

WAKISSHA JOINT MOCK EXAMINATIONS
MARKING GUIDE
Uganda Certificate of Education
UCE August 2016
MATHEMATICS 456/2

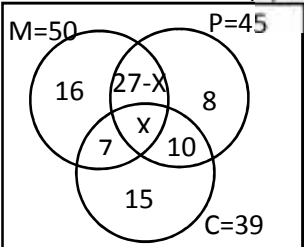


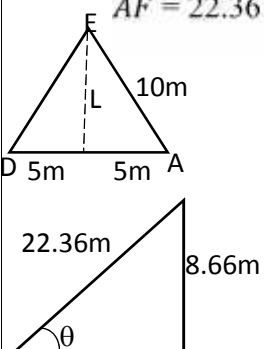
Solution	Mark	Comments
$1. \frac{3\frac{1}{4} - 1\frac{3}{5}}{1\frac{1}{4} \times \frac{2}{3}} = \frac{4\frac{13}{20} - 1\frac{3}{5}}{\frac{5}{4} \times \frac{2}{3}} = \frac{19\frac{13}{20}}{10\frac{2}{12}}$ $= \frac{19}{12} \times \frac{12}{10} = 1.9$	<p>M₁</p> <p>M₁</p> <p>M₁</p> <p>A₁</p>	<p>For subtraction $\frac{13}{20}$</p> <p>For simplification of denominator</p> <p>Simplification</p> <p>Accept $1\frac{9}{10}$.</p>
$2. \frac{\sqrt{3}}{\sqrt{3}-\sqrt{2}} = \frac{\sqrt{3} \cdot \sqrt{3+\sqrt{2}}}{(\sqrt{3}-\sqrt{2})(\sqrt{3+\sqrt{2}})}$ $= \frac{3+\sqrt{6}}{3-2}$ $= 3 + \sqrt{6}$ $= m = 3$ $= n = 6$	<p>M₁</p> <p>A₁</p> <p>B₁</p> <p>B₁</p>	<p>Simplification</p>
<p>3. T = { 1, 3, 6, 10, 15 }</p> <p>M = { 3, 6, 9, 12, 15, 18 }</p> <p>(i) n(T ∩ M) = 3 Element</p> <p>(ii) M ∩ T = { 1, 10 }</p>	<p>B₁</p> <p>B₁</p> <p>B₁</p> <p>B₁</p>	<p>For all entire correct</p> <p>For all entire correct</p>
$4. \sqrt[3]{3.375} = \left(\frac{3375}{1000}\right)^{\frac{1}{3}}$ $= \left(\frac{3^3 \times 5^3}{2^3 \times 5^3}\right)^{\frac{1}{3}}$ $= \frac{3 \times 5}{2 \times 5}$ $= \frac{15}{10}$ $= 1.5$	<p>M₁</p> <p>M₁</p> <p>M₁</p> <p>A₁</p>	<p>For factorization of 3375</p> <p>for factorization of 1000</p> <p>For simplification.</p> <p>Accept $\frac{3}{2}$</p>
<p>5. $\frac{6-3}{a-2} = 3$</p> $3a - 6 = 6 - 3$ $\frac{3a}{3} = \frac{9}{3}$ $a = 3$	<p>M₁</p> <p>M₁</p> <p>M₁</p> <p>A₁</p>	<p>For Gradient $\frac{3}{a-2}$ expression</p> <p>For equating expression to 3</p> <p>For simplification</p>

<p>6. $AC = \frac{3}{2} - \frac{4}{4} - \frac{5}{-2}$ $OT = \frac{3}{4} + \frac{1}{2} \left(\frac{5}{-2} \right)$ $= \frac{3}{4} + \left(\frac{2.5}{-1} \right)$ $OT = \left(\frac{5.5}{3} \right)$ $\therefore T(5.5, 3)$</p>	<p>B₁ M₁ A₁ B₁</p>	<p>For AC = $\frac{5}{-2}$ Simplification For OT For coord.</p>
<p>7. Total Expenses = 740,000 + 20,000 = Shs. 760,000 Net profit = 1000,000 – 760,000 = Shs. 240,000.</p>	<p>M₁ A₁ M₁ A₁</p>	<p>1,000,000 – (740,000 + 29,000) = 240,000/= C's 760,000 Cas.</p>
<p>8. Error = $\frac{5.44}{5.44} - 5.43$ = 0.01 % error = $\frac{0.01}{5.44} \times 100\%$ = 0.18%</p>	<p>M₁ A₁ M₁ ✓ A₁</p>	<p>C's 0.01 Accept 0.184%</p>
<p>9. $4.5\text{cm}^2 = \frac{648}{100} \text{m}^2$ $1\text{cm}^2 = \left(\frac{548}{4.5} \times 10^{10} \right) \text{cm}$ $1\text{cm}^2 = 144 \times 10^{10}$ $1\text{cm} = 1,200,000\text{cm}$ R.F = $\frac{1}{1,200,000}$</p>	<p>M₁ M₁ M₁ A₁ A₁</p>	<p>Dividing + Converting For Sq.root/L.S.F</p>
<p>10. Log 72 = log (2³ x 3²) = log 2³ + log 3² = 3 (0.3010) + 2 (0.4771) = 0.903 + 0.9542. = 1.8572</p>	<p>M₁ M₁ M₁ A₁</p>	<p>For factorization of 72 Correct Addition. Simplification.</p>
	<p>04</p>	

<p>11. (a) (i) $\vec{AB} = \vec{OB} - \vec{OA}$ $= \vec{b} - \vec{a}$ $\vec{OP} = \vec{OA} + \vec{AP}$ $\vec{OA} + \frac{1}{3} \vec{AB}$ $\vec{a} + \frac{1}{3}(\vec{b} - \vec{a})$ $\vec{OP} = \frac{2}{3}\vec{a} + \frac{1}{3}\vec{b}$</p> <p>(ii) $\vec{BQ} = \vec{OQ} - \vec{OB}$ $= \frac{1}{3}\vec{a} - \vec{b}$</p> <p>(b) (i) $\vec{OC} = n\left(\frac{2}{3}\vec{a} + \frac{1}{3}\vec{b}\right)$ $= \frac{2}{3}n\vec{a} + \frac{1}{3}n\vec{b}$</p> <p>(ii) $\vec{BC} = m(\vec{BQ})$ $= m\left(\frac{1}{3}\vec{a} - \vec{b}\right)$ $= \frac{1}{3}m\vec{a} - m\vec{b}$</p> <p>But $\vec{OC} = \vec{OB} + \vec{BC}$ $= \vec{b} + \frac{1}{3}m\vec{a} + (1 - m)\vec{b}$ $\frac{2}{3}n\vec{a} + \frac{1}{3}n\vec{b} = \frac{1}{3}m\vec{a} + (1 - m)\vec{b}$ $\frac{2}{3}n = \frac{1}{3}m \dots\dots(1)$ $\frac{1}{3}n = 1 - m \dots\dots(2)$ From (1) $6n = 3m$ $M = 2n$ Substitute for m in (2) $\frac{1}{3}n = 1 - 2n$ $\frac{1}{3}n + 2n = 1$ $\frac{7}{3}n = 1$ $n = \frac{3}{7}$ $\therefore M = 2\left(\frac{3}{7}\right)$ $= \frac{6}{7}$</p>	<p>B1</p> <p>M1 A1</p> <p>M1 A1</p> <p>B1</p> <p>M1 A1</p>	<p>For $\vec{b} - \vec{a}$</p> <p>Substitution Correct \vec{OP}</p> <p>Correct path... For OQ Accept $= \frac{1}{3}(\vec{a} - 3\vec{b})$</p> <p>For \vec{OC}</p> <p>For 2nd OC</p>
	<p>M1</p> <p>M1</p> <p>A1</p> <p>A1</p>	<p>For equating coeff.</p> <p>Solving equation</p> <p>C.a.o for $n = \frac{3}{7}$</p> <p>C.a.o For $m = \frac{6}{7}$</p>
	<p>12</p>	

<p>12. (a) $f(2) = 2a + 3 = 1$ $a = -1$</p> <p>(b) (i) $g(-3) = (-3)^2 - (-3)$ $= 9 + 3$ $= 12$</p> <p>(ii) $gg(x) = (x^2 - x)^2 - (x^2 - x)$ $= x^4 - 2x^3 + x^2 - x^2 + x$ $= x^4 - 2x^3 + x.$</p> <p>(iii) Let $w = x^2 - x$ Or $x^2 - x = w$ $(x - \frac{1}{2})^2 = w + \frac{1}{4}$ $x - \frac{1}{2} = \sqrt{w + \frac{1}{4}}$ $x = \sqrt{(w + \frac{1}{4})} + \frac{1}{2}$ $g^{-1}(x) = \sqrt{(x + \frac{1}{4})} + \frac{1}{2}$ $g^{-1}(6) = \sqrt{6 + \frac{1}{4}} + \frac{1}{2}$ $= \sqrt{\frac{25}{4}} + \frac{1}{2}$ $= \pm \frac{5}{2} + \frac{1}{2}$ $= 3 \text{ or } -2.$</p>	<p>M₁ A₁</p> <p>M₁ A₁</p> <p>B₁ M₁ A₁</p> <p>M₁</p> <p>A₁</p> <p>M₁ ✓</p> <p>A₁A₁</p>	<p>Substitution</p> <p>Substitution</p> <p>Substitution Simplification</p> <p>Transformation of formular</p> <p>For correct $g^{-1}(x)$</p> <p>C's $g^{-1}(x)$ dependent on.</p>
<p>13. (a) $V = L \times \text{width} \times \text{height}$ $15,400,000 = 22/7 \times r^2 \times 1000$ $15,400 = 22/7 r^2$ $\sqrt{r^2} = \sqrt{4900}$ $r = 70\text{cm}$</p> <p>(ii) $\left(\frac{10}{6}\right)^3 = \frac{15,400}{V}$ $\frac{1000}{216} = \frac{15,400}{V}$ $V \approx 3326.4 \text{ litres}$</p> <p>(b) $D \propto \frac{t}{c} \rightarrow D = \frac{kt}{c}$ $4 = \frac{32}{6} k$ $K = \frac{3t}{4c} = 0.75$ $= \left(\frac{3 \times 20}{4 \times 5}\right) \text{ days}$ $= 3 \text{ days.}$</p>	<p>B₁ M₁ M₁</p> <p>A₁</p> <p>M₁ M₁</p> <p>A₁</p> <p>B₁</p> <p>M₁</p> <p>A₁ M₁ ✓ A₁</p> <p>12marks</p>	<p>For converting both Correct substitute Simplification</p> <p>Equating vol. to $\frac{15400}{V} = (l.s.f)^3$</p> <p>For correct expression substitution</p> <p>Correct value of K Simplification Correct substitution</p>

<p>14. $(2,800,000 + 727,193.60) = (1.08)^n(2,800,000)$ $3527,193.6 = (1.08)^n(2,800,000)$ $(1.08)^n = 1.259712$ $n = \frac{\log 1.259712}{\log 1.08}$ $n = 3 \text{ years.}$</p> <p>(b) $= \frac{30}{100} \text{ of } 1,960,000 + (85,000 \times 20)$ $= 588,000 + 1,700,000$ $= \text{Shs } 2,288,000.$ Savings = $2,288,000 - 1,960,000$ $= \text{Shs. } 328,000$</p> <p>(ii) monthly = $245,000 \times 10 + 588,000$ $= \text{Shs. } 3,038,000/=$ Weekly hire purchase would be cheaper.</p>	<p>$M_1 A_1$ $M_1 \checkmark C'S$</p> <p>M_1</p> <p>A_1</p> <p>M_1</p> <p>A_1 M_1 A_1</p> <p>M_1 A_1 B_1</p> <p>12</p>	<p>For (amount = interest + Principle) Substitution (amount)</p> <p>Simplification</p> <p>Subtracting</p> <p>Cal. Monthly</p> <p>Dependant on (i) & (ii)</p>
<p>15. $n(\epsilon) = 100$</p> 	<p>B_1 B_1</p> <p>B_1 B_1</p>	<p>For 16 B_1 for @ correct entry of 16, 8, 7 and 15 for 7 for 15</p>
<p>(b) (i) $x + 7 + 10 + 15 = 39$ $x + 32 = 39$ $x = 7$</p> <p>(ii) (M and P) only = $27 - 7$ $= 20 \text{ students}$</p> <p>(iii) none = $100 - (16 + 20 + 8 + 7 + 7 + 10 + 15)$ $= 100 - 83$ $= 17 \text{ students.}$</p> <p>(c) $P(\text{at least one}) = \frac{(100-17)}{100}$ $= \frac{83}{100}$</p>	<p>$M_1 \checkmark$</p> <p>A_1</p> <p>M_1 A_1</p> <p>$M_1 \checkmark$</p> <p>A_1</p> <p>$M_1 \checkmark$</p> <p>A_1</p> <p>12</p>	<p>C's equation (s)</p> <p>C's value of x (7)</p> <p>Subtract/Addn</p> <p>C's values of a, b, or c</p>

<p>16. (a) $D = 30 \times \frac{3}{4}$ $= 45\text{km}$</p> <p>$t = \frac{55}{30}$ $= 1 \text{ hr } 50 \text{ min.}$</p> <p>(b) (i) $8:03\text{am} \pm 0.01$ $62.5\text{km} \pm 0.01$</p> <p>(ii) $= 60\text{km} - 59\text{km}$ $= 1\text{km} \pm 0.5 \text{ km}$</p> <p>Vertical scale Horizontal scale Bus 1st leg, 2nd leg, 3rd leg Car 1st and 2nd leg See graph</p>	<p>B_1</p> <p>B_1 B_1</p> <p>M_1 A_1</p> <p>B_1 B_1</p> <p>B_1 $B_1 B_1$</p> <p>$B_1 B_1$</p>	<p>For time 8.03 ± 0.01 For distance $(61.5 \pm 0.5)\text{km}$</p> <p>Drawing correct VS Drawing correct HS</p> <p>} Straight line graph</p> <p>} Straight line graph.</p>
<p>17. $AF^2 = AB^2 + \frac{1}{3}F^2$ $= 20^2 + 10^2$ $AF^2 = 500$ $AF = 22.361\text{m}$</p>  <p>$\tan 60^\circ = \frac{l}{5}$ $L = 5 \tan 60^\circ$ $= 8.660\text{m.}$</p> <p>$\sin \theta = \frac{8.66}{22.361}$ $\sin \theta = 0.3873$ $\theta = 22.79^\circ$</p> <p>(c) volume = (area of x - section) x length $= \frac{1}{2} (8.66)(10) \times 20$ $= 866\text{m}^3$</p>	<p>M_1</p> <p>A_1 $B_1 M_1$</p> <p>A_1</p> <p>B_1 $M_1 \checkmark$</p> <p>A_1</p> <p>$M_1 A_1$ M_1 A_1</p>	<p>For Pythagoras</p> <p>\checkmark C's AF</p> <p>Accept</p> <p>Identify the angle C's AF and height.</p> <p>Accept</p>
12		
12		

END