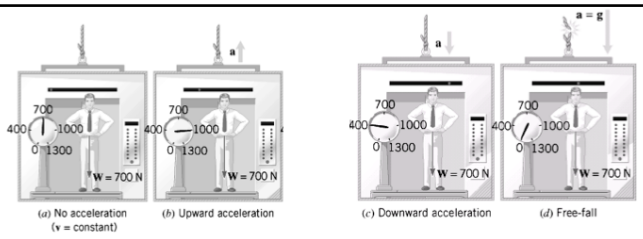


$F_g = 700\,N$

$m = 70\,kg$

$mg = 700N$ + ↓ −

6. When does the scale read the normal weight of the person?

$a = 0$

7. When does the scale read higher than the normal weight of the person?

$a = upward$

8. When does the scale read less than the normal weight of the person?

$a = downward$

9. What does a scale reading actually measure?

normal force (b)

10. Determine the acceleration of the elevator in cases (b) and (c).

$F_N = 400\,N$ $\quad F_N = 1000N$

$\Sigma F = ma$

$F_N + F_g = ma$

$a = \frac{F_N + F_g}{m} = \frac{400N + -700N}{70\,kg} = -4.3\frac{m}{s^2}$ $\quad \frac{1000N + -700N}{70\,kg} = +4.3\,m/s^2$

11. The elevator descends, accelerating at -2.7 m/s2. What does the scale read?

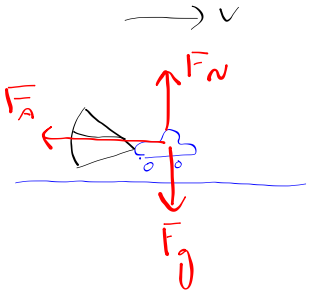
$F_N + F_g = ma \rightarrow F_N = ma - F_g = 70\,kg(-2.7m/s^2) - (-700N) =$

$511N$

12. Suppose the cable snapped and the elevator fell freely. What would the scale read?

---

50. The parachute on a racecar that weighs 8820 N opens at the end of a quarter-mile run when the car is traveling 35 m/s. What net retarding force must be supplied by the parachute to stop the car in a distance of 1100 m?



$\Sigma F = ma$ ↓ ↓

(F_A)

$V_0 = 35\,m/s$

$V_f = 0$

$d = 1100m$

$V_f^2 = V_0^2 + 2ad$

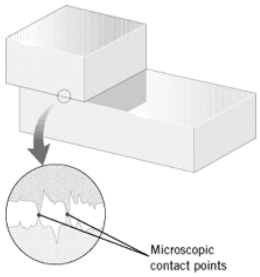
$mg = 8820N$

$m =$ ____

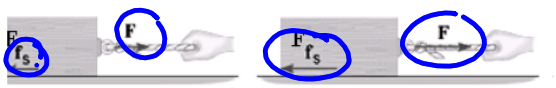
Friction

Cause of friction:

Electromagnetic force of attraction



9

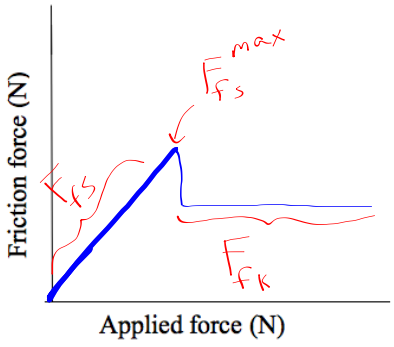


a) no movement

b) no movement

c) movement begins

d) while moving



Static Friction (F_{fs})

1) Force preventing surfaces from moving relative to each other

2) Amount of static friction is not constant

3) $F_{fs} = F_a$ and net force is zero up to a maximum amount of force (F_{fs}^{max})
then object begins to move when $F_a > F_{fs}^{max}$

Kinetic Friction (F_{fk}) (dynamic friction, sliding friction)

1) Force resisting motion when surfaces are moving relative to each other

2) Amount of kinetic friction remains constant while moving – does not depend on applied force

3) Amount of kinetic friction is less than maximum amount of static friction

Relationships: $F_{fs} \leq \mu_s F_N$ $F_{fK} = \mu_K \cdot F_N$

Variable:	F_f	μ	F_N
Quantity:	Force of friction	Coefficient of friction	Normal Force
Units:	[N]	—	[N]
Type:		scalar	

P138

1. What does the **coefficient of friction** measure?

Roughness of two surfaces in contact As roughness increases, so does coefficient

2. Why are there two types of coefficients of friction? Compare them.

μ_s Static – objects are not moving relative to each other

μ_k Kinetic – objects are moving relative to each other

Kinetic less than static

3. What materials on top of one another are the:

   a) easiest to start moving?

   b) hardest to start moving?

   c) easiest to slide over one another?

   d) hardest to keep moving?

4. What coefficient of friction applies while dragging a wooden crate across a hardwood floor?

5. What coefficient of friction applies when a car skids across a dry asphalt roadway?