

EDUCATION PROGRAM

TEACHER GUIDE: MIDDLE SCHOOL



PROGRAM FOCUS

The Middle 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 that compares predicted and 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
- Understanding the nature of fluids and how they exert forces on solid objects
- Using algebraic thinking to understand proportional relationships
- Using decimal, scientific notation, and unit conversions to do calculations
- Graphing and interpreting results
- 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. Students will predict which balls fly at the fastest speeds, then see if their predictions were correct.

The lecture begins with a discussion with iFLY STEM Educators to introduce STEM concepts related to the wind tunnel. Students will discuss the differences between solids and fluids. They will identify air as a fluid and learn that air can exert a force 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. Educators will also introduce engineering careers and how engineers use wind tunnels to test their designs.

Classroom Experiment

Students move into a classroom and break into groups of 2-3 to carry out an investigation. Students use scales and tape measures to find the mass and area of various spheres. iFLY Educators help the students create an Excel graph of the relationships between mass, frontal area, and velocity. The class analyzes the data together, then uses it to make connections to other applications of wind tunnel testing.

Modification for advanced students: Each student will predict his/her own terminal velocity in the wind tunnel. In other words, how fast must the air in the wind tunnel move to make each student “float”? The students will use algebraic reasoning to solve the air drag equation for “v”. The groups will then use measuring tapes and scales to determine their weight and frontal area.

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: 6.NS.B.3; 6.EE.A.1-3; 6.EE.B.6-7; 6.RP.A.3.D; 6.SP.B.4 7.EE.B.3-4, 7.G.B.4; 8.EE.A.2; 8.EE.C.7

NGSS: MS-PS2-2; MS-PS2-4, MS-PS2-5, MS-ETS1-1; MS-ETS1-3

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.