

Newton's Third Law

You may work with a partner, or two, during this activity but be sure you each try Part 2 of the following.

Part 1 Fan Cart and Sail

1. Your instructor will demonstrate the motion of the fan cart without the sail. When the fan is in the 0^0 position, in which direction does the fan cart travel? Why?
2. Make a prediction about the direction the fan cart will travel when the fan is in the 180^0 position. Was your prediction correct? Explain.
3. Make a prediction about the direction the fan cart will travel when the fan is in the 90^0 position. Was your prediction correct? Explain.
4. Your instructor will now demonstrate the motion of the fan cart with the sail. Make a prediction about the direction the cart will travel when the fan is in the 0^0 position. Was your prediction correct? Explain.
5. Make a prediction about the direction the fan cart will travel when the fan is in the 180^0 position. Was your prediction correct? Explain.
6. Make a prediction about the direction the fan cart will travel when the fan is in the 90^0 position. Was your prediction correct? Explain.

Part 2 Rolling Chairs

7. While facing your partner and with your feet on the chair legs and off the ground, push your right hand against your partner's left hand and your left hand against your partner's right hand. Who moved the farthest? Why?
8. If you were the more/less massive partner, try this with a less/more massive partner and describe the results.

Part 3 Astronauts

9. You and your partner are in your space ship in orbit around Earth. You go outside to tighten a few bolts on the cargo hatch while your partner steers the space ship. Unfortunately, the tether keeping you in contact with the space ship catches on a sharp metal edge of a hatch door and snaps, disconnecting you from the space ship. Unfortunately, your partner can't reach you to haul you back into your seat and you are now too far away to grab onto one of the handles used to maneuver around the exterior of the space ship. Fortunately, you have a self-contained oxygen tank and a few tools with you. You do not have a jet pack. Remembering Newton's Laws you find a very easy way of getting yourself close to the space ship to grab onto one of the external handles and get yourself back into your seat. What did you do?

Conclusion

10. What law of physics made each of the above possible? Explain. Be specific.