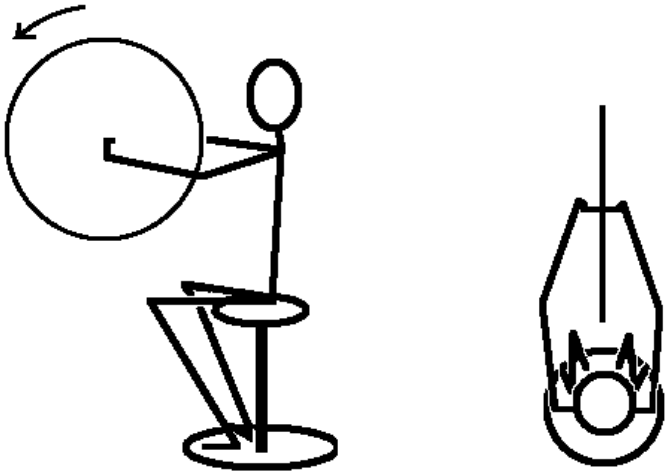
The bicycle wheel gyroscope: *predict, observe, explain*

Predict: A student sits on a stool that is free to rotate around a vertical axis. A bicycle wheel that is rotating as shown in the diagram is handed to the student.



(a) Indicate the direction of the angular momentum of the bicycle wheel on the diagram above.

(b) Suppose the student lowers her right hand relative to her left hand. What is the direction of the change in the angular momentum vector, relative to what it was before? Use the coordinate system where x is to the right, y is away from the student, and z is up.

(c) If angular momentum is conserved during the time she turns the axle of the wheel, which way should she be rotating on the stool after she lowers her right hand relative to her left?

Observe: what do you observe? What happens if instead she lowers her left hand relative to her right hand?

Explain: If your predictions were not the same as your observations, do you understand why?