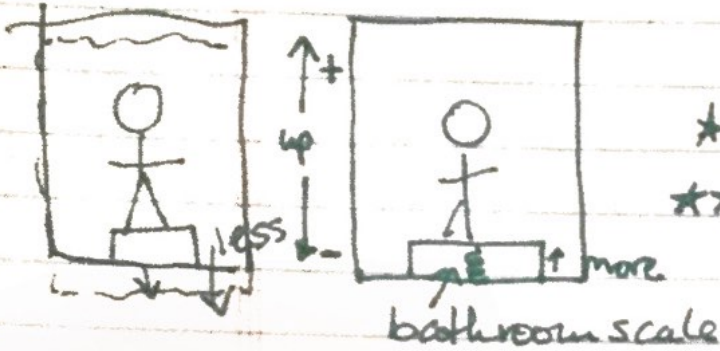
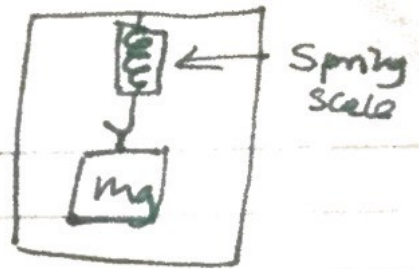


Elevator Problems



* Scale = Normal force = Apparent Weight
 ** These are all Newton 2nd Law Problems $\Sigma F_y = ma$

$$\Sigma F_y = F_{up} + F_{down}$$

$$= F_N - F_W$$

$$\Sigma F_y = F_N - mg$$

$$ma = F_N - mg \Rightarrow F_N = ma + mg$$

or $F_N = m(a+g)$ **Sign of 'a' matters!**

Q: An 80 kg ^{$g=10 \frac{m}{s^2}$} man is standing on a scale inside an elevator. What force will the scale read when...



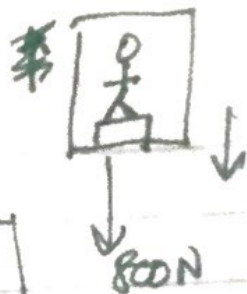
(a) Elevator is at rest $a=0$ $F_N = 800N$

(b) " moving up at $v = 5 \frac{m}{s}$ (constant) $a=0$
 $F_N = mg = 800N$

(c) " moving down at $v = 8 \frac{m}{s}$ (constant) $a=0$
 $F_N = 800N$

(d) Elevator is moving up with $a = +3 \frac{\text{m}}{\text{s}^2}$

$$F_N = m(a+g) = 80\text{kg}(3+10) = \boxed{1040\text{N}}$$



(e) Elevator is moving down at $a = -4 \frac{\text{m}}{\text{s}^2}$

$$F_N = m(a+g) = 80\text{kg}(-4+10) = \boxed{\cancel{800}} \\ \boxed{480\text{N}}$$