

# Chapter 15

## Problem 32

a)  $\Delta x = 8.00 \text{ cm}$      $m = 10.0 \text{ kg}$



From Newton's 2nd Law

$$\sum F = ma$$

$$F_s - mg = 0 \quad (\text{static equilibrium})$$

(#1)  $k\Delta x - mg = 0 \rightarrow k\Delta x = mg \rightarrow k = \frac{mg}{\Delta x}$

$$k = \frac{(10.0 \text{ kg})(9.8 \text{ m/s}^2)}{(0.080 \text{ m})} = 1225 \frac{\text{N}}{\text{m}}$$

b) Find The mass of a fish when  $\Delta x = 5.50 \text{ cm}$

using equation (#1), solve for mass

$$k\Delta x = mg \rightarrow m = \frac{k\Delta x}{g} = \frac{(1225 \text{ N/m})(0.055 \text{ m})}{9.80 \text{ m/s}^2}$$

$$m = 6.875 \text{ kg}$$

c) How far apart are the  $\frac{1}{2} \text{ km}$  marks?

Using equation (#1), solve for  $\Delta x$

$$k\Delta x = mg \rightarrow \Delta x = \frac{mg}{k} = \frac{(0.50 \text{ kg})(9.8 \text{ m/s}^2)}{(1225 \text{ N/m})}$$

$$\Delta x = 4.0 \times 10^{-3} \text{ m}$$

$$= 0.40 \text{ cm}$$