

ACTIVITY PAGES

## *Finding the Balance*

Gravity is the force that pulls all objects together depending on their size, density, and distance. (See Discover Gravity!) The main example of gravity that people encounter everyday is the pull from the earth that allows people to stand up - and not fly away. All things have a **balance point**, or a **center of gravity**, at which they are in perfect balance.



The center of gravity is the point where the body weight is evenly distributed. If a body is of uniform density and has a symmetrical shape its center of gravity is its center. If the object is not symmetrical and does not have uniform density, it is more difficult to describe the location of its center of gravity. (Try balancing a ball on your finger and then try balancing a stuffed animal!)

Because the human body is not symmetrical and is of non-uniform density, the center of gravity is hard to find. In fact, your body's center of gravity shifts every time you move it! When the distribution of a person's body weight changes, the center of gravity shifts toward the greater weight concentration. This experiment will play with finding the balance point between two moving bodies - yours and a friend's!

**Part 1:** Find a partner who's about your size. Face your partner, standing toe to toe, and hold both of their hands. Now, keeping hold of their hands, each of you take one small step backwards, and stand with your feet about shoulder width apart, each keeping your own balance.

Now, without moving your feet (though you can bend your knees slightly if it helps you), both of you can lean backwards very slowly, so that you feel some weight being transferred to your hands. Try to lean back at the same rate, so that you can keep a **center of gravity** steady, and neither one of you falls down. Lean back as far as you can without letting go, and without falling down, so that you are fully supporting each other with your hands.

Keeping hold of each other's hands and maintaining the **shared balance point**, both of you bend your knees, slowly, so that you lower yourselves down towards the floor. Stop for a moment right before your bottom touches the ground, and feel the balance between the two of you.

Now raise yourselves back up slowly, still holding hands and relying on the center of gravity that is keeping you balanced together. When you're standing back up, and still leaning away from each other, very slowly and carefully, each raise one leg. Concentrate to keep your balance together! Then try moving around, and play with supporting each other's weight while maintaining your balance – if one person leans to one side, where does the other person have to go to stay balanced?

When you're done, come back to standing and balance on your own two feet, and notice your very own center of gravity in your own body. Discuss your observations.

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**Part 2:** Stand back to back, feet shoulder width apart with your heels about 6-10 inches from the other person's. Lean back into each other so that your backs touch. Feel the center of balance as you lean in, where your backs touch.

Again, without moving your feet, slowly, both at the same rate bend your knees so that you lower yourselves down, leaning as much as you can on that center of gravity for balance. Don't try to overpower your partner, just find the balance between you that you can both rely on. Lower yourselves to the ground, and pause for a moment.

Then raise yourselves back up to standing, again relying on that center of gravity on your backs as you stand together. When you are almost at standing, turn a little to one side, then the other. Try moving around like a slow motion dance, lean forwards/backwards, to the side, up and down, raise a leg, experiment, all the time keeping your contact point and supporting each other's weight. How does the center of gravity move? How did you find the cooperation necessary to keep your shared balance?

Slowly come back to balancing on your own. Now, where is each of your centers of gravity? Discuss your observations.