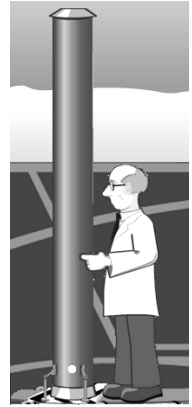


During this interactive you are going to experiment with a light clock to determine the different times experienced in two different reference frames and the different distances traveled during these times.

In this simulation, you experiment with a light clock. The professor rolls across a basketball court with a light clock on his skateboard, while Katherine watches from the side. You will view the light clock in operation from the professor's reference frame, and from Katherine's reference frame.



1. Why would the height of the light clock not be changed by the motion of the professor across the basketball court?

Open the shortcut **IL T&L** on one of the lab stations.

Open the simulation contained in this section. **Do Not follow the directions in the simulation follow these instructions.**

The simulation launches in the professor's reference frame, where the light clock is stationary. Press GO and watch the basketball court and the background pass by. A counter will record the number of light clock cycles, the number of round trip journeys made by the light pulse. The clock is 3.0 m tall.

2. From the information you gained by running the simulation and what you know about the speed of photons calculate the amount of time the professor experiences during his trip across the basketball court. Check your answer by entering it into the simulation. (If you do not get it correct see Mr. C for help.) **Show all work and equations including substitution with units.**

Now press the tab labeled “Student’s reference frame” and press GO again. You will see the same series of events from Katherine’s reference frame. The simulation displays the path of the light and indicates some key distances in a fashion similar to the derivation of the prior section.

3. From the information you gained by running the simulation and what you know about the speed of photons calculate the amount of time Katherine experiences during the professor’s trip across the basketball court. Check your answer by entering it into the simulation. (If you do not get it correct see Mr. C for help.) **Show all work and equations including substitution with units.**

4. From the two values you just calculated and checked determine the speed of the professor as measured in Katherine’s frame of reference. Express this speed in terms of c . **Show all work and equations including substitution with units.**

5. Katherine measures the basketball court to have a length of 24.0m. Use this fact and the time Katherine measured for the professor's trip to determine the speed of the professor from Katherine's frame of reference. Express this speed in terms of c . This is the same speed the professor would measure of the basketball court moving beneath him. **Show all work and equations including substitution with units.**

6. Do your answers for 4 and 5 agree? Why or Why not?

7. Using the speed the professor sees the basketball court moving and the time he measures how long does he measure the basketball court to be? **Show all work and equations including substitution with units.**

8. How long is the basketball court? Explain your answer fully.
