The Automotive Physics Engineering eXperience at Citrus College applies intermediate school math and science standards to the engineering of a car.

**Description**
Students learn how an automobile works while focusing on mathematical and scientific principles. Topics included:

- Simple machines
- Torque and horsepower
- Geometry (steering, suspension, center of gravity)
- Fluid/hydraulics (Pascal’s Law)
- Chemistry (Combustion, fuel)
- Gear Reduction and Ratios (Torque and Speed)
- Friction
- Vacuum/Pressure (Boyle’s Law/Venturi Effect)
- Mass/Inertia (Engine theory)
- Aerodynamics
- Heat

Teamwork and problem solving are emphasized during the program. Students earn points to exchange performance upgrades as each team builds and “improves” the performance of the karts. The program concludes with each team member driving their kart in timed trials on the “APEX Motor Speedway” at Citrus College. This year’s teams with the best performance in timed trials were in session one the Blue Team and in session two the Grey Team.

The Automotive Physics Engineering eXperience at Citrus College is funded by a grant through the, California Community Colleges Chancellor’s Office awarded to Citrus College for the Career-Technical Education Pathways Initiative (SB70 grant award #11-140-821) and donations from Lucas Oil and the Technician Development Center.
KICK THE TIRES AND LIGHT THE FIRES!

Building on last year’s success, we doubled our efforts and APEX 2013 at Citrus College offered two sessions. Four partner middle schools responded and 36 students were enrolled. Taking their seats in a college classroom, day one learning got underway with discussions of expectations, introductions, and team assignments. A current Citrus College automotive technology student was assigned as a Crew Chief to each team. Over the next three weeks we revved up the competition! Understanding they were competing for points to “purchase” additional high performance add-ons; the grey, blue, red, yellow, black and orange teams exploded to life.
Applying Math and Science:
One homework assignment required students to locate simple machines around their house; in labs students explored the physics of simple machines and how each applied to their karts. Later students installed the rack and pinion steering system.
Both APEX sessions ended their first day with a trip to the APEX Gasoline Alley where the teams completed a Torque Lab. It was a perfect connection to an earlier classroom discussion on fasteners.
After daily classroom lessons, the students worked hard in the shop! Every team finished assembling and installing the engines and building their karts. Now, it was time for performance driving instruction.
APEX Awards

Fastest Team

Session 1

Fastest Lap

Session 2

Fastest Lap
Acknowledgements:

Without the publically funded Career Technical Education (CTE) Act, the three college partnership of Citrus, Mt. San Antonio and Rio Hondo Colleges would not be possible – thank you to the California Community Colleges Chancellor’s Office for funding San Gabriel Valley CTE Community Collaborative (SB70 grant award #11-140-821). Thank you Lucas Oil Products; your sponsorship and Mr. Mark Sromalla’s support of this pilot program was invaluable and we are grateful.

Jim Lancaster dean, Curriculum, Career/Technical and Continuing Education and Jeremy Clark, faculty at Citrus College, designed and ‘engineered’ APEX. Their interest in student engagement, understanding and academic success is the apex of a collaboration that resulted in two years of successful summer career experiences for our district partner’s middle school students. This second year of success is also possible, in part, because of successful summer career experiences for middle school students crafted by pioneers Mike Slavich, Claudia Romo, and dedicated faculty representing Rio Hondo College. Thank you for your inspiration.

This year’s Automotive Physics Engineering eXperience (APEX) was offered in two sessions. Duarte Unified School District’s Northview Intermediate and Azusa Unified School District’s Foothill Middle School participated in the first session. Second session participants were Monrovia Unified School District’s Clifton and Santa Fe Middle Schools. These middle school girls and boys attended foundational theory classes followed by applied (hands-on) learning in the lab (nicknamed "Gasoline Alley") housed in the Citrus College Technician Development Center. As lessons progressed so, too, did the team Go-Kart, as students assemble their karts with their team leader, a Citrus College Automotive Technology student. Throughout the learning experience, students earned extra credit to ‘purchase’ parts or upgrades to improve performance of the team Go-Kart. It all came together on the APEX track when students completed timed trials, one team member at a time "Enduro style," to earn the coveted best overall team time!

Jeremy Clark, faculty, translated Automotive Technology instructional concepts to learners entering 8th grade and for many weeks we witnessed “wheels” turning with the power of positive energy boosted by collaboration with Jim Lancaster and faculty in the Technician Development Center at Citrus College. Instructional personnel aimed high and students hit every target no matter how hard or advanced the content was – the Northview Intermediate and Foothill Middle School students, Clifton and Santa Fe Middle School students, excelled and represented their schools with pride. The photos and videos tell the story at Facebook.com/CitrusCollegeAPEX.

Mr. Eric Ramos Math instructor from Northview Intermediate School, Michelle Marie Garcia Math instructor from Foothill Middle School, and Kyle McClure, Science Teacher from Clifton Middle School served as team teachers, accentuating the ‘real world’ applications of math and science in the classroom and the lab. We appreciate all their contributions!

The Citrus College Automotive Technology students representing the Technician Development Center are the best of the best! This year’s APEX Team leaders were: Dave Luevano - Blue Team, Patricia Barroso - Yellow Team, Alexus Fraire-Gamell - Grey Team, Vincent Zampiello - Orange Team, Juan Luis - Black Team and Ryan Quioque – Red Team.

Planning & daily activities by Marti DeYoung, Terry Adams, Elizabeth Rodarte-Saldaña & Jackie Munoz.

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Citrus College Reprographics
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