Defying Gravity: The Science and Skill of Indoor Skydiving

Lesson Overview

This lesson explores the physics, body mechanics, and excitement of indoor skydiving at iFly. Jennfitness22 will learn how vertical wind tunnels work, the forces that allow humans to "fly," and the physical techniques required to control movement in the air.

Materials Needed

- Access to a high-speed floor fan or a hair dryer
- Lightweight materials (tissue paper, a ping pong ball, a feather, a small piece of cardboard)
- A yoga mat or a clear carpeted area
- Notebook or digital device for logging observations
- A stopwatch or phone timer

Learning Objectives

By the end of this lesson, you will be able to:

- Identify the four primary forces acting on a body in a vertical wind tunnel.
- Explain the concept of **Terminal Velocity** in the context of indoor skydiving.
- Demonstrate the "Neutral Body Position" used by professional flyers.
- Calculate how surface area affects lift and drag through a hands-on experiment.

---

1. Introduction: The Hook

Imagine standing on a glass floor with a massive 1,000-horsepower engine humming beneath you. Suddenly, you lean forward into a 120 mph column of air. You aren't falling; you're floating. In indoor skydiving, you aren't fighting gravity—you're balancing against it. Today, we’re going to look at the "fitness of flight" and how your body becomes an airplane wing.

2. Body: "I Do" (The Physics of Flight)

To fly at iFly, we must understand the **Vertical Wind Tunnel (VWT)**. In a normal skydive, you fall through still air. In a VWT, the air moves up while you stay in one place.

The Four Forces:

- **Gravity (Weight):** Pulls you down toward the fans.
- **Lift/Drag:** The upward force of the air pushing against your body.
- **Thrust:** The power generated by the tunnel's massive fans.

- **Stability:** The balance you maintain to stay centered in the "flight chamber."

Terminal Velocity: This is the point where the upward force of the wind exactly equals the downward force of your weight. When these are balanced, you hover!

3. Body: "We Do" (The Human Wing Experiment)

Let's test how shape and surface area change how things "fly."

1. **Set Up:** Turn on your high-speed fan or hair dryer pointing straight up (if safe) or horizontally across a table.
2. **The Test:** Take a flat sheet of tissue paper and drop it over the air. Note how it reacts. Now, crumple that same sheet into a tight ball and drop it.
3. **Discussion:** Why did the flat paper "fly" better?
    - *The Answer:* Surface area! More surface area catches more air molecules, creating more **drag**. In the tunnel, if you want to go up, you make yourself "big" (arch your back, spread limbs). If you want to go down, you make yourself "small" (pull arms in).

4. Body: "You Do" (The Neutral Position Challenge)

Indoor skydiving is a total body workout. It requires core stability and "proprioception" (knowing where your body is in space). Since you enjoy fitness, let's practice the **Neutral Flight Position** on the ground.

Activity: The "Dry" Flight

1. Lay face down on your yoga mat.
2. **The Arch:** Lift your chest and thighs off the floor, balancing on your hip bones.
3. **Arms:** Position your arms like "goal posts" (90-degree angles), keeping hands at eye level.
4. **Legs:** Keep your knees slightly bent with your toes pointed back.
5. **The Hold:** Hold this position for 60 seconds. Notice which muscles are engaged (glutes, lower back, shoulders).
6. **The Movement Simulation:** While holding the arch, slowly straighten your legs. In the tunnel, this would push your head up and move you forward. Now, pull your arms in slightly. This would make you sink.

5. Assessment: Check for Understanding

Answer the following questions to verify your flight readiness:

1. If a flyer at iFly wants to move **higher** in the tunnel, should they increase or decrease their surface area?
2. What force is the wind tunnel fan trying to overcome?
3. Explain why a 200lb person needs a faster wind speed to fly than a 100lb person.

6. Conclusion and Recap

Today, we learned that indoor skydiving is a perfect blend of physics and physical discipline. We learned

that **Drag + Surface Area = Lift**. By changing your body shape, you change the physics of the air around you. You've practiced the neutral position and seen how air resistance works in real-time.

Flight Log Reflection: Write down one way your current fitness routine (Jennfitness22) might help you control your body during a real iFly session. (Hint: Think about core strength or balance!)

Success Criteria

- Can explain the relationship between surface area and lift.
- Can demonstrate a stable "arch" position for 60 seconds.
- Can identify gravity and drag as the two competing forces in the tunnel.

Differentiation & Extensions

- **For Advanced Learners:** Research "Relative Wind" and how flyers perform "turns" by tilting their hands like rudders on an airplane.
- **For Kinesthetic Learners:** Use a skateboard or a swivel chair to simulate "turns" by using your hands to "catch" the air while someone spins you gently.