Province of the
EASTERN CAPE
EDUCATION

EC CURRICULUM: FET MATHEMATICS, MATHEMATICAL LITERACY AND TECHNICAL MATHEMATICS

NATIONAL SENIOR CERTIFICATE

GRADE 12

MATHEMATICS TOPIC TEST 3 OF 2020: TRIGONOMETRY MARKING GUIDELINES

MARKS: 40

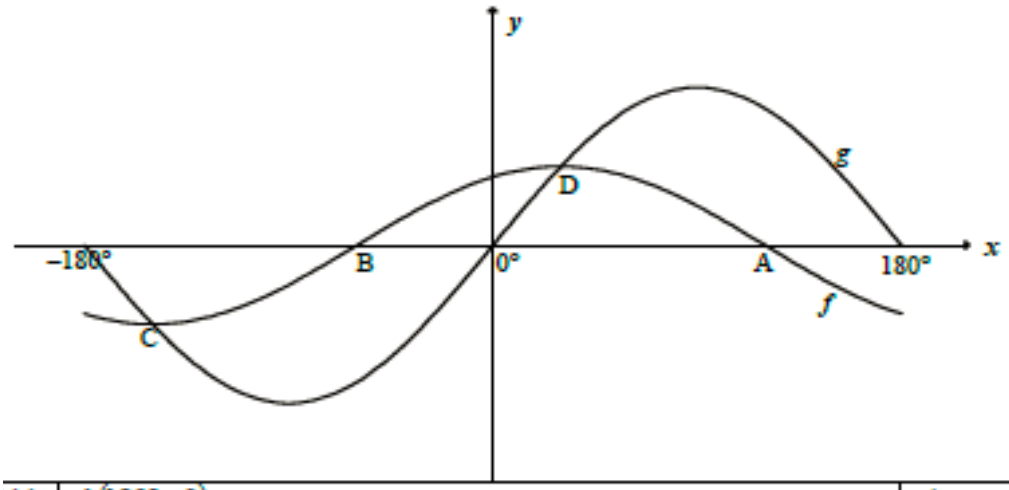
This Marking Guidelines consists of 5 pages.

QUESTION/*VRAAG* 1

1.1.1	$\sin 191°$ $=-\sin 11°$	✓ $-\sin 11°$ (1)
1.1.2	$\cos 22°$ $=\cos(2\times 11°)$ $=1-2\sin^2 11°$	✓ answer (1)
1.2	$\cos(x-180°)+\sqrt{2}\sin(x+45°)$ $=-\cos x+\sqrt{2}(\sin x\cos 45°+\cos x\sin 45°)$ $=-\cos x+\sqrt{2}\left(\sin x\left(\frac{1}{\sqrt{2}}\right)+\cos x\left(\frac{1}{\sqrt{2}}\right)\right)$ $=-\cos x+\sin x+\cos x$ $=\sin x$ **OR** $\cos(x-180°)+\sqrt{2}\sin(x+45°)$ $=-\cos x+\sqrt{2}(\sin x\cos 45°+\cos x\sin 45°)$ $=-\cos x+\sqrt{2}\left(\sin x\left(\frac{\sqrt{2}}{2}\right)+\cos x\left(\frac{\sqrt{2}}{2}\right)\right)$ $=-\cos x+\sin x+\cos x$ $=\sin x$	✓ $-\cos x$ ✓ expansion ✓ special angle ratios ✓ simplification of last 2 terms ✓ answer (5) ✓ $-\cos x$ ✓ expansion ✓ special angle ratios ✓ simplification of last 2 terms ✓ answer (5)
1.3	$\sin P+\sin Q=\sin P+\cos P$ $(\sin P+\cos P)^2=\left(\frac{7}{5}\right)^2$ $\sin^2 P+2\sin P\cos P+\cos^2 P=\frac{49}{25}$ $2\sin P\cos P=\frac{49}{25}-1$ $\sin 2P=\left(\frac{49}{25}-\frac{25}{25}\right)$ $=\frac{24}{25}$	✓ $\sin Q=\cos P$ ✓ squaring ✓ expansion ✓ $\sin^2 P+\cos^2 P=1$ ✓ answer (5)
		[12]

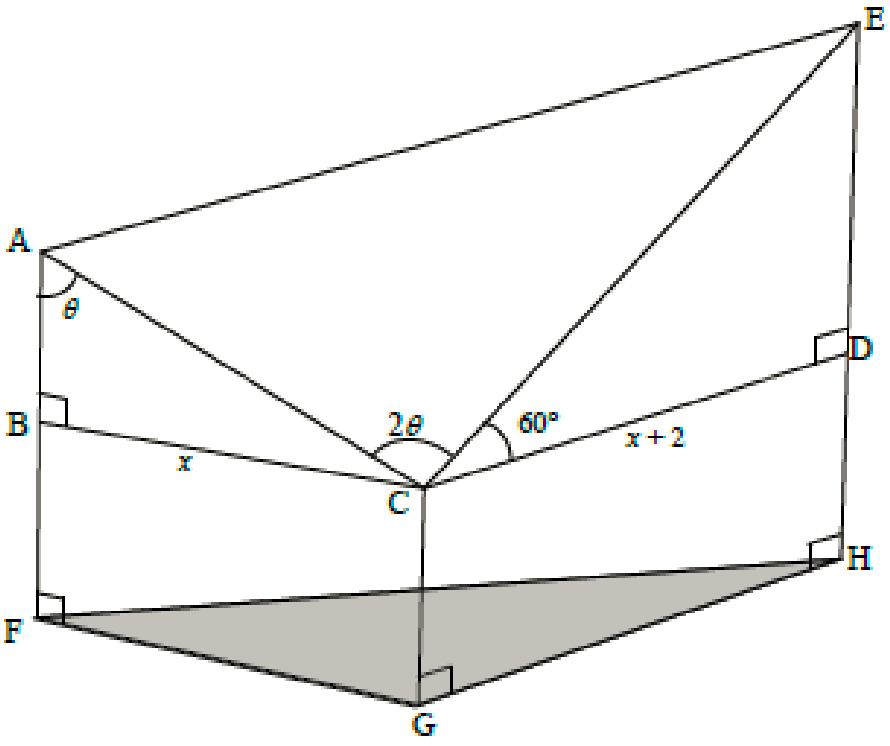
QUESTION/VRAAG 2

2.1	$\cos(x-30°) = 2\sin x$ $\cos x\cos 30° + \sin x\sin 30° = 2\sin x$ $\frac{\sqrt{3}}{2}\cos x + \frac{1}{2}\sin x = 2\sin x$ $\frac{\sqrt{3}}{2}\cos x = \frac{3}{2}\sin x$ $\tan x = \frac{\sqrt{3}}{3}$ $x = 30° + k.180°;\quad k \in Z$ **OR** $x = 30° + k.360°$ or $x = 210° + k.360°;\quad k \in Z$	✓ expansion ✓ special ∠s ✓ simplification ✓ equation in tan ✓ 30° ✓ $k.180°; k \in Z$ **OR** ✓ 30° and 210° ✓ $k.360°;\quad k \in Z$ (6)



2.2.1	(a)	A(120° ; 0)	✓ answer (1)
2.2.1	(b)	C(−150° ; −1)	✓ x value ✓ y value (2)
2.2.2	(a)	$x \in (-90° ; 30°)$ OR $-90° < x < 30°$	✓ endpoints ✓ correct interval (2)
2.2.2	(b)	$x \in (-160° ; 20°)$ OR $-160° < x < 20°$	✓endpoints ✓correct interval (2)
2.2.3		$y = 2^{2\sin x+3}$ Range of $y = 2\sin x$: $y \in [-2 ; 2]$ **OR** $-2 \le y \le 2$ Range of $y = 2\sin x + 3$: $y \in [1 ; 5]$ **OR** $1 \le y \le 5$ Range: $y = 2^{2\sin x+3}$: $y \in [2 ; 32]$ **OR** $2 \le y \le 32$ Answer only: full marks	✓ 1 ✓ 5 ✓ 2 ✓ 32 ✓ correct interval (5)
			[18]

QUESTION/*VRAAG* 3



3.1.1	$\sin\theta=\frac{x}{AC}$ **OR** $\frac{\sin\theta}{x}=\frac{\sin 90°}{AC}$ $AC=\frac{x}{\sin\theta}$ $AC=\frac{x}{\sin\theta}$	✓ trig ratio ✓ simplification (2)
3.1.2	$\cos 60°=\frac{x+2}{CE}$ **OR** $\frac{\sin 30}{x+2}=\frac{\sin 90°}{CE}$ $CE=\frac{x+2}{\cos 60°}$ $CE=\frac{x+2}{\sin 30°}$ $=\frac{x+2}{\frac{1}{2}}=2(x+2)$ $=2(x+2)$	✓ trig ratio ✓ making CE the subject (2)
3.2	$\text{Area }\Delta ACE=\frac{1}{2}AC.EC.\sin A\hat{C}E$ $=\frac{1}{2}\left(\frac{x}{\sin\theta}\right)(2(x+2))\sin 2\theta$ $=\frac{x(x+2)\times 2\sin\theta\cos\theta}{\sin\theta}$ $=2x(x+2)\cos\theta$	✓ use area rule correctly ✓ substitution of $\frac{x}{\sin\theta}(2(x+2))$ ✓ substitution of $\sin 2\theta$ (3)

3.3	$EC = 2(12+2) = 28$ $AE^2 = AC^2 + EC^2 - 2(AC)(EC)\cos A\hat{C}E$ $= \left(\frac{12}{\sin 55°}\right)^2 + 28^2 - 2\left(\frac{12}{\sin 55°}\right)(28)\cos 110°$ $AE = 35{,}77m$	✓ EC ✓ substitution ✓ answer **(3)**
		[10]

TOTAL: 40