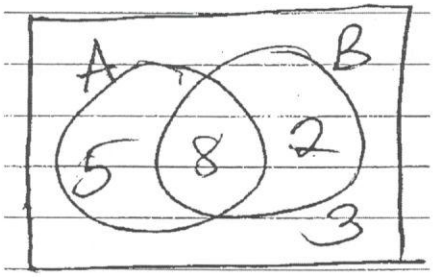
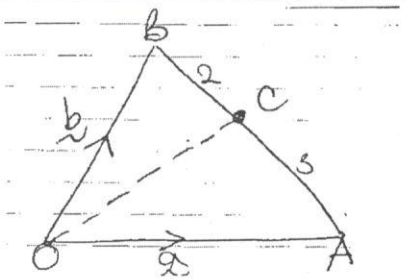
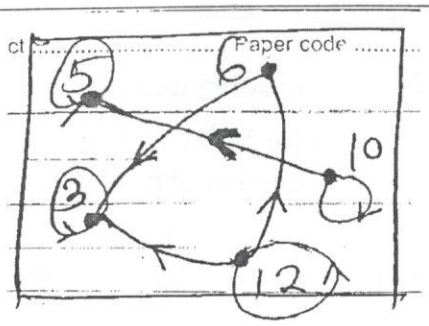
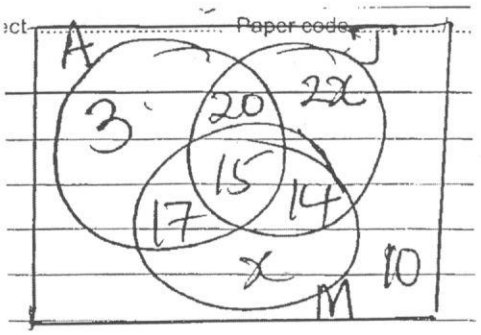
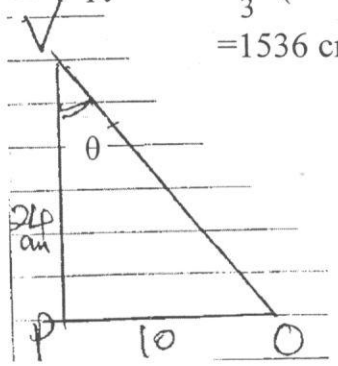
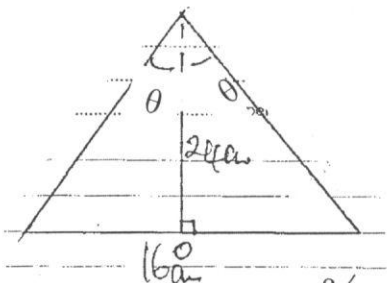
WAKISSHA
MARKING GUIDE
Uganda Certificate of Education
MATHEMATICS 456/2

No.	SOLUTIONS	MARKS	COMMENTS
1.	$F_{12} = \{1,2,3,4,6,12\}$ $F_{18} = \{1,2,3,6,9,18\}$ $F_{30} = \{1,2,3,5,6,10,15,30\}$ $\therefore$ HCF = 6	B1 B1 B1 B1 04	for factors of 12 for factors of 18 for factors of 30
2.	Cost price of bicycle $\frac{90}{100}$ of x =180,000 $x = \frac{180,000 \times 100}{90}$ = Shs 200,000	B1 M1 M1 A1 04	For 90 Correct expression simplification
3.	$2\sqrt{3\times49} - \sqrt{81\times3} + \sqrt{25\times3}$ $14\sqrt{3} - 9\sqrt{3} + 5\sqrt{3}$ $19\sqrt{3} - 9\sqrt{3}$ $10\sqrt{3}$	M1 M1 M1 A1 04	For factorization Simplification simplification
4.	 $n(\varepsilon)$=5+10+3 =18	B3 B1 04	For all entries correct B2 if one entry is wrong B1 if two entries are wrong B0 if more than 2 are wrong.
5.	$5y = {}^{-}3x$ $\Rightarrow y = {}^{-3}/_{5}\, x$ Grad of line = $5/3$ $\frac{5-y}{4-7} = 5/3$ $15 - 3y = {}^{-}15$ $3y = 30$ $y = 10$	B1 M1✓ M1 A1 04	Obtaining grad of the Correct expression C's Simplification

6.	$P \propto \frac{1}{q_2}$ or $P\frac{K}{Q^2}$ $K = 5(2^2) = 20$ $P = \frac{20}{(10)^2} = 0.2$	M1 A1 M1 A1 04	 C's K Cao
7.	Let $K = 3x^2 - 1$ $\Leftrightarrow 3x^2 = K + 1$ $x^2 = (k+1)/3$ $x = \sqrt{\frac{k+1}{3}}$ $g^{-1}(x) = \frac{\sqrt{x+1}}{3}$ $g^{-1}(47) = \frac{\sqrt{47+11}}{3}$ $= \sqrt{16}$ $= \pm 4$	M1 A1 M1 A1 04	formular transformation Correct inverse C's $g^{-1}(x)$ for both correct Cao
8.	$2^{3x} = \frac{1}{4} or 2^{-2}$ $\frac{3x}{3} = -\frac{2}{3}$ $x = -\frac{2}{3}$	M1 M1 M1 A1 04	Correct indices Equating Simplification
9.	$3 \div \frac{1}{9}$ vol.scale factor $\therefore$ LS.F = $3\sqrt{27}$ $= 3$ $\frac{x}{20} = 3$ $x = 60$	M1 A1 M1 A1 04	Obtaining correct V.S.F For LSF =3 Correct expression
10.	 $3CB = 2AC \Rightarrow AC = \frac{3}{5}AB$ $OC = OA + AC$ $= \underset{\sim}{a} + \frac{3}{5}(-\underset{\sim}{a} + \underset{\sim}{b})$ $= \underset{\sim}{a} - \frac{3}{5}\underset{\sim}{a} + \frac{3}{5}\underset{\sim}{b}$ $= \frac{2}{5}\underset{\sim}{a} + \frac{3}{5}\underset{\sim}{b}$	B1 B1 M1 A1 04	Correct sketch Correct interpretation Simplification

11 a)		B3 B1	If all four arrows correctly drawn B2 if one is wrong B1 of two are wrong B0 if more than 2 wrongs For arrows mapping of itself
b)	Let $K = \frac{x+5}{2x-3}$ $K(2x-3) = x+5$ $2xk - 3k = x+5$ $2xk - x = 5+3k$ $x(2k-1) = 5+3k$ $x = \frac{5+3k}{2k-1}$ $\therefore f(x) = \frac{5+3x}{2x-1}$ $f\left(-\frac{1}{3}\right) = \frac{5+3\left(-\frac{1}{3}\right)}{2\left(-\frac{1}{3}\right)-1}$ $= \frac{5-1}{\left(-\frac{5}{3}\right)}$ $= -2\frac{2}{5}$	M1 A1 M1 A1	formulae transformation for correct $f(x)$ C'S f(x) Accept $-2\frac{2}{5}$, -2.4
c)	$gh(x) = (x-3)^2 + 1$ $= x^2 - 6x + 10$ $hg(x) = x^2 + 1 - 3$ $= x^2 - 2$ $x^2 6x + 10 = x^2 - 2$ $-6x + 10 = x^2 - 2$ $x = 2$	B1 B1 M1 A1 12 marks	Correct $gh(x)$ Correct $hg(x)$ simplification
12 (a)	Num. $\frac{6}{5} \times \left(\frac{5}{4} + \frac{8}{5}\right) = \frac{6}{5} \times \frac{57}{20} = \frac{342}{100}$ Den. $\frac{25}{3} \times \frac{4}{9} = \frac{100}{27}$ $\frac{\frac{6}{5} of \left(\frac{5}{4}+\frac{8}{5}\right)}{\frac{25}{3} \div \frac{9}{4}} = \frac{\frac{342}{100}}{\frac{100}{100/27}} = \mathbf{0.9234}$	M1 A1 M1 A1 M1 A1	simplification correct numerator simplification correct deno simplification

(b)	$\frac{(\sqrt{3}+\sqrt{2})(\sqrt{5}-\sqrt{2})}{(\sqrt{5}+\sqrt{2})(\sqrt{5}-\sqrt{2})}$ $= \frac{\sqrt{15}+\sqrt{10}-\sqrt{6}-\sqrt{2}}{5-2}$ $= \frac{3.873+3.162-2.450-2}{3}$ $\frac{7.035-4.450}{3}$ $= \frac{2.585}{3}$ $= 0.86$	M1 M1 M1 M1 A1 12	rationlzate mult by $(\sqrt{5}-\sqrt{2})$ for both. correct exp. of Num correct exp. of Den simplification divide 2.585/3
13.	$n(\varepsilon) = 100$  	B4	If all entries are Correctly filled. B3 If one is wrong B2 if two are wrong B1 if more than two
(b)	$3x+14=35$ $3x=21$ $x=7$	M1 A1	-solving any eqtn. to obtain value of x Value of x
(i)	$n(J)=49+21$ =70 Students	M1 A1	
(ii)	$n(A')=100-55$ = 45 Students	M1 A1	
(c)	$P(Atmost2)=\frac{(100-15)}{100}$ $=85/100$	M1 A1 12	Addition or any correct expression used Aecept $0.85/17/20$
14i)	$\overrightarrow{AB} = {}^{-}\underset{\sim}{a}+\underset{\sim}{b}$	B1	
ii)	OR= OA +AR $=\underset{\sim}{a}+1/3\left({}^{-}\underset{\sim}{a}+\underset{\sim}{b}\right)$ $=2/3\,\underset{\sim}{a}+1/3\,\underset{\sim}{b}$	M1 M1 A1	for AR $= 1/3\,AB$ Simplification

iii)	$AT=\underset{\sim}{a}+\frac{1}{2}\underset{\sim}{b}$	M1 A1	Follow through correct route
14b	$OC=t\left(\frac{2}{3}\underset{\sim}{a}+\frac{1}{3}\underset{\sim}{b}\right)$ $OC = OA+AC$ $=\underset{\sim}{a}+K\left(-\underset{\sim}{a}+\frac{1}{2}\underset{\sim}{b}\right)$ $=\underset{\sim}{a}+(1-K)+1/2\,\underset{\sim}{b}K$ $1-K=\frac{2}{3}t$ and $1/3t=\frac{1}{2K}$ $2t+3k=1$ $2t-3k=0$ $4t=1=8t=\frac{1}{4}$ $K=\frac{1}{6}$	M1 A1 M1 M1 A1 A1 12	Correct equating of Coeff of $\underset{\sim}{a}+\underset{\sim}{b}$ solution equation Value t Value of K
15(i)	$PQ^2 = 20^2-12^2$ $= 400-144$ $= 256$ $\therefore PQ = 16cm$ Vol. of pyramid $=\frac{1}{3}\times(16\times12)\times12$ $=1536\ cm^3$	M1 A1 M1 A1	For exp. PQ^2 Simplification
(ii)	 $24\tan\theta = 10$ $\text{Tan}\quad\theta=\frac{10}{24}$ $\theta=22.6x2$ $=45.24^0$	B1 M1 A1	Identifying the angle simplification
(iii)	 $24\tan\theta = \theta = D\ \tan\theta = \frac{8}{24}$ $\theta=\tan^{-1}(\frac{8}{24})=18.4349$ $\therefore\quad\theta=18.4349\times2$ $=36.87^0$	B1 M1 A1 M1 A1 12	identification of angle for doubling of Angle

16(a)	Time taken by cyclists $\frac{d}{60}$	B1	- Correct expn
	Time taken by motorist $\frac{(240-d)}{80}$	B1	- Correct expn
	$09.45+\frac{d}{60}=10.50+\frac{240-d}{8}$	M1	- Equating
	$\frac{d}{60}-\frac{240-d}{80}=\frac{65}{60}$	M1	Simplification (collecting like terms)
	$\frac{4d-3(240-d)}{240}=13/12$	M1	Simp(same LCM)
	7d-+ 720 = 260		
	7d = 980	M1	Simplification
	D = 140Km	A1	
(b)	Time they by-pass		
	09:45+2:20 or 10:50 +1:15	M1	Aft. Motorist rotue
	12:05pm	A1	10:50 +1:15 12:05Pm
		M1	
		A1	
(c)	Arrival Times	B1	Obtaining times of arrival
	Cyclist:1345hrs or 1:45pm		
	Motorist :13 50hrs 0r 1:50pm	M1	subtraction
	Diff is time of Arrival 13:50hrs		
	13:45 hrs		
	00:05minutes	A1	
		12mks	
17(a)	Amount %age Tax		
	230,000= 0% 0		
	300,000= 8% $8/100\times300,000$	B1	For both
	= Shs 24,000		
	315,000 15% $15/100\times315,000$		
	= Shs47,250	M1	Addn
	Total tax Shs 71,250	A1	For total tax
	Net Income per month 845,000		
	-71,250	M1	Subtraction
	Shs773,750	A1	
	Net Y P.a 773,750 x 12		
	= Shs. 9,285,000	A1	

(b)	Duty $\frac{25}{100} \times 20,500,000 = 5,125,000$	B1	For duty
	Value duty $\Rightarrow$ 20,500,000 +5,125,000	M1	Addition
	Purchase tax $\Rightarrow \frac{10}{100} \times 25,625,000$	A1	For value obtained
	= Shs 2,562,500	B1	Tax
	Total levied shs (5,125,000 + 2,562,500)	M1	Addition
	= Shs 7,687,500	A1	
		12	

END