

## Dr Oliver Mathematics

### Sine and Cosine for Angles $0^\circ$ , $30^\circ$ , $45^\circ$ , $60^\circ$ , and $90^\circ$

In this note, we will observe the relationship between sine and cosine for angles  $0^\circ$ ,  $30^\circ$ ,  $45^\circ$ ,  $60^\circ$ , and  $90^\circ$ .

First, we need to draw up a table.

	$0^\circ$	$30^\circ$	$45^\circ$	$60^\circ$	$90^\circ$
sin					
cos					

Table 1: a table

Second, we insert a ' $\frac{1}{2}$ ' into each column.

	$0^\circ$	$30^\circ$	$45^\circ$	$60^\circ$	$90^\circ$
sin	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
cos	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$

Table 2:  $\frac{1}{2}$  added

Third, we insert a ' $\sqrt{\quad}$ ' into each column.

	$0^\circ$	$30^\circ$	$45^\circ$	$60^\circ$	$90^\circ$
sin	$\frac{\sqrt{\quad}}{2}$	$\frac{\sqrt{\quad}}{2}$	$\frac{\sqrt{\quad}}{2}$	$\frac{\sqrt{\quad}}{2}$	$\frac{\sqrt{\quad}}{2}$
cos	$\frac{\sqrt{\quad}}{2}$	$\frac{\sqrt{\quad}}{2}$	$\frac{\sqrt{\quad}}{2}$	$\frac{\sqrt{\quad}}{2}$	$\frac{\sqrt{\quad}}{2}$

Table 3:  $\sqrt{\quad}$  added

Fourth, we take 0 and insert that into the top left, 1 and insert that into the top second left, and so on, until we insert 4 into the top right. For cosine, we repeat the process but *backwards*.

	0°	30°	45°	60°	90°
sin	$\frac{\sqrt{0}}{2}$	$\frac{\sqrt{1}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{4}}{2}$
cos	$\frac{\sqrt{4}}{2}$	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{1}}{2}$	$\frac{\sqrt{0}}{2}$

Table 4: numbers added

Fifth (and finally), we simplify the ten numbers.

	0°	30°	45°	60°	90°
sin	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1
cos	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0

Table 5: simplify

That's it!