

Quiz 2

Date: Friday, 03/09

Time: 11:00 AM~ 11:50 AM

(This is an open-book, open-note quiz. You must sign your name on this sheet and return it with your examination book. Academic misconduct (any type of cheating) will result in a failing grade in ENGN 2070-201 *Dynamics*.)

Name: _____

- (30%) A 400 N crate is released from the top of a frictional slope, as shown in Figure 1. With the following information, determine the maximum deflection (Δ_{\max}) of the spring down the slope.

- Slope angle $\theta = 30^\circ$
- Slope height $h = 1.5$ m
- Coefficient of kinetic friction $\mu_k = 0.16$
- Spring constant $k_s = 500$ N/m

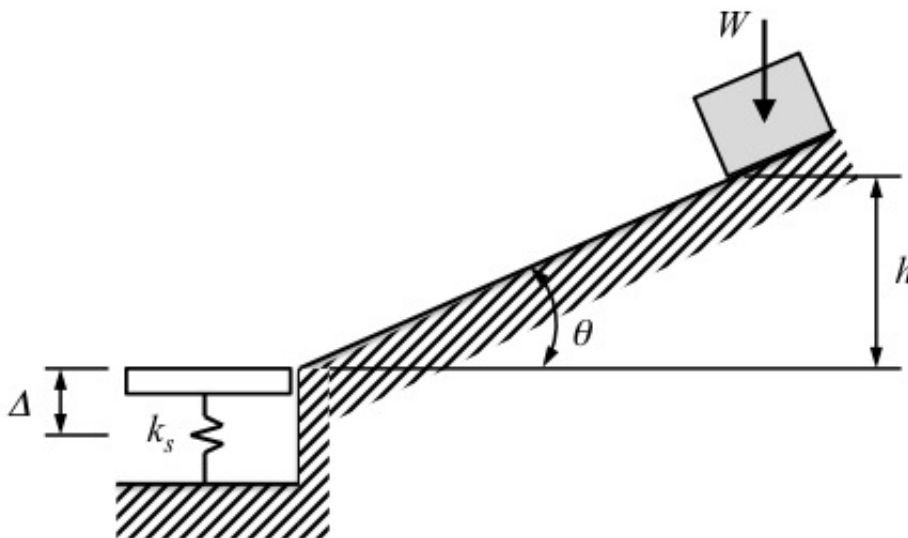


Figure 1: A crate on a frictional slope

2. (30%) Two boats leave the shore at the same time and travel in the directions shown in Figure 2. If $v_A = 35$ ft/s and $v_B = 20$ ft/s, determine the following information.
- The velocity of B with respect to A , $v_{B/A}$ (15%)
 - The time when two boats are 1,000 ft apart, t (15%)

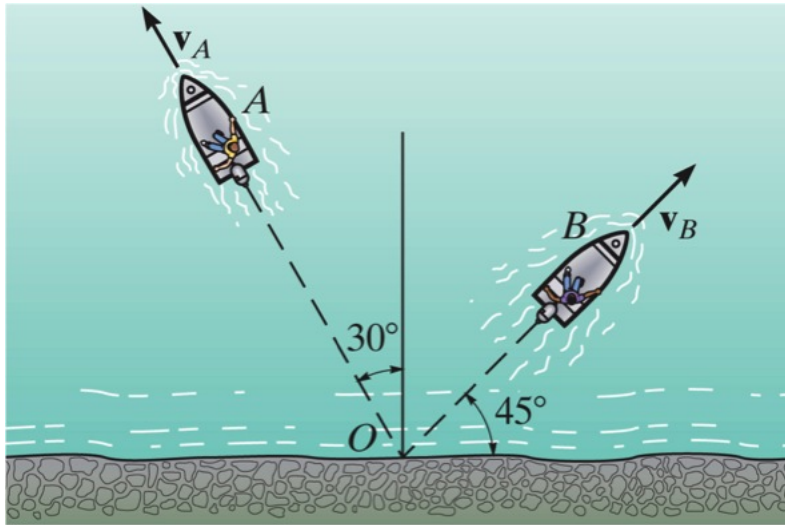


Figure 2: Relative motion between two boats

3. (40%) In Figure 3, a 3-lb collar C fits loosely on the smooth shaft. If the spring is unstretched when $s = 0$ and the collar is given an initial velocity of 20 ft/s, determine the following information with $k_s = 4.5$ lb/ft.
- The velocity of the collar when $s = 0.5$ ft (20%)
 - The maximum travelling distance when the velocity of the collar becomes zero, s_{\max} (20%)

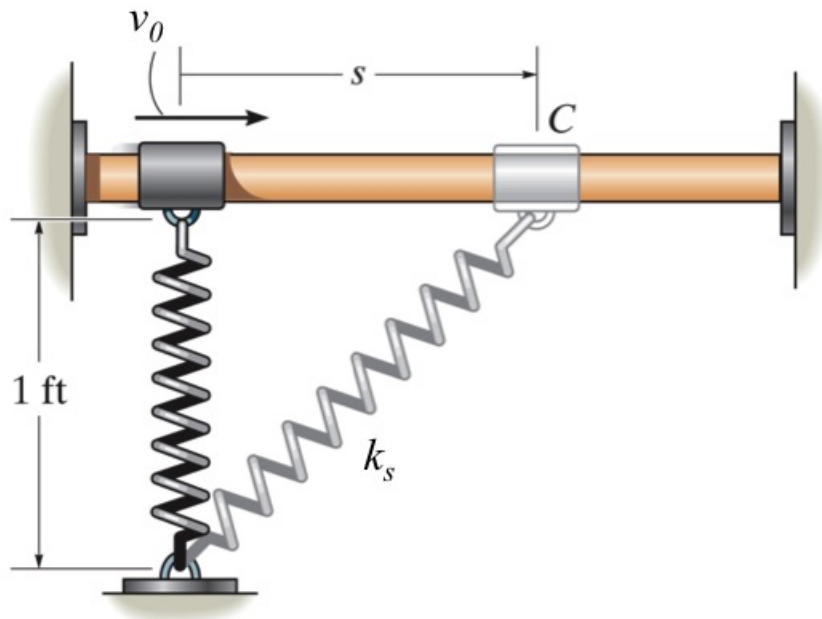


Figure 3: Motion of a collar attached to a spring