

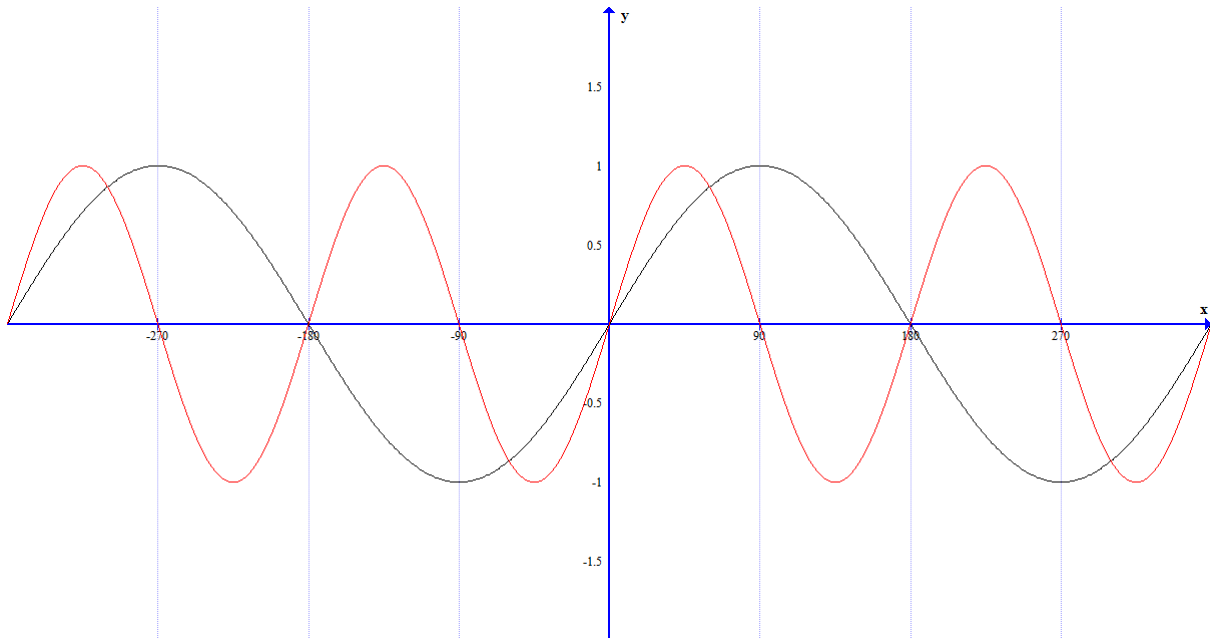
## Trigonometry Q9 (30/6/23)

Sketch  $y = \sin(2x + 30^\circ)$

## Solution

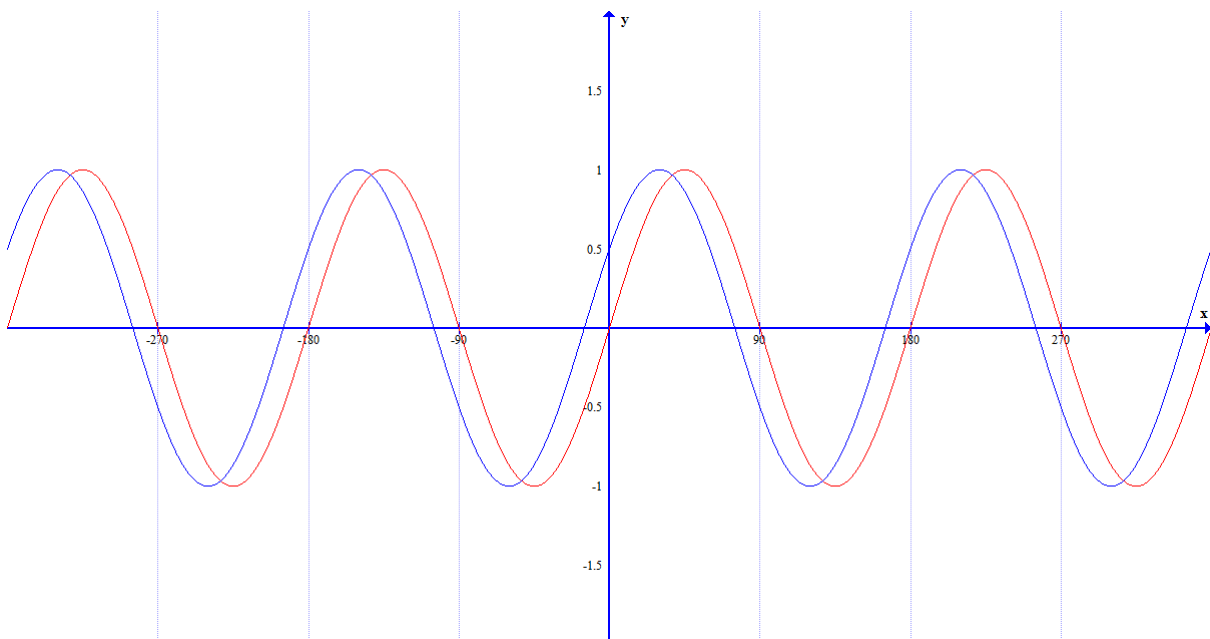
This is a composite transformation of  $y = \sin x$ , and we have a choice of two approaches:

(i)  $y = \sin x \rightarrow y = \sin 2x$  [stretch of factor  $\frac{1}{2}$  in the  $x$ -direction]

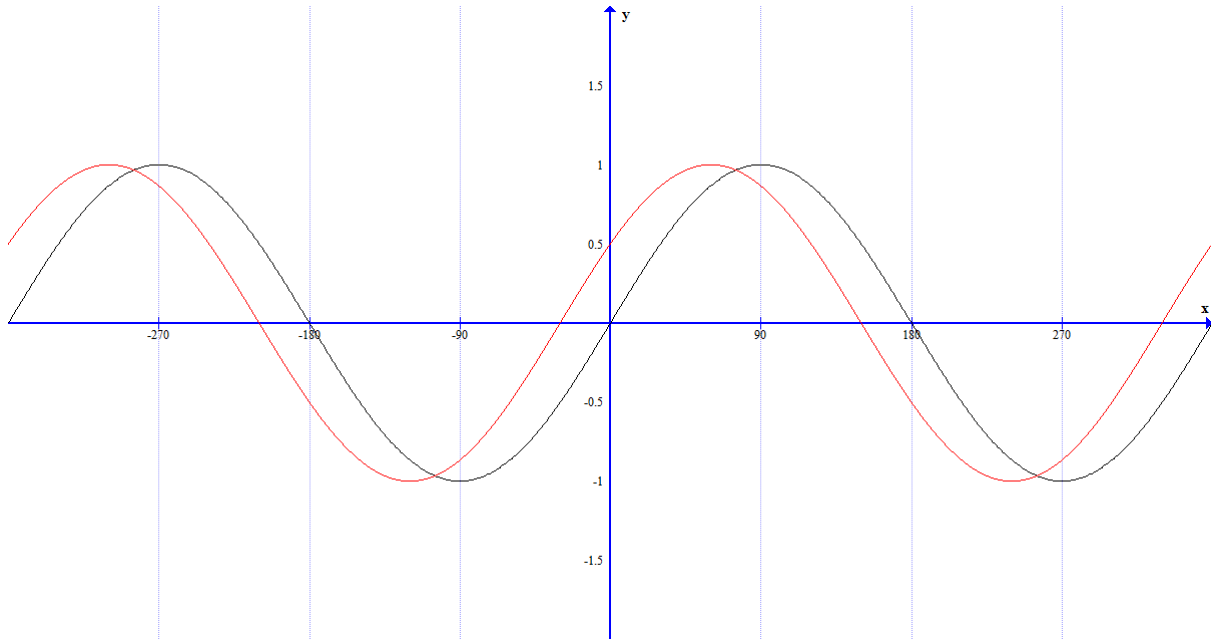


$\rightarrow y = \sin (2[x + 15^\circ])$  [translation of  $15^\circ$  to the left]

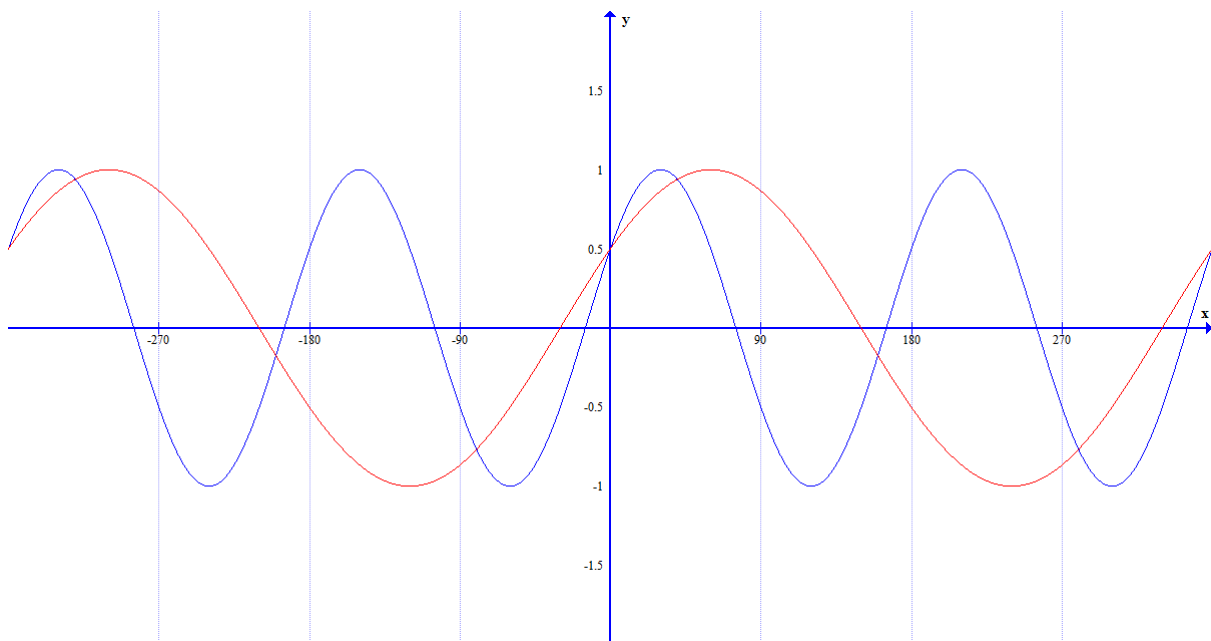
$= \sin(2x + 30^\circ)$



(ii)  $y = \sin x \rightarrow y = \sin(x + 30^\circ)$  [translation of  $30^\circ$  to the left]



$\rightarrow y = \sin(2x + 30)$  [stretch of factor  $\frac{1}{2}$  in the  $x$ -direction]



Note that, in the above transformation, the graph 'pivots' about  $x = 0$ ; ie  $\sin(2x + 30^\circ) = \sin(x + 30^\circ)$  at  $x = 0$ .

You may find approach (i) easier to carry out.