

# Monday Reading Assessment: Unit 6, Circular Motion

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## 1 Memory Bank

- $\Delta s = r\Delta\theta$
- $\omega = \frac{\Delta\theta}{\Delta t}$  ... Definition of angular velocity
- $v = r\omega$  ... Relationship between tangential velocity and angular velocity a distance  $r$  from the center
- $a_C = v^2/r = r\omega^2$  ... Centripetal acceleration

## 2 Angular Displacement and Velocity

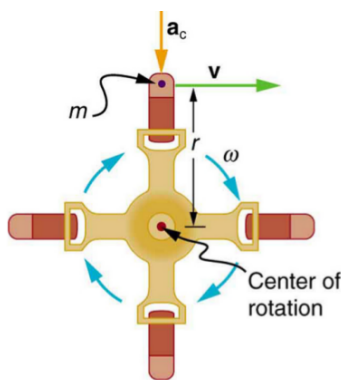


Figure 1: A blood centrifuge spinning counter-clockwise.

1. A diagram of a blood centrifuge is depicted in Fig. 1. It is spinning at an angular velocity of  $\omega$  and tangential velocity  $v$ . In order to separate the contents in the vials (indicated with the mass  $m$ ), the *centripetal acceleration* needs to be increased by a factor of 100. Which of the following actions will achieve this?
  - A: Doubling the angular velocity:  $\omega \rightarrow 2\omega$ .
  - B: Tripling the angular velocity:  $\omega \rightarrow 3\omega$ .
  - C: Quadrupling the angular velocity:  $\omega \rightarrow 4\omega$ .
  - D: Increasing the angular velocity by a factor of 10:  $\omega \rightarrow 10\omega$ .
2. Suppose the radius is 8 cm, and  $\omega = 2000$  revolutions per minute. What is the centripetal acceleration?
3. Suppose the radius is 8 cm, and we measure  $v = 75$  m/s. What is  $\omega$ ? What is  $a_C$ ?