

## #30 Angular Momentum Post-class

Due: 11:00am on Friday, November 2, 2012

**Note:** You will receive no credit for late submissions. To learn more, read your instructor's [Grading Policy](#)

### Exercise 10.42

A diver comes off a board with arms straight up and legs straight down, giving her a moment of inertia about her rotation axis of  $18\text{kg} \cdot \text{m}^2$ . She then tucks into a small ball, decreasing this moment of inertia to  $3.6\text{kg} \cdot \text{m}^2$ . While tucked, she makes two complete revolutions in  $1.2\text{s}$ .

#### Part A

If she hadn't tucked at all, how many revolutions would she have made in the  $1.8\text{s}$  from board to water?

**Express your answer using two significant figures.**

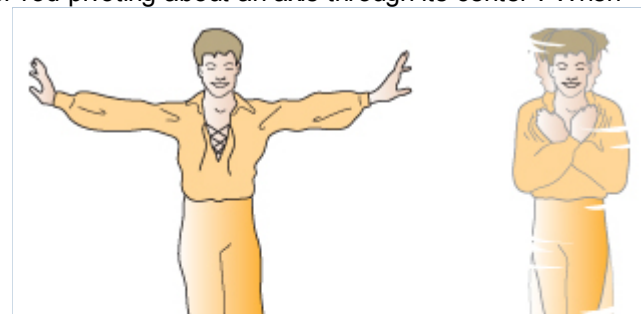
ANSWER:

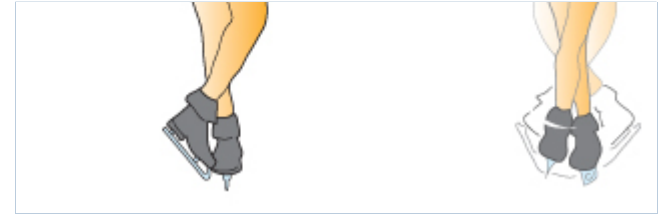
0.60 rev

**Correct**

### Exercise 10.41: The spinning figure skater

The outstretched hands and arms of a figure skater preparing for a spin can be considered a slender rod pivoting about an axis through its center. When his hands and arms are brought in and wrapped around his body to execute the spin, the hands and arms can be considered a thin-walled hollow cylinder. His hands and arms have a combined mass  $7.0\text{kg}$ . When outstretched, they span  $1.8\text{m}$ ; when wrapped, they form a cylinder of radius  $23\text{cm}$ . The moment of inertia about the rotation axis of the remainder of his body is constant and equal to  $0.40\text{kg} \cdot \text{m}^2$ .



**Part A**

If his original angular speed is  $0.40 \text{ rev/s}$ , what is his final angular speed?

**Express your answer using two significant figures.**

ANSWER:

$$\omega_2 = 1.2 \text{ rev/s}$$

**Correct**

**Exercise 10.34**

A woman with a mass of  $47.0 \text{ kg}$  is standing on the rim of a large disk that is rotating at an angular velocity of  $0.550 \text{ rev/s}$  about an axis through its center. The disk has a mass of  $114 \text{ kg}$  and a radius of  $3.80 \text{ m}$ .

**Part A**

Calculate the magnitude of the total angular momentum of the woman-plus-disk system. (Assume that you can treat the woman as a point.)

ANSWER:

$$5190 \text{ kg} \cdot \text{m}^2/\text{s}$$

**Correct**

### Score Summary:

Your score on this assignment is 97%.

You received 29.1 out of a possible total of 30 points.