

## Balance Challenge

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Category	Activities
Advancement	Healthy Body
Time to allocate (mins)	10
Outcome	How humans balance and what effects it
Resources	Chairs Smarties

You maintain your balance by keeping your centre of gravity over your support base (your feet). If there is a major change in this equilibrium, you fall over. In routine day-to-day activities, your body maintains balance with little adjustments that are so automatic that you don't notice them. In the following series of activities, students reflect on these adjustments that make balancing their bodies possible.

When you're standing straight, your centre of gravity is somewhere around your belly button. When you change your body's shape, you shift the centre of gravity a bit. For example, when you stick a leg out in front of you, your centre of gravity shifts forward. To keep your centre of gravity over your other foot, you lean your upper body or arms in the opposite direction to the leg.

At the elementary school age, most students have a centre of gravity below their belly button. As they grow, the centre of gravity shifts as their bodies change, depending on their sex. Older boys tend to have bigger, heavier shoulders and a higher centre of gravity. Older girls will keep a lower centre of gravity, which is naturally located in the pelvis.

**General Procedure:**

Invite a different volunteer to come to the front of the class to demonstrate each part. After each demonstration, invite the students to try it for themselves.

**Part 1: The Impossible Leap**

- While standing, bend over and hold your toes with your hands, keeping your knees slightly bent.
- Jump forward in this position while holding your toes
- Try jumping backwards.

While bent over and holding on to your toes, you can jump backwards from one end of the room to the other, but you won't be able to do a single jump forward. When we jump, we first shift our centre of gravity in the direction we want to jump, and then we move our support base (i.e. our feet) in the same direction to regain our balance. When you are holding onto your toes, jumping backwards is not a problem because you can use your heels to shift your weight. But to jump forward, you would have to use your toes. Unfortunately, your fingers are in the way.

## **Part 2: The Super Glue Chair**

Sit in a straight-back armless chair, keeping your back against the back of the chair and your feet flat on the floor.

Fold your arms across your chest.

Keeping your feet flat and your back straight, stand up.

While sitting in a chair with your back against the chair and your feet on the floor, your centre of gravity is at your waist, supported by the chair. When you try to stand up with your back straight, you prevent the centre of gravity from moving to a position above your feet (your support base), as you would need to, to stand up. So you remain glued to your chair!

## **Part 3: Pick-Up Trick**

Place an object on the floor about 50 cm from a wall. Paper money works well. Tell the students they can keep the \$10 bill if they succeed at this challenge (Hint: they cannot).

Stand with your back against the wall, feet together and heels against the wall.

Try to pick up the object on the floor without moving your feet or bending your knees.

When you stand straight against the wall, your centre of gravity is over your feet. When you bend forward, your centre of gravity shifts forward. In order to keep your balance, you must move your feet forward or your bum backwards. This would ensure that your centre of gravity is right above your feet to maintain stability. Since the rules of this challenge do not allow you to move your feet and the wall is behind you, there is no way to shift your centre of gravity to maintain balance while trying to pick up the money. If you insist on picking up the object, you will fall flat on your face.

## **Part 4: Leg Lift**

Stand against a wall with your right side facing the wall, then put your right foot and cheek against the wall (you may need to move your right arm backwards).

Lift your left foot off the floor.

In order to move your left leg while your right side is against a wall, you need to shift your centre of gravity over your right foot. You cannot do this without moving the wall.

## **Part 5: Smartie Sniffer**

Pair up the students and give them each a Smartie.

Partner 1: Kneel on the floor with your knees together. Crouch down with your arms in front of your knees, elbows snug against your kneecaps.

Partner 2: Place the Smartie at the tip of your partner's outstretched fingers.

Partner 1: Once the Smartie is in place, straighten up so that you are kneeling upright. With your arms behind your back, lean forward to touch your nose to the Smartie.

Swap roles with your partner.

This exercise can be used to determine the approximate location of your centre of gravity. If you could not touch the Smartie (candy) without falling over, your centre of gravity is high

## **Instructions**

(above your belly button). When your centre of gravity is high, it will surpass your base (between the knees and toes) when you lean over. If you succeeded in touching the Smartie, it means that you have a low centre of gravity. Even when you lean over, your centre of gravity is still above your base.

**You can also try some others:**

**Step over broom**

You grab a sweeping brush and hold it sideways with two hands.  
Bend over towards the floor so the brush is almost touching the ground.  
Step over the brush one foot at a time.  
Surprisingly most women can complete the manoeuvre relatively easily, but most men cannot.

**Chair lift**

Step two feet away from the wall.

Bend over so that your head is pressed against the wall at a 45 degree angle.

Lift the chair up to your chest.

Stand back up without removing the chair from your chest.

Again most women can complete the move, but men cannot.

One suggested reason why men can't finish this move is that their centre of gravity stops them from standing up.

**Face to the floor**

Get on your knees.

Lean forward, rest your elbows on the floor, and rest your head in your hands.

Take your elbows away, putting your hands behind your back without smacking your face on the floor.

Many men struggle to complete this move. However, a rare few have managed.

**Squat to the floor**

Stand with your toes touching the wall.

Slowly squat all the way down until your bottom is on the floor.

Lay flat on the floor.

Get back up the exact same way.