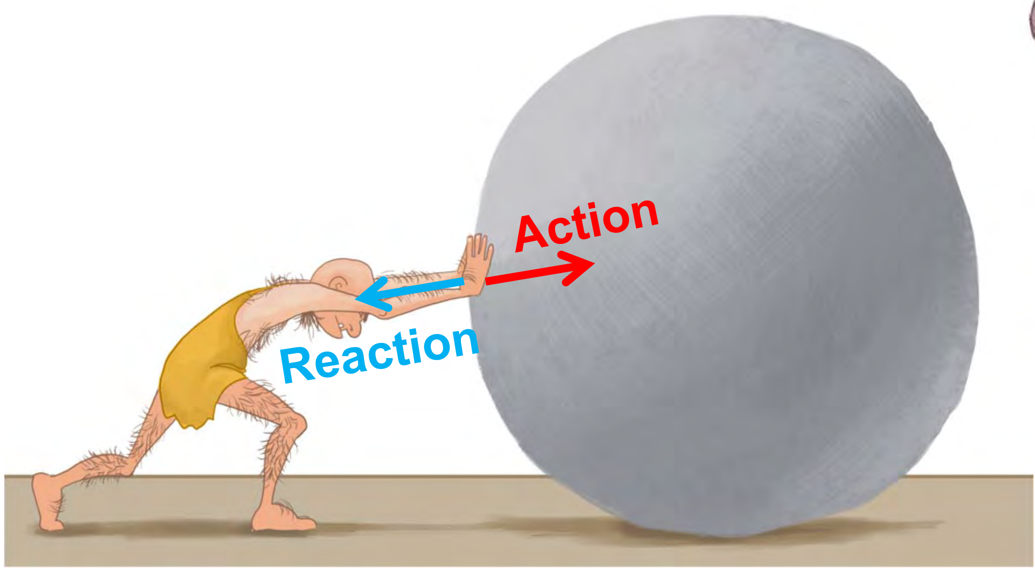
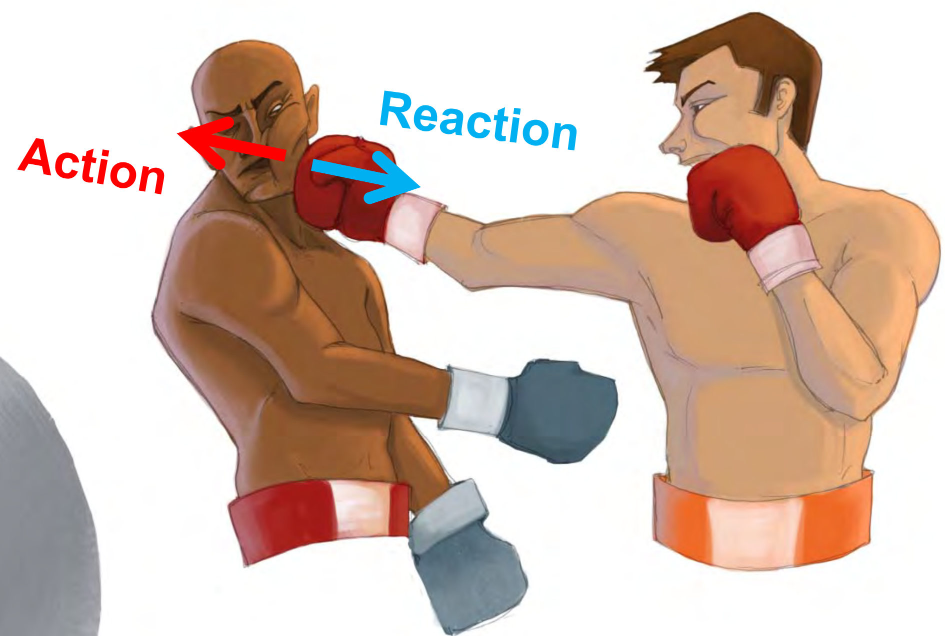
Action & Reaction Part 2

National Science Foundation
WHERE DISCOVERIES BEGIN

Action-Reaction Principle

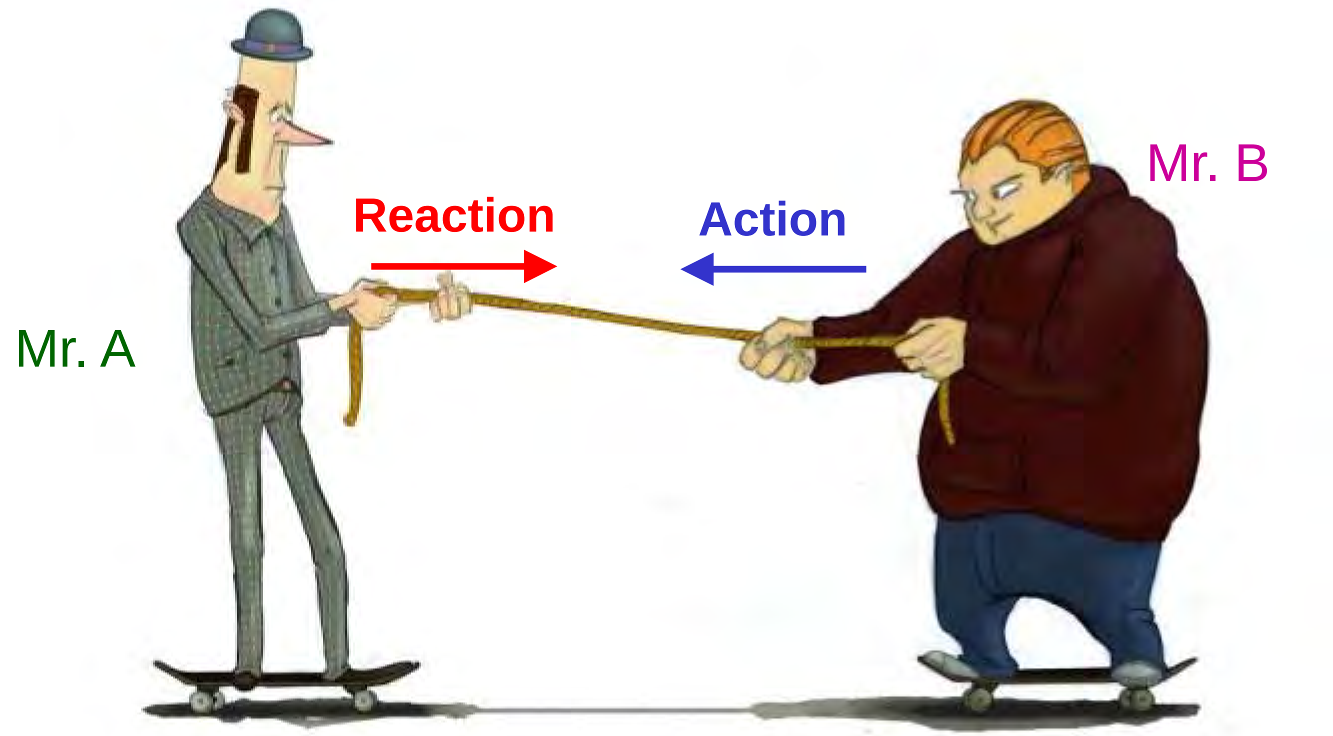
For every action force there is an equal reaction force in the opposite direction.





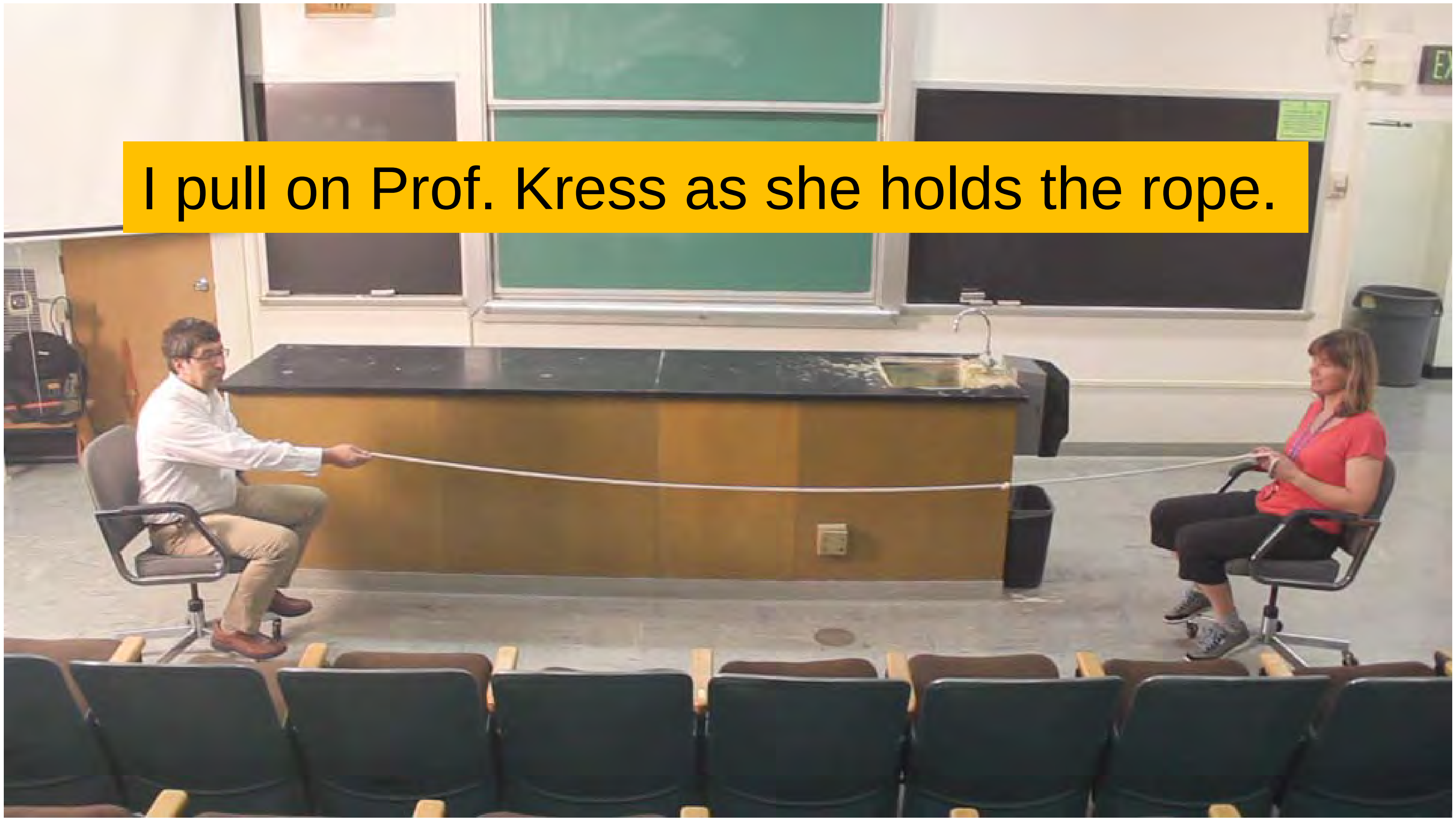
Pulling

Mr. A is pulling and Mr. B just holds the rope yet they both move towards the center.



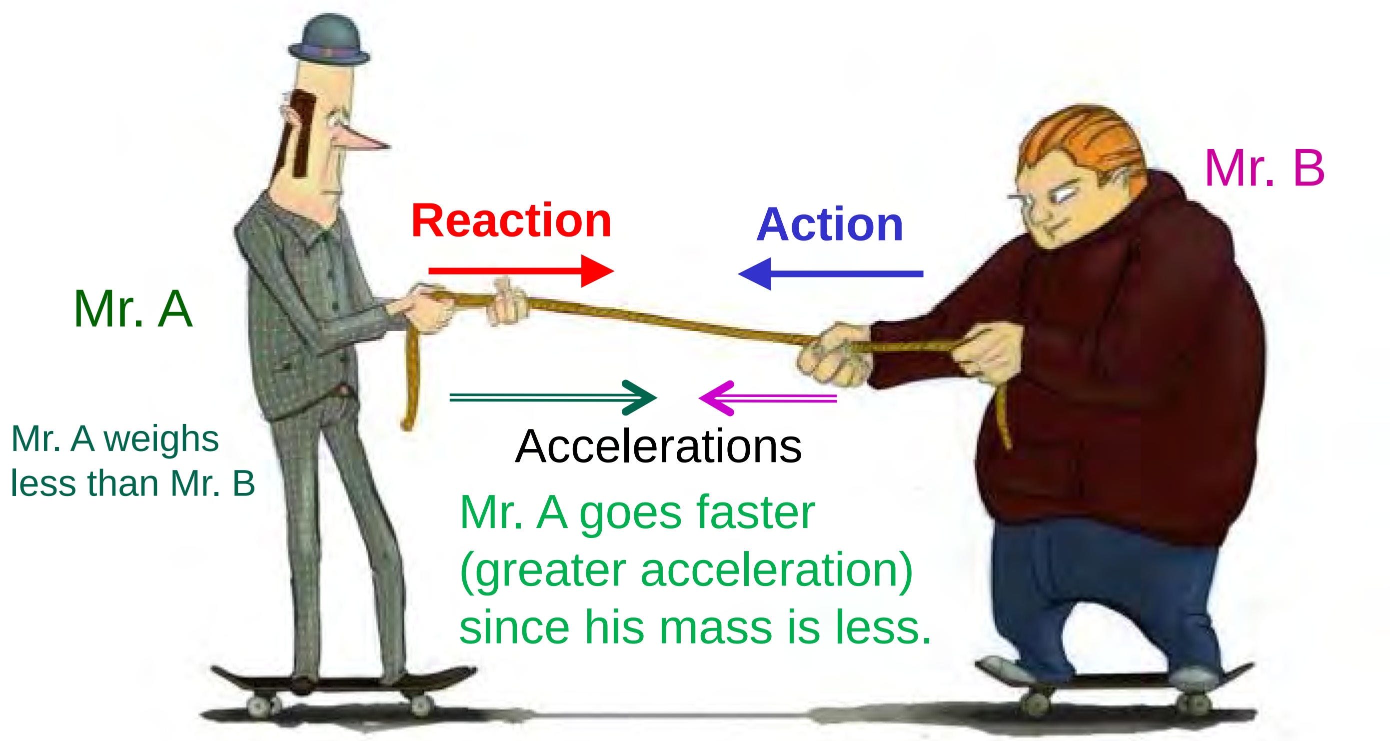
Mr. A pulls **Mr. B**

Pulling



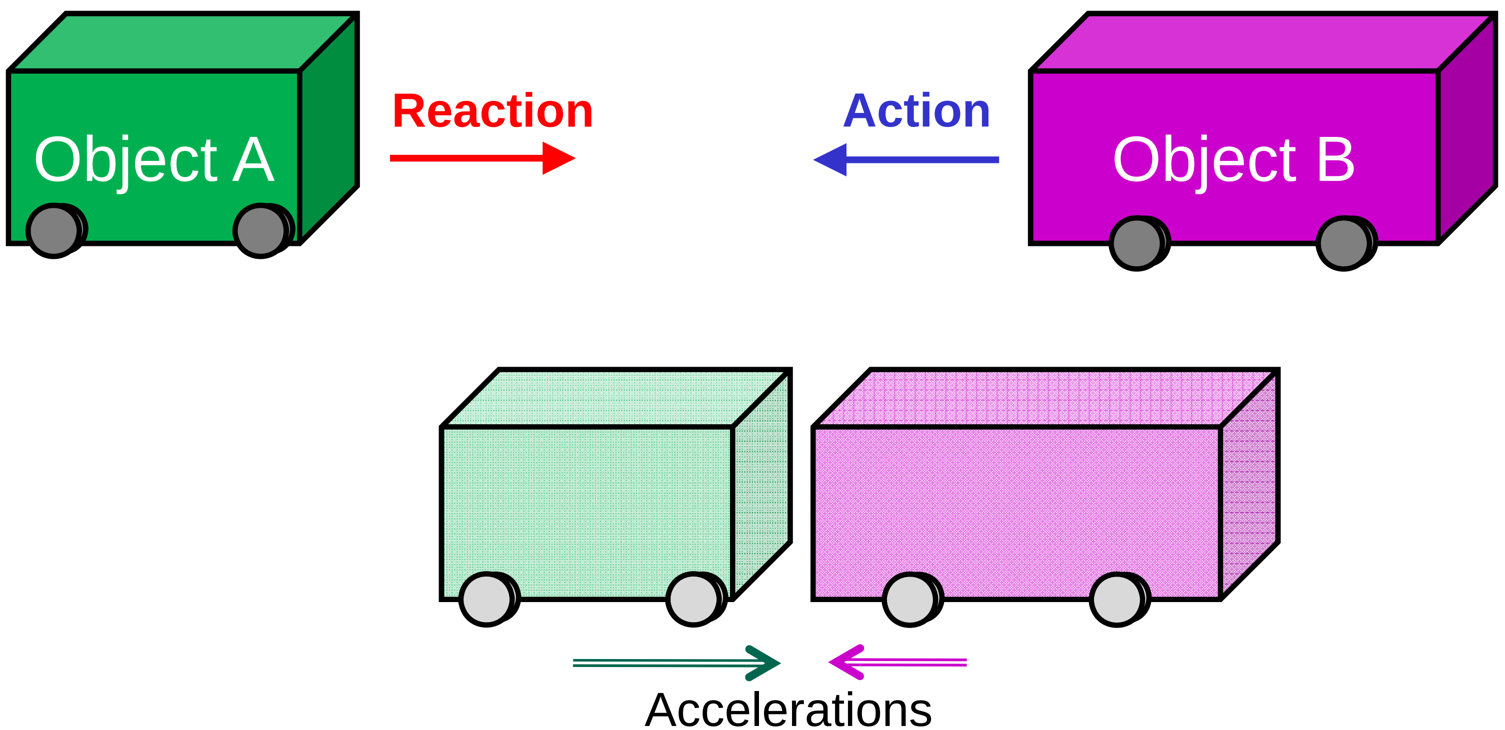
Pulling & Acceleration

Action / Reaction forces are equal in magnitude but the resulting accelerations are usually *not* equal.



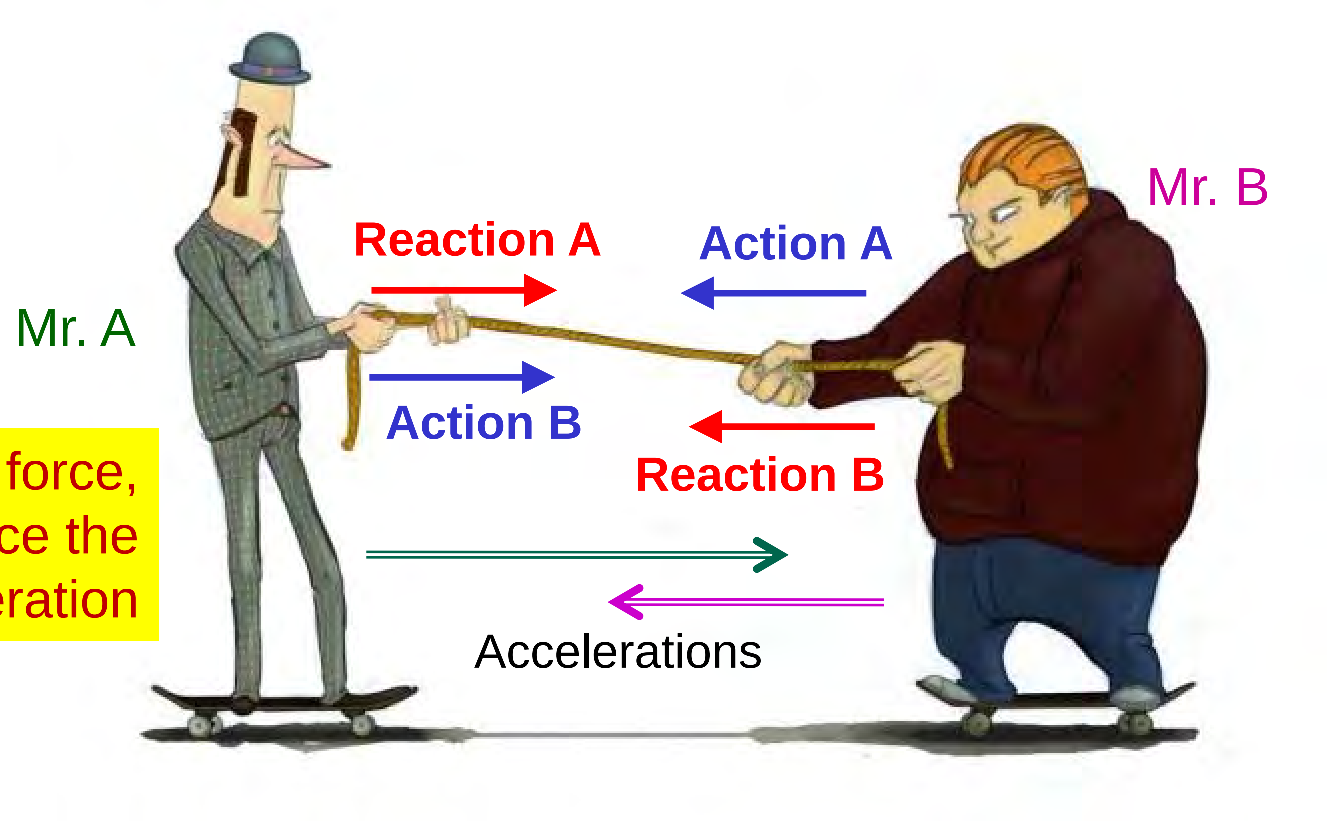
Pulling & Acceleration

If A pulls B then both accelerate by equal forces.
By Law of Acceleration, Object A, having less weight, will accelerate more than the heavier Object B.



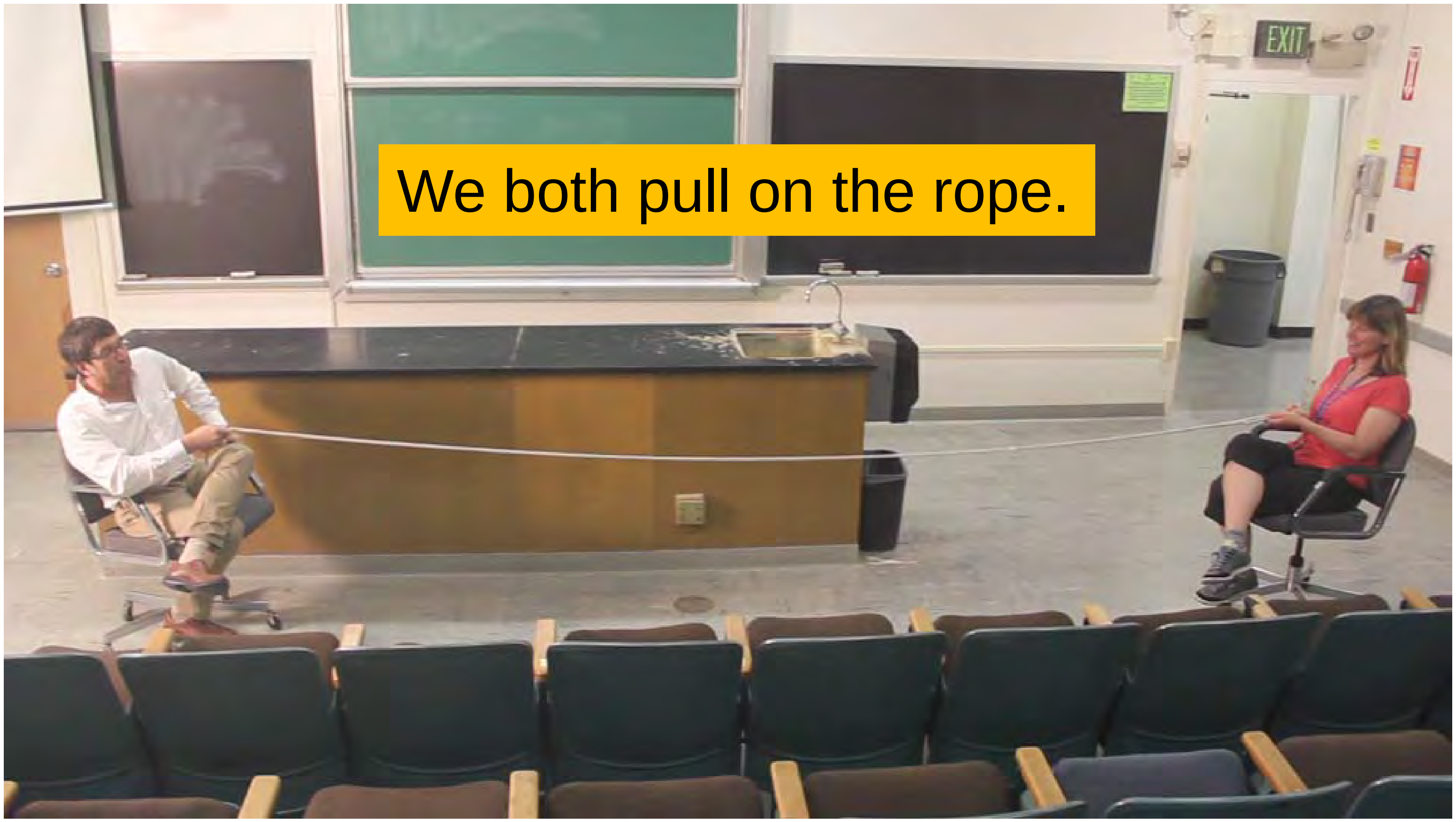
Two Actions, Two Reactions

When both persons pull then there are two action forces and two reaction forces.



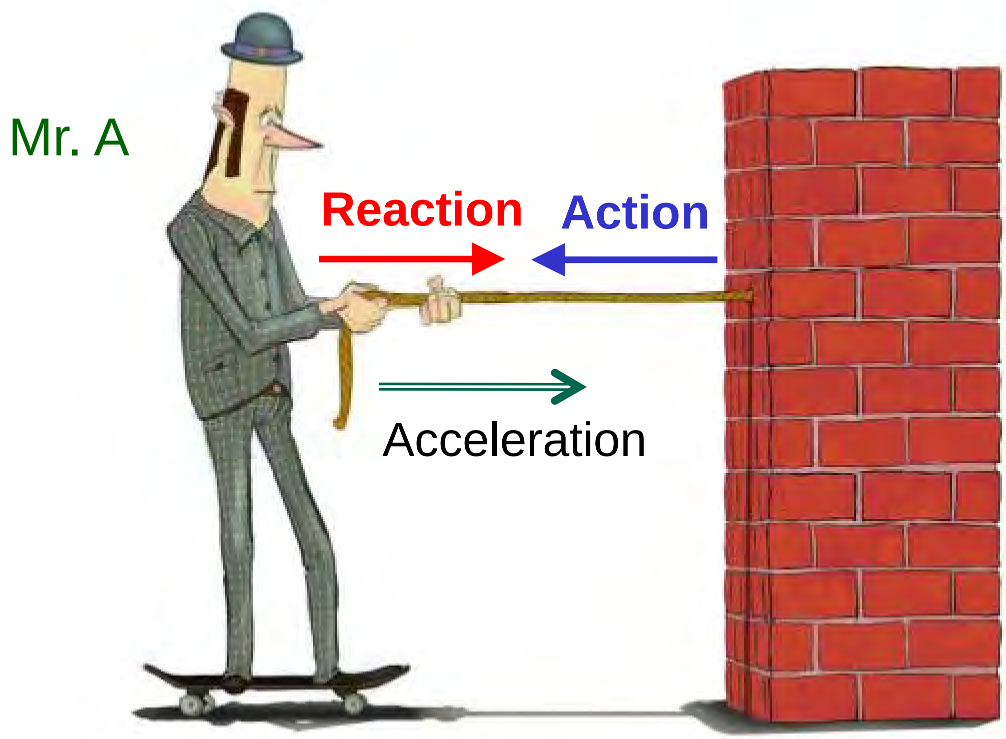
Twice the force,
twice the
acceleration

Two Actions, Two Reactions



Pulling Towards a Wall

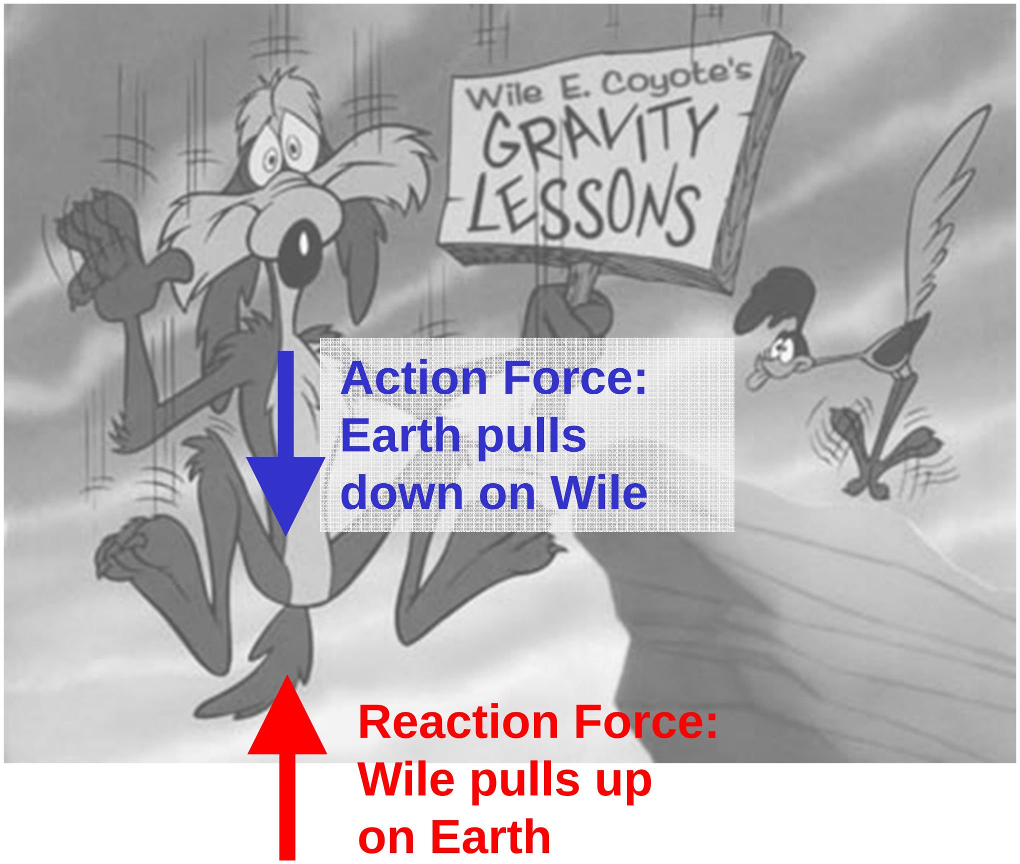
Replace Mr. B with a solid wall.
Mr. A pulls on the wall (that's the action force).
Due to its huge weight, the wall doesn't move.



Wall exerts a reaction force, pulling Mr. A towards the wall.

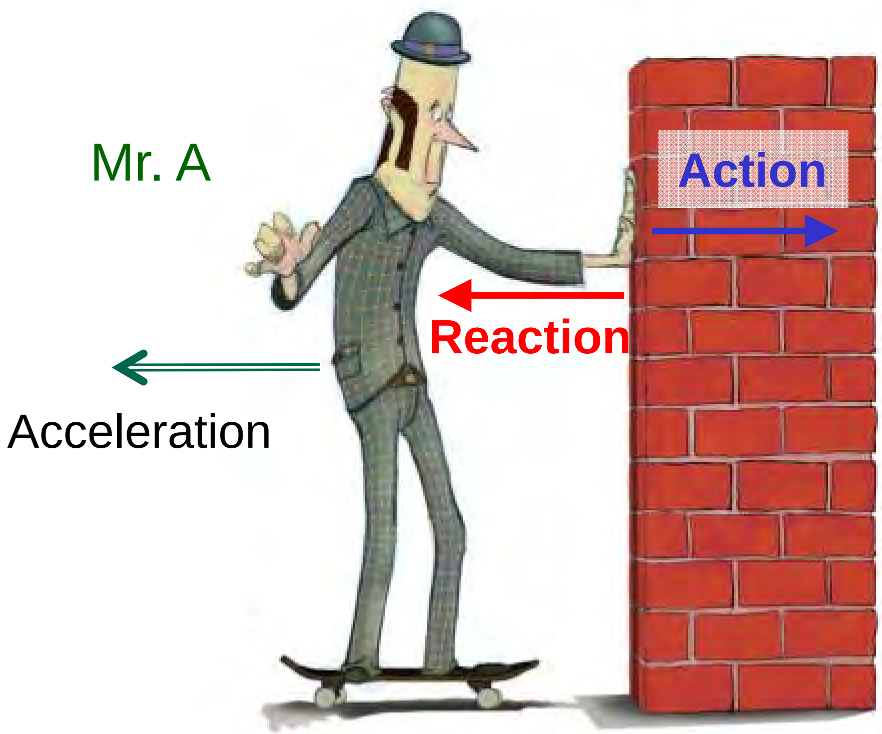
Action / Reaction for Gravity

The reaction force due to the gravitational pull on a character has a negligible effect since Earth is massive.



Pushing Off from a Wall

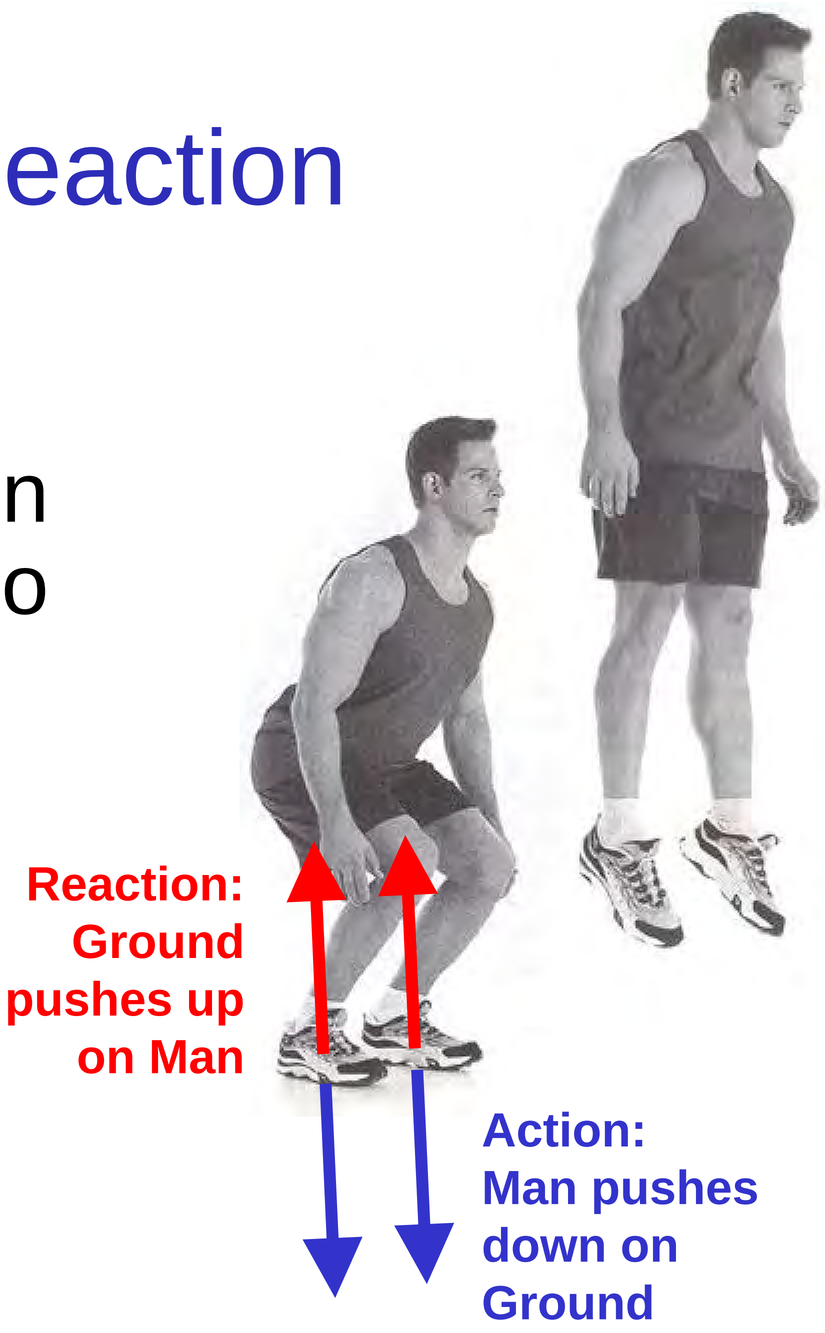
Replace Mr. B with a solid wall.
Mr. A pushes on the wall (that's the action force).
Due to its huge weight, the wall doesn't move.



Wall exerts a reaction force, pushing Mr. A away from the wall.

Jumping Action/Reaction

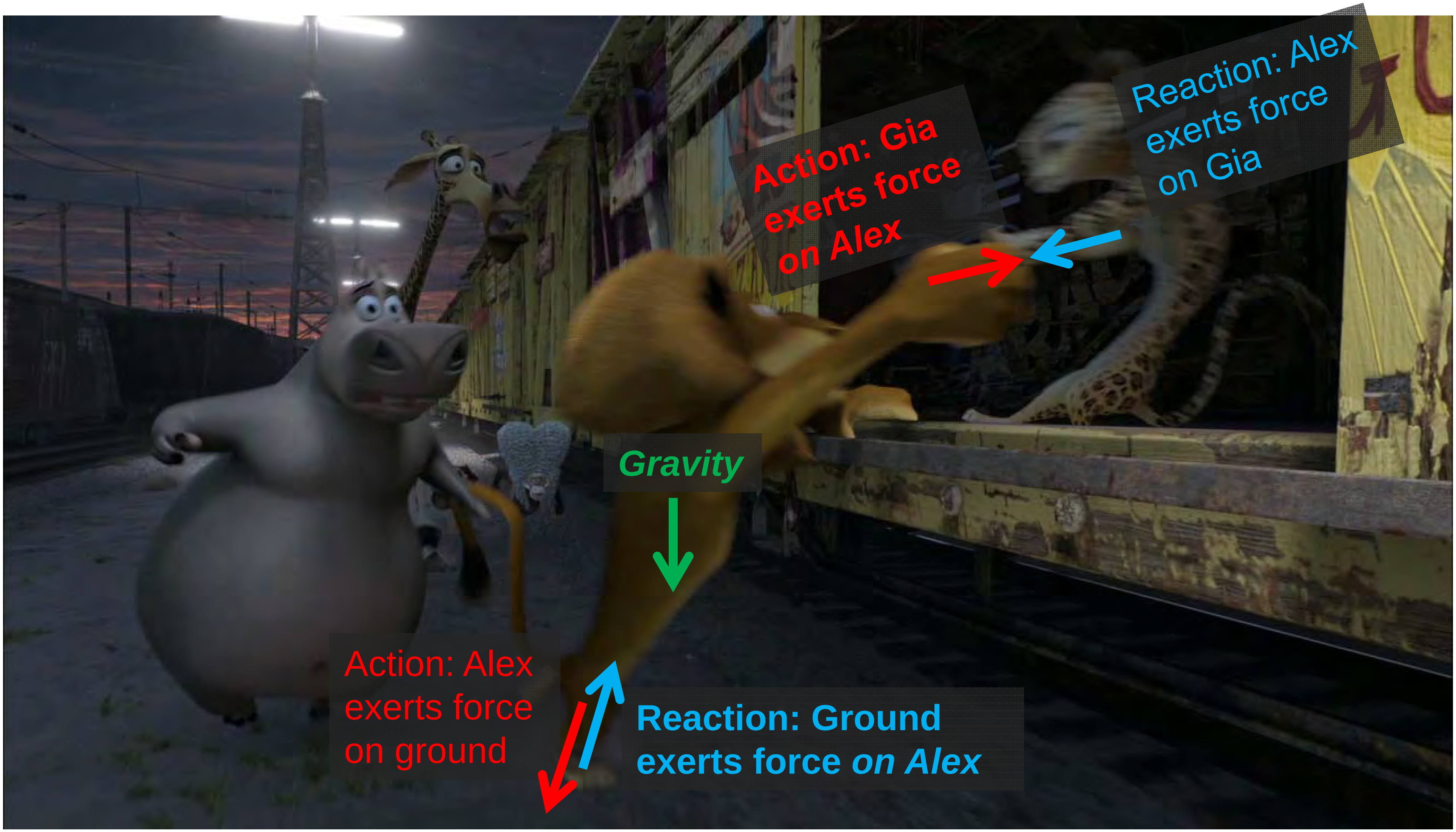
Jumping is done by pushing downward on the ground (action) so the ground pushes upward on you (reaction).



Madagascar 3 (2012)

Forces on Gia

Forces on Alex



Summary

- When a character pulls or pushes another character the action/reaction forces are equal but the accelerations are usually not equal.
- If both characters pull or both push then there are two action forces and two reaction forces.
- The reaction force due to the gravitational pull of the Earth (weight) is negligible.
- When a character jumps, the downward action force from the legs results in an upward reaction force exerted by the ground.