

# **Problem Solving Strategies: Work and the Dot Product**

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**Oct 15, 2003**

# Class Problem 1

## Work done by Gravity Near the Surface of the Earth

Consider an object of mass  $m$  near the surface of the earth falling directly towards the center of the earth. The gravitational force between the object and the earth is nearly constant. Suppose the object starts from an initial point  $y_0$  and moves to a final point  $y_f$  closer to the earth. How much work does the gravitational force do on the object as it falls?

# Class Problem 2

## Work Done by the Spring Force

Connect one end of a spring with spring constant  $k$  to an object resting on a smooth table and fix the other end of the spring to a wall.

Stretch the spring a distance  $x_0$  and release the spring-object system. How much work does the spring do on the object as a function of the stretched or compressed length of the object?

# Class Problem 3

## Work done by the Inverse Square Gravitational Force

Consider an object of mass  $m$  moving directly towards the sun (mass  $m_s$ ). Initially the object is at a distance  $r_0$  from the center of the sun. The object moves to a distance  $r_f$  from the center of the sun. How much work does the gravitational force between the sun and the object do on the object during this motion?