

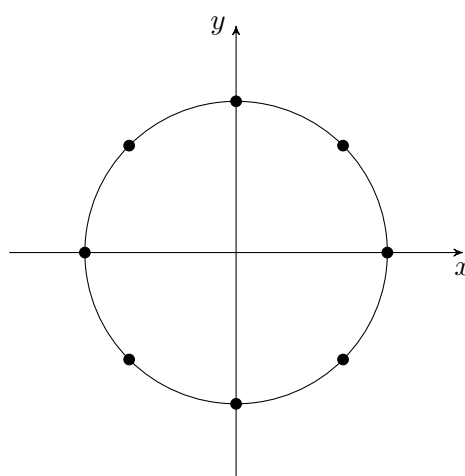
Using Mathematics to Make and Stream Music: Activity Sheet

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Activity 1: Calculating the co-ordinates of points on a circle

Use the sine and cosine functions to calculate the co-ordinates of points on a circle with radius $r = 3$ using angles $\theta = 0, \frac{\pi}{4}, \frac{2\pi}{4}, \frac{3\pi}{4} \dots, 2\pi$. Remember to set your calculator to radians mode.

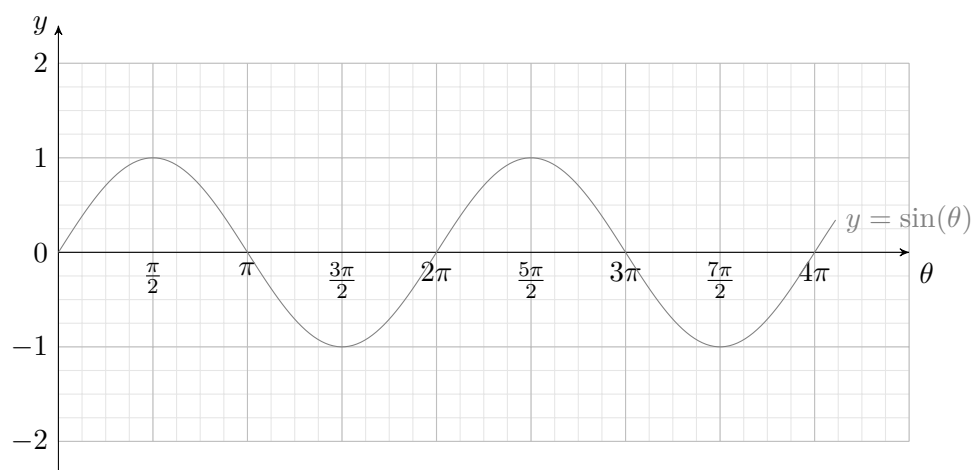
θ	$x = r \cos(\theta)$	$y = r \sin(\theta)$
0	3	0
$\frac{\pi}{4}$	2.12	2.12
$\frac{2\pi}{4}$	0	3
$\frac{3\pi}{4}$		
π		
$\frac{5\pi}{4}$		
$\frac{6\pi}{4}$		
$\frac{7\pi}{4}$		
2π		



Activity 2: Changing the amplitude of a sine wave

Complete the table for $y = 2 \sin(\theta)$ and plot the curve on the axes below. How does multiplying $\sin(\theta)$ by 2 change the shape of the sine wave?

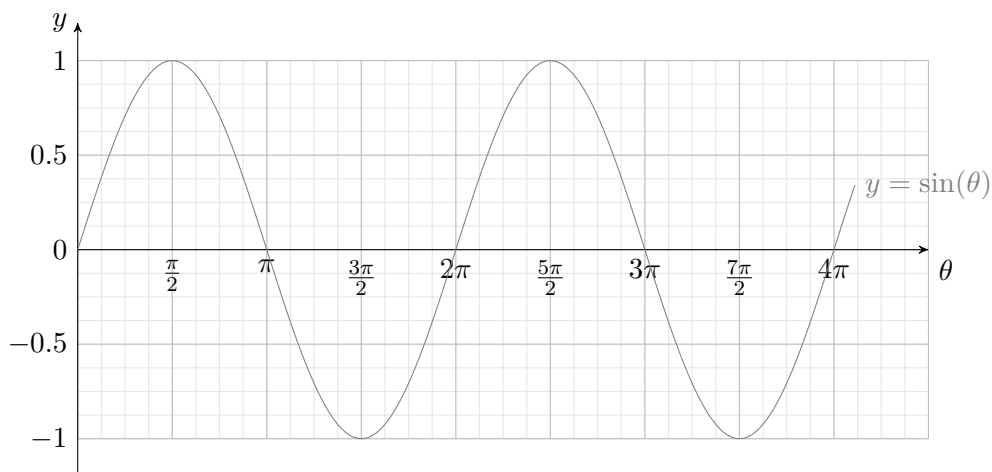
θ	0	$\frac{\pi}{4}$	$\frac{\pi}{2}$	$\frac{3\pi}{4}$	π	$\frac{5\pi}{4}$	$\frac{3\pi}{2}$	$\frac{7\pi}{4}$	2π
y	0	1.4142	2						



Activity 3: Changing the frequency of a sine wave

Complete the table for $y = \sin(2\theta)$ and plot the curve on the axes below. How does multiplying θ by 2 change the shape of the sine wave?

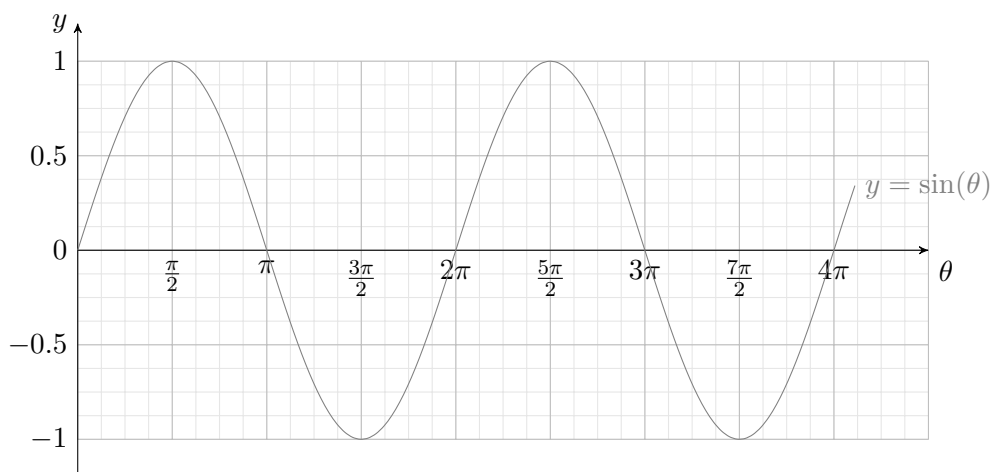
θ	0	$\frac{\pi}{4}$	$\frac{\pi}{2}$	$\frac{3\pi}{4}$	π	$\frac{5\pi}{4}$	$\frac{3\pi}{2}$	$\frac{7\pi}{4}$	2π
y	0	1	0						



Activity 4: Changing the phase angle of a sine wave

Complete the table for $y = \sin(\theta + \frac{\pi}{2})$ and plot the curve on the axes below. How does adding $\frac{\pi}{2}$ to θ change the shape of the sine wave?

θ	0	$\frac{\pi}{4}$	$\frac{\pi}{2}$	$\frac{3\pi}{4}$	π	$\frac{5\pi}{4}$	$\frac{3\pi}{2}$	$\frac{7\pi}{4}$	2π
y	1	0.7071	0						



Activity 5: Adding sine waves together

Complete the table for $y = 2\sin(\theta) + \sin(2\theta) + \sin(\theta + \frac{\pi}{2})$ and plot the curve on the axes below. You can use your calculations from the previous activities to help you with this.

θ	0	$\frac{\pi}{4}$	$\frac{\pi}{2}$	$\frac{3\pi}{4}$	π	$\frac{5\pi}{4}$	$\frac{3\pi}{2}$	$\frac{7\pi}{4}$	2π
y	1	3.121	2						

