

Thursday 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

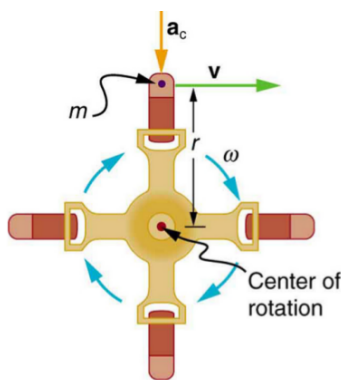


Figure 1: A blood centrifuge spinning counter-clockwise.

1. A diagram of a blood centrifuge is depicted in Fig. 1. It is spinning at an angular velocity of ω 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 $\omega = 200$ revolutions per minute. What is the centripetal acceleration?
3. Suppose the radius is 8 cm, and we measure $v = 15$ m/s. What is ω ? What is a_C ?