Memorandum Bergvliet High September 2010

QUESTION 1

1.1. $S\left(\frac{-4+6}{2};\frac{-1+(-3)}{2}\right)$

$S(1;-2)$

1.1.2. $m_{Rc}=\frac{-3}{2}$

$y=\frac{-3}{2}x+c$

$3=\frac{-3}{2}(2)+c$

$c=6$

$y=\frac{-3}{2}x+6$

1.1.3. $m_{RA}=\left(\frac{3--1}{2--4}\right)$

$=\frac{4}{6}=\frac{2}{3}$

$m_{RC}=\frac{-3}{2}$

Therefore these lines are perpendicular therefore $\beta=90^0$

product of gradients $=-1$

1.1.4. $RA=\sqrt{(2+4)^2+(3+1)^2}=2\sqrt{13}$

$RC=\sqrt{(2-6)^2+(3+3)^2}=2\sqrt{13}$

$RA=RC$ *therefore isoceles*

proved β *is* 90^0 *therefore right angled isocles*

1.2.1. $H:\ 0=-x+2$

$x=2 \qquad H(2;0)$

$G:\ y=2(2)+5$

$=9$

$G(2;9)$

1.2.2. $2x+5=-x+2$

$3x=-3$

$x=-1$

$y=-(-1)+2$

$=3$

$K(-1;3)$

1.2.3. $G(2;9)\ \ H(-1;3)$

$KG=\sqrt{(2--1)^2+(9-3)^2}$

$=\sqrt{9+36}=\sqrt{45}=3\sqrt{5}$

1.2.4. $m_{CD}=-1 \quad \tan^{-1}(1)=45$

QUESTION 2

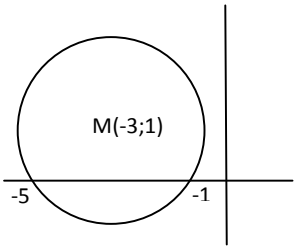
2.1. $x^2+6x+(3)^2+y^2-2y+(1)^2=-5+9+1$

$(x+3)^2+(y-1)^2=5$

$M(-3;1)$

$r=\sqrt{5}$

2.2.



$(x+3)^2+(0-1)^2=5$

$(x+5)(x+1)=0$

$x=-5 \text{ or } -1$

2.3. $(x+3)^2+(y-1)^2=5$

$x=-4$

$(-4+3)^2+(y-1)^2=5$

$y^2-2y-3=0$

$(y-3)(y+1)=0$

$y=3 \quad y=-1$

$B=(-4;-1)$

$M=(-3;1)$

$m_{MB}=\frac{-1-1}{-4--3}=2$

$perpendicular\ \ line=\frac{-1}{2}$

$y=\frac{-1}{2}x+c$

$-1=\frac{-1}{2}(-4)+c$

$-3=c$

$y=\frac{-1}{2}x-3$

QUESTION 3

3.1. *Glide* $A'(7;-1)$

3.2. $(-4;3)$

3.3. $(x;y)\rightarrow(-y;x)$

QUESTION 4

4.1.1. See diagram sheet

4.1.2. See diagram sheet

4.2. $x'=(-3)\cos 150^0-(1)\sin 150^0$

$x'=\frac{3\sqrt{3}-1}{2}$

$y'=(1)\cos 150^0+(-3)\sin 150^0$

$x'=\frac{-\sqrt{3}-3}{2}$

QUESTION 5

$x=\sqrt{(k^2+1)^2-(2k)^2}$

$=\sqrt{k^4-2k^2+1}$

$=\sqrt{(k^2-1)^2}$

$=k^2-1$

5.1.1. $\tan\theta=\frac{2k}{k^2-1}$

5.1.2. $\cos\theta=\frac{k^2-1}{k^2+1}$

5.2.1. $\frac{\sin^2 x\times\cos x}{\cos x\times(-\sin x)\times(-\cos x)}$

$=\frac{\sin x}{\cos x}=\tan x$

5.2.2. $\cos(79-34)=\cos 45=\frac{1}{\sqrt{2}}$

5.2.3 $\cos x.\cos 30^0+\sin x\sin 30^0+\sin x.\cos 60^0-\cos x.\sin 60^0$

$=\cos x.\cos 30^0+\sin x\sin 30^0+\sin x.\cos 60^0-\cos x.\cos 30^0$

$=\sin x(\sin 60^0+\cos 60^0)$

$=\sin x$

5.3. *LHS*

$\frac{2\tan x-\sin 2x}{2\sin x^2}$

$=\frac{2\frac{\sin x}{\cos x}-2\sin x\cos x}{2\sin x^2}$

$=\frac{2\sin x-2\sin x\cos^2 x}{\cos x}\div 2\sin^2 x$

$=\frac{2\sin x(1-\cos^2 x)}{\cos x}\div 2\sin^2 x$

$=\frac{2\sin x.\sin^2 x}{\cos x}\times\frac{1}{2\sin^2 x}\ =\frac{\sin x}{\cos x}=\tan x=RHS$

5.3.2. $0^0;90^0;180^0$

5.3.3. $\tan(x-30^0)=5$

$x-30^0=78,7^0$

$x=108,7^0+n180^0$

$x=108.69$ *or* 288.69

5.3.4. $8(1-\sin^2 x)-2\sin x-5=0$

$-8\sin^2 x-2\sin x-5+8=0$

$8\sin^2 x+2\sin x-3=0$

$(4\sin x+3)(2\sin x-1)=0$

$\sin x=\frac{-3}{4}$ $\sin x=\frac{1}{2}$

ref $48,6^0$ *ref* 30^0

$x=180^0+48,6^0+n360^0$ $x=30^0+n360^0$

$x=228,6^0+n360^0$ *or* $x=150^0+n360^0$

or

$x=360^0-48,6^0+n360^0$

$x=311,4^0+n360^0$

QUESTION 6

6.1. $a=2$ $b=-45$

6.2. 360^0

6.3.1. $165<x<180$

6.3.2. $x=-135$

6.4. $f(x)=\sin(2x+30)$

6.5. $f(x)=-2\sin x-2$

QUESTION 7

7.1. $\angle DFE=90^0-x\,(angles\ of\ triangle)$

$\angle FDG=90^0-x\,(alt\ angles)$

$\angle DGF=180^0-y-(90^0-x)$

$=90^0-(y-x)$

7.2. $\frac{GF}{\sin(90^0-x)}=\frac{DF}{\sin(90^0-(y-x))}$

$DF=\frac{GF.\cos(y-x)}{\cos x}$

$\frac{h}{GF}=\tan x$ $GF=\frac{h}{\tan x}$

$DF=\frac{\frac{h}{\tan x}.\cos(y-x)}{\cos x}$

$DF=h\times\frac{\cos x}{\sin x}\times\cos(y-x)\times\frac{1}{\cos x}$

$DF=\frac{h.\cos(y-x)}{\sin x}$

7.3. $DF=\frac{20\times\cos(60^0-30^0)}{\sin 30^0}=34.64m$

QUESTION 8

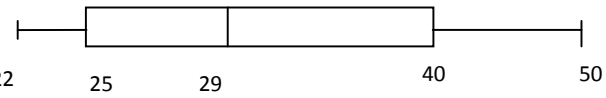
8.1. 27

8.2. 32

8.3. *std deviation* $=8.44$

$23,56\leftarrow 32\rightarrow 40,44$

$7\ out\ of\ the\ 10=70\%$



8.5. *Positively skewed – to the right*

Any valid reasons

QUESTION 9

9.1. $Position\ 40.5\ \ value \pm 22$

9.2. $Q_1 = 20,25 \quad value = 17$

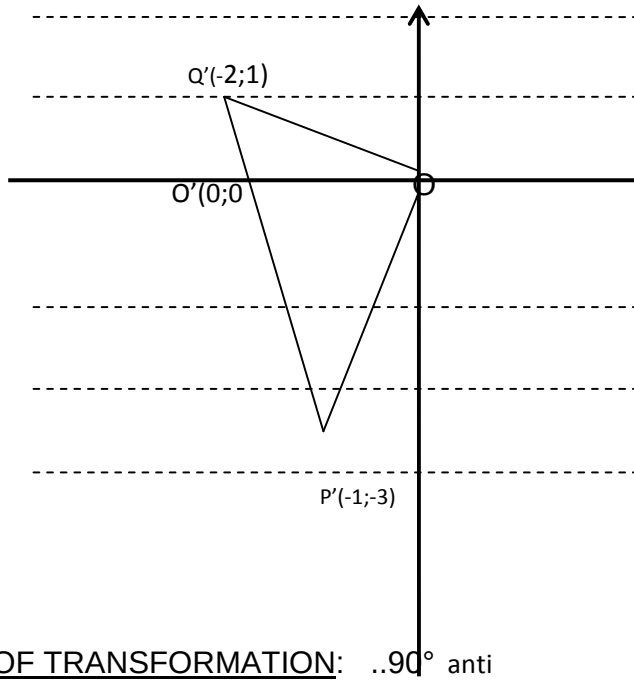
$Q_3 = 60,75 \quad value = 26$

$Interquartile\ range = 26 - 17 = 9$

9.3. $80 - 20 = 60$

9.4. $\frac{70}{100} \times 80 = 56$

$25\,\text{sec}\,onds$



x

TYPE OF TRANSFORMATION: ..90° anti clockwise

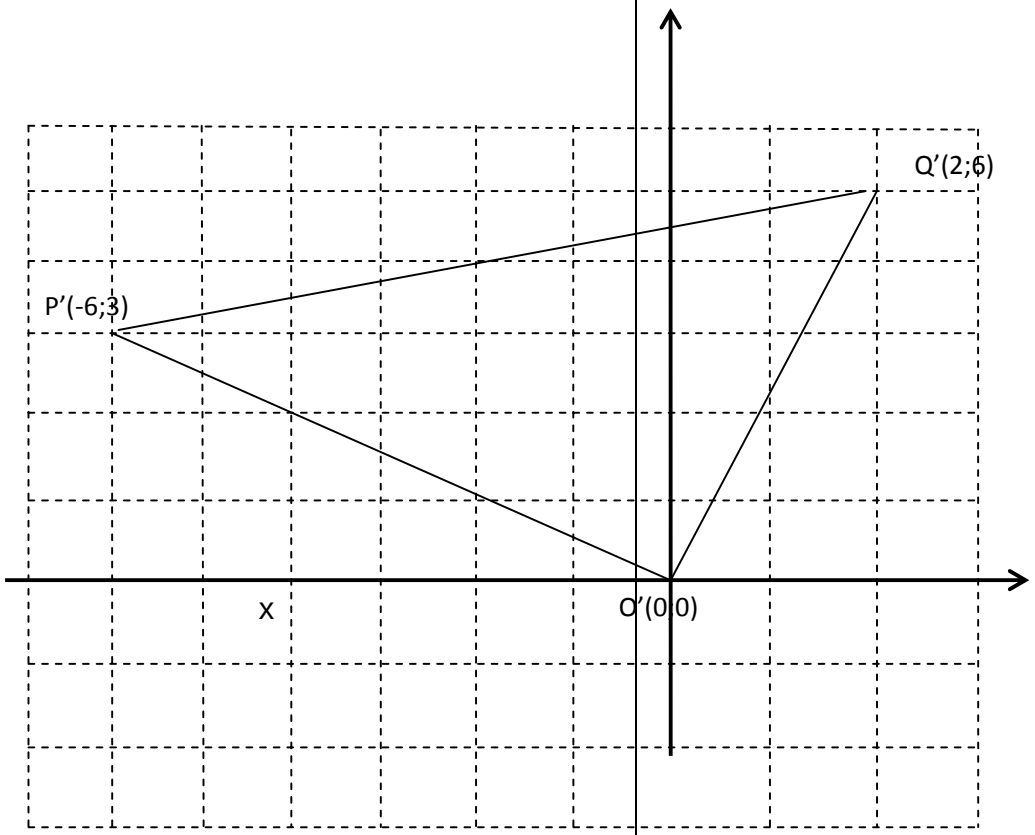
or.....

RATIO; .....1.....

[6]

DIAGRAM SHEET 2

4.1.2



TYPE OF TRANSFORMATION:
.....Enlargement.....
.....

RATIO; .....6.....

[6]