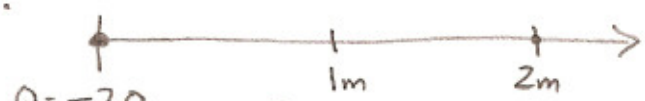
10.



$\vec{E}_P = ? = \vec{E}_{P \text{ from } Q_0} + \vec{E}_{P \text{ from } Q_1}$

$E = k \frac{Q}{r^2}$

$E_{P \text{ from } Q_0} = k \frac{(-2Q)}{(2m)^2} = -\frac{2}{4} k \frac{Q}{m^2}$

$E_{P \text{ from } Q_1} = k \frac{(Q)}{(1m)^2} = + k \frac{Q}{m^2}$

So $E_P = \left(-\frac{1}{2} + 1\right) k \frac{Q}{m^2} = \frac{1}{2} k \frac{Q}{m^2}$

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11. As discussed in class: 330 mph

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12. $Q_T = ? = Q_1 + Q_2 + Q_3$

$Q_1 = mc\Delta T = (100\,kg)(0.55 \frac{kcal}{kg\,K})(5K) = 275\ kcal$

$Q_2 = m l_f = (100\,kg)(80 \frac{kcal}{kg}) = 8000\ kcal$

$Q_3 = mc\Delta T = (100\,kg)(1.00 \frac{kcal}{kg\,K})(25K) = 2500\ kcal$

$Q_T = 10775\ kcal$.

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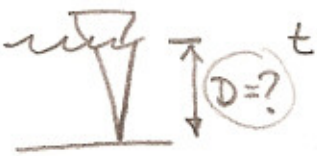
13. $V = \lambda f = \lambda\left(\frac{1}{T}\right) = \frac{5.0m}{2.s} = 2.5 \frac{m}{s}$

14.



$t = 1.5s \quad V = 1440 \frac{m}{s}$

distance traveled in 1.5s = 2D

$V = \frac{d}{t} \Rightarrow V = \frac{2D}{t} \Rightarrow D = \frac{Vt}{2} = 1080m$ long.