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9) $k = 1.1$

$\Delta x = 1.93\,m$ $\quad (-1.1)(1.93) = 2.2x$

$k = ?$

$\frac{1.1}{1.93} = \frac{x}{2.2}$

$\Delta x = 2.2$

$x = 1.25\,cm$

10) $R = 0.2$

$M = 2$

$h = 3$

a) $(10)(\sin(30))$

$10(0.5)$

$5\,m/s^2$

b) $\frac{1}{2} I w^2$ $\quad K_{max} = \frac{1}{2} m v^2$

$\frac{1}{2}\left(\frac{1}{2} M R^2\right)\left(\frac{v}{r}\right)^2$ $\quad v = \sqrt{(2)(10)(3)}$

$\frac{1}{2}\left(\frac{1}{2}(2)(0.2)^2\right)\left(\frac{7.75}{0.2}\right)^2$ $\quad v = 7.75$

$\frac{1}{2}(0.04)(1501.56)$

$KE = 30.03$

11)

a) $PV_t = PV_t$

$A = \frac{3}{2}(4)(0.5)t = (1)(2)(300)$

$A = 300K$

$B = (4)(2)t = (1)(2)(300)$

$B = 75K$

e) 1

b)

$A \to B = (-4)(2-0.5) = -6J$

$B \to C = 0$ $C \to A = (1)(2-0.5) = 1.5J$

c) $A = \frac{3}{2}(4)(0.5)(300) = 900J$

$B = \frac{3}{2}(4)(2)(75) = 900J$

$C = \frac{3}{2}(1)(2)(300) = 900J$

internal energy remains constant

d) $A \to B = 225K$ $B \to C = -225K$ $C \to A = 0$

12) a) $\frac{1}{\sqrt{1-0.3^2}}(10.8) = \frac{10.8}{\sqrt{1-0.09}} = \frac{10.8}{0.9539} = 11.32$ light years

b) $(0.3)(10.8) = 3.24$ light years

c) $-0.7c + 0.3c = -0.4c$