

Newton's Third Law

1. What is Newton's Third Law? (*Words*)

2. What is another way of saying Newton's Third Law? (*Equation*)

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?

10. 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.

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11. If two objects exert forces on each other (and there are no other forces) which object will have a greater acceleration?

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.
- In the box to the right, draw and label a force diagram showing the two forces that are acting on the backpack.
 - Are those two forces equal and opposite? How do you know?

- Hopefully, you said one of the forces on the backpack was its *weight*. Remember that the term *weight* is just a faster way of saying the *force of gravity*, which is faster way of saying:

force of gravity on the backpack => the _____ pulling
_____ on the backpack

- So what is the reaction to the weight of the backpack?
- Hopefully, you said the other force on the backpack was the *normal force*. Remember that the term *normal force* is just a faster way of saying:

normal force on the backpack => the _____ pushing _____ on the backpack

- So what is the reaction to the normal force on the backpack?

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

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

- Who experiences the greater acceleration? Explain.