7. a, $1\,kw = 1000\,W = 1000\,\frac{J}{s}$

$1\,hour = 3600\,s$

$1\,kw\text{-}h = 1000\,J/s\,(3600\,s) = 3{,}600{,}000\,J$

b. $1\,month \approx 30\,days$

$30\,days\left(\frac{24\,hr}{1\,day}\right) = 720\,hours.$

$520\,W(720\,hours) = 374{,}400\ Watt\text{-}hours$

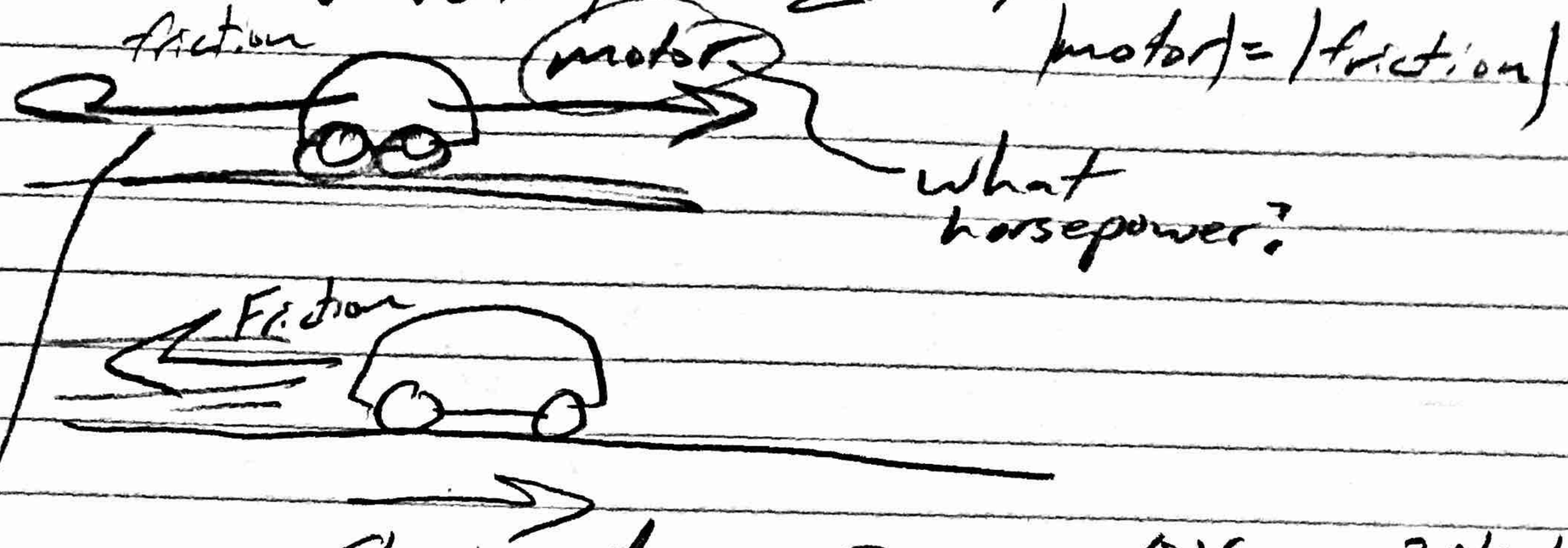
$374{,}400\,W\text{-}h\left(\frac{1\,kw}{1000\,W}\right) = 374.4\,kwh$

c. $374.4\,kwh\left(\frac{3.6\times10^{6}\,J}{1\,kwh}\right) = 1.35\times10^{9}\,J$

d. $\frac{\$0.12}{1\,kwh}(374.4\,kwh) = \$44.93$

$P = \frac{W}{t} = F\frac{d}{t} = Fv$

8.



Slowing down @ $a = \frac{\Delta v}{\Delta t} = \frac{-20\,km/hr}{6s}$

$\Delta v \rightarrow \left(\frac{-20km}{hr}\right)\left(\frac{1000m}{km}\right)\left(\frac{1hr}{3600s}\right) = -5.56\,m/s$

$a = \frac{-5.56\,m/s}{6s} = -0.926\,m/s^2$

$F = ma \Rightarrow F_{Fr} = (1150kg)(-0.926\,m/s^2)$

$\left(\frac{1km}{h}\right)\left(\frac{1000m}{1km}\right)\left(\frac{1hr}{3600s}\right) = 0.278\,m/s$ $\quad F_{Fr} = -1065\,N$

So, to move at constant rate, motor = 1065N

$75\,km/h\left(\frac{0.278\,m/s}{km/h}\right) = 20.83\,m/s$

$P = \frac{W}{t} = \frac{Fd}{t} = F\frac{d}{t} = Fv = 1065N(20.83m/s)$

$P = 22{,}200\,W$

$P = 22{,}200W\left(\frac{1hp}{746W}\right) = 29.7hp$

9. $3hp = 3(746W) = 2,238W = 2,238\frac{J}{s}$

$$2,238\frac{J}{s}\left(1hr\right)\left(\frac{3600s}{hr}\right) = 8.06\times10^{6}J$$

10. $P = \frac{W}{t} \leftarrow Fd$

$F = ma$

$a = \frac{\Delta v}{\Delta t} = \frac{14m/s}{1.5s} = 9.33m/s^2$

$F = 7.3kg(9.33m/s^2) = 68.1N$

$W = Fd = 68.1N(d)$

$\Delta x = v_0 t + \frac{1}{2}at^2$

$\Delta x = 0 + \frac{1}{2}(9.33m/s^2)(1.55)^2$

$\Delta x = 10.5m$ shot putter has long arms!

$W = 68.1N(10.5m) = 715J$

$P = \frac{W}{t} = \frac{715J}{1.5s} = 477W$

11. $P = \frac{W}{t} = \frac{Fd}{t}$

weight of H_2O; height lifted; 1 minute

$W = mg = 18kg(9.8 m/s^2) = 176.4N$

$P = \frac{Fd}{t} = \frac{(176.4N)(3.6m)}{60s} = 10.6W$

Seems low