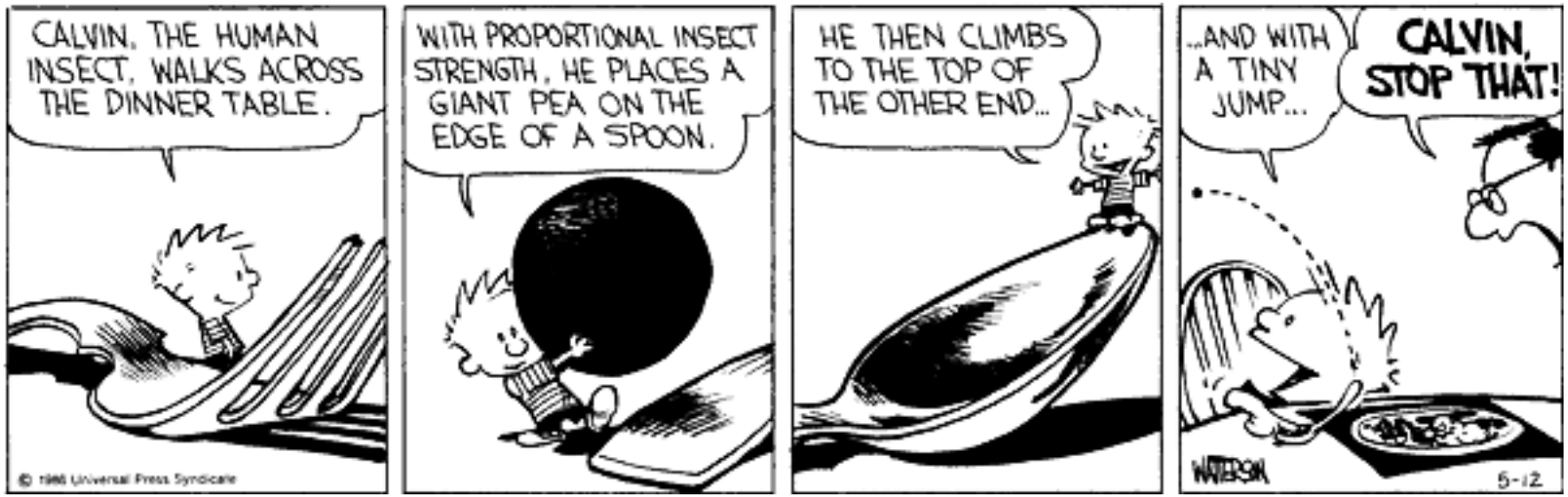
- **Today's Topics:** Normal force, tension, & torque
- **Cartoon: Bill Waterson** ***Calvin & Hobbes***



Announcements

- Ch 1&2 homework due tonight at midnight
  - Last two problems on Ch 2 homework – I've put in Ch 3 homework for you to try again. Your points will only count 1x.
- Change in help room – Instead of Thurs 2-3pm, Stephanie will have an hour this Sunday from 1-2pm

How are you feeling about free body diagrams?

A. Excellent! Less do this!
B. Pretty good, ready to push forward
C. OK, I think
D. Not ready, I need more practice
E. What's a free body diagram?

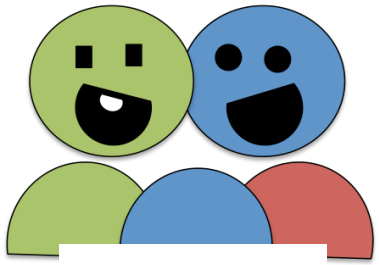
Foothold Principles
Newton's Laws

- Newton 0:
  - An object responds to the forces it feels when it feels them.
- Newton 1:
  - An object that feels a net force of 0 keeps moving with the same velocity (which may = 0).
- Newton 2:
  - An object that is acted upon by other objects changes its velocity according to the rule
- Newton 3:
  - When two objects interact the forces they exert on each other are equal and opposite.

$$\vec{F}_A^{net} = \Delta\vec{p} \Big/ \Delta t$$

$$\vec{a}_A = \vec{F}_A^{net} \Big/ m_A$$

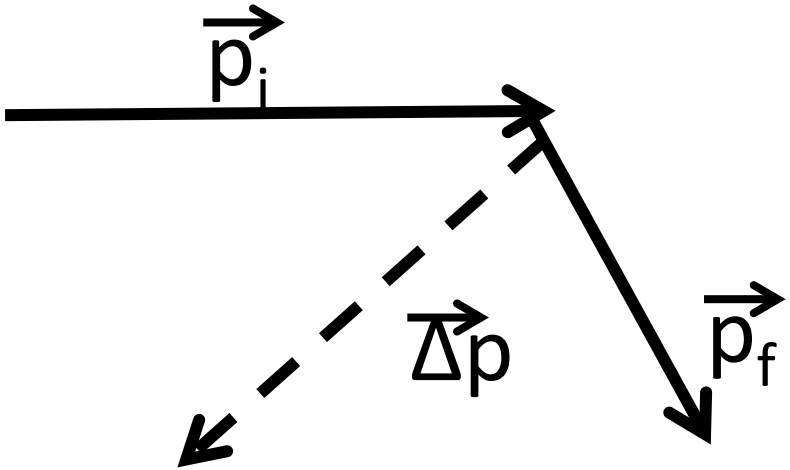
$$\vec{F}_{A\to B}^{type} = -\vec{F}_{B\to A}^{type}$$



Come up with a sentence that expresses this equation in words. (Hint: Don't just read the symbols)

$$\vec{F}_A^{net} = \Delta\vec{p} \Big/ \Delta t$$

Let's get into N2 a little more



Momentum: Tells you the direction and how fast something is moving.

What was the direction of the net force?

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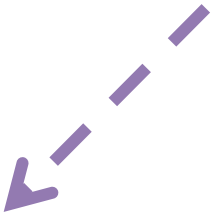
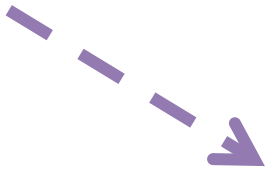
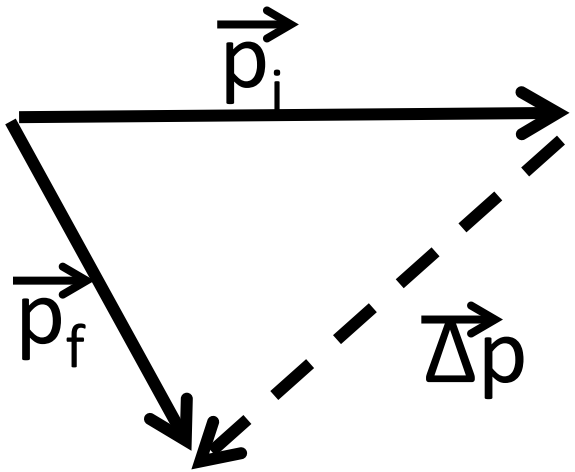
A. 

B. 

C. 

D. None of these

Let's get into N2 a little more



Momentum: Tells you the direction and how fast something is moving.

What was the direction of the net force?

$$\vec{F}_A^{net} = \Delta\vec{p} \Big/ \Delta t$$

CHAPTER 3: FORCES & STRUCTURES

Reading Question

Q: How can we determine which way a normal force will point on the free body diagram?

A: (part 1) “Normal” just means “perpendicular” to the surface.

Compare forces 1 and 2

A. Force 1 is bigger because the upward force must be bigger to keep the box from falling through the table.

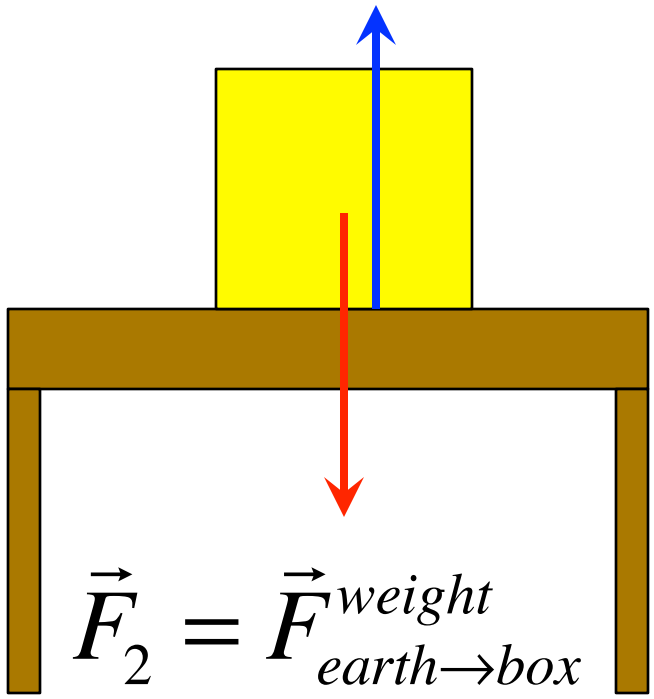
B. Force 2 is bigger because the weight is an active force that is always bigger than a passive force.

C. They are equal in magnitude because the normal force is a passive force that adjusts itself to the active force.

D. They are equal in magnitude because the box isn't moving and Newton's 2nd law says the forces must be equal.

E. There is not enough information to tell.

$$\vec{F}_1 = \vec{F}^{normal}_{table \to box}$$



$$\vec{F}_2 = \vec{F}^{weight}_{earth \to box}$$

Compare forces 1 and 2

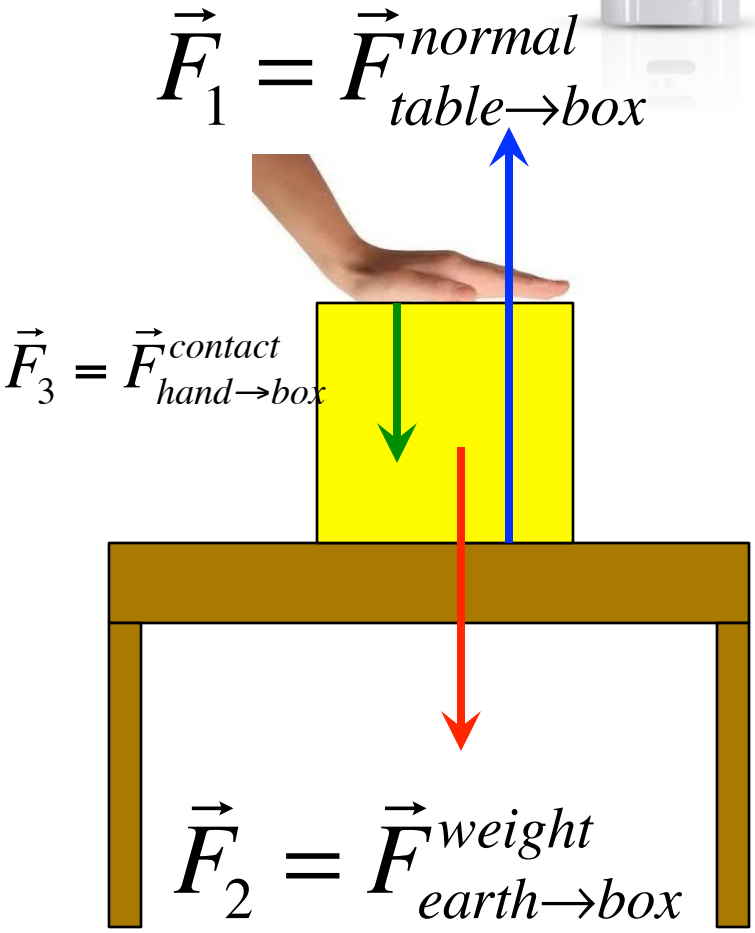
A. Force 1 is bigger because the upward force must be bigger to keep the box from falling through the table.

B. Force 2 is bigger because there is more force pushing down on the box

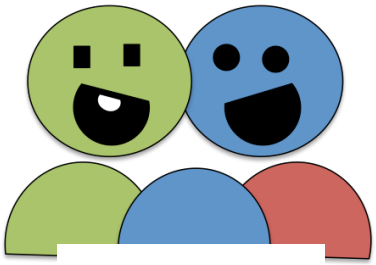
C. Force 1 is bigger because the normal force is a passive force that adjusts itself to the active force.

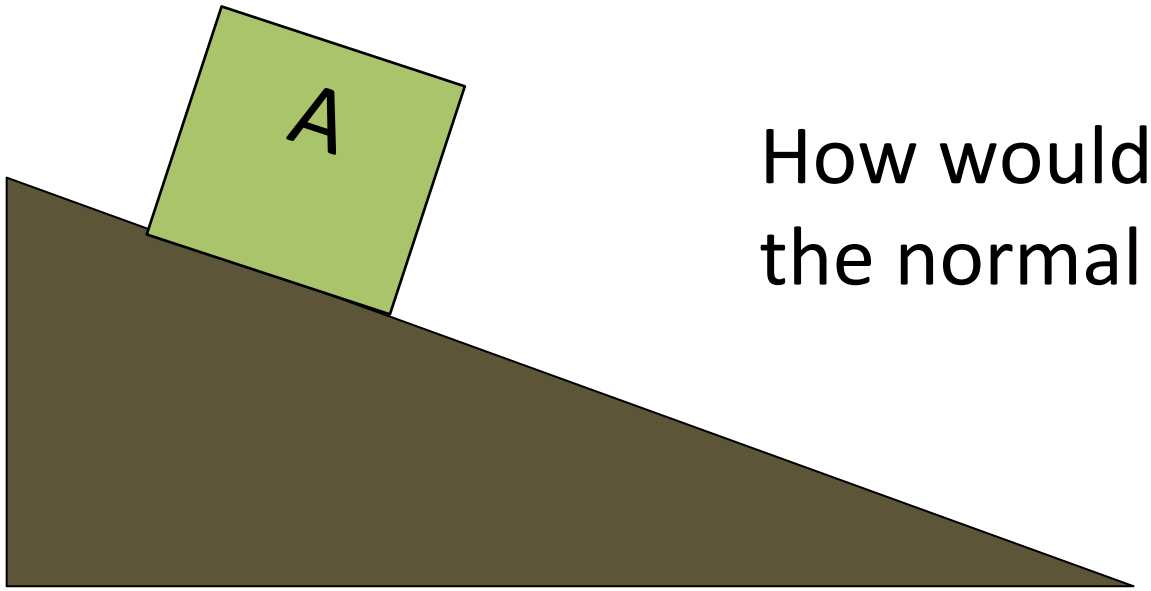
D. They are equal in magnitude because the box isn't moving and Newton's 2nd law says the forces must be equal.

E. There is not enough information to tell.



Box A is sitting still on the ramp. Draw a free body diagram for box A.





How would you quantify the normal force?