

5E Lesson Template

Lesson Author(s)	Mike Howard
Lesson Title	Fracking: Meeting our Energy Needs or Environmental Disaster?
Lesson Source	
Technology Needs (if any)	Computer with internet access
Date/Time Lesson to be Taught	
School	
Supervising Teacher	
Math or Science?	Science
Lesson Concepts	How is fracking done? What is fracking? Is it safe? Is the energy necessary?
Objectives	Learn about a 21 st century energy source and its potential environmental impact(s) in a student debate format.
CO State Standards	Natural Science 2.1, 2.2, 3.2, 3.3
Materials List and Advanced Preparation	
Safety	
Accommodations for Learners with Special Needs	

5Es

1. ENGAGEMENT		Time: Minutes
What the Teacher Will Do	Probing/Eliciting Questions	Student Responses and Misconceptions
Introduce the concept of fracking.	What is fracking? Why do we need it? Is it safe?	Students may have heard about fracking in the news but most likely lack knowledge on the topic.
Evaluation/Decision Point Assessment		Student Outcomes
Are students asking leading questions about fracking? Do they understand the general concept?		Understand what fracking is.

2. EXPLORATION		Time: Minutes
What the Teacher Will Do	Probing/Eliciting Questions	Student Responses and Misconceptions
Pass out worksheet and have students establish the definition of fracking (this may actually be done prior to the whole group engagement in step 1).	As you use the word bank to define fracking, are you being certain to follow grammar rules?	Where is fracking done? Do we do it here? Is it safe?
Evaluation/Decision Point Assessment		Student Outcomes
Go over the definition of fracking and any pertinent questions that arise.		Understand what fracking is.

3. EXPLANATION		Time: Minutes
What the Teacher Will Do	Probing/Eliciting Questions	Student Responses and Misconceptions
<p>Introduce a debate or point-counterpoint class conversation. Students will randomly (allow for option of students choosing which point to debate) be divided into 1 of 4 perspectives: 1) Pros/need of fracking for energy as it affects the United States.2) Cons:fracking is not needed for energy production in the United States. 3) Fracking is environmentally safe. 4) Fracking is not environmentally safe. This lesson is designed to be completed individually, but may be done in groups.</p>	<p>Based on what you've learned so far, how many of you think fracking is good? Safe? What are ways you can prove your perspective? What questions need to be answered?</p>	<p>Student responses will be varied based on past experiences and perspectives.</p>
Evaluation/Decision Point Assessment		Student Outcomes
<p>How well did the students argue the different points related to fracking?</p>		<p>Students should have come to some conclusions about fracking and have learned to gather information and make effective arguments.</p>

4. ELABORATION		Time: Minutes
What the Teacher Will Do	Probing/Eliciting Questions	Student Responses and Misconceptions
<ul style="list-style-type: none"> Allow students to research their point online. Use Fractracker.org (additionally use arcgis.com/explorer) to pull up maps that isolate fracking data (options vary by state but include where fracking is being done, company names, spills/environmental problems, bans, etc). Have students individually brainstorm questions they need to answer. After 10 minutes, group students according to the point they are arguing/defending and offer some proposed questions, as listed to the right. After all research has been completed (one class period and perhaps continued as homework assignment) have students present their findings to the class. Teacher may require students to debate one another, but a simple presentation of their research is sufficient. 	<p>Group 1: Why do we need fracking? How much energy is currently being extracted in the U.S. using fracking? Does fracking help the U.S. import less fossil fuels from other nations? How many jobs does fracking provide? How much money has fracking added to the economy?</p> <p>Group 2: Does the U.S. import enough fossil fuels? Is fracking too costly? What other energy sources should the U.S. utilize and how much energy do we generate from these other sources?</p> <p>Group 3: What laws do fracking companies have to follow? How regulated is the industry? How does the pollution from fracking compare to other energy sources? Are fracking practices improving?</p> <p>Group 4: How does releasing natural gas affect methane? How does methane affect the environment? What specific incidents/problems have there been from fracking? (fractracker.org).</p>	<p>Based on their research, individual student responses will be varied.</p>
Evaluation/Decision Point Assessment		Student Outcomes
Are students engaged? Did students adequately research their topic?		Increased understanding of the values and drawbacks of fracking.

5. EVALUATION		Time: Minutes
What the Teacher Will Do	Probing/Eliciting Questions	Student Responses and Misconceptions
Evaluate the effectiveness of the arguments.	Why do you believe what you do?	Students may not understand the process of fracking.
Differentiation		Time: N/A
Students who are behind or need support	For advanced or gifted students	
Students may be given some information that they will evaluate.	Additional materials can be evaluated and mapping may be done of the location of some fracking.	