

Engineering Connections

In the CA Science Framework

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Life Science

Biology	
Organ Donation: Students can consider the different aspects of the problem of donor matching and brainstorm and evaluate possible solutions to them	More info: https://www.cde.ca.gov/ci/sc/cf/documents/scifwchapter8.pdf#page=24
Wastewater Treatment Facilities: Engineers have learned to put biological processes to work to process human waste in wastewater treatment facilities. Students can make models of this process and develop techniques for speeding up the wastewater treatment process.	More info: https://www.cde.ca.gov/ci/sc/cf/documents/scifwchapter8.pdf#page=36
Conservation: Students can investigate one specific environmental change that threatens biodiversity and propose a solution. As they obtain more information, including the needs of people as well as plants and other animals, they refine their solution.	More info: https://www.cde.ca.gov/ci/sc/cf/documents/scifwchapter8.pdf#page=41
Captive Breeding and Release Program: Students can develop or revise a computer simulation of a condor captive breeding and release program like the one implemented in California (Ventana Wildlife Society n.d.).	More info: https://www.cde.ca.gov/ci/sc/cf/documents/scifwchapter8.pdf#page=66
The Living Earth	
Coastline Erosion: Students can design and build erosion control measures using stream tables as well as read about actual measures that are taken in places like Pacifica and locations all along the California coastline.	More info: https://www.cde.ca.gov/ci/sc/cf/documents/scifwchapter7.pdf#page=40

Physical Science

Chemistry	
Global Energy Supplies: Carbon dioxide is released when	More info:

fossil fuels react with oxygen during combustion, and students can obtain information about chemical methods of carbon sequestration currently being researched. Students could also obtain information about how improvements to the combustion efficiency of cars have reduced smog. Students should consider the criteria and constraints about society's need for clean air and clean water along with the need for more energy.	https://www.cde.ca.gov/ci/sc/cf/documents/scifwchapter8.pdf#page=134
Energy Conversion Device: Students can build their own device to convert energy from one form to another by designing calorimeters that combust food to transform chemical potential energy into light energy and thermal energy.	More info: https://www.cde.ca.gov/ci/sc/cf/documents/scifwchapter8.pdf#page=136
Chemistry in the Earth System (same)	

Physics	
Minimizing Effects of Collisions: Equipped with a basic understanding of classical mechanics, including Newton's three laws of motion and the momentum conservation principle, students should now be able to "apply scientific and engineering ideas to design, evaluate, and refine a device that minimizes the force on a macroscopic object during a collision."	More info: https://www.cde.ca.gov/ci/sc/cf/documents/scifwchapter8.pdf#page=149
Energy Conversion Device: Designing, building, and improving energy conversion devices that are more efficient or that pollute less In the laboratory, students learn to work within engineering constraints as they strive to maximize efficiency (minimize energy loss) while designing and building devices with limited resources.	More info: https://www.cde.ca.gov/ci/sc/cf/documents/scifwchapter8.pdf#page=181
Using Waves to Transmit Information: Students may design their own devices where electromagnetic waves interact with matter to transmit and capture information.	More info: https://www.cde.ca.gov/ci/sc/cf/documents/scifwchapter8.pdf#page=190
Physics of the Universe	
Testing Material Strength: Engineers do calculations to test their designs before investing the time and materials to actually build a prototype.	More info: https://www.cde.ca.gov/ci/sc/cf/documents/scifwchapter7.pdf#page=169
Computational Models of Orbit: Students can gain a deeper understanding of the orbital relationships and develop computational thinking skills by interacting directly with computer models of simple two-body systems. They can vary different parameters in the code such as the distance from Earth or initial speed and see how those parameters	More info: https://www.cde.ca.gov/ci/sc/cf/documents/scifwchapter7.pdf#page=183

affect the path of the satellite.	
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Earth and Space Sciences

Earth and Space Sciences	
Evaluating Renewable Energy Options: They can explore renewable energy options and debate the pros and cons of each possible energy source for meeting society's needs.	More info: https://www.cde.ca.gov/ci/sc/cf/documents/scifwchapter8.pdf#page=217
Mitigating Erosion Hazards: Students can design and build erosion control measures using stream tables as well as read about actual measures that are taken in places like Pacifica and locations all along the California coastline.	More info: https://www.cde.ca.gov/ci/sc/cf/documents/scifwchapter8.pdf#page=225
Water Filtration: Students could obtain information about water treatment and purification systems in their community, or be given engineering challenges to design water purification systems.	More info: https://www.cde.ca.gov/ci/sc/cf/documents/scifwchapter8.pdf#page=232
Reducing Urban Runoff: Students can apply their knowledge of Earth materials to explore solutions to the urban runoff problem by designing systems to catch and filter runoff before it enters waterways	More info: https://www.cde.ca.gov/ci/sc/cf/documents/scifwchapter8.pdf#page=257
Computational Models of Orbit: Students can gain a deeper understanding of the orbital relationships and develop computational thinking skills by interacting directly with computer models of simple two-body systems. They can vary different parameters in the code such as the distance from Earth or initial speed and see how those parameters affect the path of the satellite.	More info: https://www.cde.ca.gov/ci/sc/cf/documents/scifwchapter8.pdf#page=277