Newton's Third Law

1. What is Newton's Third Law?

2. What is another way of saying Newton's Third Law?

3. According to Newton's Third Law, forces are interactions between two objects and that forces always come in _____.

4. In Newton's Third Law, the action/reaction forces are always equal and opposite. Why don't they simply cancel each other out?

5. How does Newton's Third Law apply to a hammer hitting a nail?

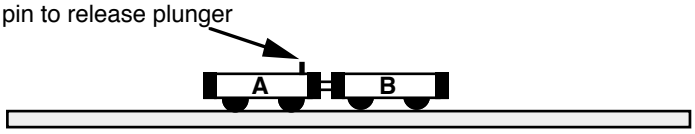
6. How does Newton's Third Law apply to a propeller on a plane?

7. How does Newton's Third Law apply to a person trying to walk?

8. If you are leaning and pushing against a wall, what is the reaction force?

9. If you pull a heavy bag to the right, what is the reaction force?

Even though the ACTION and REACTION forces are always equal and opposite, the effect of each force can be quite different, depending on the _____ of each object.



The picture above shows 2 different carts, one with a plunger, set on a level track. In each of the situations below, the carts start off touching, and the plunger is quickly released. The mass of each empty cart is 500 grams, and the mass of a black bar is also 500 grams. Change the masses of each cart, set up the carts and answer each question.

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10. A = 500 grams & B = 500 grams.
    a. When the plunger is released, A pushes B to the right. What is the reaction force?

    b. What happens to each cart?

    c. What is true about the acceleration of each cart?

11. A = 500 grams & B = 1000 grams.
    a. When the plunger is released, A pushes B to the right. What is the reaction force?

    b. What happens to each cart?

    c. What is true about the acceleration of each cart?

Just because two forces are equal and opposite does not mean they are part of a Newton's Third Law action/reaction pair. Here is a tricky example of that:

12. A backpack that weighs 50 N is at rest on a table.
    a. Draw a force diagram showing the two forces that are acting on the backpack.

    b. What are the reactions to each of those forces?

13. In general, what is the reaction to the weight of an object?

14. A bug collides with a car on the highway.
    a. Who experiences the greater impact force?

    b. Who experiences the greater change in motion?

    c. Defend your answers.