Dynamics cont... Newton's Third Law

November-20-15 11:25 AM

Review: 2nd Law $F = ma$

F_{Net} = Addition of all forces $\Rightarrow \sum F$

$F_{Net} = ma$ ← acceleration you see

↑ Final

Ex. A 1200 kg car accelerates at $5.85\ m/s^2$. If the force of Friction is 2800N, what is the force exerted by the engine?

$F_{Net} = ma = F_E + F_F$

$(1200)(5.85) = F_E + (-2800)$

$7020 = F_E - 2800$

$\boxed{F_E = 9820N}$

You are driving at 72km/h when a child runs onto the road. You slam on the brakes and stop in 2.8s. What is the force exerted by the brakes if the car's mass is 2100kg?

Surprise Kinematics!

$V_i = 72km/h \div 3.6 \Rightarrow 20\ m/s$

$V_f = 0\ m/s$

$a = \frac{V_f - V_i}{t}$

$F = ma$

$F = (2100kg)(-7.14m/s^2)$

$= -14,994N$ Stop

$v_f = 0$ m/s
$a = ?$
$t = 2.8$ s

$a = \frac{v_f - v_i}{t}$

$a = \frac{0 - 20}{2.8}$

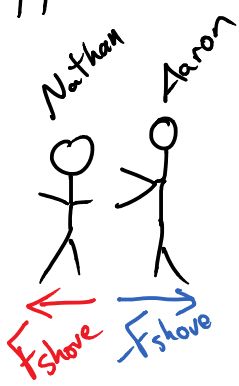
$a = -7.14 \text{ m/s}^2$

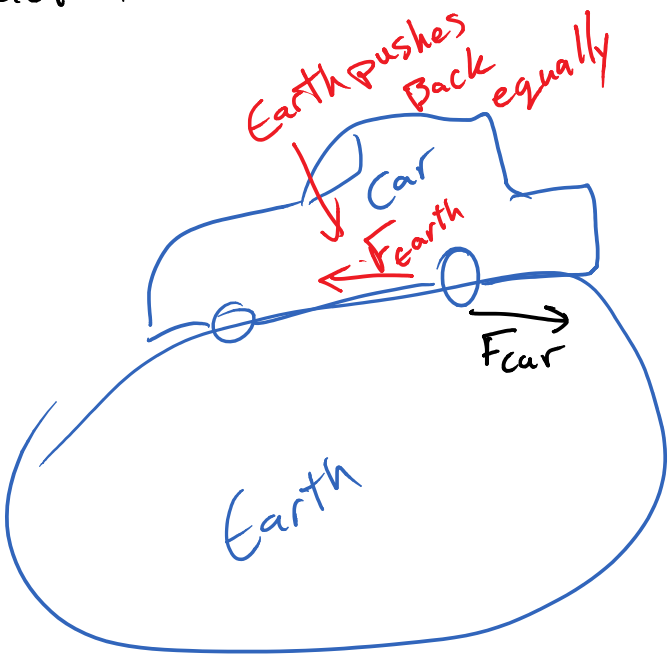
$F = -14994 \text{ N}$ (2 sig figs)

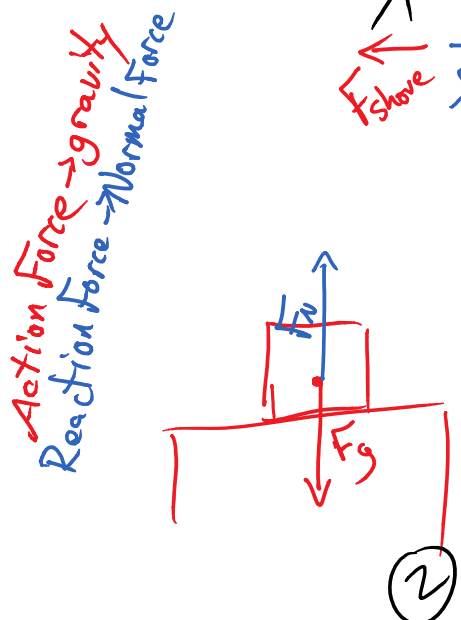
$F = -15000 \text{ N}$

Newton's Third Law

① Every action force has an equal and opposite reaction force.







② Reaction Forces can never be larger than the action Force.

③ The action and reaction forces do not have to be on the same object.

Defend the statement:

The Earth weighs exactly as much as you do.

↓ Force of gravity

As the Earth pulls you with a Force you pull Earth with an equal and opposite Force ↑ This is weight

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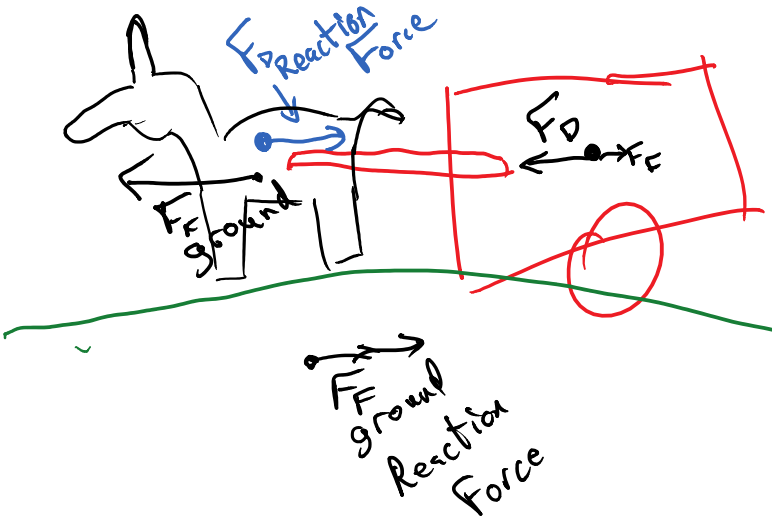
A smart ass is hooked up to a cart. It says since Newton's 3rd Law states every force has an equal and opposite reaction force there is point of me trying to pull the cart, since the forces will balance and there will be no acceleration. What do you say to the donkey?

The Forces don't have to be on the same object.



Big Lesson: When looking for motion for use forces for each body seperately

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