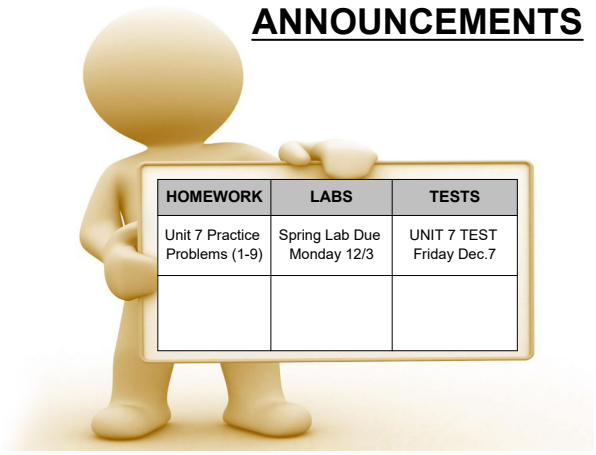
ANNOUNCEMENTS



HOMEWORK	LABS	TESTS
Unit 7 Practice Problems (1-9)	Spring Lab Due Monday 12/3	UNIT 7 TEST Friday Dec.7

7.3 SPRING FORCES

LEARNING TARGETS

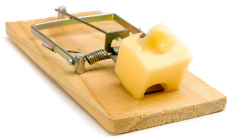
7.4	I can define, analyze, and solve dynamic problems involving spring forces.

SPRINGS

Name three objects that use springs.

Pen
Shocks
Bed
Trampoline
Pogo Stick
Slinky

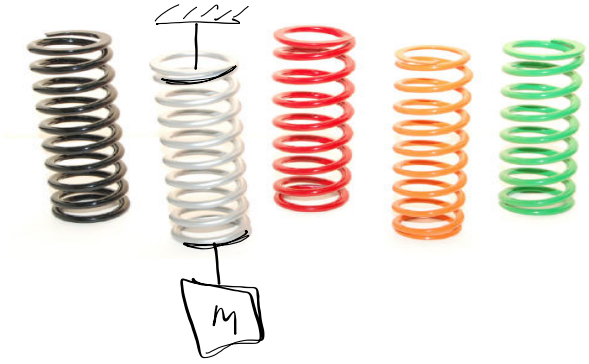
SPRINGS



SPRINGS

SPRINGS

Ideal springs are massless and they are assumed to obey Hooke's law exactly.

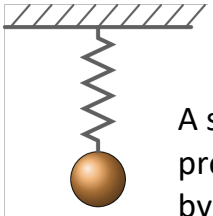


SPRINGS

Robert Hooke
(1635-1703)

Philosopher
Physicist
Biologist
Architect

SPRINGS



Hooke's Law

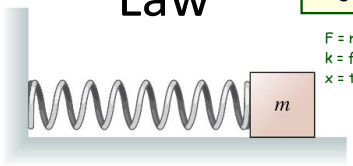
A spring exerts a force that is proportional to the amount by which it is stretched or compressed, and in the opposite direction.

SPRINGS

Hooke's Law

$$F_s = k\,x$$

F = magnitude of the spring force
k = force constant or spring constant
x = the length of stretch or compression



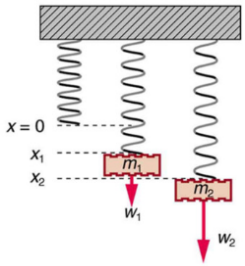
$\frac{F_s}{x} = k$

SPRINGS

What is "k" (stiffness)

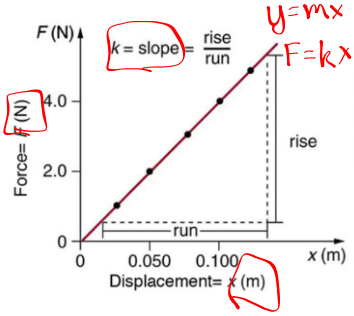
"k" is a constant of proportionality, referred to as the **force constant**, or spring constant.

SPRINGS



m (kg)	w (N)	x (m)
0.000	0.00	0.000
0.100	0.98	0.025
0.200	1.96	0.050
0.300	2.94	0.076
0.400	3.92	0.099
0.500	4.90	0.127

SPRINGS



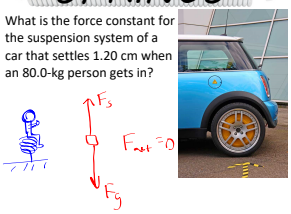
y = mx
F = kx

m (kg)	w (N)	x (m)
0.000	0.00	0.000
0.100	0.98	0.025
0.200	1.96	0.050
0.300	2.94	0.076
0.400	3.92	0.099
0.500	4.90	0.127

UNITS $\frac{N}{m}$

SPRINGS

What is the force constant for the suspension system of a car that settles 1.20 cm when an 80.0-kg person gets in?



$F_s = F_g$

$kx = mg$

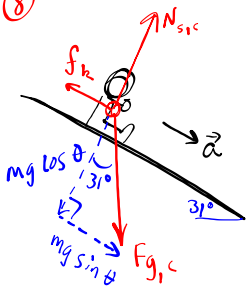
$k = \frac{mg}{x} = \frac{(80kg)(9.8 m/s^2)}{0.012m}$

$k = 65,300 \frac{N}{m}$

PRACTICE

UNIT 7 PROBLEMS (10-13)

(8)



$F_{net} = mg\sin\theta - f_k$

$ma = mg\sin\theta - \mu N$

$ma = mg\sin\theta - \mu mg\cos\theta$

$\mu g\cos\theta = g\sin\theta - a$

$\mu = \frac{g\sin\theta - a}{g\cos\theta}$