

Exploring the Unit Circle and Robotic Arm Motion

Name_____

Date_____

1. Explore Desmos

Investigate how angles control the position of a point on the unit circle using Desmos, and connect this to robotic arm movement.

Open the Desmos Simulation:

Access [this interactive unit circle tool](https://link.nycfirst.org/interactive_unit_circle).
link.nycfirst.org/interactive_unit_circle

- Interact with the Slider:
- Move the angle slider (θ) slowly from 0° to 360° .
- Observe how the point (x, y) moves around the circle.

2. Position Changes

As θ increases:

- How does the x-coordinate change?
- How does the y-coordinate change?
- Describe the path traced by the point.

3. Key Angles

Record the (x, y) coordinates when:

- $\theta = 0^\circ \rightarrow (\quad , \quad)$
- $\theta = 90^\circ \rightarrow (\quad , \quad)$
- $\theta = 180^\circ \rightarrow (\quad , \quad)$
- $\theta = 270^\circ \rightarrow (\quad , \quad)$

4. Trig Connection

- How do sine and cosine relate to the coordinates?
- Why does $x = \cos(\theta)$ and $y = \sin(\theta)$ make sense for this circle?

5. Robotic Arm Application

Imagine this point is the tip of a robotic arm:

- How could engineers use $\cos(\theta)$ and $\sin(\theta)$ to program the arm's position?
- If the arm needs to reach (0.5, 0.87), what angle θ (in degrees) should it use?