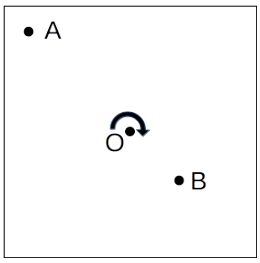
Matter and Motion – Wed. Nov 29, 2017
Physics Quiz #8 Name:_____

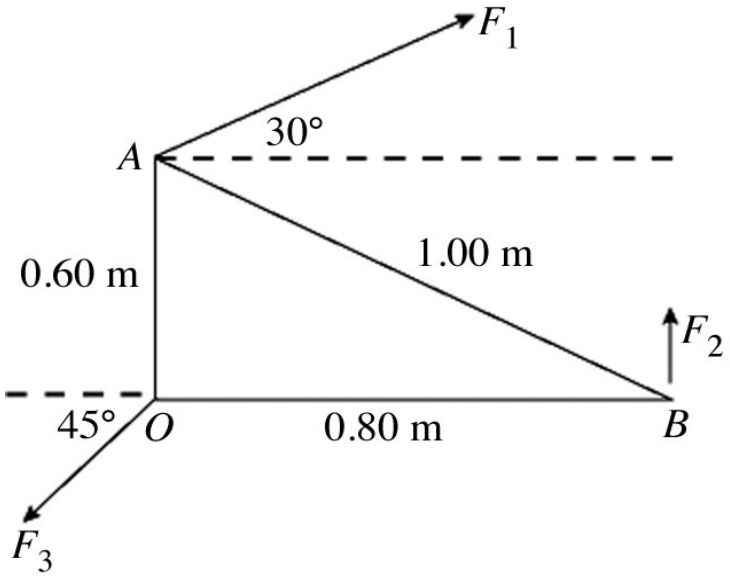
- This quiz is for you to display your personal understanding of program material
- You may use a single 3 inch by 5 inch note card and a calculator
- ***Show/explain all work/reasoning***. You will be evaluated on clarity/completeness of process, not simply on answer
- The quiz begins at 9:00 and ends promptly at 9:30

1. [4 points] A square object rotates about its center with a constant angular speed ω in the direction about point O shown by the curved arrow (see diagram at right).

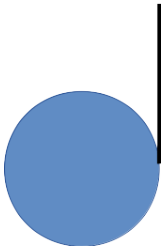


   a. [2 points] Using the convention given by the text, is the rotation shown ***positive*** **(+)** or ***negative*** **(-)**? (circle one)
   b. [2 points] Consider points A and B on the square. Point A is twice as far from O as Point B. Which of the following statements are true? (Select all that are true; there may be more than one!)
      i. The linear acceleration of B is twice as great as the linear acceleration of A.
      ii. The angular velocity of A is twice as great as the angular velocity of B.
      iii. A is moving twice as fast as B.
      iv. The linear acceleration of A is twice as great as the linear acceleration of B.
      v. A and B have the same linear acceleration.

2. [6 points] A triangular plate *OAB* is in a horizontal plane. Three forces, with magnitudes F_1 = 6.0 N, F_2 = 9.0 N, and F_3 = 7.0 N, act on the plate, which is pivoted about a vertical axis through point *O*. In the figure, $\vec{F}_2$ is perpendicular to *OB*. Find the sum of the torques about the vertical (i.e. out of the page) axis through point *O*, acting on the plate, due to forces F_1, F_2, and F_3



3. [10 points] A lightweight string is wrapped tightly around a spool. You hold the string and release the spool from rest, holding the string steady. As the spool falls, the string unwinds from the spool as shown to the right. The spool has a diameter of 4.0 cm and a mass of 45 grams and is a uniform solid cylinder (not hollow). After the spool has fallen a distance of 1.0 m…



   a. [2 points] How many full revolutions has the spool completed?

   b. [8 points] What is the velocity of the spool?