



3d printers club

3D Grand Prix

Coach's Notes



In an effort to help guide an instructor through the logistics of this unit, “Coach’s Notes” are provided as a valuable resource. These notes are meant to clarify expectations as well as provide lists of resources and/or materials based on the authors’ past experiences in teaching this unit. Of course, your individual students will have unique needs, so adapting the unit activities to fit your situation will bring success.

The strengths of this unit:

- Curriculum is standards-based and involves real-life problem solving.
- Twenty-first century skills are utilized.
- STEM (science, technology, engineering, and mathematics) skills are incorporated.
- The Engineering and Design Process is enforced.
- Students have the opportunity to use CAD (computer aided design) and 3D printers.
- Thinking skills are strengthened (divergent/evaluative/visual-spatial).
- Independent as well as cooperative activities are included.
- Students practice public speaking skills.

The mission:

Students become designers in this unit and will:

- learn about Sir Isaac Newton and the laws of motion;
- experiment with the laws of motion;
- use creative thinking skills to design a vehicle that demonstrates the laws of motion and is suitable for racing;
- build a prototype (model) of the vehicle utilizing the 3D printer; and
- participate in a racing competition with other students.

Before you begin:

- Decide if you will have the students create vehicles powered by rubber bands or if you will use a ramp to race the vehicles.
- Decide what CAD program your group will use.
- In order for students to understand the expectations that are in place, please ensure you discuss the rubric located in the back of the student coursebook with your students as you embark on this unit.
- We have included a letter that we recommend sending home with your students at the beginning of this unit. Communication helps to ensure success!
- Note that there are “checkpoints” throughout the unit, where students are encouraged to consult with you. These opportunities are important for ensuring that individual students are progressing appropriately.

Suggested time frame:

- Approximately 12 two-hour sessions and 3D Grand Prix Race Event

- In addition, there are opportunities for “Going Further” with extension activities listed in this manual.

Suggested Materials:

- 3D printer(s)
- computers
- plastic filament for 3D printers (assorted colors suggested)
- Internet access
- student course books
- flashdrives (one per 3D printer)
- access to basic school supplies
- materials for physics experiments (see student coursebook pages 13-16)
- popsicle sticks to help with SCAMPER brainstorming
- materials for vehicle construction, such as:
 - corrugated cardboard
 - tagboard
 - rubber bands (various sizes)
 - paper clips
 - wooden dowel rods (1/4 “)
 - wooden spools
 - duct tape
 - hot glue sticks
 - floral wire
 - assorted types of paper
 - fishing line
 - yarn
 - string
 - masking tape
 - foamboard
 - index cards
- toy cars/vehicles for students to tinker with to see how they run
- tools: screwdrivers, wire cutters, saw, pliers, clamp,
- rulers, protractors, scissors, glue, markers, pencils, colored pencils
- calculators
- trifolds
- laminating machine (for Hero Cards)
- cardstock, construction paper
- space for printer to be housed as it is printing (The length of time that it takes a printer to print on object is often time-consuming.)

Background on this unit:

This unit was first developed by educators from the Bethel-Tate and West Clermont STEM Programs for students in grades 5-8. This was made possible by the Greater Cincinnati STEM Collaborative and their supporting partners. As a result of its success with the students that piloted it, the unit was further revised and made available to other organizations throughout the Greater Cincinnati area.