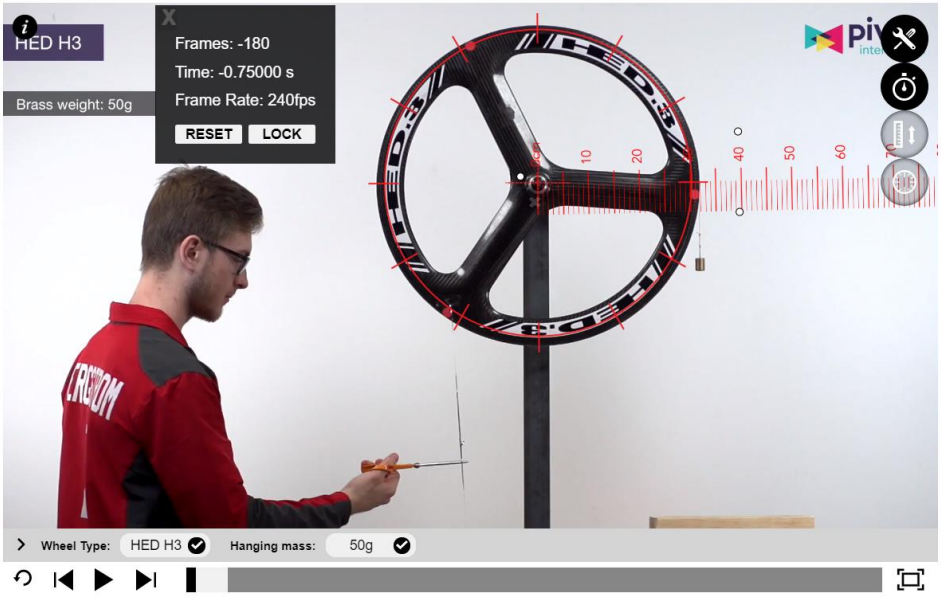
Pivot Wheels Accelerated by Hanging Weight

Purpose: To determine the moment of inertia of a high performance bicycle wheel.

Access the Pivot Interactives lab “Wheels Accelerated by Hanging Weight”.



The picture above illustrates the video window after deploying the three tools from the toolbox – stopwatch, ruler and angle measurement device.

To determine the moment of inertia of the wheel, we will determine the torque applied on the wheel by the hanging weight and then determine the angular acceleration of the wheel while the weight on the string is pulling on the wheel.

To determine the torque, measure the distance from the center of the wheel to the location where the string from which the weight is hanging comes in contact with the wheel. That is, you are measuring the distance from the center to the rim. To measure this distance, remember that you can change the orientation of the ruler using the white dots around the ruler.

To determine the acceleration, you will first determine the angular velocity of the wheel after the weight has stopped pulling on the wheel – that is, after the weight has reached the table. After the weight reaches the table, determine the amount of time it takes for the wheel to make one complete revolution. Use the red dots on the wheel and the angle measuring device to do this.

After you have measured the final angular velocity, determine the time it took for the wheel to spin up to that final angular velocity. That is, measure the time from the moment the ribbon

holding the wheel stationary is cut until the moment the weight reaches the table (so that the weight stops applying a force on the string holding it).

Once you have the final angular velocity and the time it took for the wheel to spin up to that angular velocity, you can calculate the angular acceleration. And by comparing the angular acceleration to the torque, you can determine the moment of inertia of the wheel.

Determine the moment of inertia for the HED H3 wheel for four of the hanging weights – 50 g, 100 g, 150 g and 200 g. Use a spreadsheet to record your measurements and to calculate your conclusions. Once you have completed that, take a screen shot of the relevant part of your spreadsheet and copy it into a Word document. The submit the Word document via Canvas.