

## Research & Development Activity Guide

### Objectives

*In this unit, students will:*

1. Identify and define specifications and tolerances and their required use in vehicle design.
2. Produce a prototype following the design/development continuum.
3. Apply, appropriately use, and enforce safety procedures when using tools and machines.
4. Define, demonstrate and use in application the laws of aerodynamics and mass in order to maximize vehicle performance.
5. Design safety restraint and airbag systems and destructively test for effectiveness.
6. Use 'crush zone' engineering in a vehicular design program and test for integrity.

Day #	Activity #	Activity Description	Type of Activity
1	1	<b>Industrial Robotics Systems</b> - Explains the increased interest in robots used in manufacturing, materials handling, and quality control.	Video
1	2	<b>Parts and Materials Inventory</b> Verify that all necessary materials and parts are present and box is labeled.	Project
2	1	<b>Advancing Vehicle Safety</b> Demonstrates vehicle safety testing and investigation of auto accidents.	Video
2	2	<b>Specifications &amp; Limitations</b> Begin development stage of building the CO2 dragster.	Project
3	1	<b>Thumbnail Sketches</b> Put ideas for the dragster on paper	Project
3	2	<b>Rough Sketches</b> - Take the thumbnail sketches and develop rough sketches	Project
3	3	<b>Drag Racing</b> - Explore professional drag racing. Write in journal.	Internet
4	1	<b>Final Drawing &amp; Pattern</b> Complete the final grid drawing of dragster including measurements. Cut and trace the pattern onto the styrofoam prototype.	Project
5	1	<b>Dragster Prototype</b> - Construct a prototype of the finished drawing including axle holes.	Project
5	2	<b>Construction of Dragster</b> Begin production phase by cutting the wood body of the dragster.	Project
5	3	<b>Narrative Writing activity/on-screen multiple-choice test</b> Describe the phases of research and development process; list all of the steps and material required.	Test
6	1	<b>Dragster Body Filing, Sanding, Finishing</b> Continue working on the production phase of the dragster. Complete Dragster Specs worksheet.	Project
7	1	<b>Dragster Assembly</b> - Complete the dragster by assembling all of the parts. Complete the test and measurement worksheet	Project
8	1	<b>Vehicle Safety</b> Explore information about vehicle safety and injury prevention during accidents. Write in journal.	Internet
8	2	<b>Crash Safety</b> Crash test footage shows what happens during crashes to demonstrate how to get the maximum benefits from your restraints.	Video
9	1	<b>Car Builder</b> - Demonstrates the elaborate real-world physics of drag coefficients	Computer Program
10	1	<b>Design Brief</b>	Project
10	2	<b>Persuasive Writing activity/on-screen multiple-choice test</b> Describe the types of designs and materials used to construct superior restraints to minimize injuries in auto accidents	Test

#### NOTE:

- It is a good idea to place washers, hook screws and axles into an envelope in the dragster kit.
- Pencils, markers and blank sheets of paper are necessary during the design phase.
- Let the entire class watch the race.

Modified by Mae Thomas, Tech Lab Instructor

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