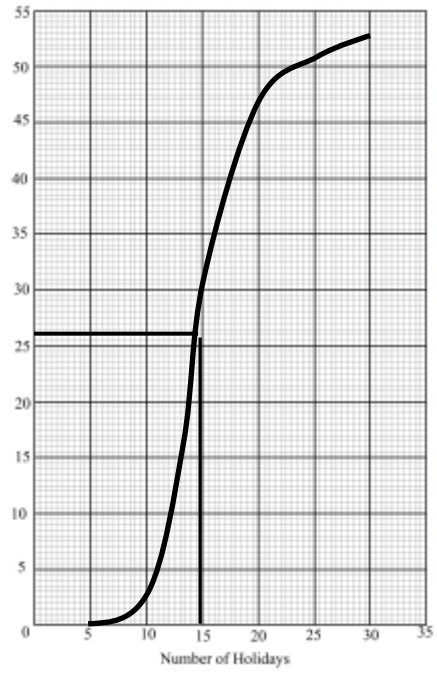
GRADE 11 PAPER 2 NOVEMBER 2021

MEMO

QUESTION 1

1.1.1	2011 – 1980 = 31 ✓	answer	(1)
1.1.2	1991✓	answer	(1)
1.1.3	25% ✓	answer	(1)
1.1.4	Upper quartile will decrease ✓✓	upper quartile decrease	(2)
1.2.1	3 31 47 ✓ 51 53	cf correct	(1)
1.2.2		grounded to 5 ✓ plot endpoints ✓ shape (no ruler) ✓ co-ords ✓	(4)
1.2.3	$Q_2 = 15$ ✓ ✓	graph ✓ answer (± 2) ✓ answer only = 2	(2)
1.2.4	$\frac{47}{53} \times 100$ $= 88,68$ $\therefore 11,32$	47 ✓ 53 ✓ 11,32 ✓	(3)

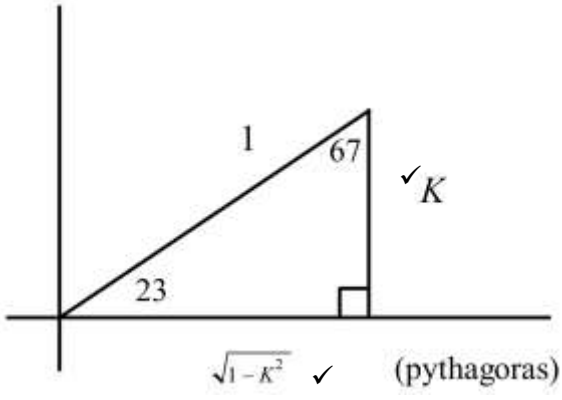
QUESTION2

2.1	$\tan 45 = m$ $\therefore m = 1$ ✓	answer	(1)
2.2	✓ $\frac{-2-k}{8-4} = 1$ ✓ $-2-k = 4$ ✓ $-k = +6$ $k = -6$	gradient subs =1 (CA) working	(3)
2.3	$y+6 = -\frac{1}{2}(x-4)$ ✓✓ $y = -\frac{1}{2}x - 4$ ✓	substitute m substitute (x; y) equation	(3)
2.4.1	$\tan\beta = -\frac{1}{2}$ ✓ $\beta = \tan^{-1}\left(\frac{1}{2}\right)$ $\beta = 180° - 26,57°$ $\beta = 153,43°$ ✓ $\therefore\ \theta = 71,57°$ ✓	equate β θ	(3)
2.4.2	$d^{AB} = \sqrt{(-2-2)^2 + (8-0)^2}$ ✓ $= \sqrt{16+64}$ $= 4\sqrt{5}$ ✓✓ $\left(\sqrt{80} = 8,94\right)$	subst. answer	(3)
2.4.3	$d_{BC} = \sqrt{(8-4)^2 + (-2+6)^2}$ ✓ $= \sqrt{16+16}$ $= 4\sqrt{2}$ ✓ $\left(\sqrt{32} = 5,66\right)$ $\therefore\ Area = \frac{1}{2}\left(4\sqrt{5}\right)\left(4\sqrt{2}\right)\sin 71,57°$ ✓ $= 24\ units^2$ ✓	substitute (BC) length (BC) substitute area rule answer	(4)

QUESTION 3

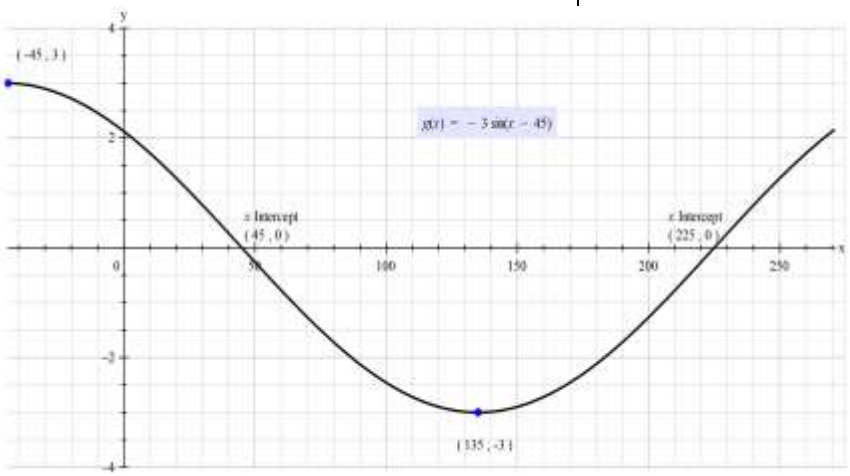
3.1	$R(=8;0)$ ✓ ✓	x value y value	(2)
3.2	$x^2+10x+y^2-8y=8$ $x^2+10x+25+y^2-8y+16=8+25+16$ ✓ ✓ $(x+5)^2+(y-4)^2=49$ ✓ $S(-5;4)$ ✓	LHS RHS factorise LHS centre	(4)
3.3	$x \leq -11$ ✓ ✓		(2)

QUESTION 4

4.1.1		sketch $\sqrt{1-k^2}$	(4)
	$\tan^2 23$ $=\left(\frac{k}{\sqrt{1-k^2}}\right)^2$ ✓ $=\frac{k^2}{1-k^2}$ ✓	subst answer	
4.1.2	$\sin 247$ $=\sin(180+67)$ $=-\sin 67$ ✓ $=-\sqrt{1-k^2}$ ✓	reduction answer	(2)
4.2	$\frac{\tan(540+x).\cos(-x)}{\cos(90-x)}$ $=\frac{\tan(180+x).\cos(-x)}{\cos(90-x)}$ $=\frac{\tan x.\cos x}{\sin x}$ ✓ ✓ $=\frac{\sin x}{\cos x}\times\frac{\cos x}{\sin x}$ ✓ $=1$ ✓	tan x cos x sin x tan identity 1	(5)

4.3	$\frac{2\cos(1020°)+\sin^2(315°)}{\tan(-135°)+\sin(210°)}$ $=\frac{2\cos 300°+\sin^2 315°}{\tan 225°+\sin 210°}$ $=\frac{2\cos(360°-60°)+\sin^2(360°-45°)}{\tan(180°+45°)+\sin(180°+30°)}$ $=\frac{2\cos 60°+(-\sin 45°)^2}{\tan 45°-\sin 30°}$ ✓ ✓ ✓ ✓ $=\frac{\frac{2}{1}\left(\frac{1}{2}\right)+\left(\frac{1}{\sqrt{2}}\right)^2}{1-\frac{1}{2}}$ ✓ $=3$ ✓	cos 60° - sin 45° tan 45° - sin 30° special angle subs answer	(6)
4.4	$LHS=\frac{\cos x}{1-\sin x}-\tan x$ $=\frac{\cos x}{1-\sin x}-\frac{\sin x}{\cos x}$ ✓ $=\frac{\cos^2 x-\sin x(1-\sin x)}{\cos x(1-\sin x)}$ ✓ $=\frac{\cos^2 x-\sin x+\sin^2 x}{\cos x(1-\sin x)}$ ✓ $=\frac{1-\sin x}{\cos(1-\sin x)}$ ✓ $=\frac{1}{\cos x}=RHS$	tan identity LCD simplify numerator squares identity	(4)
4.5	$\sin^2 1+\sin^2 2+\sin^2 3+\cdots+\sin^2 88+\sin^2 89+\sin^2 90$ $=44+\sin^2 45+\sin^2 90$ $=44+\left(\frac{1}{\sqrt{2}}\right)^2+(1)^2$ $=45\frac{1}{2}$	44 ✓ $\frac{1}{\sqrt{2}}$ ✓ 1 ✓	(3)

QUESTION 5

5.1.1		endpoints and TP ✓ intercepts ✓ shape ✓	
5.1.2	3 ✓	3	(1)
5.1.3	$\frac{180°}{2} = 90°$ ✓ ✓	180° 90°	(2)
5.1.4	$x = 135°$ ✓	x = 135°	(1)
5.2.1	$x \in (-90°; 0°)$ ✓✓	values brackets	(2)
5.2.2	$y \in [1; 3]$ ✓✓	values brackets	(2)
5.2.3	$\cos 2x = \cos(x + 40)$ $2x = (x + 40)$ ✓ 1st quad $2x = x + 40 + 360n$ ✓ $(n \in \mathbb{Z})$ $x = 40 + 360n$ ✓ 4th quad $2x = 360 - (x + 40)$ ✓ $+ 360n$ $2x = 360 - x - 40 + 360n$ $3x = 320 + 360n$ ✓ $x = 106,67 + 120n$ $\therefore\ x \in \{-133,33; -13,33; 40\}$ ✓	equate angles x = 40 + 360n 2x =360 – (x + 40) Answer Specific solutions	(6)

QUESTION 6

$\sin\theta = \frac{BC}{12}$ ✓ $\therefore BC = 12\sin\theta$ ✓ $\frac{b}{\sin B} = \frac{g}{\sin G}$ ✓ ✓ $\frac{b}{\sin\alpha} = \frac{12\sin\theta}{\sin\theta}$ $b = 12\sin\alpha$	subst. (sin rule/Soh) $12\sin\theta$ subst into sin rule method	(4)

QUESTION 7

7.1	$A = 90°$ ($\angle$ in semi $\odot$) ✓ ✓ $\therefore E_2 = 90°$ (corr $\angle s, AB \parallel OD$)	S|R S|R	(3)
7.2	$AE = EC$ line from centre ✓$\perp$ to chord $\therefore EC = 8$ ✓ & $OC = 10$ given $\therefore OE = 6$ ✓ pythag $\therefore ED = 10 - 6 = 4$ ✓	R EC = 8 OE =6 ED = 4	(4)

QUESTION 8

8.1	are supplementary ✓	reason	(1)
8.2.1	$C_1 = 46$ ✓ opposite angles cyclic quad ✓	S R	(2)
8.2.2	$O\hat{B}C = \hat{C}_1$ ($\angle s$ opp = radii) ✓ $O = 180° - 2(46°)$ $= 88°$ ✓ ($\angle$s of Δ) ✓	R O = 88° R	(3)
8.2.3	$D_2 = 44°$ ✓ ($\angle$ at centre = $2\times\angle$ at circ) ✓	S R	(2)
8.2.4	$D_3 = 78°$ ✓ (corresp $\angle s, AB \parallel DC$) ✓	S R	(2)
8.2.5	$D_1 = 58°$ ✓ ($\angle s$ on str line) ✓ OR (co-int angles, $AB \parallel CD$)	S R	(2)

QUESTION 9

9.1	Construct diameter AT and join to B $T\hat{A}P = 90°$ (rad $\perp$ tan) $\hat{B} = 90°$ ($\angle$ in semi $\odot$) $T\hat{B}C = T\hat{A}C$ ($\angle$s in same seg) $\therefore\ C\hat{A}P = A\hat{B}C$	Construction ✓ S|R (90)✓ S|R (90)✓ statement ✓ reason ✓	(5)
9.2.1	$S_3 = x$ (= chords, = $\angle$s) $Y\hat{Q}R = x$ (tan chord thm)	S ✓ R ✓ S✓ R ✓	(4)
9.2.2	$V\hat{Q}S = 90°$ (rad $\perp$ tan) $V\hat{S}Q = 2x$ (given) $\therefore\ V = 90° - 2x$ ($\angle$s in Δ)	S|R (90)✓ (statement) ✓ (reason) ✓	(3)
9.2.3	$T\hat{Q}S = 90° - 2x$ (proven) $P_1 = 90° - 2x$ ($\angle$s in same seg) $\therefore$ $VWPT$ is cyclic (conv ext $\angle$ cyclic quad)	TQS ✓ Reason ✓ P_1 (S|R) ✓ Reason ✓	(4)

QUESTION 10

$PA = PC$ (tans from same pt) ✓ $Area\ \Delta PAC = \frac{1}{2} PA.PC.\sin 60°$ ✓ $PA^2 = PF \times PB$ ✓ $\therefore \frac{Area\ \Delta PAC}{PF \times PB} = \frac{\frac{1}{2} PA.PA.\sin 60°}{PA^2}$ $= \frac{1}{2}\sin 60°$ $= \frac{1}{2}\left(\frac{\sqrt{3}}{2}\right)$ ✓ $= \frac{\sqrt{3}}{4}$ ✓ OR ✓ $PC^2 = PF \times PB$ $AP^2 = PF \times PB$ $\therefore PC^2 = AP^2$ $\therefore PC = AP$ ✓ ✓ $\therefore \frac{\frac{1}{2} AP.PC\sin 60°}{PC^2}$ ✓ $\frac{\frac{1}{2} AP\left(\frac{\sqrt{3}}{2}\right)}{PC}$ $\frac{1}{2}\left(\frac{\sqrt{3}}{2}\right)$ ✓ $\frac{\sqrt{3}}{4}$	S|R area rule rule special angle subs answer rule PC = AP area rule special angle subs answer	(5)