Pg 420: 30, 31, 33, 34, 35

30.) $T_p = 2\pi\sqrt{\frac{l}{g}}$

a.) $15.5s = 2\pi\sqrt{\frac{l}{10 m/s^2}}$

$l = 60.9m$ or ($59.6m$ if using $g = 9.8 m/s^2$)

b.) $T_p = 2\pi\sqrt{\frac{60.9m}{1.67 m/s^2}} = 38s$

31.) use $T_p = 2\pi\sqrt{\frac{l}{g}}$, or just compare $l$ values for each location

$T_p$ Tokyo $= 2.00s = 2\pi\sqrt{\frac{.9927m}{g}}$ $g = 9.80$

$T_p$ Cambridge $= 2.00s = 2\pi\sqrt{\frac{.9942m}{g}}$ $g = 9.81$

$\frac{9.81}{9.80} = 1.001$

33.) a.) Slow, because g is less on moon, so divide by a smaller #

b.) Compare $\sqrt{g}$ values to determine $T$ → $\sqrt{\frac{10.0 m/s^2}{1.63 m/s^2}}$

Ratio of $T = 2.48$ to 1 → meaning the earth clock "ticks" 2.48 times for every 1 tick of the moon clock

– so if 24 earth hrs have passed → $24 \text{ hrs earth} \times \frac{1 \text{ hr moon}}{2.48 \text{ hrs earth}} =$

9.68 hrs moon

Pg 420: 35

35) $T_p = 2\pi\sqrt{\frac{l}{g}}$

a.)

$$l = \left(\frac{T}{2\pi}\right)^2 \cdot g = \left(\frac{1s}{(2\pi)}\right)^2 \cdot 10m/s^2$$

$l = .25m$ on earth

$$l = \left(\frac{T}{2\pi}\right)^2 \cdot g = \left(\frac{1s}{2\pi}\right)^2 \cdot 3.7m/s^2$$

$l = .094m$ on mars

b.) $T_s = 2\pi\sqrt{\frac{m}{k}}$

$\hookrightarrow m = \left(\frac{T}{2\pi}\right)^2 \cdot k$ * since "g" does not appear in equation T will be same on earth & mars

$$m = \left(\frac{1s}{2\pi}\right)^2 \cdot k$$

$$m = \left(\frac{1s}{2\pi}\right)^2 \cdot 10N/m$$

$m = .25 kg$