Worksheet 6: Newton's Laws

Objectives

- Analyze forces in mechanical equilibrium.
- Determine the effect of a nonzero net force on an object.
- Identify the directions and magnitudes of forces between interacting objects.

Summary

Newton's 1 st law	Newton's 2 nd law	Newton's 3 rd law
$\Sigma \vec{F} = \vec{0} \iff \vec{a} = \vec{0}$	$\vec{a} = \Sigma \vec{F}/m$	$\vec{F}_{A\to B} = -\vec{F}_{B\to A}$

Problems

- 1. Draw free body diagrams for the following objects.
 - a. A block resting on an incline.
 - b. A bird perched on a wire.
 - c. A baseball in flight.
 - d. A cart pulled by a horse.
 - e. A dog straining at a leash, but not going anywhere.

- 2. A person weighing 500 N rests in a hammock. The cables of the hammock drop 1.0 m vertically for every 4.0 m of horizontal extent.
 - a. Identify the forces acting on the hammock and draw them in a free body diagram.

b. Find the y (vertical) and x (horizontal) components of the forces acting on the hammock.

- c. What is the tension in the cables?
- 3. A vertical radio tower 30. meters tall is stayed by three cables staked to the ground in an equilateral triangle centered on the base of the tower. The stakes are each 30. m from the base of the tower, and the tension in each cable is 1500 N. The weight of the tower is 6000. N. What is the magnitude of the force of compression at the base of the tower?