radical maths

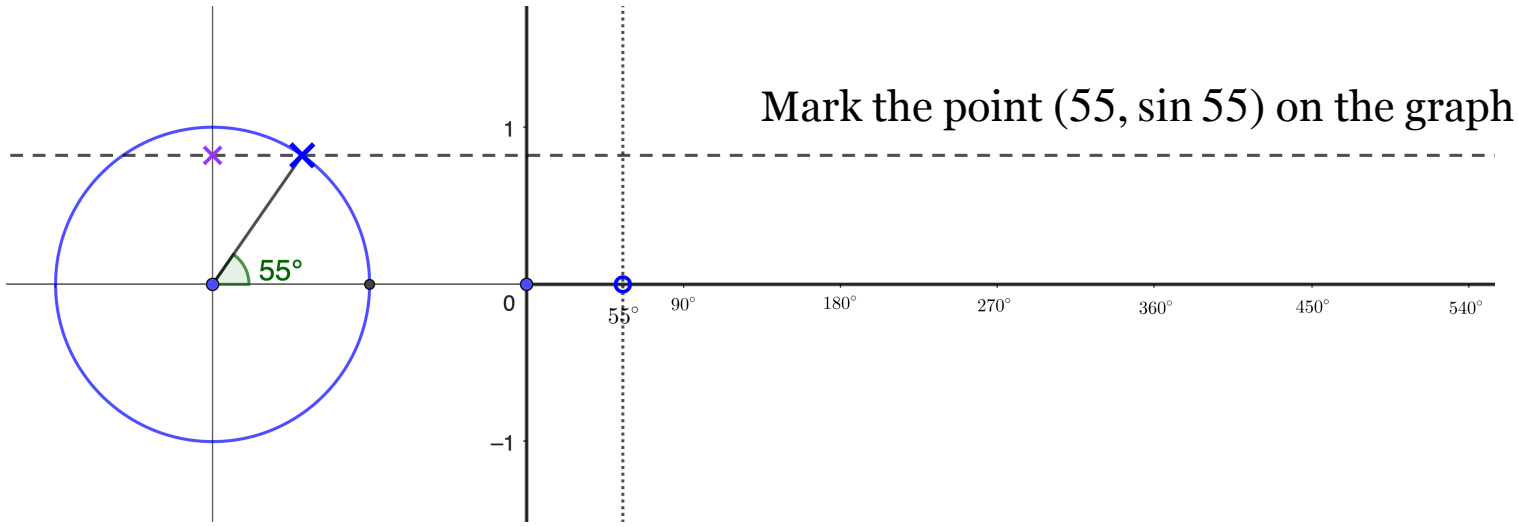
for independence
for confidence
for creativity
for insight

Circular functions 3

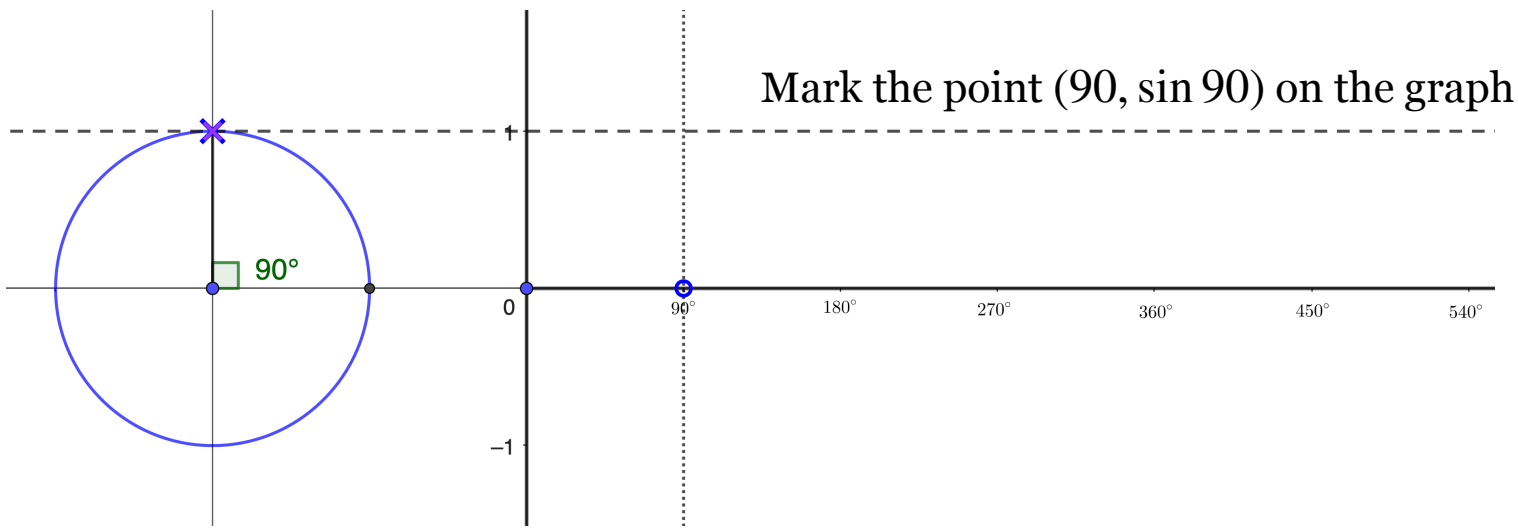
Graphs of circular functions

Circular functions

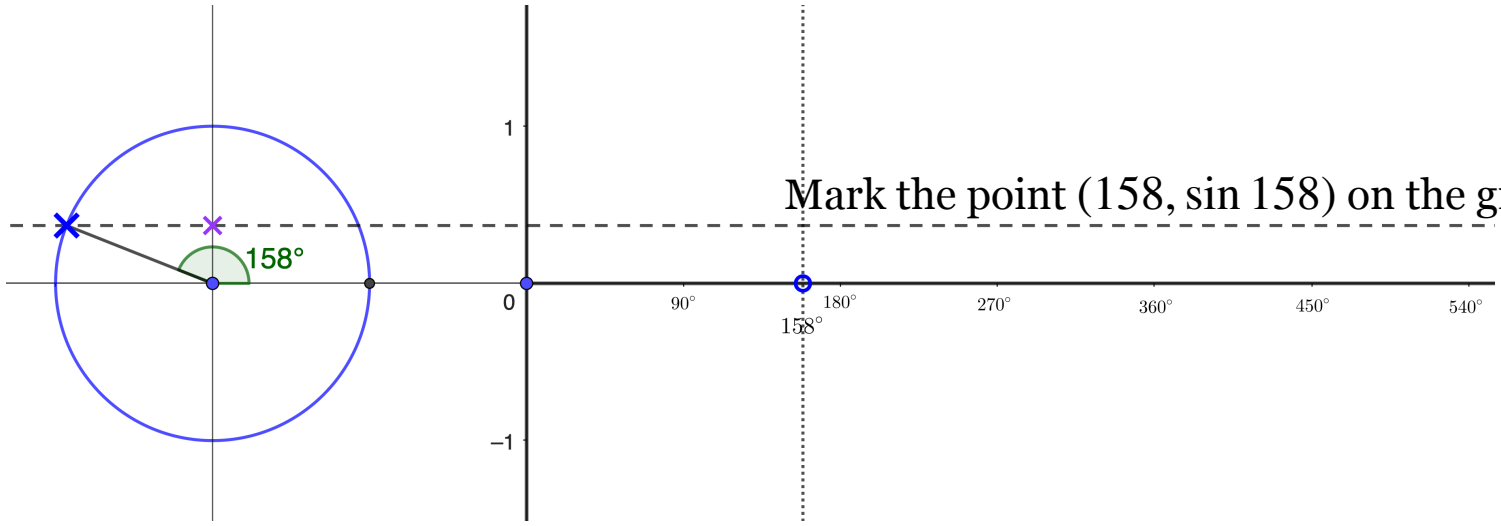
Defining the circular functions	sin, cos, tan and the unit circle
Solving circular function equations	like $\sin\theta = 0.4$
Graphing the circular functions	**graphs $y = \cos x$ and the like**
Relationships between circular functions	$\sin(90° - x) = \cos x$ and the like
More circular functions	$\sec x = \dfrac{}{\cos x}$ and so on
Circular functions of sums	formulas like $\sin(A + B) = \sin A \cos B + \cos A \sin B$
Transforming and adding circular functions	$\sin x + \cos x = \sqrt{2}\sin\left(x + 45°\right)$ and so on
Differentiating circular functions	radians, and tangents to graphs
Integrating circular functions	areas
Inverses of circular functions	$\arcsin x$, $\cos^{-1} x$, $\cot^{-1} x$ and the like, including graphs, differentials, integrals, and integration by substitution



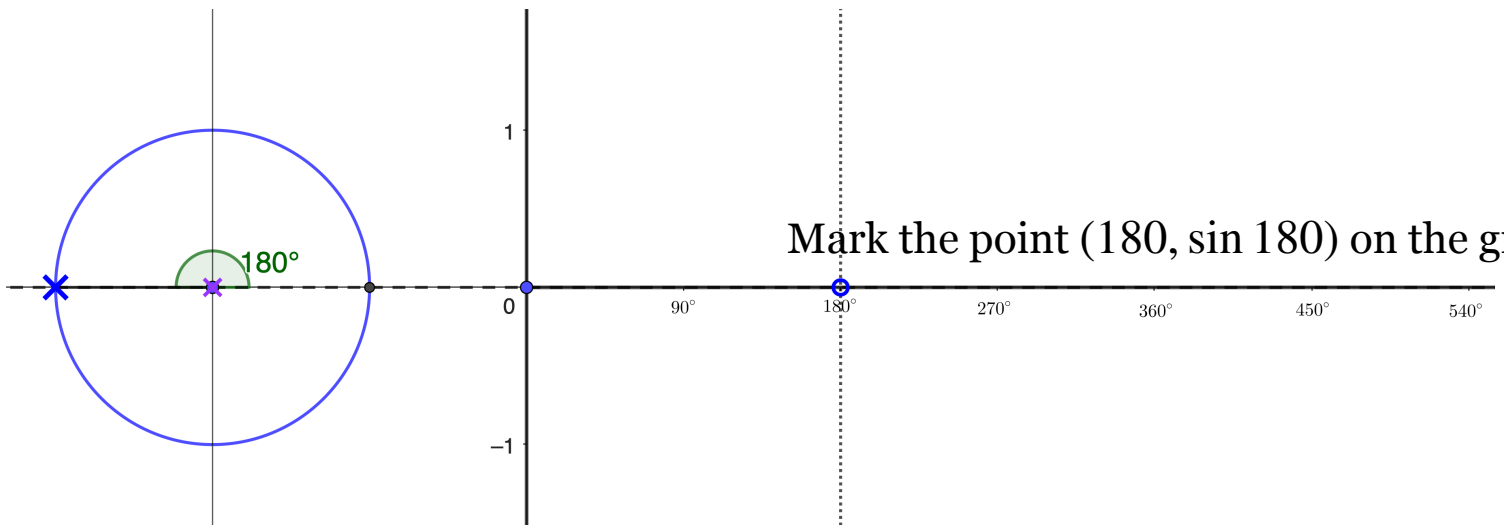
Mark the point (55, sin 55) on the graph



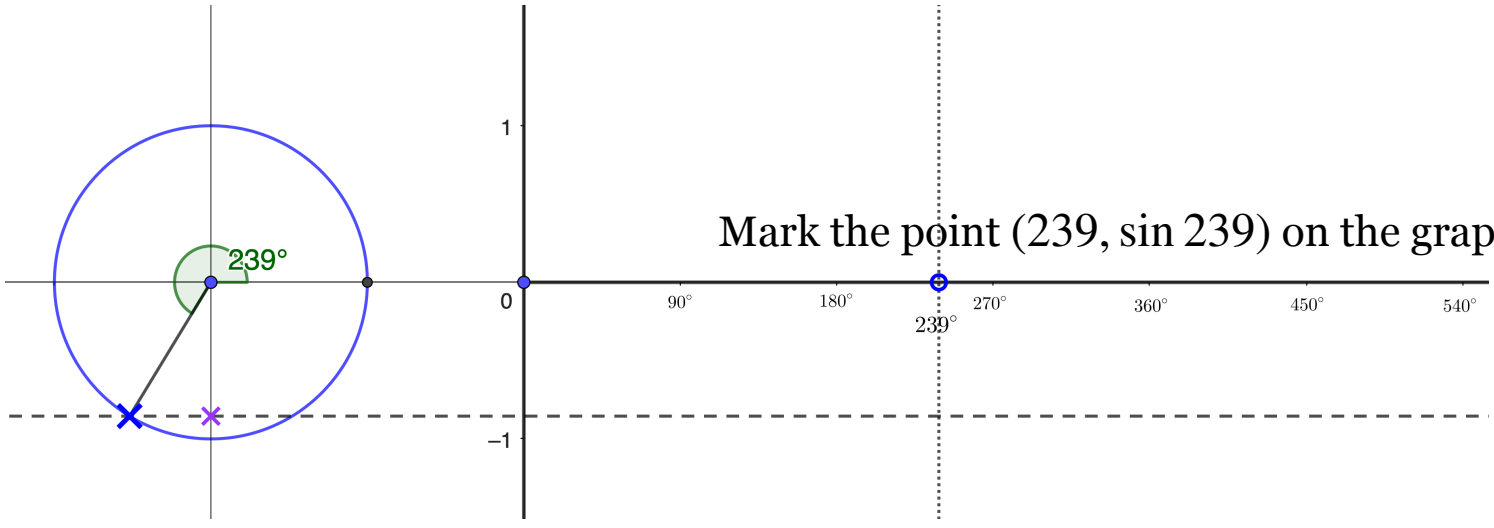
Mark the point (90, sin 90) on the graph



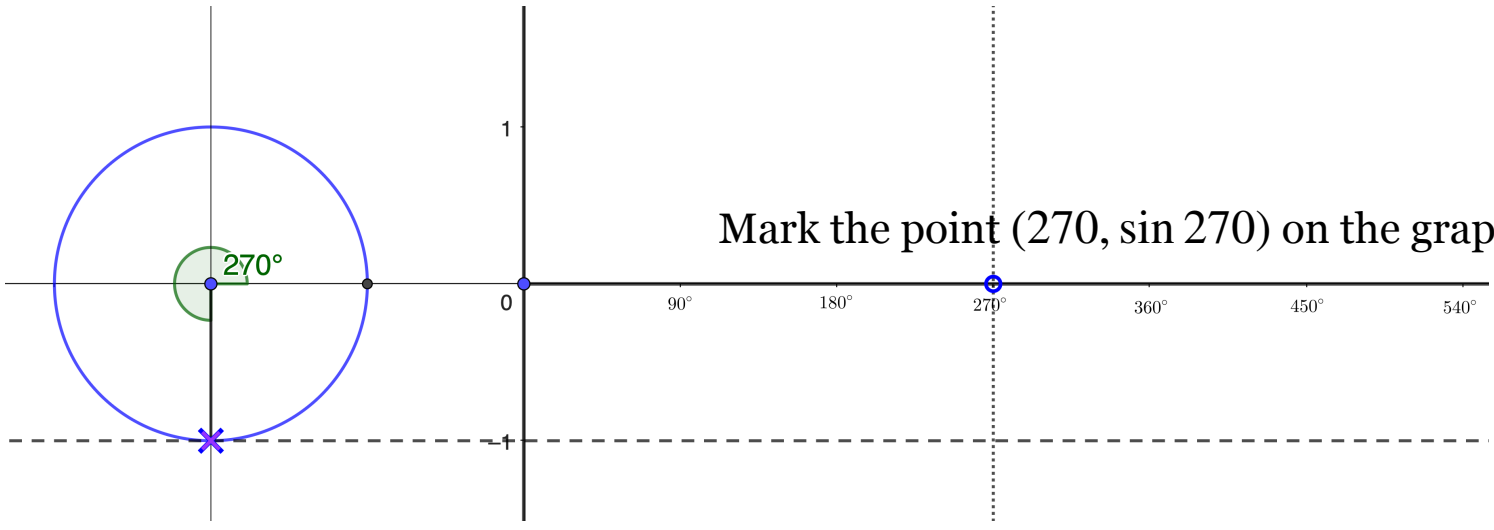
Mark the point (158, sin 158) on the graph



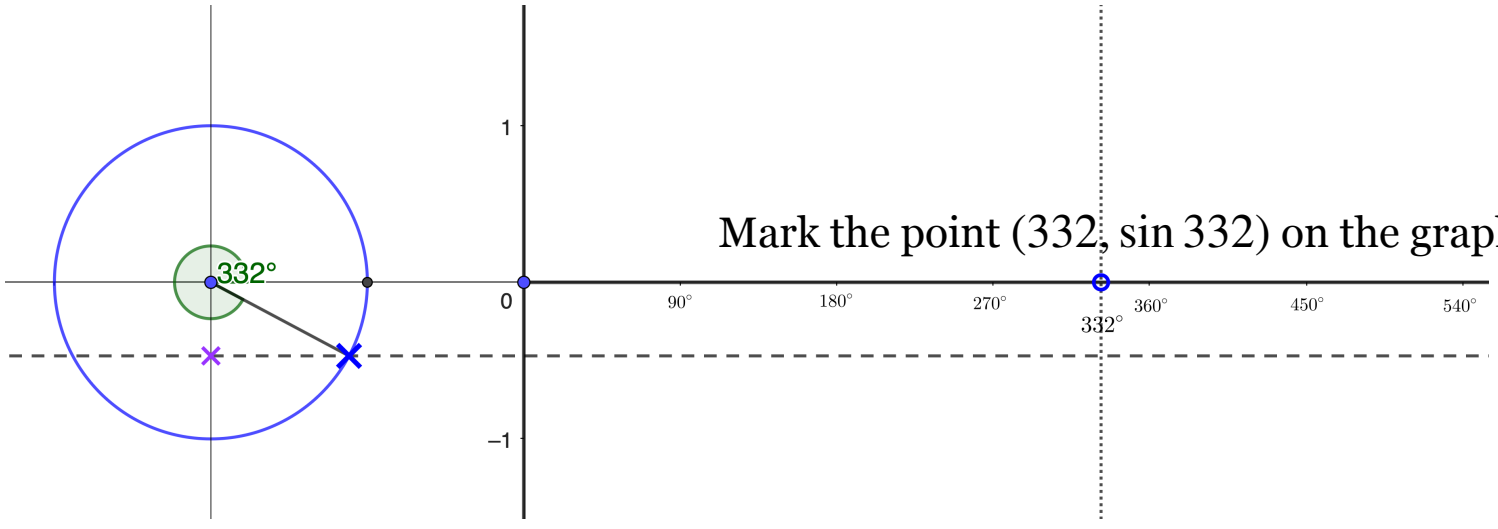
Mark the point (180, sin 180) on the graph



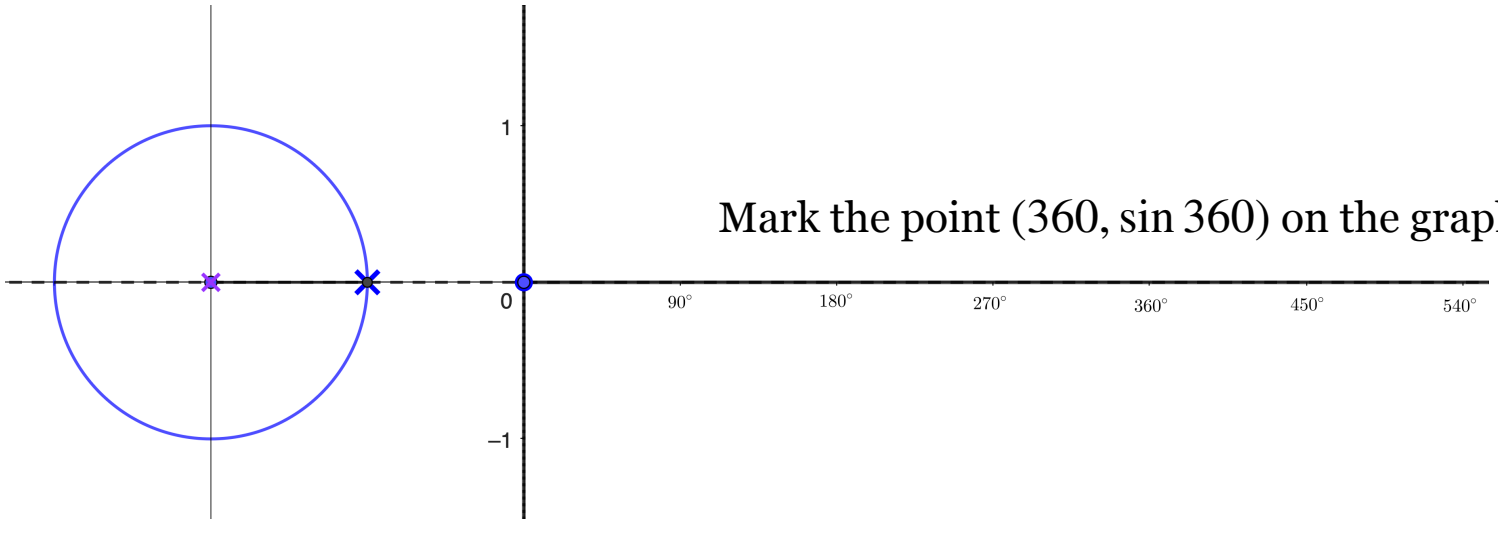
Mark the point (239, sin 239) on the graph



Mark the point (270, sin 270) on the graph

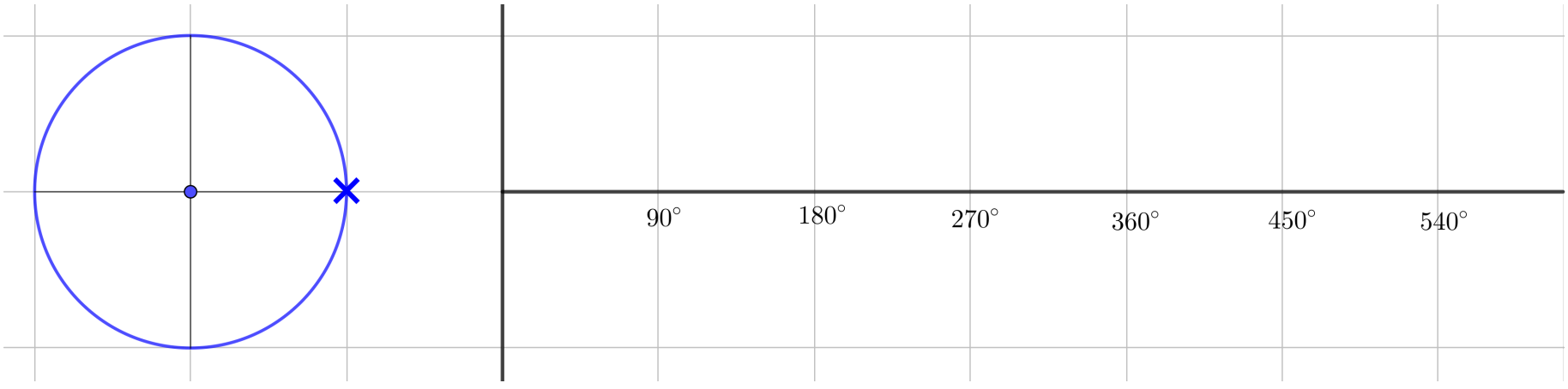


Mark the point (332, sin 332) on the graph

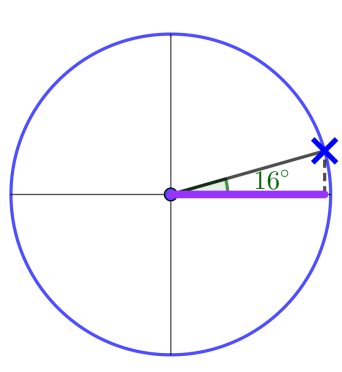


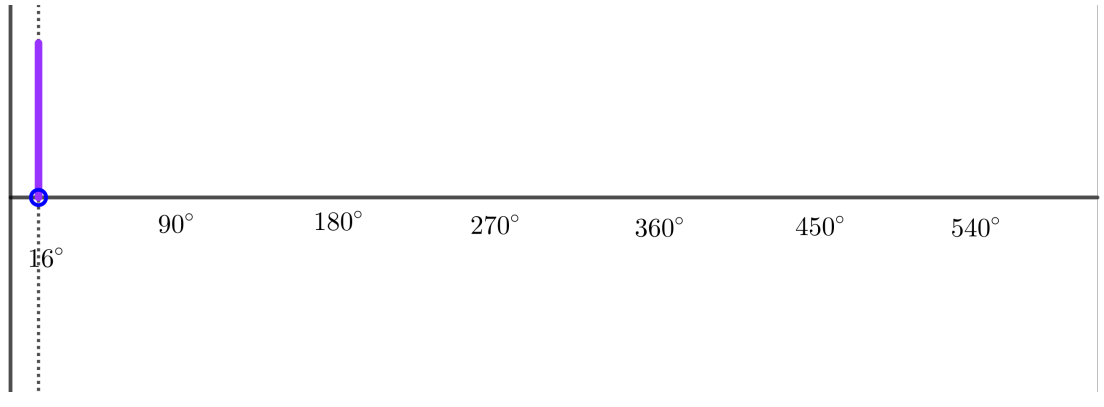
Mark the point (360, sin 360) on the graph

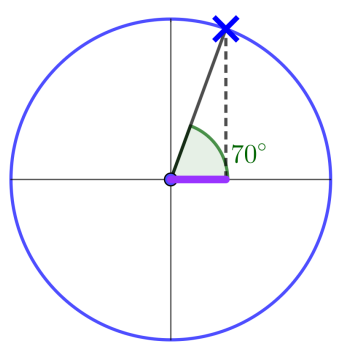
Use these points as a guide to draw the graph $y = \sin x$.

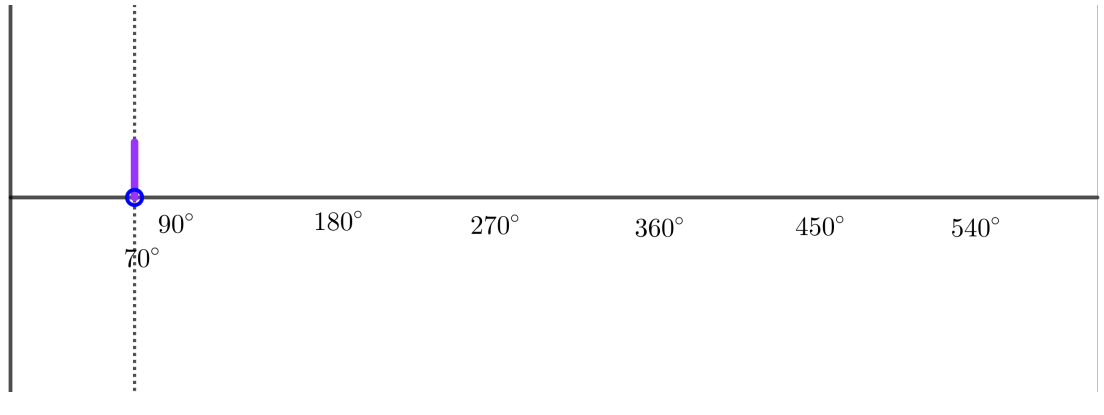


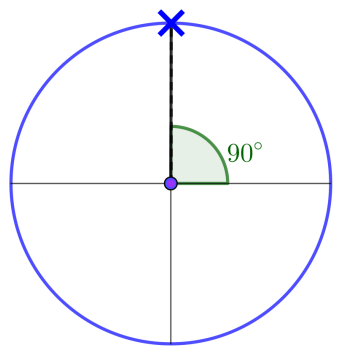
Look at the next sequence of images, and think about the relationship between the purple line segment on the left and the purple line segment on the right.

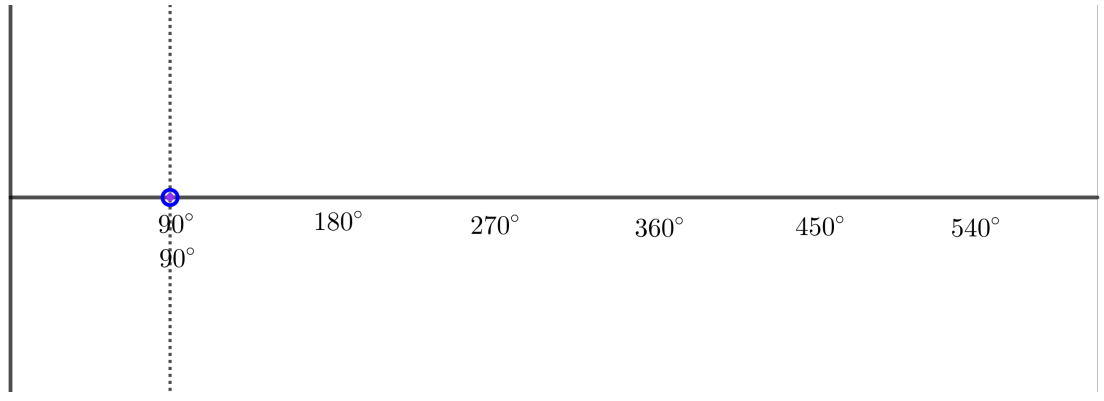


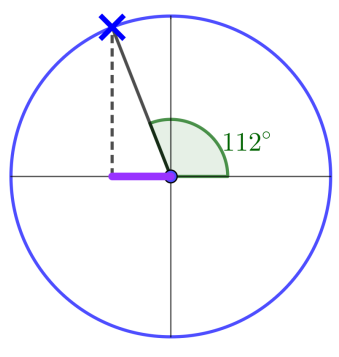


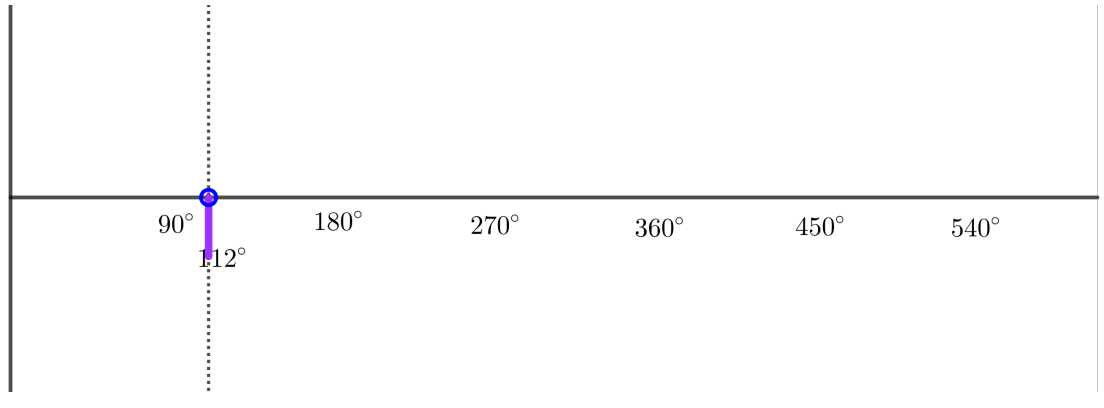




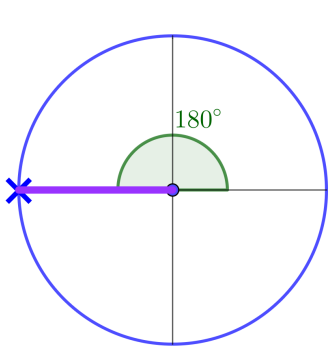


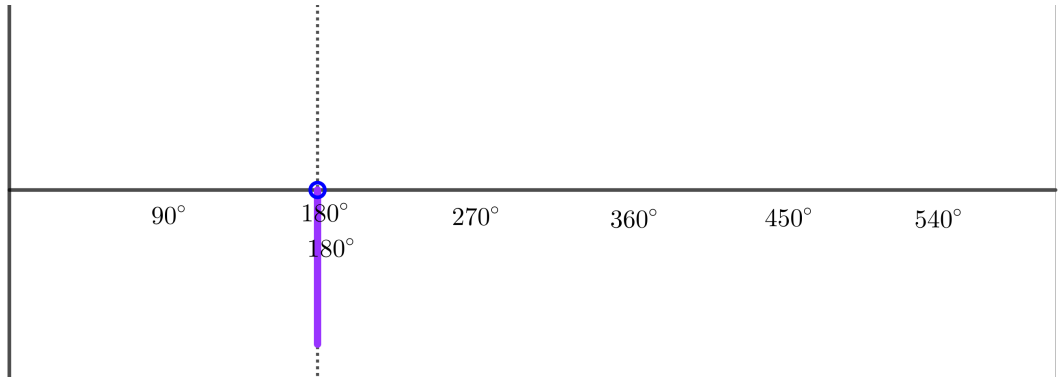


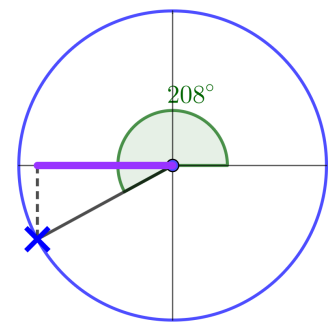


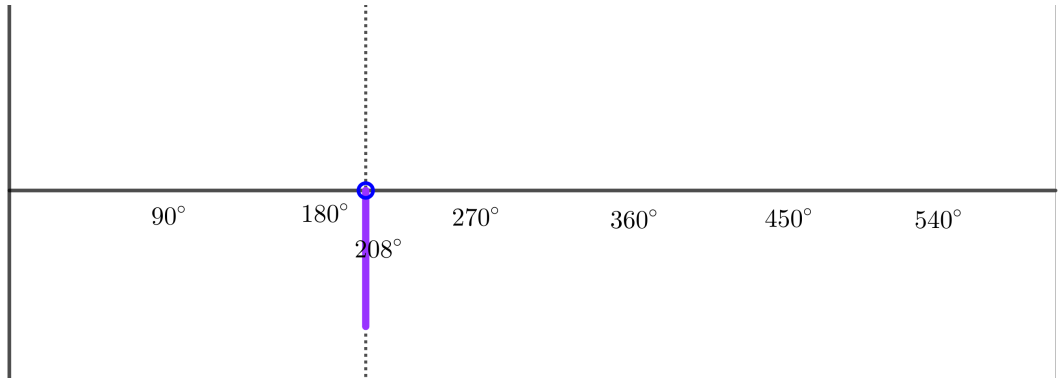


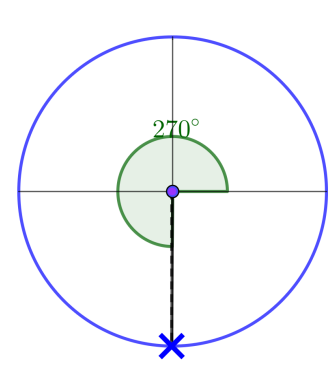
Demonstrating how the x coordinates on the unit circle become the y coordinates on the graph is a bit trickier. The signed length of the segment on the left is the same as the signed length of that on the right.

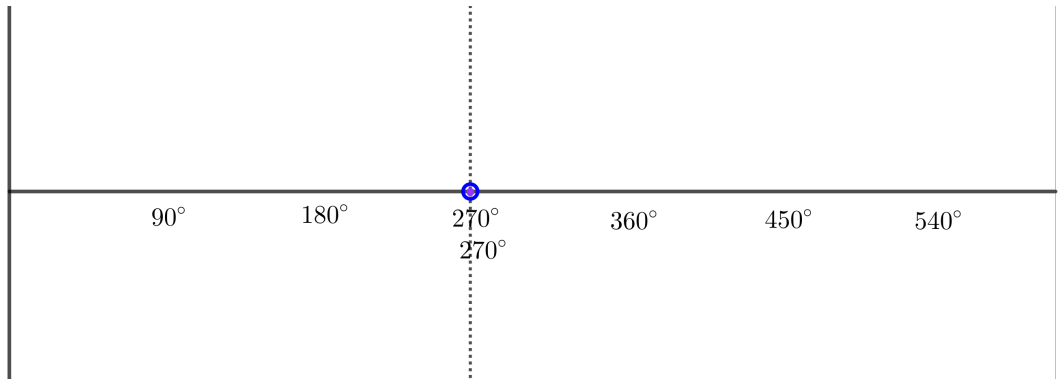

180°

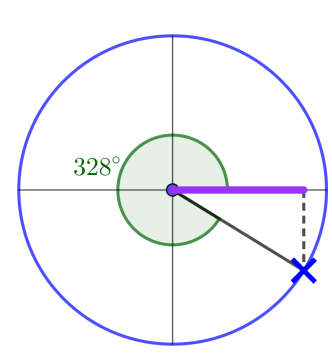

90°
180°
270°
360°
450°
540°
180°

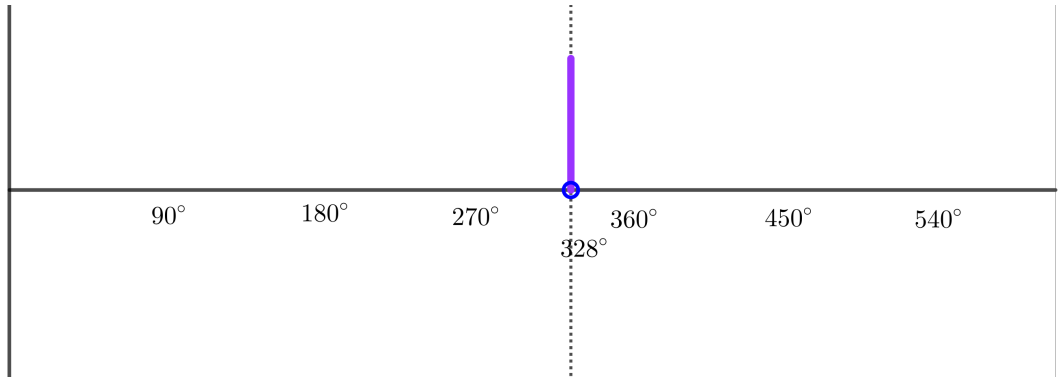

208°

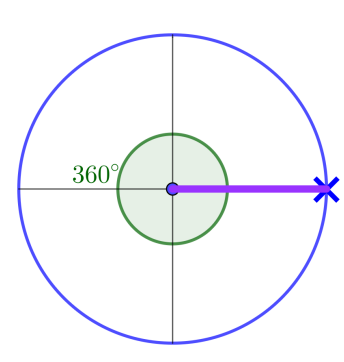

90°
180°
270°
360°
450°
540°
208°

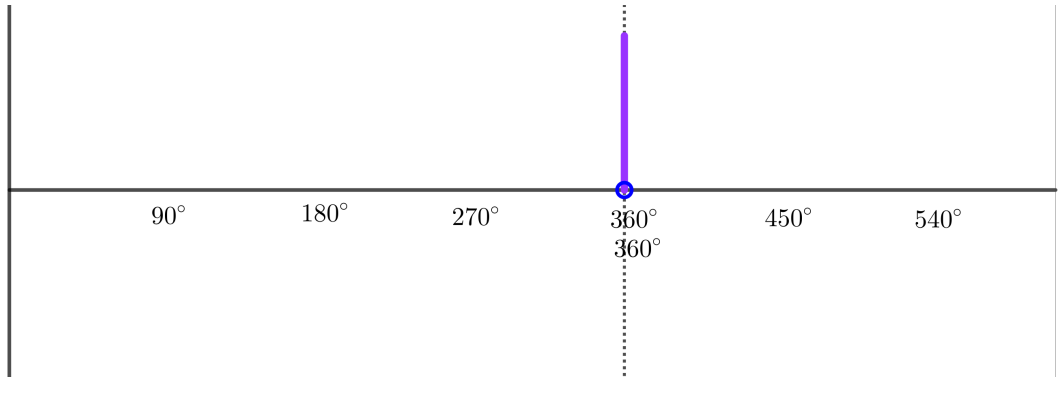

270°


90°
180°
270°
360°
450°
540°
270°

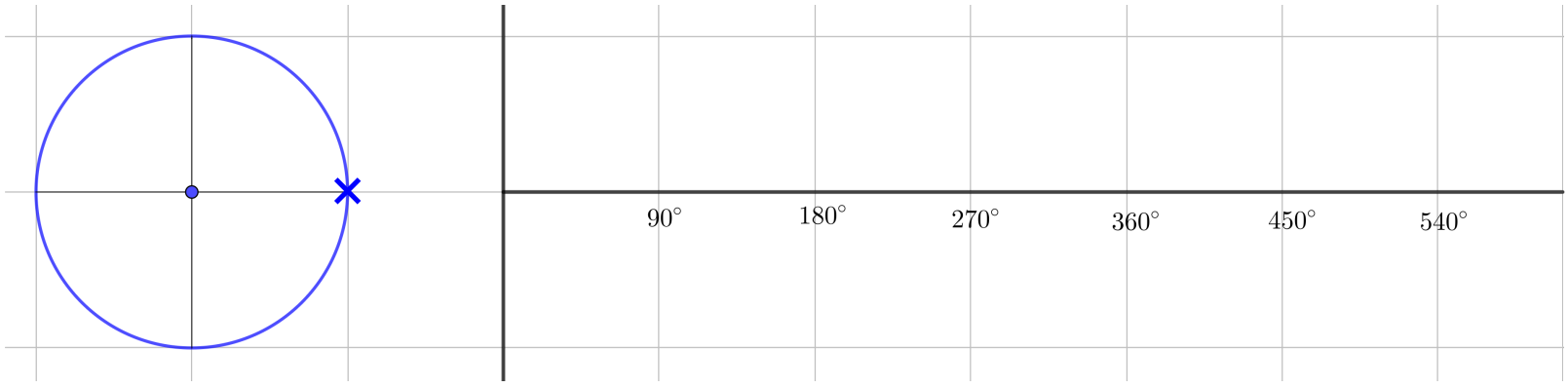

328°


90°
180°
270°
360°
450°
540°
328°

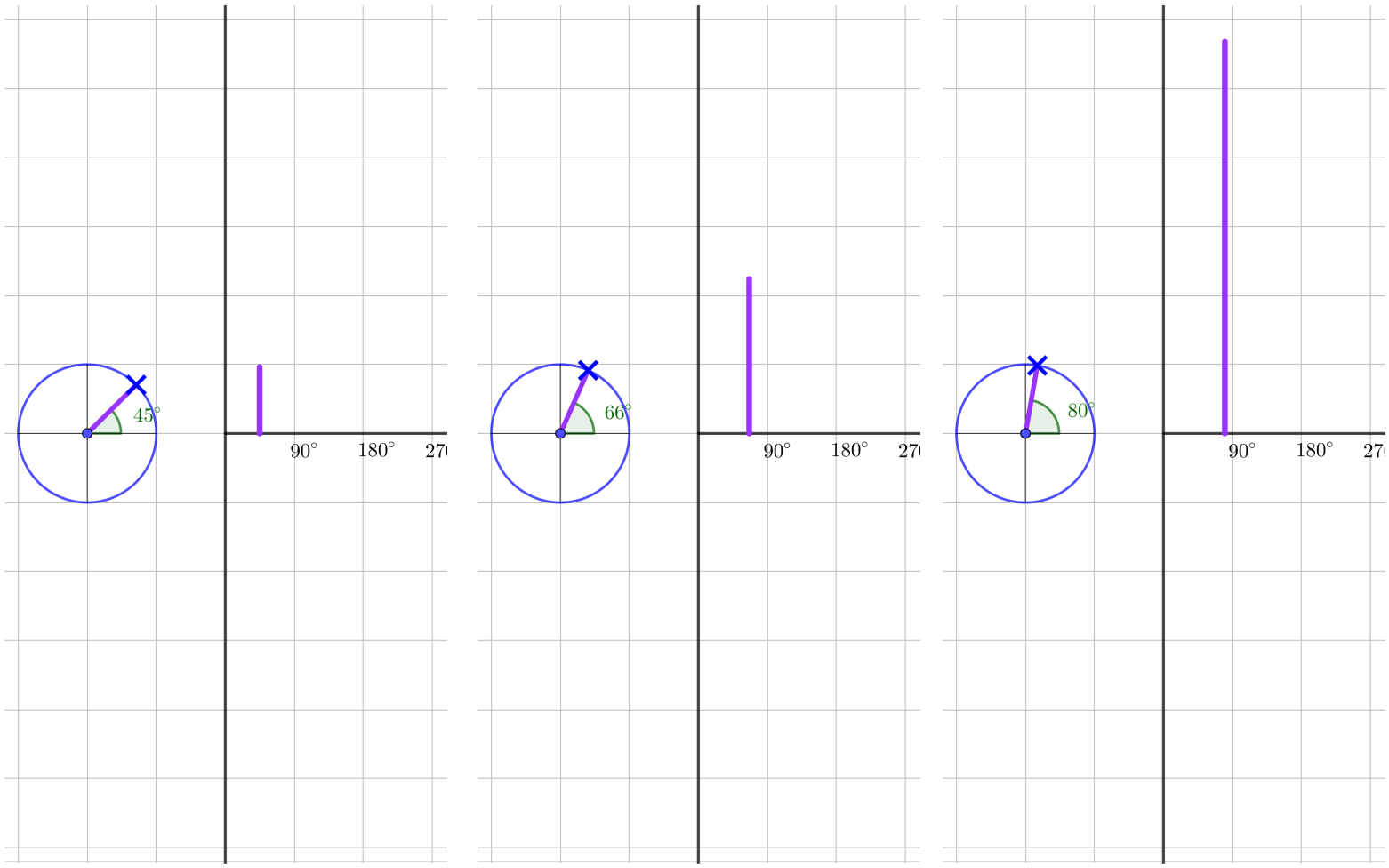

360°

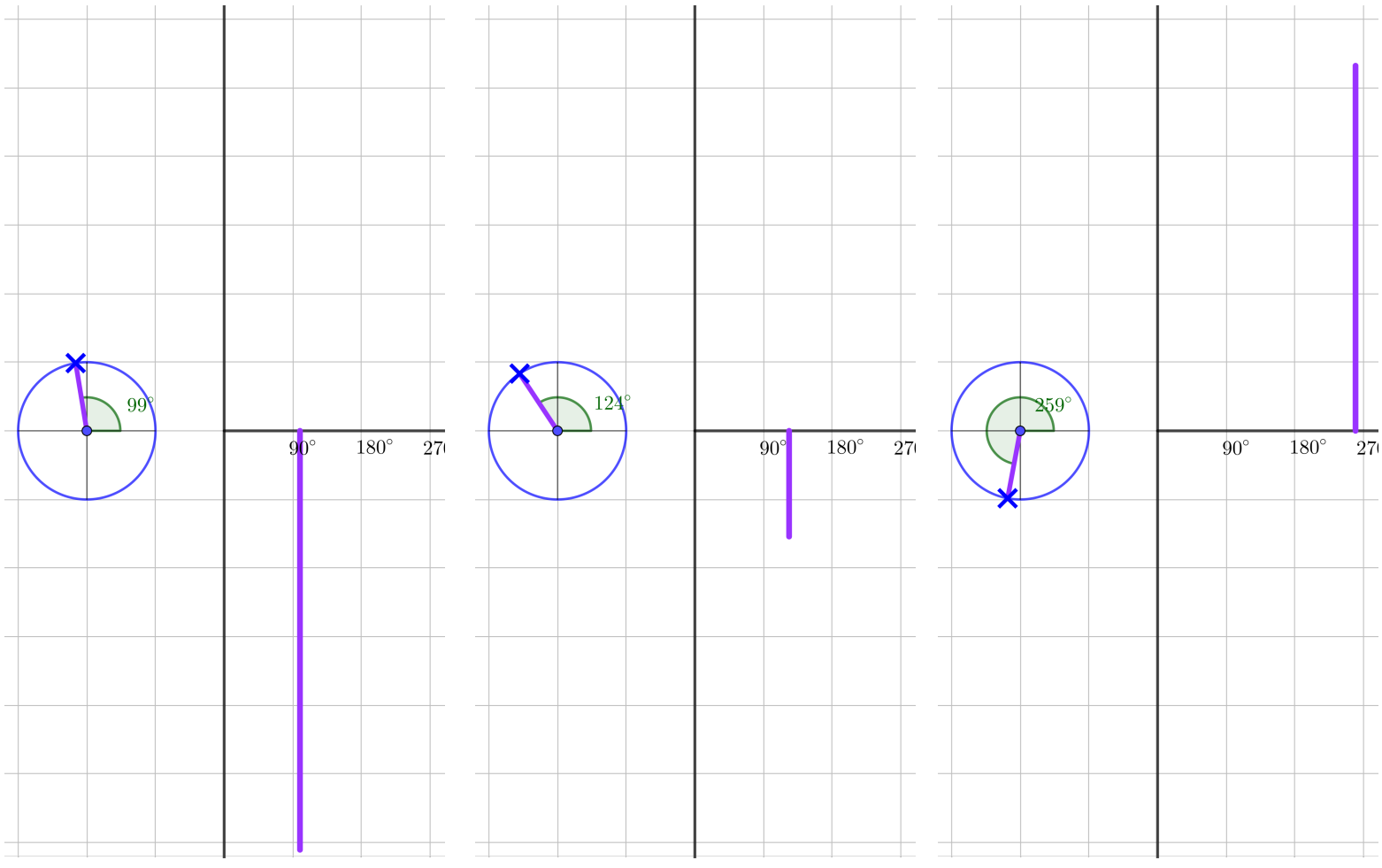

90°
180°
270°
360°
450°
540°
360°

Use these points as a guide to draw the graph $y = \cos x$.

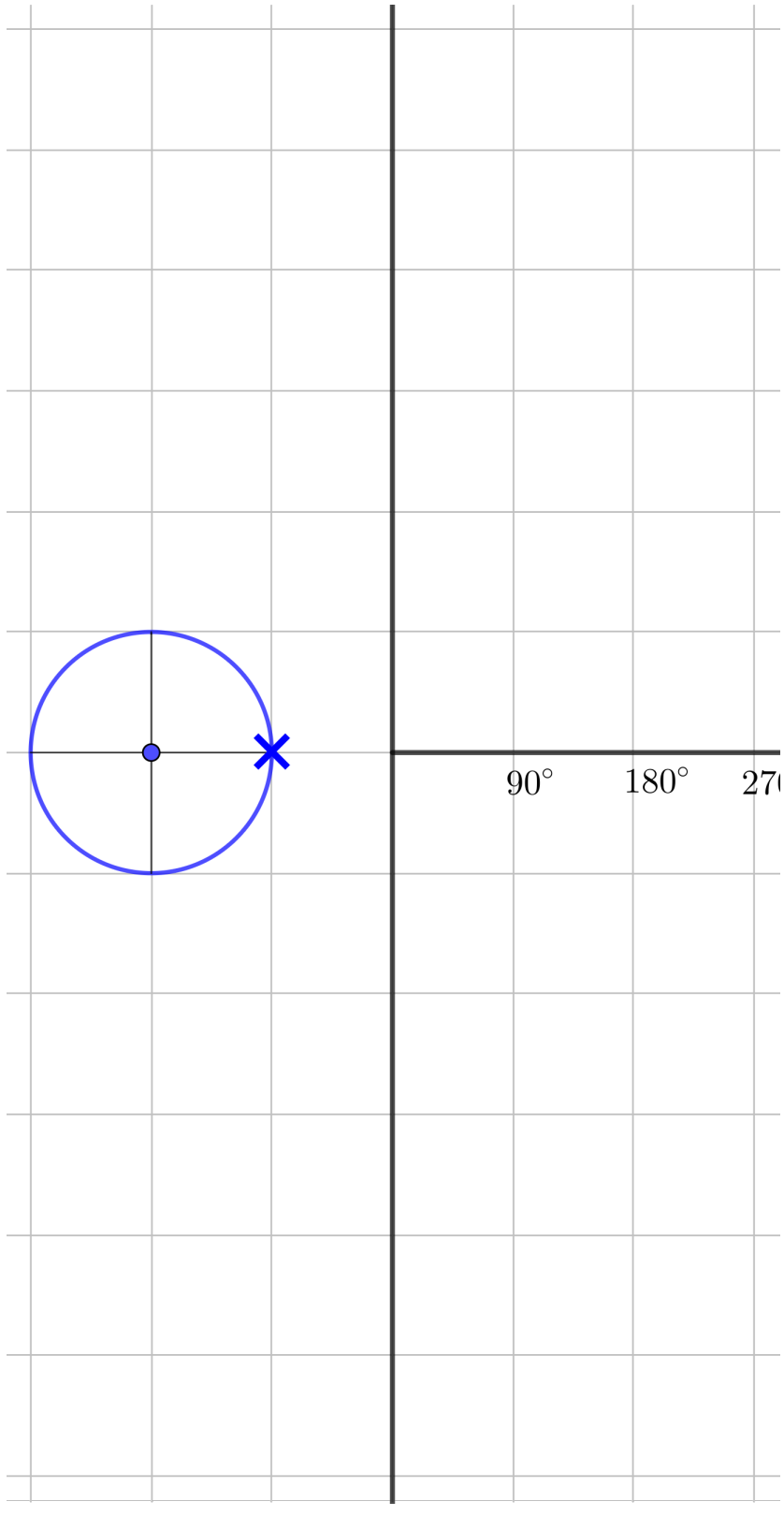


Look at this sequence of images, and describe the relationship between the purple line segment on the left and the purple line segment on the right.

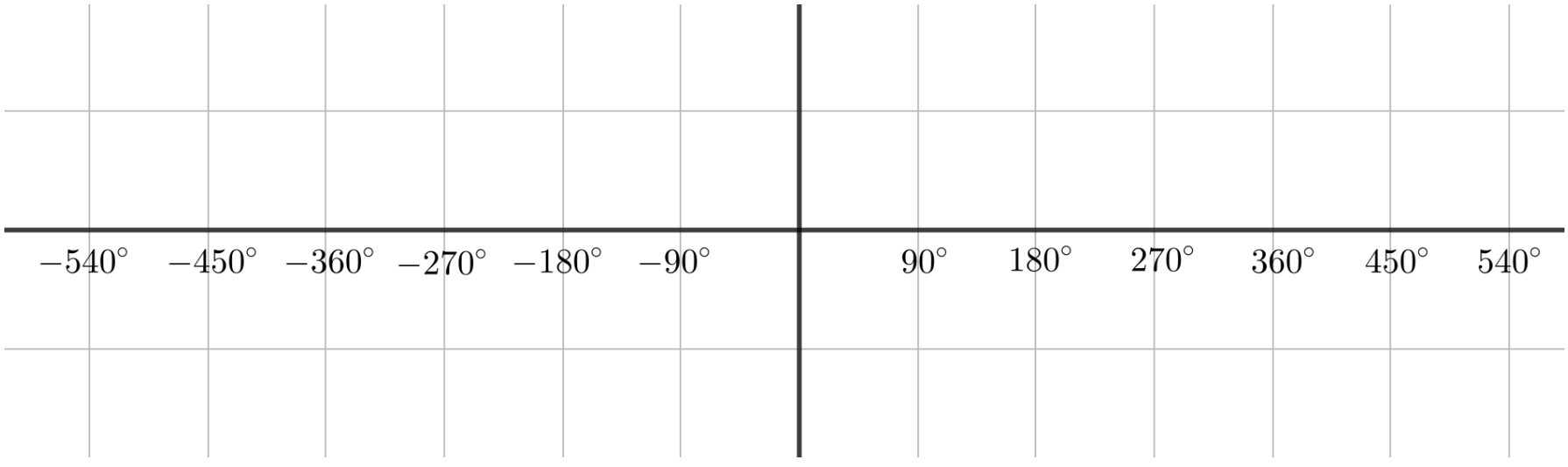




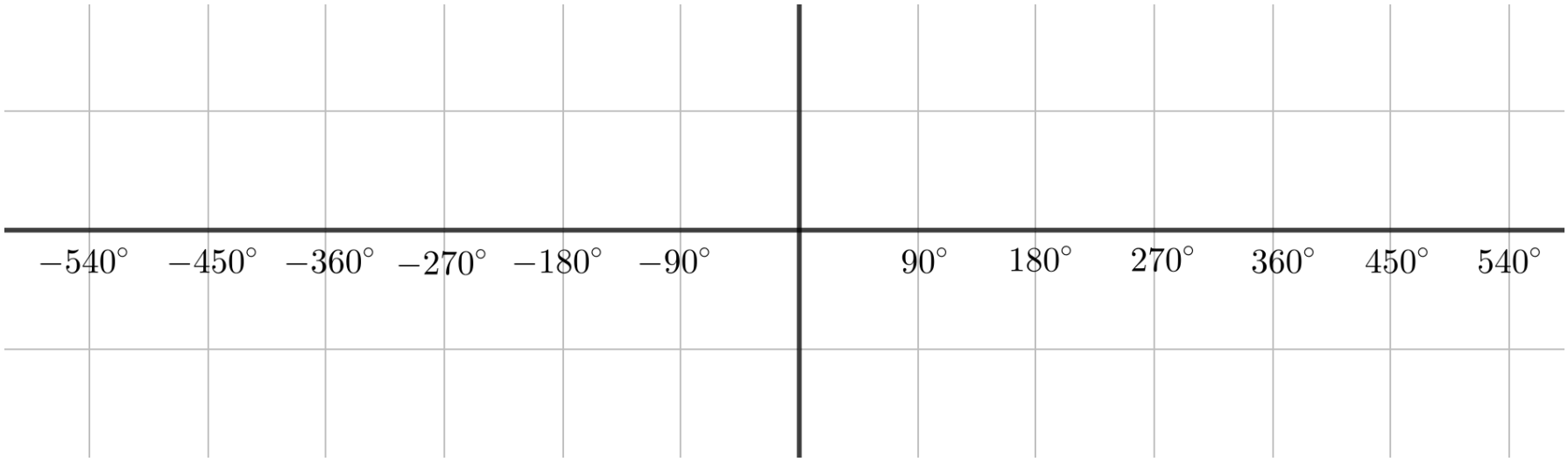
Use this idea to draw the graph $y = \tan x$.



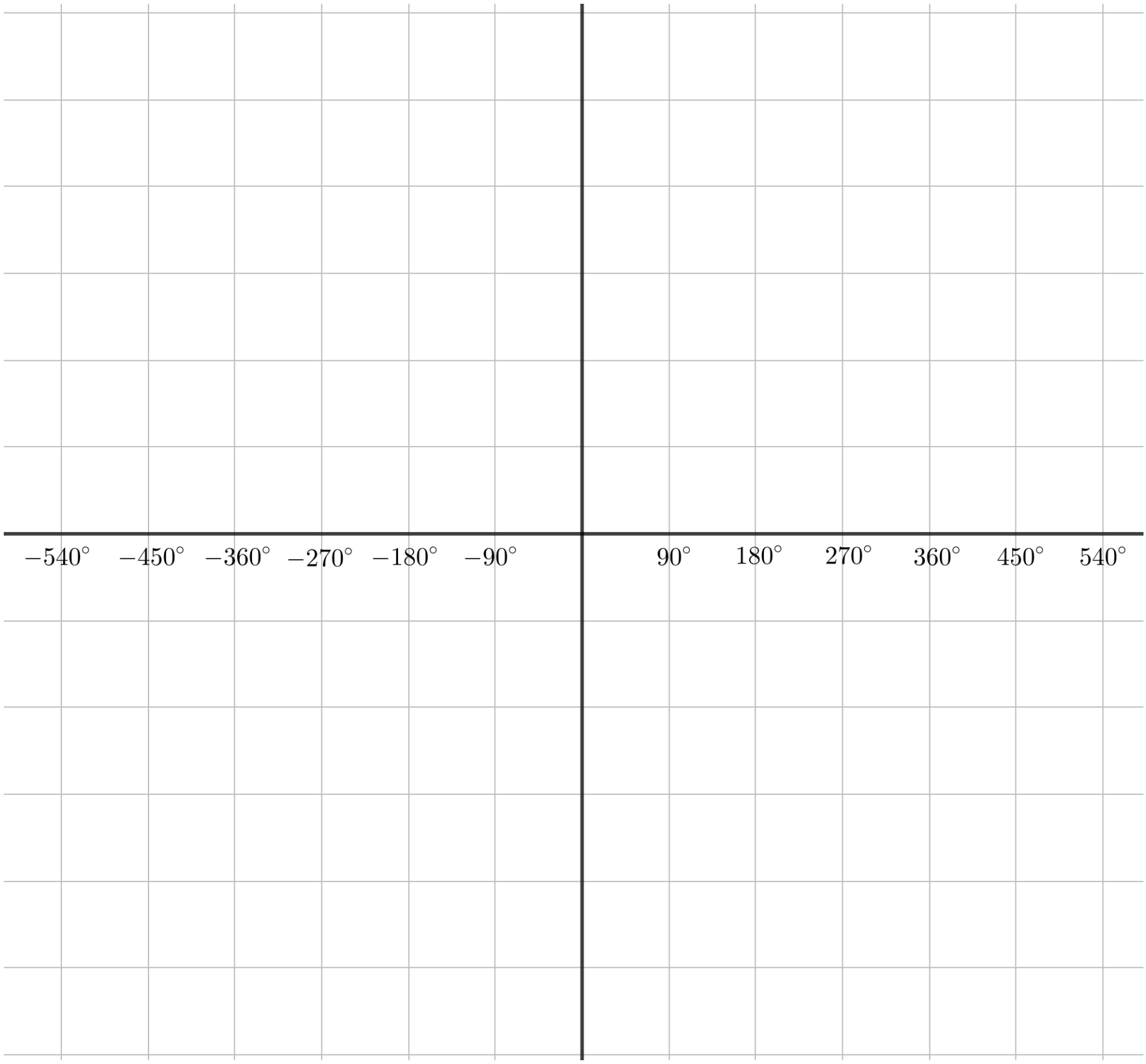
Draw the graph $y = \sin x$.



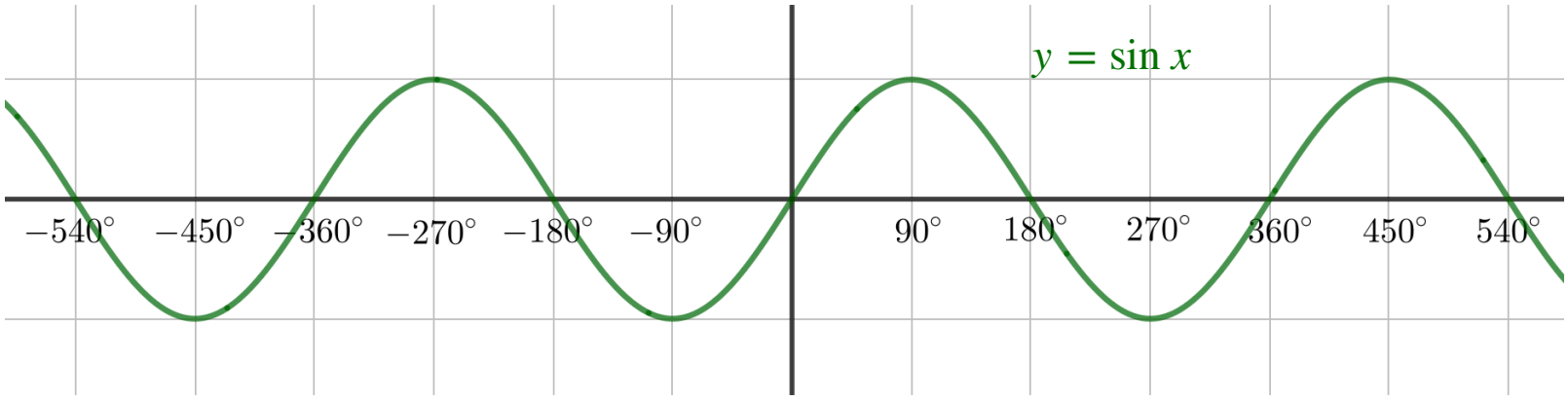
Draw the graph $y = \cos x$.

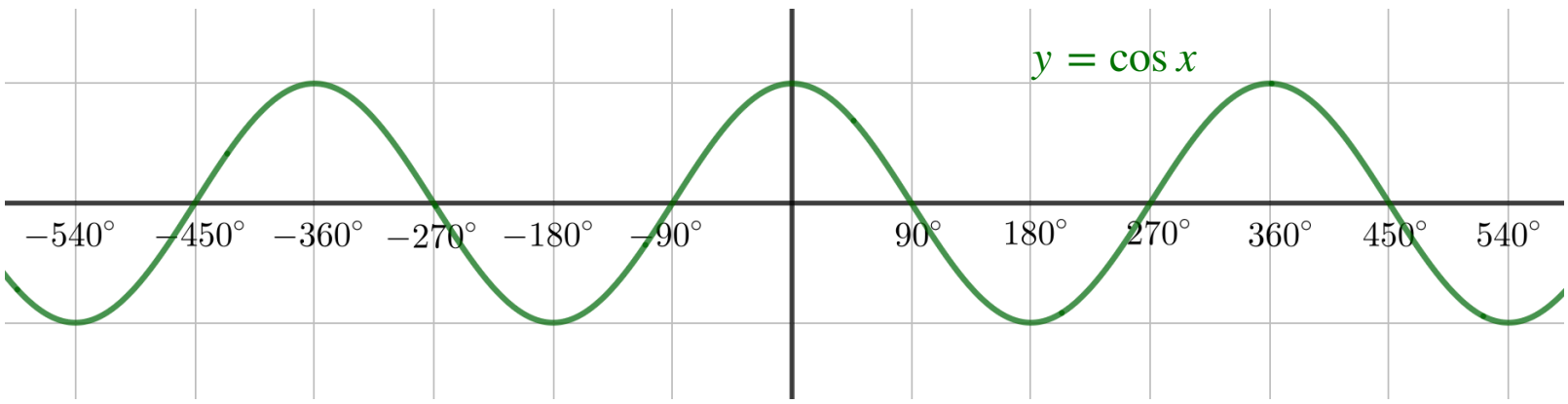


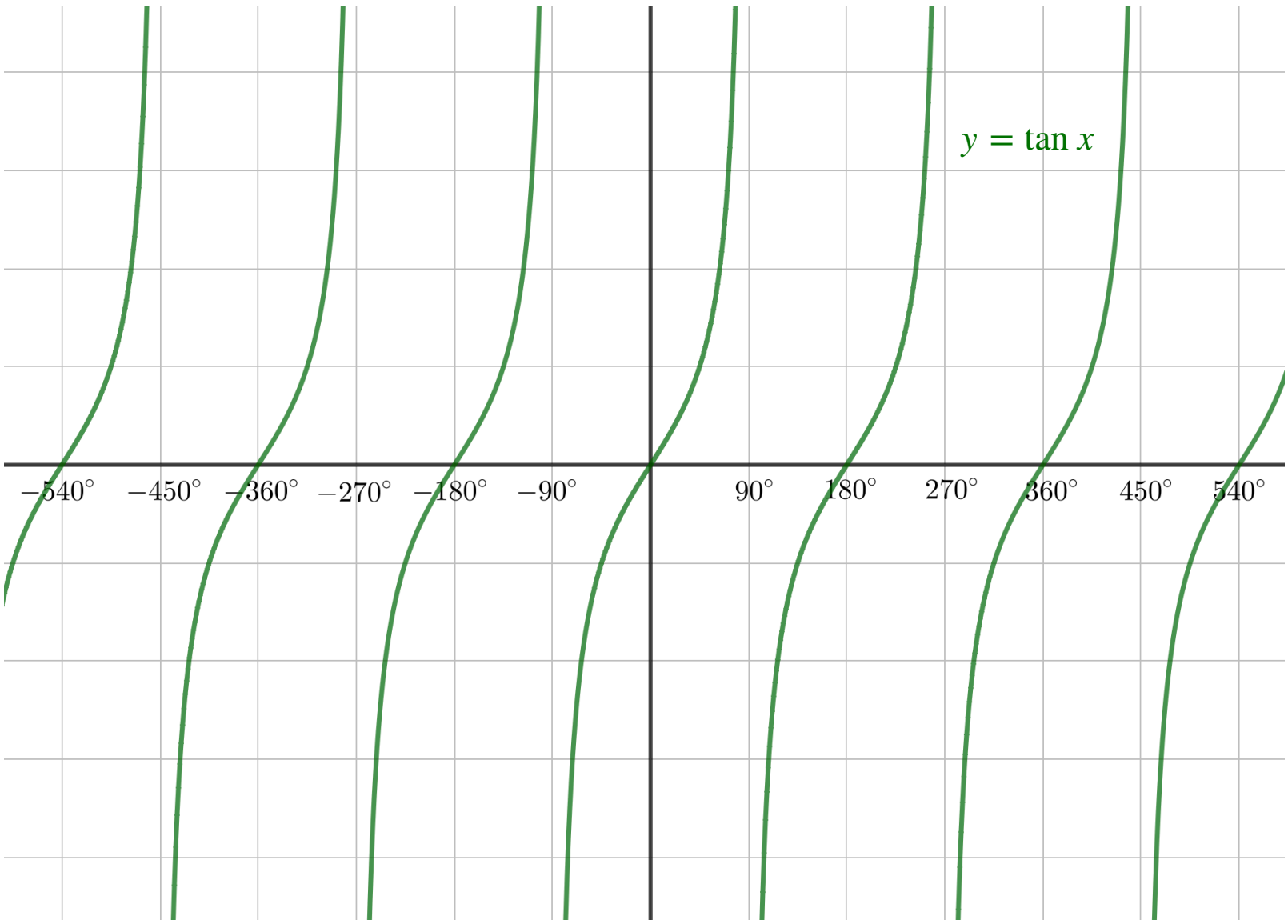
Draw the graph $y = \tan x$.



Describe the symmetry of each of these graphs.






$y = \tan x$
−540°
−450°
−360°
−270°
−180°
−90°
90°
180°
270°
360°
450°
540°