4.6. Why can't we ? The choice of the frame of reference is up to you. If in such a problem you use a reference system attached to the disk (i.e. a non-inertial system), the body is considered to be at rest. But if your reference system is attached to the earth (i.e. an inertial reference system), then the body is dealt with as one traveling in a circle.

I would advise you to choose an inertial frame of reference. And now please state *Newton's second law of motion.* ♢

. This law can be written as $F = ma$, where F is the force acting on the body, m is its mass and a : acceleration. ∎

4.7. Your laconic answer is very typical. I should make three critical remarks on your statement; two are not very important and one is essential. In the first place, *it is not the force that results from the acceleration, but, on the contrary, the acceleration is the result of the applied force.* It is therefore more logical to write the equation of the law as

$$a = B \cdot \frac{F}{m} \tag{4.1}$$

where B is the proportionality factor depending upon the choice of units of measurement of the quantities in Eq. (4.1). Notice that your version had no mention of the proportionality factor B. Secondly, a body is accelerated by all forces applied to it (though some may counterbalance one another). Therefore, in stating the law you should use, not the term *force*, but the more accurate term *resultant force.*

My third remark is the most important. Newton's second law establishes a relationship between force and acceleration. But force and acceleration are vector quantities, characterized not only by their numerical value (magnitude) but by their direction as well. Your statement of the law fails to specify the directions. This is an essential shortcoming. Your statement leaves out a vital part of Newton's second law of motion. Correctly stated it is: *the acceleration of a body is directly proportional to the resultant of all forces acting on the body, inversely proportional to the mass of the body and takes place in the direction of the resultant force*. This statement can be analytically expressed by the formula

$$\vec{a} = B \cdot \frac{\vec{F}}{m} \tag{4.2}$$

(where the arrows over the letters denote vectors). ♢

. When in Dialogue 2 we discussed the forces applied to a body thrown upward at an angle to the horizontal, you said you would show later that the direction of motion of a body does not necessarily coincide with the direction of the force applied to it. You referred then to Newton's second law. ∎

4.8. Yes, I remember, and I think it would be quite appropriate to return to this question. Let us recall what acceleration is. As we know, acceleration is characterized by the change in velocity in unit