Apparent Weight (how you feel)

You can feel lighter or heavier depending on your motion.
Your weight is always the same near the Earth's surface.

Imagine standing on the Newton scales during an elevator ride. When do you feel lighter? heavier? the same?

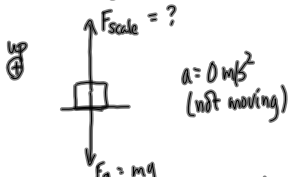
MP|184

$m = 55kg$

a) $F_{scale} = ?$ (not moving)

b) $F_{scale} = ?$ $(\vec{a} = 0.75 m/s^2$ [up]$)$

a) not moving:

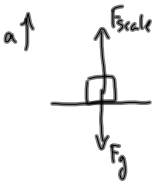


$F_g = mg$
$F_g = (55kg)(9.81 m/s^2)$
$F_g = 539.55N$

$\vec{F}_{net} = m\vec{a}$
$F_{scale} - F_g = (55kg)(0)$
$F_{scale} = F_g$
$F_{scale} = 5.4 \times 10^2 N$

Feel "normal" when the elevator is at rest OR going up or down at a constant velocity.

b) When $\vec{a} = 0.75 m/s^2$ [up]



$\vec{F}_{net} = m\vec{a}$
$F_{scale} - F_g = ma$
$F_{scale} - 539.55N = (55kg)(0.75 m/s^2)$
$F_{scale} - 539.55N = 41.25N$
$F_{scale} = 580.8N$
$F_{scale} = 5.8 \times 10^2 N$

$-9.81 m/s^2$ (cut cable)
$-539.55N$

Feel heavier if acceleration is upwards
(speeding up / going up)
(slowing down / going down)

When would you feel lighter?
If the acceleration is downward
(going down / speeding up)
(going up / slowing down)

What if someone cut the elevator cable?
You feel weightless ($F_{scale} = 0$)

PP|182|18 + 19 (towing problems)
PP|186 (elevator problems)