Project FOCUS
Best Lessons
FOURTH GRADE

Title of Lesson: Water Cycle: Making a Cloud
Theme: Water Cycle
Unit Number: 2 Unit Title: Weather
Performance Standard(s) Covered (enter code):

- **S4E3 Students will differentiate between states of water and how they relate to the water cycle and water.**
  a. Demonstrate how water changes states from solid (ice) to liquid (water) to gas (water vapor/steam) and changes from gas to liquid to solid.
  b. Identify the temperatures at which water becomes a solid and at which water becomes a gas.
  c. Investigate how clouds are formed.
  d. Explain the water cycle (evaporation, condensation, and precipitation).

Enduring Standards (objectives of activity):

Habits of Mind

[X] Asks questions
☐ Uses numbers to quantify
☐ Works in a group
[X] Uses tools to measure and view
[X] Looks at how parts of things are needed
[X] Describes and compares using physical attributes
[X] Observes using senses
[X] Draws and describes observations

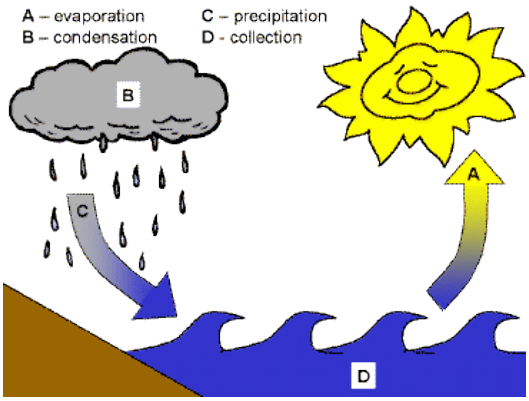
Content (key terms and topics covered):
-Water Cycle
-Evaporation
-Condensation
-Precipitation
-Collection
-Water Vapor
-Cloud
-Continuous

Learning Activity (description in steps)
Abstract (limit 100 characters): We will be creating a cloud as seen in one of Bill Nye's experiments in order to explain how the water cycle works. Once the cloud is made, we can then allow it to condense and even reform it again, showing how the water cycle is continuous. Throughout, we will draw out and explain the steps and terms of the water cycle.

Details: I began by showing a Bill Nye clip the Tuesday before and explaining the terms of phase changes. We reviewed evaporation, condensation, boiling, freezing, melting, etc and the temperatures at which these happen. This prepared us for Friday's lesson. The begin I took out the 1000mL flask and said what is the first, bottom, piece of the water cycle? The collection. I drew a lake on the board (or ocean, etc). Then I put some water in my flask. Now what happens when sun heats the water? The class knew evaporation occurred due to the sun's heat on the surface of the water. Water vapor forms. I swirled/ shoot the flask to signify this. Now what? The water vapor is warm class, so where do you think it will go? Up. Heat rises. The water vapor goes up until it reaches the cool air high up. I pressurized the flask with the pump and said, so now a cloud forms once it goes up and reached the less dense air above? Signified by pressurizing then releasing the pressure in the flask (like rising to a less pressurized area). Most kids should know a cloud still wont form. Why? You need dust or some particles to condensate on! I lit a match and put it in the flask to add some airborne particles in the form of smoke. Now I pressurize it and what will happen class? A cloud forms! You release the pressure and a cloud forms in the flask if done correctly. Some practice may be needed for this part to work right (a lot of pressure is needed). From here you can keep drawing the water cycle on the board and explain that the clouds with precipitate (usually in the form of rain). I can cap the flask and you can see water droplets form on the side of the contained. The rain falls and streams and rivers bring it back to the lakes and oceans or the collection areas. My flask showed this with the water returning to the bottom of the flask when capped. Then I repeated the cloud making once more with the kids explaining the cycle back to me and why I needed the dust, the pressure, etc (the pressure is hard conceptually so I kinda ignored that bit). Then I can repeat again and again if I want because just like the water cycle the most important part is that it is continuous.

Materials Needed (type and quantity): One 1000mL Round Bottom (or similar) flask
One pump
A box of matches
Liquid water
Imagination
White board (or chalkboard. But not a smartboard because those are a waste of the schools money and never work)
White board markers

Notes and Tips (general changes, alternative methods, cautions): When providing pressure make sure you have a good seal to give maximum pressure. It may take practice so try it at home. Make sure you hold the matches in the flask for a sec to make the smoke sit before you drop the matches to get maximum smoke before they go out in the water in the flask. Bellow is a super basic version of what your pic should look like but this one is by no means how I drew mine, its just a start to see what you are drawing. I added much more detail and the sun should not be a target of evaporation rather a reason it occurs. The water vapor should go to the cloud.



Sources/References:

1) http://www.youtube.com/watch?v=hehXEYkDq_Y
2) The class textbook
3) http://www.youtube.com/watch?v=SQ7oqxuZXPU