RONDEBOSCH BOYS' HIGH SCHOOL

GRADE 11

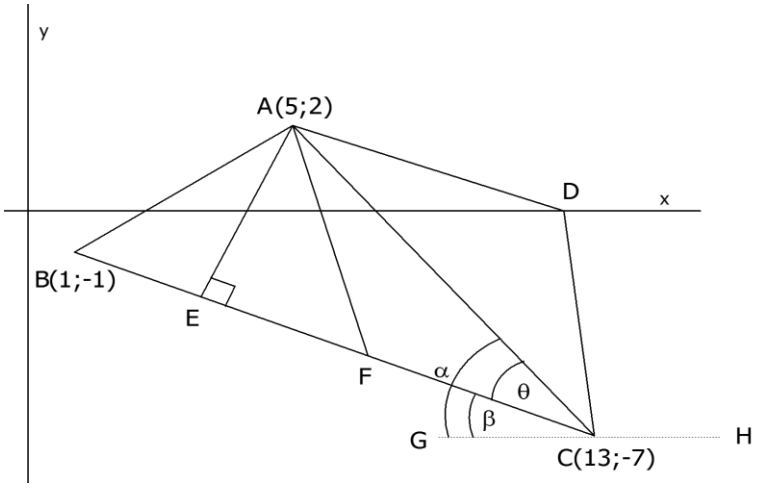
MATHEMATICS (PAPER 2)
19 JUNE 2017

MARKS: 100 **EXAMINER: T EDWARDS**

TIME: 2 HOURS **MODERATOR: D GELDENHUYS**

MEMORANDUM

QUESTION 1



1.1 $F(7\checkmark;-4\checkmark)$ (2)R

1.2 $m_{BC}=\frac{-1+7}{1-13}=-\frac{1}{2}$ ✓
$\therefore m_{AD}=-\frac{1}{2}$ ✓
$\therefore 2=-\frac{1}{2}(5)+c$ ✓
$\therefore y=-\frac{1}{2}x+\frac{9}{2}$ ✓ (4)R

1.3 $y=2x+c$ ✓
$2=2(5)+c$ ✓
$y=2x-8$ ✓ (3)R

1.4 $y=-\frac{1}{2}x+c$ ✓
$-1=-\frac{1}{2}(1)+c$ ✓
$y=-\frac{1}{2}x-\frac{1}{2}$ ✓
$-\frac{1}{2}x-\frac{1}{2}=2x-8$ ✓
$\frac{5}{2}x=\frac{15}{2}$
$E(3\checkmark;-2\checkmark)$ (6)R

1.5 $d_{BE}=\sqrt{(1-3)^2+(-1+2)^2}$ ✓
$d_{BE}=\sqrt{5}$ ✓
$d_{EC}=\sqrt{(3-13)^2+(-2+7)^2}$ ✓
$d_{EC}=5\sqrt{5}$ ✓
$\therefore \frac{BE}{EC}=\frac{\sqrt{5}}{5\sqrt{5}}=\frac{1}{5}$ ✓
$\therefore BE=\frac{1}{5}EC$ (5)R

1.6 $\tan\alpha=\frac{9}{8}$ ✓ $\tan\beta=\frac{1}{2}$ ✓
$\alpha=48{,}37°$ ✓ $\beta=26{,}57°$ ✓
$\therefore \theta=\alpha-\beta=21{,}80°$ ✓

OR $\tan H\hat{C}B=-\frac{7}{4}$ ✓ $\tan H\hat{C}A=-\frac{1}{2}$ ✓
$H\hat{C}B=153{,}43°$ ✓ $H\hat{C}A=131{,}63°$✓
$\therefore \theta=21{,}80°$ ✓ (5)C

[25]

QUESTION 2

2.1 $-(3-2k)=4$ ✓

$-3+2k=4$ ✓

$2k=7$

$k=\frac{7}{2}$ ✓ (3)R

2.2 $3-2k=0$ ✓

$k=\frac{3}{2}$ ✓ (2)C

2.3 $(3-2k)(-3)+(4)=12$ ✓

$-9+6k+4=12$ ✓

$6k=17$

$k=\frac{17}{6}$ ✓ (3)C

[8]

QUESTION 3

$Radius=\sqrt{24}$

$d_{OA}=\sqrt{(-3-0)^2+(4-0)^2}$ ✓

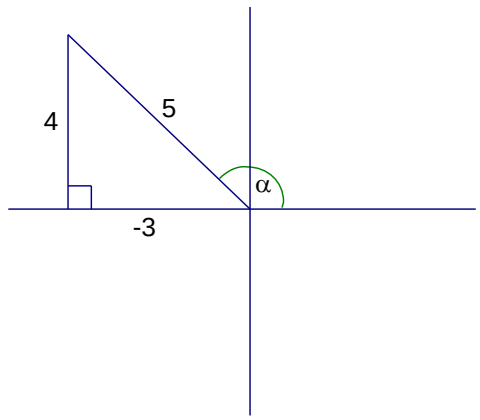
$d_{OA}=5$ ✓

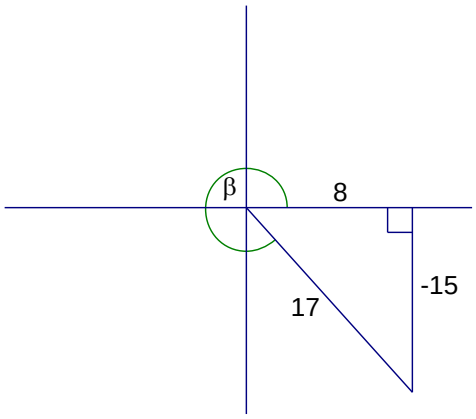
$5>\sqrt{24}$ ✓

A lies outside the circle. ✓ **[4]PS**

QUESTION 4

4.1





✓ quadrant and angle ✓ quadrant and angle

✓ values ✓ values (4)C

4.2 $\sin\alpha\checkmark + \cos\beta = -\frac{15}{17}\checkmark + \left(-\frac{3}{5}\right)\checkmark = -\frac{75}{85} - \frac{51}{85} = -\frac{126}{85}\checkmark$ (4)R

[8]

QUESTION 5

5.1.1 $\frac{(-\cos 45°)\checkmark(-\sin 60°)\checkmark(-\sin\theta)\checkmark}{(-\sin\theta)\checkmark}$

$= \left(-\frac{1}{\sqrt{2}}\right)\left(-\frac{\sqrt{3}}{2}\right)\checkmark$

$= \frac{\sqrt{3}}{\sqrt{2}}\checkmark$ (6)R

5.1.2 $\frac{\cos^2 220°\checkmark}{\cos 40°\checkmark} = \frac{\cos^2 40°\checkmark}{\cos 40°} = \cos 40°\checkmark$ (4)C

5.2.1 $LHS = \sin x\checkmark.\tan x\checkmark - (-\cos x)\checkmark$

$LHS = \sin x.\frac{\sin x}{\cos x}\checkmark + \cos x$

$LHS = \frac{\sin^2 x+\cos^2 x}{\cos x}\checkmark$

$LHS = \frac{1\checkmark}{\cos x}$

$LHS = RHS$ (6)R

5.2.2 $LHS = \frac{\sin^n\theta-\cos^n\theta}{1-\frac{\sin^n\theta}{\cos^n\theta}\checkmark}$

$LHS = \frac{\sin^n\theta-\cos^n\theta}{\frac{\cos^n\theta-\sin^n\theta\checkmark}{\cos^n\theta\checkmark}}$

$LHS = \frac{\sin^n\theta-\cos^n\theta}{1} \times \checkmark\frac{\cos^n\theta}{-(\sin^n\theta-\cos^n\theta)\checkmark}$

$LHS = -\cos^n\theta$

$LHS = RHS$ (5)C

5.3 $\tan(60°-45°)\checkmark = \frac{\tan 60°-\tan 45°}{1+\tan 60°.\tan 45°}\checkmark$ or $\tan(45°-30°)\checkmark = \frac{\tan 45°-\tan 30°}{1+\tan 45°.\tan 30°}\checkmark$

$\tan 15° = \frac{\frac{\sqrt{3}}{1}-1}{1+\left(\frac{\sqrt{3}}{1}\right)(1)}\checkmark$ $\tan 15° = \frac{1-\frac{1}{\sqrt{3}}}{1+(1)(\frac{1}{\sqrt{3}})}\checkmark$

$\tan 15° = \frac{\sqrt{3}-1}{\sqrt{3}+1}$ $\tan 15° = \frac{\sqrt{3}-1}{\sqrt{3}+1}$ (3)PS

[24]

QUESTION 6

6.1.1 $\sin x = \frac{0,71}{2}$ ✓

$x = 20,79°$ ✓ or $x = 159,21°$ ✓ (3)R

6.1.2 $RA = 75,52°$

$\therefore 2x + 30° = 104,48° + n.360°$ ✓ or $2x + 30° = 255,52° + n.360°$ ✓
$\therefore x = 37,24° + n.180°$ ✓ or $x = 112,76° + n.180°$ ✓
$n \in Z$ (-1 if missing) (4)R

6.2 $\cos^2 89° = \sin^2 1°$

$(\cos^2 1° + \sin^2 1°) + (\cos^2 2° + \sin^2 2°) + \cdots + \cos^2 45 + \cos^2 90°$ ✓✓

$44(1) + \left(\frac{1}{\sqrt{2}}\right)^2 + 0$✓ $= \frac{89}{2}$ ✓ (4)PS

[11]

QUESTION 7

7.1 $\sin 2x = \cos(x - 60°)$

$\sin 2x = \sin[90° - (x - 60°)]$ ✓

$\sin 2x = \sin(150° - x)$

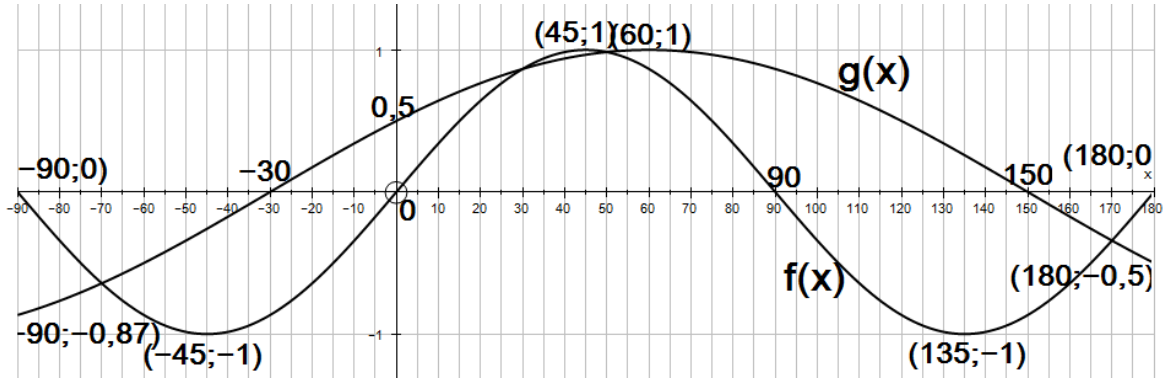
$2x = 150° - x + n.360°$ ✓ or $2x = 30° + x + n.360°$ ✓

$3x = 150° + n.360°$ $x = 30° + n.360°$ ✓

$x = 50° + n.120°$ ✓ $n \in Z$ (5)C

7.2 $x = -70°;\ 30°;\ 50°; 170°$ ✓✓ (-1 per missing value) (2)R

7.3



$f(x)$: ✓ *turning points*; ✓ *shape*; ✓*start & end points*

$g(x)$: ✓*turning point*; ✓ *shape*; ✓*starting point*; ✓ *ending point* (7)R

7.4 $180°$ ✓ (1)R

7.5.1 $-90° \leq x \leq -70°$ ✓ or $30° \leq x \leq 50°$ ✓ or $170° \leq x \leq 180°$ ✓ (3)C

7.5.2 $-30° < x < 0°$ ✓ or $90° < x < 150°$ ✓ (2)C

[20]