5E Lesson Template

Lesson Author(s)	Mitchell Smith
Lesson Title	Which Energy Works Best
Lesson Source	
Technology Needs (if any)	Computers, Google Earth, solar cars, fans, pin wheels
Date/Time Lesson to be Taught	
School	
Supervising Teacher	
Math or Science?	Science
Lesson Concepts	Energy, solar and wind power
Objectives	The students will be able to predict what places on Earth work the best for wind and solar power, and use that information to determine what source of renewable energy would work best for colonizing Mars.
CO State Standards	
Materials List and Advanced Preparation	Computers, Google Earth, worksheet, pin wheel materials (straws, paper plates, tape, push pins, paper propellers, fans), solar power materials (small solar panels, tools, parts for the car/robot).
Safety	Students need to follow classroom and school rules that have already been put in place. Work appropriately with the given materials, i.e. fans, solar panels, cars/robots.
Accommodations for Learners with Special Needs	Have the students work in pairs, ability pairing. Have the teacher work more closely with those students.

5Es

1. ENGAGEMENT		Time: Minutes
What the Teacher Will Do	**Probing/Eliciting Questions**	**Student Responses and Misconceptions**
Show the students YouTube clips on cool things that people have done with Solar and wind power energy. Solar power: http://www.youtube.com/watch?v=jrje73EyKag Wind Power: http://www.youtube.com/watch?v=_RPLfnEN4bE http://www.youtube.com/watch?v=ze6RFpzQ75c	• While you guys are watching these video clips, I want you to think about how powerful wind and solar energy can be. • In the solar power video how is he able to get the temperature up to 2000 degrees? • Can we get the sun's rays even hotter? • How does wind energy work? • Can you store energy? • Is it always going to be this windy?	• Students may not understand how powerful wind and solar energy can be. • Students may not understand how he is able to get the sun's rays that hot. • Students may not understand how just a little bit of wind energy for long periods of time, maybe better than a lot of wind all at once. • Students may not understand that energy cannot be efficiently stored.
Evaluation/Decision Point Assessment		**Student Outcomes**
The evaluation for this point is just to make sure that the students have a basic understanding what is going to be taking place within the lesson that will precede the engagement.		My goal is to have the students interested in renewable energy peaked by watching these videos. I also want them to understand that solar and wind power can be used and is being used on Mars.

2. EXPLORATION		**Time: Minutes**
What the Teacher Will Do	**Probing/Eliciting Questions**	**Student Responses and Misconceptions**
• I will have the students open up Google Earth and set up the two layers that show solar and wind amounts on the world map. • I will show is process, so all the students are on the same page when it comes to google earth. • I will pass out the worksheet that allows for students to formulate hypothesis on where on each of the 7 continents would be the best place to have solar and wind capturing instruments. • As the students are working, I will be walking around making sure that the students are on task and asking probing questions. • Once that activity is done I will have the students move on to creating the Pin wheel and the solar car/robot. • I will pass out the materials and instructions on how to create them. • Once again I will walk around making sure students are on task and proceed to ask informal questions, to see where the students are at.	• Does everyone know how to work Google Earth? • When looking at the map layers what do the different colors represent in the legend? • Can you place solar panels/wind turbines anywhere? • Is the amount of sun light going to be different depending on the time of the year? • Logically where in the world is the best place to put solar panels that receives the most sun light? • Can these two renewable energies be stored?	• Students may struggle with google earth and not know where to find the different layers. • They may also struggle with the reading of the maps layers. • The students may not understand where the best place to place the renewable energy devices at. • Students may have a hard time relating this information back to colonizing Mars.
Evaluation/Decision Point Assessment		**Student Outcomes**
For the evaluation portion of this lesson, I want to make sure that the students have filled out the work sheet that I gave them. I will also be doing a lot of informal assessment		The students outcomes will hopefully be that they understand what the difference between solar and wind power

along the way, making sure that they understand what it is they are doing and how this will apply to colonizing Mars.	energy is, and which one would they rather use when creating their colonies on Mars.

3. EXPLANATION		**Time: Minutes**
What the Teacher Will Do	**Probing/Eliciting Questions**	**Student Responses and Misconceptions**
• After the students have created the pin wheel, I will give them about 5-10 minutes to write a paragraph explaining which renewable energy resource would be better to start a colony on mars and why?	• Where in the world has the best place for solar energy? • Where in the world has the best place for wind energy? • Why are you deciding to choose one over the other? • Are there any other types of energy that you think would work better?	• Students may still struggle with understanding where in the world would be the best place to put solar and wind devices. • Students may not have a clear reasoning to why they choose one over the other. • Students my think that other types of energy (fossil fuels) are better.
Evaluation/Decision Point Assessment		**Student Outcomes**
I want the students to write a paragraph, telling me why they choose the renewable energy source they did, and support it with information that they discovered in the lesson that day.		I want the students to pick a side on which renewable energy resource they would use to create their colony on Mars. They must support their decision with information that they discovered that day.

4. ELABORATION		**Time: Minutes**
What the Teacher Will Do	**Probing/Eliciting Questions**	**Student Responses and Misconceptions**
• This will be done right after the students get done creating their models that demonstrate solar and wind energy. • I will have the students stand up in front of the class and tell us what it was they were doing and the finding they discovered while messing with the models.	• How many paper clips did your pinwheel pick up? • How much wind was needed to pick up the paper clips? • How well did you solar cars/robots work? • Did they work better inside or outside? • What happen when there was no light, or a shadow covered the panels?	• Students may have different amount of paper clips being picked up and not know why this is the case/ • Students may not understand that the more wind you have the more energy you create. • Students may have no noticed any difference between outside and inside?
Evaluation/Decision Point Assessment		**Student Outcomes**
For this part I will see if the students have created their models to the point where they were able to work. I will also be looking at how well the students were able to discuss what happen throughout the lesson and the questions that I ask them. I also want everyone in the group to take turns in talking about what it was they did in the groups and their findings.		Students should be able to explain what it was they did in the exploration part of the lesson, and support their ideas with information that they got from doing the exploration.

5. EVALUATION		**Time: Minutes**
What the Teacher Will Do	**Probing/Eliciting Questions**	**Student Responses and Misconceptions**
Overall, I want the students to take the information that they got from the lesson and be able to use it in their colonizing of Mars. I also want the students have an understanding in why they are using solar and wind capturing devices when they are on mars, and why can't they just use the same things that we are using today on earth.		

Differentiation	**Time: N/A**
Students who are behind or need support.	**For advanced or gifted students.**
I will have students work in groups, so if they need more help they have someone they can bounce ideas off of. I will also way be around and circulating the room, making sure I'm available to answer any question.	I will ask the students to look more at the climate of Mars. I want them to think about would it be a good idea to use fossil fuels to create a thicker ozone layer, and would that help with creating a thicker atmosphere?