NAME _____ DATE _____

Scenario

A coin is set on a large turntable a distance of 4 m from the center of the turntable. The turntable is slowing down so that the speed of the coin is given by the equation $v = 6 - 2t$, in units of meters and seconds.

PART A: The coin is in the locations shown in the diagrams below at times $t = 1$ s and $t = 2$ s. On each diagram, draw the following three vectors. Make the vector lengths such that each square on the diagram represents either one m/s or one m/s².

- A vector (labeled v) representing the velocity of the coin at this instant

- A vector (labeled a_t) representing the tangential component of acceleration of the coin at this instant

- A vector (labeled a_c) representing the centripetal component of acceleration of the coin at this instant

Time $t = 1$ second   Time $t = 2$ seconds
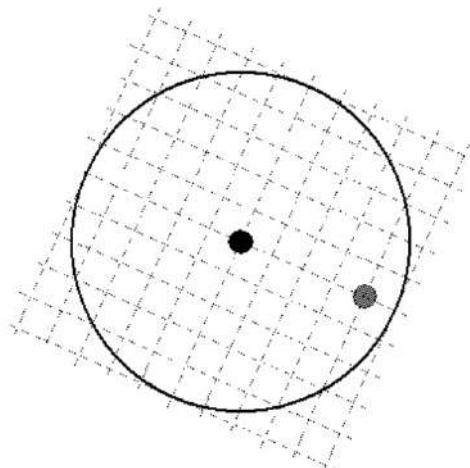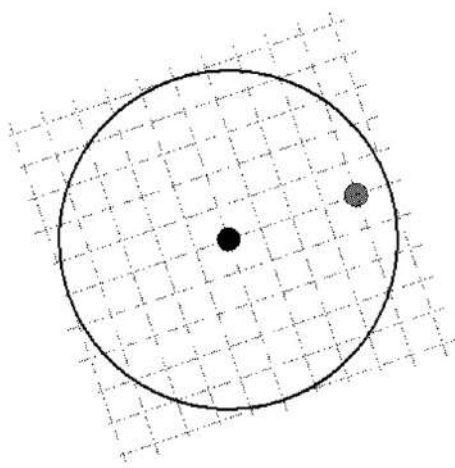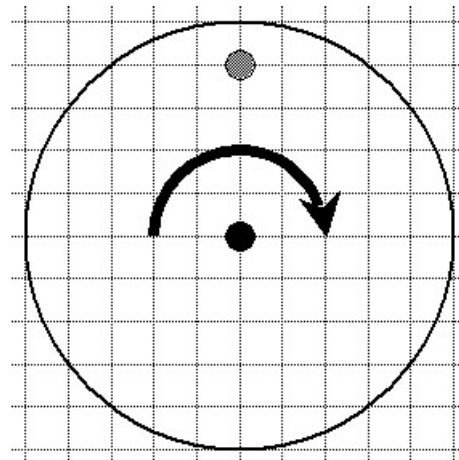
PART B: The experiment is repeated with the coin again set 4 m from the center. This time, two trials are performed with the turntable starting at rest. On Trial 1, the turntable increases its motion very gradually, and the coin slips on the turntable surface when the coin moves any faster than 6 m/s. On Trial 2, the turntable increases its motion so that the coin's speed increases at a rate of 8 m/s^2, and the coin slips when its speed reaches 4 m/s. In a clear, coherent, paragraph-length response that may include equations, figures, and calculations (but these are not necessary), explain why the speed to make the coin slip in Trial 2 was less than in Trial 1.

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