Fairfax Collegiate

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Vehicle Engineering 5-6 Syllabus

Course Goals

1 Building Vehicles
Students construct various types of vehicles including cars, boats, and autonomous cars.

2 Engineering Design Process
Students learn about the engineering design process and how to apply it to the vehicles and components they construct.

3 The Testing Process
Students test their vehicle's speed, power, safety and function through competitions and experiments.

4 Physics
Students learn basic physics concepts that underlie the vehicles they construct.

Course Topics

1 The History of Vehicle Engineering
Students learn about the history of different types of vehicles, as well as how engines were first invented and gradually improved over time.

2 Vehicle Components
Students design and test different components of vehicles such as chassis, gearboxes, and safety features.

3 Crash Testing
Students perform crash tests to ensure their vehicles design are safe.

4 Aerodynamics
Students learn the aerodynamic principles of cars.

5 Speed Testing
Students test different designs in an attempt to maximize speed.

6 Power Testing
Students test different designs in attempt to maximize torque or power.

Course Schedule

Day 1

What Do You Know about Vehicle Engineering?
Students participate in a discussion about what they know and what they are excited to learn. This also serves as a class introduction.

The History of Vehicle Engineering

Students learn about the history of engines and vehicle production.

Ramp Race
Students design and build their own model cars to race down a ramp. Students also have to choose which materials to "buy" with a limited budget to achieve the fastest car.

Day 2

Sailboat Race
Students use the engineering design process to design their own sailboats. After building completion students will compete in a time trail race.

Aerodynamic Resistance
Students learn about Aerodynamics and how they are taken into account when designing cars.

Day 3

Car Components
Students learn about how cars are designed as well as the main components required to build cars.

Tire Treads
Students design and create tire treads on blocks of clay and test to see which one blocks is most effective through water.

Day 4

Brake Testing
Students design and test different methods of brakes.

The Safety Testing Process
Students learn about how cars are designed to be safe as well as learn about crash testing.

Crash Testing
Students modify a wooden car set to make their vehicle as safe as possible for an egg "test driver."

Day 5

Crash Testing
Students modify a wooden car set to make their vehicle as safe as possible for an egg "test driver."

Vehicle Physics
Students learn about the governing physics of cars.

Day 6

How Gear Boxes Work
Students learn about gearboxes and how they are built to increase torque or speed.

Tug of War
Students design and build their own gearboxes with the intent on making them as strong as possible. After building, students will compete in a tug of war to see which gear box generates the most torque.

Day 7

Tug of War

Students design and build their own gearboxes with the intent on making them as strong as possible. After building, students will compete in a tug of war to see which gear box generates the most torque.

Race

Students reconfigure their gearboxes with the goal of making them fast.

Day 8

Building RC Cars

Students build and race their own RC cars.

Day 9

Building RC Cars

Students build and race their own RC cars.

Day 10

Building RC Cars

Students build and race their own RC cars.

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