Chapter 4: Newton's Laws of Motion

superposition of forces:

Newton's First Law of Motion:

What must be true if an object is in mechanical equilibrium?

static equilibrium:

dynamic equilibrium:

inertial reference frame:

Newton's Second Law of Motion:

What is the main difference between mass and weight? Which of the two is a force?

Newton's Third Law of Motion:

When drawing the forces on an object in a free-body diagram, which forces *must* be drawn and which forces must *not* be drawn?

Ex: 4 A 5.60-kg bucket of water is accelerated upward by a cord of negligible mass whose breaking strength is 75.0 N. If the bucket starts from rest, what is the minimum time required to raise the bucket a vertical distance of 12.0 m without breaking the rod?

Chapter 5: Applying Newton's Laws

What is the acceleration of an object moving with CONSTANT VELOCITY?

What would the sum of the forces equal for an object with mass 5*m* moving with CONSTANT VELOCITY?

What would the sum of the forces equal for an object with mass 2*m* moving with CONSTANT ACCELERATION?

What would the sum of the forces equal for an object with mass 3*m* moving in a CIRCLE?

Give the general equation for the force of friction.

Ex: 5 A pickup truck is carrying a toolbox, but the rear gate of the truck is missing. The toolbox will slide out if it is set moving. The coefficients of kinetic friction and static friction between the box and the level bed of the truck are 0.355 and 0.650, respectively. Starting from rest, what is the shortest time this truck could accelerate uniformly to 30.0 m/s without causing the box to slide? Draw a free-body diagram of the toolbox.

Chapter 6: Work and Kinetic Energy

energy:

work:

Give the three most general equations for work.

Which equation(s) can be used for constant forces?

How can work be positive, zero, or negative?

Give the two most general equations for the work-kinetic energy theorem.

Give the equation for kinetic energy.

Give the equation for the force a spring exerts.

Give the equation for the work done by a spring.

power:

Ex: 6 At a waterpark, sleds with riders are sent along a slippery, horizontal surface by the release of a large compressed spring. The spring, with force constant $k = 40.0$ N/cm and negligible mass, rests on the frictionless horizontal surface. One end is in contact with the stationary wall. A sled and rider with total mass 70.0 kg are pushed against the other end, compressing the spring 0.375 m. The sled is then released with zero initial velocity.

What is the sled's speed when the spring
a. returns to its uncompressed length and
b. is still compressed 0.200 m?

Chapter 7: Potential Energy and Energy Conservation

Give the two most general equations for gravitational potential energy.

Give the equation for work due to weight.

Give the equation for elastic potential energy.

Give the equation for work due to an elastic force.

When is mechanical energy conserved?

conservative force:

List all of the conservative and non-conservative forces you know in the table below.

conservative forces	**non-conservative forces**

Write the most general equation for the energy of a system.

Ex: 7 Two blocks with different masses are attached to either end of a light rope that passes over a light, frictionless pulley suspended from the ceiling. The masses are released from rest, and the more massive one starts to descend. After this block has descended 1.20 m, its speed is 3.00 m/s. If the total mass of the two blocks is 22.0 kg, what is the mass of each block?