

“Solar Roadways”	Subject/Unit: Earth Science, Physics, Geometry	Date
<p>Materials & Resources: Latitude of a city: http://zipinfo.com/search/zipcode.htm</p> <p>Solar Noon: http://www.esrl.noaa.gov/gmd/grad/solcalc/sunrise.html</p> <p>Angle of Insolation: http://www.esrl.noaa.gov/gmd/grad/solcalc/azel.html</p> <p>Solar City Worksheet</p>	<p>Standards:</p> <ul style="list-style-type: none"> - Physics: 4.3h: when a wave strikes a boundary between two media, reflection, transmission, and absorption occur. A transmitted wave may be refracted - Physics: 4.1b: energy may be converted among mechanical, electric, and thermal forms - Biology: HS-LS2-7 Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity - ESC: 7 – Interdisciplinary Problem Solving: apply knowledge and thinking skills of math/science/technology to address real-life problems and make informed decisions. Analyze issues related to local energy needs and develop a viable energy generation plan for the community - CCSS.MATH.PRACTICE.MP4 Model with mathematics. - CCSS.MATH.PRACTICE.MP2 Reason abstractly and quantitatively - CCSS.MATH.CONTENT.HSG.SRT.C.8 Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems. 	<p>Assessment/Ticket Out:</p> <p>Worksheet</p> <p>Poster session/presentation</p>
<p>Learning Targets:</p> <p>I can calculate the surface area of a hexagon.</p> <p>I can use various methods to determine the surface area of my driveway.</p> <p>I can compare and contrast the surplus of electric productivity between two cities.</p> <p>I can explain the photovoltaics of solar</p>	<p>Class Activity: “Would our driveways produce enough electricity for our households?”</p> <p>Warm-up:</p> <ul style="list-style-type: none"> - What process is needed to find the area of a hexagon? <p>Lesson:</p> <ul style="list-style-type: none"> - Can our driveways produce enough electricity to cover our electric usage? - What factors may affect solar energy reaching the solar panels? - As a community do we produce enough electricity to cover total usage? - Is there enough surplus to sell to other communities? - <p>Practice:</p> <ul style="list-style-type: none"> - Show teacher model as an exemplar project; the end product 	<p>Comments/Differentiation:</p> <p>Possible concerns: students without a driveway</p> <p>Have a list of cities for students to choose from</p> <p>Favorite sports team cities</p> <p>Advanced students: verify model is correct by computing the</p>

<p>panels.</p> <p>I can describe the change in the sun's path across the sky with latitude, day time, and seasons.</p>	<ul style="list-style-type: none"> - Scaffolding; walk students through the process of creating the end result for New York community - Break into groups of 4 (ideally, depending on class size) - Students will complete calculations for driveways in NY - Groups will choose one city (different for each group) to compare to NY - As a group; students will use the teacher's computer model to create a representation of their homes in their chosen city - Create a poster comparing their results from living in NY to their chosen city. 	<p>(output) total kilowatt hours produced by the solar panels, total energy used per day and the total surplus</p>
<p><u>Vocabulary:</u> Angle of the Insolation/Incidence Photovoltaic Cosine Loss Angle Hexagon Surface Area kW, kWh Surface area Latitude Renewable Resources Energy Conservation Solar Noon</p>	<p><u>Language Functions:</u>(Compare/Contrast-Conjecture-Describe-Explain-Prove-Bloom's)</p> <p>Compare/Contrast- Students will be comparing and contrasting the different energy output and usage between summer and winter. They will then select a new city and compare/contrast summer vs. winter, and then compare/contrast the second city with the first city.</p>	<p><u>Homework:</u></p> <p>Complete necessary steps on worksheet</p> <ul style="list-style-type: none"> - Driveway measurements - Electric usage - Unfinished calculations from class to stay on track