53 $\sin 3\theta = \sin(2\theta + \theta)$

$= \sin 2\theta \cos\theta + \cos 2\theta \sin\theta$

$= (2\sin\theta\cos\theta)\cos\theta + \left(1 - 2\sin^2\theta\right)\sin\theta$

$= 2\sin\theta\cos^2\theta + \sin\theta - 2\sin^3\theta$

$= 2\sin\theta\left(1 - \sin^2\theta\right) + \sin\theta - 2\sin^3\theta$

$= 2\sin\theta - 2\sin^3\theta + \sin\theta - 2\sin^3\theta$

$= 3\sin\theta - 4\sin^3\theta$

Graph $Y_1 = \sin(3X)$ and $Y_2 = 3\sin(X) - 4(\sin(X))\text{^}3$ in $[-2\pi,\ 2\pi,\ \pi/2]$ by $[-2,\ 2,\ 1]$.

Graph Y_1 is shown in *Figure 53a*. Graph Y_2 is shown in *Figure 53b*. The graphs are the same.

Table $Y_1 = \sin(3X)$ and $Y_2 = 3\sin(X) - 4(\sin(X))\text{^}3$ starting at $x = 0$, incrementing by $\frac{\pi}{6}$.

The tables are the same. See *Figure 53c*.

[−2π, 2π, π/2] by [−2, 2, 1]

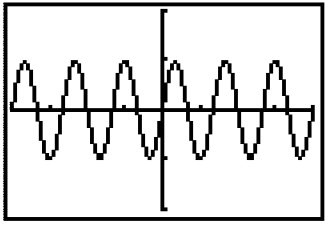

Figure 53a

[−2π, 2π, π/2] by [−2, 2, 1]

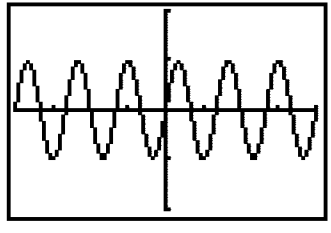

Figure 53b

X	Y1	Y2
0	0	0
.5236	1	1
1.0472	0	0
1.5708	-1	-1
2.0944	0	0
2.618	1	1
3.1416	0	0

Y1=sin(3X)

Figure 53c