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2) $\frac{F}{A} = Y\frac{\Delta L}{L}$ $\quad \Delta L = \frac{F}{A}\frac{L}{Y}$ $\quad F = \frac{91 \cdot 9.8}{2}$ (both legs support his weight)

$A = 7\times10^{-4}\ m^2$, $L = .5m$ $\quad F = \frac{\cancel{640}}{446}N$

$Y = 61\times10^{10}$

$$\boxed{\Delta L = 2.9\times10^{-5}\ m}$$

4) $\frac{F}{A} = Y\frac{\Delta L}{L}$ $\quad Y = \frac{F/A}{\Delta L/L}$ $\quad F = 1\times10^3 N$, $A = .1cm^2 = 10^{-5}m^2$

$\Delta L = 6.5\times10^{-3}\ m$ $\quad L = 5m$

$$\boxed{Y = 7.7\times10^{10}\ N/m^2}$$

13) $\frac{F}{A} < \text{elastic limit} = 2\times10^8$ $\quad F < 2\times10^8 \cdot A$ $\quad A = \pi r^2$

$A = \pi(10^{-3})^2 = 3\cdot10^{-6}\ m^2$ $\quad \boxed{F < 628\ N}$

27) $a_{max} = \omega^2 A$ $\quad \omega = \frac{2\pi}{T} = \frac{6.28}{.5} = 12.56/sec$ $\quad A = 5cm = 5\times10^{-2}m$

$a_{max} = (12.56)^2 \cdot 5\times10^{-2}m = \boxed{7.9\ m/s^2}$

34) $V_m = \omega A$ $\quad a_m = \omega^2 A$

$V_m^2 = \omega^2 A^2 = a_m A$

35) $\omega = \sqrt{\frac{k}{m}}$ The two springs act like a new spring with a spring constant different from either spring. We don't need to know what this constant is

$\omega' = \sqrt{\frac{k}{m'}} = \sqrt{\frac{k}{4m}} = \frac{1}{2}\sqrt{\frac{k}{m}} = \frac{1}{2}\omega = \frac{1}{2}(10\ rad/s) = \boxed{5.\ \frac{rad}{s}}$

47) ~~check~~ done in class

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51) a) $v_{av} = \frac{\Delta x}{\Delta t}$ Δx is total distance traveled in one cycle $= 4A$ (goes back & forth

$\Delta t = T$ $\quad v_{av} = \frac{4A}{\left(\frac{2\pi}{\omega}\right)} = \boxed{\frac{2\omega A}{\pi}}$

$T = \frac{2\pi}{\omega}$

b) $\boxed{v_{max} = \omega A}$ c) $\frac{v_{av}}{v_{max}} = \frac{\frac{2\omega A}{\pi}}{\omega A} = \boxed{\frac{2}{\pi} = .64}$

d) see graph and explanation p. AP-7 in text