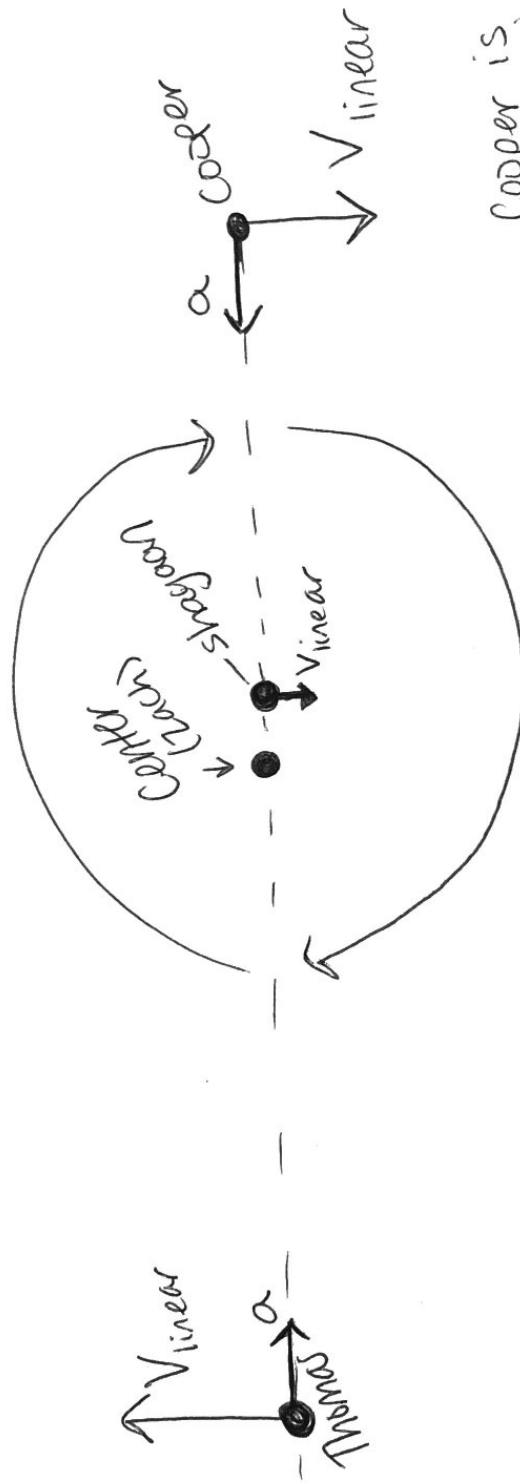


Centripetal Acceleration

- Objects moving in a circle are accelerating.



Cooper is accelerating to the right.

Shayan is accelerating to the right.

Thomas is accelerating to the right.

In a circle, always accelerating toward the center \rightarrow Centripetal acceleration.

Centripetal acceleration formula:

$$a_c = \frac{v^2}{r}$$

a_c = centripetal acceleration (m/s^2)

v = velocity (m/s)

r = radius (m)

A 300kg box on a 3m long rope moving in a circle at 4m/s. Calculate centripetal acceleration

$$a_c = \frac{v^2}{r}$$

$$a_c = \frac{(4)^2}{3}$$

$$a_c = 5.3 m/s^2$$

A 1200kg car is moving in a circle. Accelerating at $4 m/s^2$ and moving at 8m/s. What is the radius?

$$a_c = \frac{v^2}{r} \rightarrow r = \frac{v^2}{a_c}$$

$$r = \frac{(8)^2}{4}$$

$$r = 16 m$$

Newton's 2nd Law $\rightarrow F = ma$

We also have centripetal Force:

$$F_c = \frac{mv^2}{r}$$

F_c = Centripetal force (N)

m = mass (kg)

v = velocity (m/s)

r = radius (m)

$$S = \frac{d}{t} \quad \leftarrow \begin{array}{l} \text{circumference of a circle} \\ \downarrow \\ 2\pi r \end{array}$$

To find out how fast you are going around in a circle:

$$S = \frac{d}{t} \leftarrow 2\pi r, \text{ so } S = \frac{2\pi r}{t}$$