

Hooke's Law Practice

Name: Ray

1. In an exercise machine, a spring with a constant of 120 N/m is pulled 0.8 m by a weightlifter. How much force is the spring exerting on the weightlifter?

Formula:	Plug in numbers:	Answer:
$F = -kx$	$F = (-120\text{N/m})(0.8\text{m})$	$F = -96\text{N}$

2. A sack of radishes with a mass of 0.2 kg is placed on a spring scale in the grocery store. The spring is stretched 0.032 m.

a. What is the weight of the sack of radishes?

Formula:	Plug in numbers:	Answer:
$F = mg$ $F_w = mg$	$F_w = (0.2\text{kg})(9.8\text{m/s}^2)$	1.96N

b. What is the spring constant?

Formula:	Plug in numbers:	Answer:
$F = -kx$	$\frac{1.96\text{N}}{0.032} = -k \left(\frac{0.032\text{m}}{0.032} \right)$	61.25N/m

3. A pinball launcher is pulled back 0.75m. If the spring constant is 700 N/m, what is the force of the spring on the player's hand?

Formula:	Plug in numbers:	Answer:
$F = -kx$	$F = (-700\text{N/m})(0.75\text{m})$	-525N

4. What is the period of a spring system with a spring constant of 200 N/m and a mass of 0.8 kg?

Formula:	Plug in numbers:	Answer:
$T = 2\pi \sqrt{\frac{m}{k}}$	$T = 2\pi \sqrt{\frac{0.8}{200}}$	0.397 s

5. What is the spring constant for a linear spring with a period of 0.45 seconds and a mass of 1.08 kg?

Formula:	Plug in numbers:	Answer:
$T = 2\pi \sqrt{\frac{m}{k}}$	$0.45 = 2\pi \sqrt{\frac{1.08}{k}}$ $\frac{0.45}{2\pi} = \sqrt{\frac{1.08}{k}}$ $0.072 = \sqrt{\frac{1.08}{k}}$	210.6 N/m 220.4 N/m also okay

6. What is the spring constant for a linear spring with a period of 5 seconds and a mass of 80 kg?

Formula:	Plug in numbers:	Answer:
$T = 2\pi \sqrt{\frac{m}{k}}$	$\left(\frac{5s}{2\pi}\right)^2 = \frac{80}{k}$ $0.633 = \frac{80}{k} \quad k =$	126.3 N/m

7. Calculate the magnitude of the weight hanging on a spring system that has a spring constant of 400 N/m and a period of 3 seconds. (2 formulas)

Formula:	Plug in numbers:	Answer:
$T = 2\pi \sqrt{\frac{m}{k}}$ $F_w = mg$	$\left(\frac{3s}{2\pi}\right)^2 = \frac{m}{400}$ $0.228 = \frac{m}{400}$ $m = 0.228 \times 400$ $m = 91.2$ $F_w = 91.2(9.8)$	893.7 kg

$$F_w = mg$$