



Xtreme Swing

Objective 1: *To determine the time of one full cycle*

SUGGESTED PROCEDURE: Use a stopwatch to measure several complete cycles. Average the readings. Measure the height of the Swing's axle using triangulation.

APPARATUS: Stopwatch, triangulation device

DATA: Time in seconds for a complete cycle back and forth at the start: _____s
 Time in seconds for a complete cycle at the highest point _____s
 Time in seconds for the average cycle measured over several cycles. _____s
 Does the cycle time depend on how high the swing is? _____

RESULTS: Calculate the cycle using $T = 2\pi(L/g)^{1/2}$ _____ s

Objective 2 (E12, E13, E14): *Predict the speed of the swing at the lowest point of the swing from a stationary start at the top using conservation of energy.*

SUGGESTED PROCEDURE: Calculate the total mass of the swing, the potential energy at the top of the swing, and the kinetic energy at the bottom of the swing. Calculate the change in potential energy of the swing as it "falls". The difference will be the kinetic energy when the swing is at the bottom of the system.

APPARATUS: Triangulation device

DATA: Mass of full load of people: _____ kg
(use a load of 20 people averaging 60 kg each)
Radius from axle to center of mass of swing: _____ m
Height of the swing at the highest point _____ m

RESULTS: Change of gravitational potential energy of swing _____ J
Change in kinetic energy from top to bottom: _____ J
Predicted speed of swing at bottom: _____ m/s

Objective 3: *To gather subjective data about the ride to compare with the direct data and calculations.*

SUGGESTED PROCEDURE: During the ride concentrate only on how forceful you are "pushed" down into the seat or "lifted" against the retaining bar. If you can, try this with your eyes closed for the duration of the ride!

APPARATUS: Clear head, relatively empty stomach, no distractions.

DATA: Rate the relative magnitude of the force at the points indicated using the rest position before the ride starts as the neutral (N) reference force. Circle the appropriate letter.

| Were you pushed | | INTO THE SEAT | | OR | | AGAINST THE BAR | |
|-----------------|-------|---------------|-------|---------|-------|-----------------|-------|
| | large | medium | small | neutral | small | medium | large |
| Half way up | L | M | S | N | S | M | L |
| At the top | L | M | S | N | S | M | L |
| At the bottom | L | M | S | N | S | M | L |