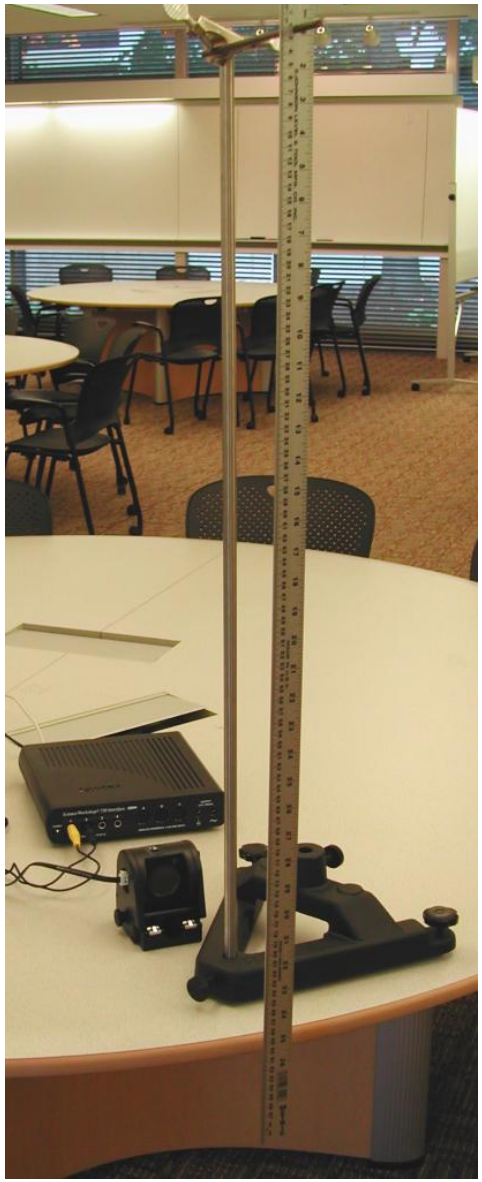
MIT

8.01T Physics I

Experiment 8: Physical Pendulum

Set Up :



Suspend 1m ruler so it can swing over edge of table.

Measure the period of oscillation with the *DataStudio* motion sensor.

Set motion sensor on narrow beam, aim it to just miss support rod and hit ruler about 25 cm away.

Place a chair about 40-50 cm from motion sensor to intercept ultrasound beam when ruler swings out of beam.

Goal

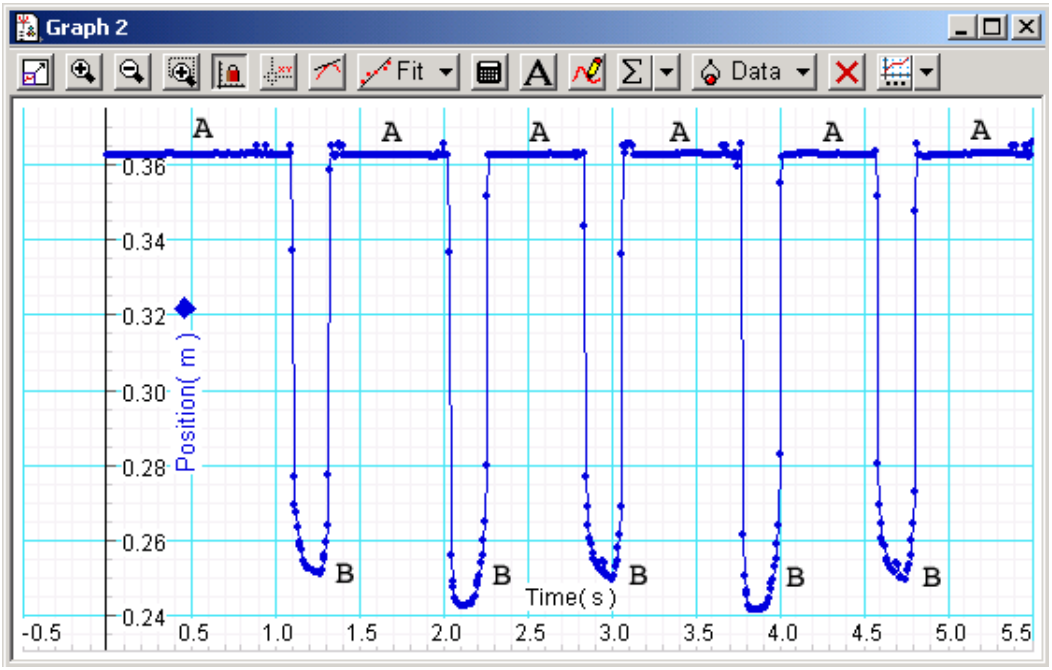
To investigate oscillation of a real (physical) pendulum and compare with an ideal (point mass) pendulum.

Practice calculating moments of inertia, using them, and solving $\tau = I\,\alpha$ equation of motion.

The next graph is typical of those you will make during your experiment. Your instructor will discuss some of its features.

Graph:

Position vs. time data from the motion sensor.



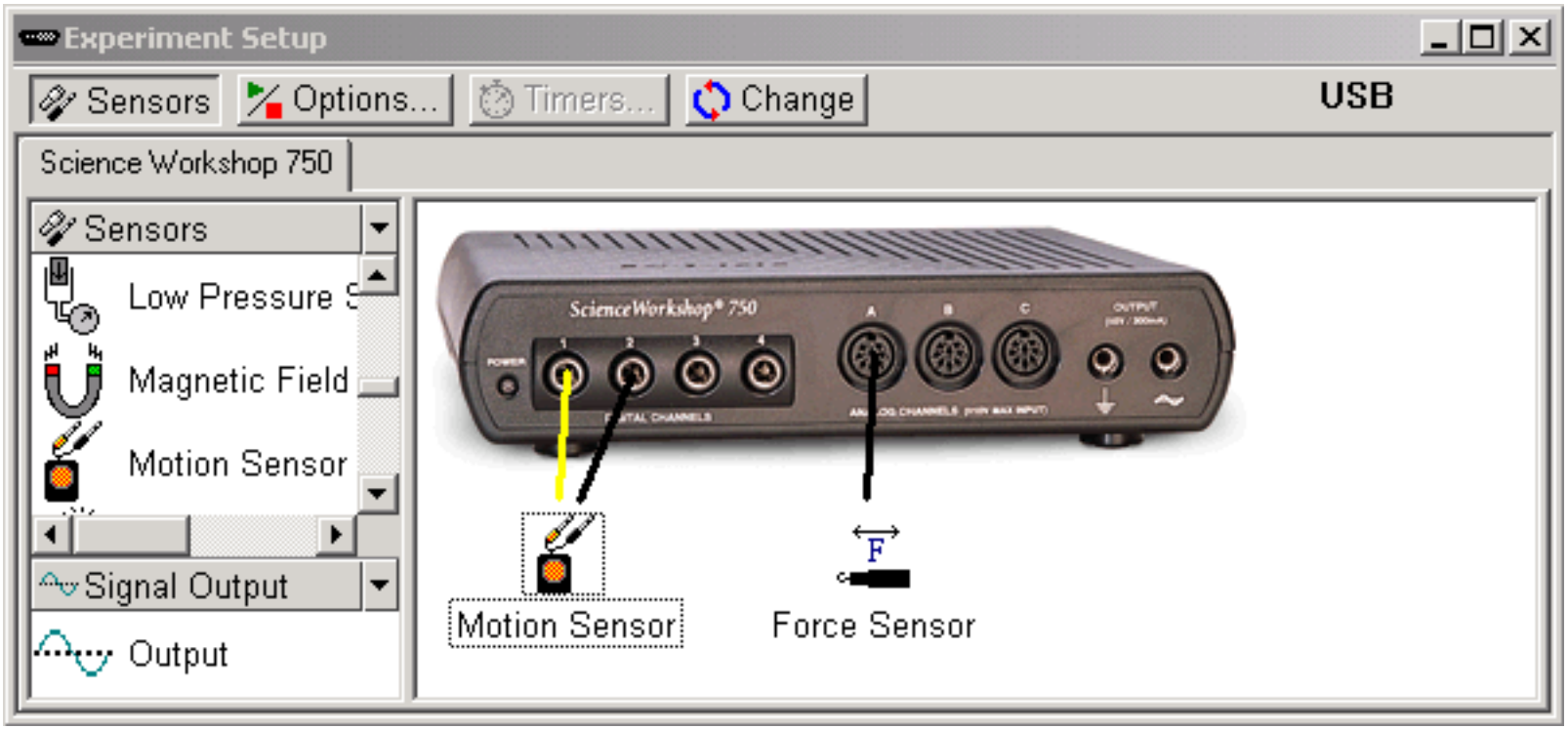
What is happening:

1. Along the top plateaus marked by A?
2. At the downward peaks marked by B?

How do you use this graph to find the period of oscillation of the pendulum?

Starting *DataStudio*:

Create a new experiment. Plug a motion sensor into the 750 and drag its icon to an input in the Setup window.



Double-click the Motion Sensor icon, set trigger rate to 120. Plot position vs. time.

Ruler Pendulum:

Click 

Delayed Start = None. Automatic Stop = 10 sec.

Pull ruler aside (from 10 to 50 cm) and release it to swing at the same time you start *DataStudio*.
Measure periods for table below.

Displacement	θ_0	*Period*
0.10 m	0.10	
0.25 m	0.25	
0.50 m	0.52	

Modified Pendulum:

Displacement	*Weight*	*Position*	*Period*
0.20 m	58.6 g	0.25 m	
0.20 m	58.6 g	0.50 m	
0.20 m	58.6 g	0.90 m	

Clip a 50 gm brass weight to the ruler at positions in table in order to change the moment of inertia. (Clip is 8.6 gm.) Measure the period of oscillation.