

## 5E Template

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**Title of Lesson: Race Car Energy Transformations**

Content/Level: Energy and transformation/ Grade 07

Big Idea: Potential energy can be transformed into kinetic energy and heat

Benchmark:

<b>SC.7.P.11.2</b>	Description of Standard Investigate and describe the transformation of energy from one form to another.

Students should be able to:

<b>Understand</b>	<b>Know</b>	<b>Do</b>
Conservation as energy is transformed from potential to kinetic and back.	How to maximize and convert potential energy to kinetic energy.	Create a machine that will convert potential to kinetic energy in a useful way.

<u><b>Advance Preparation</b></u>	<u><b>Materials</b></u>
<p><b>Print out pre/post test</b> <b>Acquire and assemble materials</b> <b>Create three model race cars</b></p>	<p><b>K'Nex Kit (or equivalent materials)</b> <b>Mouse trap/spring</b> <b>Ruler</b> <b>Tape</b> <b>Stopwatch</b> <b>Notebooks</b> <b>Clipboards</b> <b>Pre/Post test</b> <b>Trophy/Certificate</b></p>

<p><b>Engage</b> (hook, demonstration, free write, brain-storm, analyze a graphic organizer, KWL, etc.)</p>	Class will brainstorm using a circle map about the components that make a racecar move and factors that make a race car move fast.
<p><b>Explore</b> (investigate, solve a problem, collect data, construct model, etc.)</p>	Students will be shown several different models of race car. One will be wound and ready to go. Another will be intact but unwound. The third will be wound but the spring not connected to the wheels. Students must investigate the three models and rank the best to worst. Identify ways to improve the conversion of energy. Students then create their own car to test their theories.

<p><b>Explain</b> (student analysis, structured questioning, reading and discussion, teacher explanation, compare, classify)</p>	<p>Class discussion about what ways we could have improved the cars. Student analysis will require reasoned thinking as to the factors involved in conversion such as spring shape and connection to wheels. Students will explain outcome of race car modifications and distance/speed at which cars went.</p>
<p><b>Elaborate/Extend</b> (problem solving, decision-making, experimental inquiry, compare, classify, apply)</p>	<p>Students present findings and information is entered into a class created data table to identify patterns in race car optimization.</p>
<p><b>Evaluate</b> (any of the above, develop a scoring tool or rubric, performance assessment, produce a product, journal entry, portfolio, etc.)</p>	<p>Pre/Post test will be given on the basics of physics, forces, energy, power, mechanics and research and development.</p> <p>Students will also evaluate other designs based on energy storage, appropriate and efficient conversion of potential to kinetic and accurate reasoning.</p>

**References**

<p><b>Text Reference(s):</b></p>	<p>7<sup>th</sup> Grade Comprehensive Science - Pearson</p>
<p><b>Electronic References</b> (websites, Gizmo, other; paste hyperlinks or URLs here)</p>	<p>Science of Speed = <a href="http://Science360.gov">http://Science360.gov</a></p> <p>Microsoft products use Office 355 = <a href="http://vcs2go.net">http://vcs2go.net</a></p> <p>Smart Board = <a href="http://smarttech.com/downloads">http://smarttech.com/downloads</a></p>
<p><b>Electronic Attachments</b></p>	