3 marks)

$$6 \text{ (b) (ii)} \quad \frac{1}{3x+2} + \frac{5x+1}{2(x-1)} = 0$$

$$= \frac{1}{3x+2} + \frac{5x+1}{2x-2} = 0$$

$$= 2x-2 + (3x+2)(5x+1) = 0$$

$$= 2x-2 + 15x^2 + 13x+2 = 0$$

combine like terms

$$15x^2 + 15x = 0$$

Solve the quadratic equation.

$$15x(x+1) = 0$$

$$15x = 0$$

$$x = 0$$

then

$$x+1 = 0$$

$$x = -1.$$

(02 marks)

The value of x is 0 or -1.

7(a)

Given,

Volume of water = 200L, time = 5 minutes

litres

$$\text{Rate of flow} = \frac{\text{Volume}}{\text{Time}} = \frac{200\text{L}}{5 \text{ min}}$$

$$= 40 \text{ L/min}$$

$\therefore$ Water enters the tank at the rate of flow of 40 litres per minute (04 marks)

7(b)

Given

Rate of Machine A = 800 per hour

Rate of Machine B = 1000 parts per hour

Required time for producing 24000 parts

Total rate = Rate A + Rate B

$$= 800 + 1000 = 1800 \text{ parts/hour}$$

Then

$$\text{Rate} = \frac{\text{Amount of Parts}}{\text{Time}} = \frac{24000}{1800}$$

$$(i) \quad \text{Time} = \frac{24000}{1800} = \frac{40}{3} \text{ hours} \\ = 13 \text{ hours and } 20 \text{ min}$$

It will take 13 hours and 20 minutes to produce 24000 parts. (03 Marks)

(ii) Number of parts produced by Machine A in 5 hours.

$$800 \text{ parts/hr} \times 5 \text{ hours} = 4000 \text{ parts.}$$

Then

Remaining parts to be produced

$$24000 - 4000 = 20000 \text{ parts.}$$

Then, combined rate = 1800 parts/hour

$$\text{Time} = \frac{20000 \text{ parts}}{1800 \text{ parts/hr}} = \frac{100}{9} \text{ hours} = 11 \text{ hr } 6 \text{ min.}$$

∴ They will use 11 hours and 6 minutes. (03 Marks)

8a

ABCD is a trapezium with $AD \parallel BC$

$$\angle ACB = \angle CAD$$

$$AC = 15 \text{ cm}$$

$$CB = 9 \text{ cm}$$

Prove, $\triangle ACD \sim \triangle CAB$

Then,

Since $AD \parallel BC$,

$$\angle CAD = \angle ACB \text{ (alternate interior angles)}$$

$$\angle ACB = \angle CAD \text{ (Given, } +02 \text{ marks)}$$

$\therefore$ Therefore $\triangle ACD \sim \triangle CAB$ (AA similarity theorem)

Then

$$\frac{AC}{CB} = \frac{CD}{BA} = \frac{AD}{CA}$$

$$\frac{AC}{CB} = \frac{AD}{CA} \quad \text{--- (02)}$$

$$\frac{15}{9} = \frac{AD}{15}$$

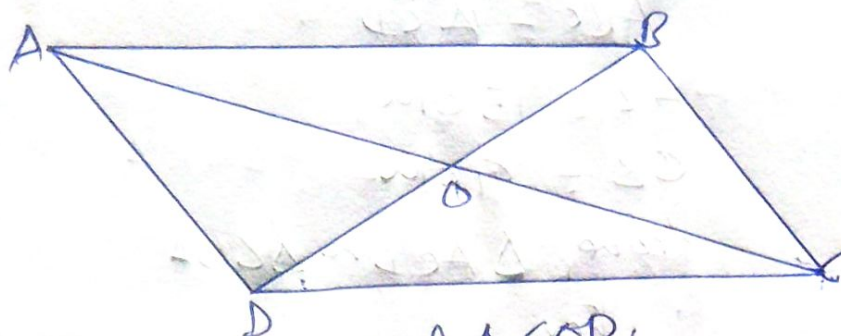
$$AD = 25 \text{ cm}$$

$$\therefore \underline{AD \text{ is } 25 \text{ cm}}$$

(04 marks
Total)

8(b)

Consider the Impariparallelogram.



Consider $\triangle AOB$ and $\triangle COD$.
 Since diagonals bisect, $AO = OC$ and $BO = OD$.

But $\angle AOB = \angle COD$ (vertically opposite)

Then $\triangle AOB \cong \triangle COD$ by SAS.

Therefore, since $\triangle AOB$ and $\triangle COD$ are congruent their corresponding sides are equal and also

$AB = CD$, and $\angle OAB = \angle OCD$

Then

Consider

$\triangle BOC$ and $\triangle DOA$

Since diagonals bisect

$BO = OD$ and $CO = OA$

Then

$\angle BOA = \angle DOC$ (vertically opposite)

$\triangle BOC \cong \triangle DOA$ (SAS)

Since triangles are congruent

$BC = DA$, and

$\angle OBC = \angle ODA$

then

$\angle OAB = \angle OCD$ (alternate interior angles by AC)

Since alternate angles are equal, $AB \parallel CD$

then

$\angle OBC = \angle ODA$ (alternate angles by BD)

Since the alternate angles are equal $BC \parallel AD$

$\therefore$ quadrilateral is a parallelogram since both pairs of opposite parallel ($AB \parallel CD$ and $BC \parallel DA$), the ABCD is a parallelogram.

(06 marks)

(14)

9(a)

(i) $\cos 165^\circ$
from second quadrant

$$\cos(180^\circ - \theta) = -\cos \theta$$

$$\cos 165^\circ = \cos(180^\circ - 15^\circ) = -\cos 15^\circ$$

$$\therefore \cos 165^\circ = -\cos 15^\circ \quad (2.0 \text{ marks})$$

(ii) $\tan 258^\circ$

then
 258° is in third quadrant

$$\begin{aligned} \tan 258^\circ &= \tan(258^\circ - 180^\circ) \\ &= \tan 78^\circ \end{aligned}$$

$$\therefore \tan 258^\circ = \tan 78^\circ \quad (2.0 \text{ marks})$$

9(b)

Let height of the building be h .

distance from bottom of building to y be d

Distance from the bottom to x is

$$(d - 50) \text{ meters}$$

then

then

$$\text{From point } x, \tan(40^\circ) = \frac{h}{d-50} \quad \text{--- (i)}$$

$$\text{From point } y, \tan(29^\circ) = \frac{h}{d} \quad \text{--- (ii)}$$

then from second equation,

$$h = d \tan(29^\circ) \quad \text{--- (iii)}$$

Substitute h into eqn (i)

$$\tan 40^\circ = \frac{d \tan 29^\circ}{d-50}$$

9 (b)

$$(d-50) \tan 40^\circ = d \tan 29^\circ$$

$$d = \frac{50 \tan 40^\circ}{\tan 40^\circ - \tan 29^\circ}$$

$$d = \frac{50 \times 0.8391}{0.8391 - 0.5543}$$

$$d = 147.31$$

$\therefore$ The distance of y from the bottom is
147.31 m (03 marks)

then

(ii) The height

use eqn (iii) $h = d \tan 29^\circ$
 $h = 147.31 \times 0.5543$

$$h = 81.64$$

$\therefore$ The height of the building is
approximately 81.64 m, (03 marks)

10

@

Given the equation

$$16x - 4y = 23$$

Make eqn in form of $y = mx + c$

$$\frac{4y}{4} = \frac{16x}{4} - \frac{23}{4}$$

$$y = 4x - \frac{23}{4}$$

$$\begin{matrix} b & | & m & x & | & c \\ & & 4 & & & -\frac{23}{4} \end{matrix}$$

$$\therefore m = 4$$

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(2)

from,

$$m = \frac{y-y_1}{x-x_1}$$

$$4 = \frac{y-1}{x-3}$$

$$y-1 = 4x-12$$

$$y = 4x-11$$

∴ The equation is $y = 4x - 11$.

(04 marks)

(6)

Given,

Equation Row 1 = $2x + 3y = 7$

Equation Row 2 = $x - 3y + 4 = 0$

then, solve two equations

$$2x + 3y = 7 \quad \text{--- (i)}$$

$$x - 3y + 4 = 0 \quad \text{--- (ii)}$$

from eqn (ii)

$$x = 3y - 4 \quad \text{--- (iii)}$$

Substitute eqn (iii) into eqn (i)

$$2(3y - 4) + 3y = 7$$

$$\frac{9y}{9} = \frac{15}{9}$$

$$y = \frac{5}{3}$$

then from eqn (iii),

$$x = 3\left(\frac{5}{3}\right) - 4$$

$$x = 1$$

(12)

So, the intersection point P is $(1, \frac{5}{3})$.

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(b)

Then slope of the new road,
from which passes through $(5, 5)$

$$m = \frac{y_2 - y_1}{x_2 - x_1} \quad \text{Points } (5, 5) \text{ and } (1, \frac{5}{3})$$

$$m = \frac{\frac{5}{3} - 5}{1 - 5}$$

(03 marks)

$$m = \frac{10}{12} = \frac{5}{6} \quad \text{Slope} = \frac{5}{6}$$

Then equation,

from

$$m = \frac{y - y_1}{x - x_1} = \frac{5}{6} = \frac{y - 5}{x - 5}$$

$$6y - 30 = 5x - 25$$

then rearrange in form of
 $ax + by = c$

$$5x - 6y = 5$$

$\therefore$ The gradient of the new road is
 $5x - 6y = 5$ and the gradient is $\frac{5}{6}$.

(03 marks)