EDUCATION PROGRAM

TEACHER GUIDE: HIGH SCHOOL

PROGRAM FOCUS

The High School Education Program at iFLY uses iFLY's unique vertical wind tunnel facility to make STEM exciting, relevant, and accessible to students. Our curriculum has been designed by STEM educators and scientists to support STEM learning in your classroom. Every iFLY field trip includes:

- Interactive STEM presentation, delivered by iFLY STEM Educator
- Physics demonstration in the wind tunnel
- Classroom experiment to derive students' predicted terminal velocity and compare with actual measured wind tunnel speeds
- Flying instruction & safety training
- Flying time, with one-on-one supervision from a highly-trained and certified instructor
- Pre and post-field trip activities to conduct in your classroom

LEARNING OBJECTIVES

- Increasing awareness of exciting STEM careers
- Learning how STEM is used in the real-world
- Drawing and interpreting free-body force diagrams
- Understanding the nature of fluids and how they exert forces on solid objects
- Deriving equations to represent physical phenomena
- Applying engineering principles to think about tunnel design, energy efficiency, and safety factors
- Understanding variability, uncertainty, and error in experimental results

PROGRAM SYNOPSIS

Demonstration and Lecture
The wind tunnel demonstration segment uses various objects such as inflatable balls to show how the "terminal velocity" (the air velocity required to "fly" the object) depends on an object's size, shape, and mass.

The lecture begins with a discussion with iFLY STEM Educators to introduce STEM concepts related to the wind tunnel. Students will discuss basic ideas of fluid dynamics, and learn how fluids exert pressure forces on objects. The STEM Educator will discuss the different forces at work in the wind tunnel, and how changing the shape or "frontal area" of an object will affect its speed in the wind tunnel. The STEM Educator will lead students through an exercise to derive the equation for "terminal velocity" (the air velocity required to "fly" the object). Educators will also introduce engineering careers and how engineers use wind tunnels to test their designs.

Classroom Experiment
Students complete a classroom experiment using algebraic reasoning to derive the equation for terminal velocity, and calculate an estimated terminal velocity for themselves in the wind tunnel.

During their flights, a chaperone or designated student will be recording their actual terminal velocities. Afterwards, the students will compare their actual velocities to their predicted values. The Educator will lead them through a discussion of error and the class will brainstorm possible reasons for the error. If time is running short, the classroom teacher will be given all the materials necessary to conduct this discussion back at school.

Flight Experience
All students are given flight instruction by a certified flight instructor, including an individual flight experience in the iFLY tunnel.

GRADE LEVEL APPROPRIATENESS

Our curriculum has been specifically designed to support the following standards:

Common Core Mathematics: HSA.CED.A.1; HSA.CED.A.2; HSA.CED.A.4; HSA.REI.A.1; HSA.REI.B.3

NGSS: HS-PS2-1; HS-ETS1-2

If your state does not follow the national standards, please ask a member of our sales staff for a copy of your state specific standard alignment.

MAKING THE MOST OF YOUR FIELD TRIP

1. Deliver the "Pre Field Trip" slides found on our website (iFLYworld.com) to your students. This presentation will show students what to expect when they arrive at the wind tunnel. It will also introduce some of the vocabulary and STEM concepts we will cover in the field trip. There is even a "script" that you can read word-for-word to your students. No preparation necessary!
2. If you have questions before, during, or after your field trip, please do not hesitate to contact iFLY staff. We are happy to answer any questions that will make your students' experience better!
3. Arrive on time. Students' flight times are pre-scheduled and cannot be rearranged. Arriving promptly will ensure that your students do not miss any portions of their education experience.
4. During the classroom activity, the STEM Educator may ask for your assistance to help students with certain portions of their investigation. Please encourage parents and other field trip chaperones to jump in and lend a hand!
5. Help us improve and strengthen our program by completing the TeacherSurvey. We value your feedback!
6. Please visit our website, iFLYworld.com, for post field trip activities. Having a follow-up discussion or activity with your students after the field trip will help support the concepts they learned during their visit.