PocketLab
SCIENCE. EVERYWHERE.

Crash Science in the Classroom
Presented by IIHS-HLDI

IIHS HLDI
Insurance Institute for Highway Safety
Highway Loss Data Institute

PocketLab Sensor Lessons

Exploring Speed: Introductory activity for students to become familiar with operation of PocketLab G-Force car and the graphing of position and speed data in real-time. Time: 30 min

G-Force: Exploring Energy and Velocity in a Half-Pipe: Explore factors that affect the energy of an object rolling down a halfpipe in simulation and using a PocketLab G-Force. Time: 50 min

G-Force: Matching Motion Graphs: In this lesson, you'll learn about position vs. time graphs and how those graphs represent motion. Then you'll look at graphs created by a PocketLab G-Force and see if you can recreate the graphs by moving the car in different ways. Time: 50 min

G-Force: Crash Cushion Design and Investigation: In this engineering challenge, students use PocketLab G-Force to test and compare model crash cushions, analyzing acceleration data to design safer impact-absorbing barriers like those used on highways. Time**:** 1–2 class periods (50 minutes each)

Voyager: Preventing Concussions and Head Injuries: In this lesson, students will investigate the g-forces experienced by a foam head during a collision and how protective devices can minimize those forces. Time: one to two 50-minute class periods depending on the number of trials.

Voyager: Match Graphing - Rangefinder: In this introductory lesson, students will learn how to use PocketLab Voyager and Notebook by recreating position vs. time graphs using Voyager's rangefinder. Time: 30 min

Voyager: Science of Sensors - Rangefinder: In this activity, students explore the physics of how a rangefinder works and real world applications of LIDAR sensors for car safety and autonomous vehicle applications. Time: 30 min

Voyager: Science of Sensors - Gyro: In this activity students will investigate angular velocity and the real-world applications of gyroscopes. Time: 30 min

Voyager: Project Pedestrian: As a culminating engineering activity option, design, build and test pedestrian-safe bumpers for a toy car using PocketLab Voyager. Time: Three 50-minute class periods (depending on your students' prior familiarity with using acceleration sensors)

Voyager: The Million Dollar Egg Drop: In this hands-on engineering challenge, students design and test egg-drop capsules using PocketLab's accelerometer to measure impact forces, then refine their designs based on real data instead of just a broken egg, before a final high-stakes drop. Time**:** 1–2 class periods (50 minutes each)