

DataSnap™ Air Racer Experience

Curriculum Overview

Designed for:

- Middle school students in engineering, career exploration, or science courses

Length:

This 12-hour curriculum is comprised of eight lessons. With supplemental materials, this curriculum can be adapted to a longer block of time. You can also select individual lessons or activities to use in your current curriculum.

Goal:

To modernize the CO² racer experience, bringing standards-driven content to life with easily accessible race performance data.

Synopsis:

The DataSnap Air Racer STEM Lab and its curriculum allow students to learn, explore, and design solutions to engineering challenges, using the compressed air launcher to repeatedly conduct test races and evaluate their customized Air Racer designs. Students will learn about and experiment with mass, inertia, power, and more. The lessons and activities feature objectives, materials required, and approximate class time.

Curriculum Components:

- Curriculum
- Student materials
- Slide presentations
- Student Engineering Workbook

Learning Objectives:

Lesson 1 – Building the Racer

- Build a simple Air Racer

Lesson 2 – Collecting Race Data

- Successfully run a simple race with the Air Racer
- Access and view data with the DataSnap Motion Sensor

Lesson 3 – Mass and Inertia

- Collect race data and observe differences in performance
- Understand how changing mass will affect the Air Racer's motion

Lesson 4 – Pneumatic Power and Energy

- Understand how changing the air pressure of the Race System changes the motion of the Air Racer

Lesson 5 – Weight Distribution

- Understand how shifting the center of mass influences the stability and steering of a car
- Identify lateral drift measurement data using the DataSnap Motion Sensor

Lesson 6 – Wheel and Axle Placement

- Measure and calculate wheel diameter, circumference, and travel
- Understand the influence of wheel properties and axle spacing on performance
- Design and build an Air Racer that maximizes stability

Lesson 7 – Collision Dynamics

- Understand the variables involved in collision dynamics
- Design, build, and test a collision bumper with crumple zone

Lesson 8 – Engineering Design Challenge

- Describe the Engineering Design Process
- Use the Engineering Design Process to identify, build, and test solutions to challenges related to velocity, safety, and stability