

## APES BIOGEOCHEMICAL CYCLES ACTIVITY

CLASS SET → DO NOT write on this sheet...All your work needs to go on a separate piece of paper with your name, date, and period

**DIRECTIONS** → Review the carbon, phosphorus, and nitrogen cycles below by accessing the websites listed. Summarize each biogeochemical cycle (in paragraph or bullet form). In addition, write two multiple-choice questions with five possible answers for the carbon, phosphorus, and nitrogen cycles (include the correct answer).

► **Carbon cycle tutorial (be sure to discuss the relationship of photosynthesis & respiration)**

- <http://bcs.whfreeman.com/thelifewire/content/chp58/5802002.html>
- [http://www.mhhe.com/biosci/genbio/tlw3/eBridge/Chp29/animations/ch29/1\\_carbon\\_cycle.swf](http://www.mhhe.com/biosci/genbio/tlw3/eBridge/Chp29/animations/ch29/1_carbon_cycle.swf)
- <http://www.sumanasinc.com/webcontent/animations/content/globalcarboncycle.html>



► **Phosphorus cycle tutorial (be sure to include the fact that the phosphorus cycle has no gaseous component)**

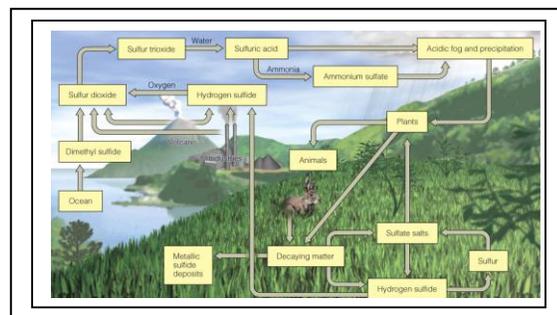
- <http://nmsp.cals.cornell.edu/publications/factsheets/factsheet12.pdf>
- <http://www.epa.gov/agriculture/ag101/impactphosphorus.html>
- [http://highered.mcgraw-hill.com/olcweb/cgi/pluginpop.cgi?it=swf::480::640::/sites/dl/free/0072879351/113987/0008.swf::Phosphorus\\_Cycle](http://highered.mcgraw-hill.com/olcweb/cgi/pluginpop.cgi?it=swf::480::640::/sites/dl/free/0072879351/113987/0008.swf::Phosphorus_Cycle)

► **Nitrogen cycle (be sure to explain nitrogen fixation, the role of nitrifying bacteria, ammonification, and denitrification.**

- <http://nmsp.cals.cornell.edu/publications/factsheets/factsheet2.pdf>
- [http://www.mhhe.com/biosci/genbio/tlw3/eBridge/Chp29/animations/ch29/1\\_nitrogen\\_cycle.swf](http://www.mhhe.com/biosci/genbio/tlw3/eBridge/Chp29/animations/ch29/1_nitrogen_cycle.swf)
- <http://bcs.whfreeman.com/thelifewire/content/chp58/5802004.html>

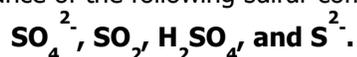
► **Review the sulfur cycle on page 77-78 of Miller: Living in the Environment and the following websites:**

- <http://nortonbooks.com/college/biology/animations/ch37a02.htm>
- <http://telstar.ote.cmu.edu/enviro/m3/s4/cycleSulfur.shtml>
- [http://www.brookscole.com/cgi-wadsworth/course\\_products\\_wp.pl?fid=M20b&product\\_isbn\\_issn=9780495015987&discipline\\_number=22](http://www.brookscole.com/cgi-wadsworth/course_products_wp.pl?fid=M20b&product_isbn_issn=9780495015987&discipline_number=22) you can download a Powerpoint for the figures from your textbook (Ch. 3) from the link above.



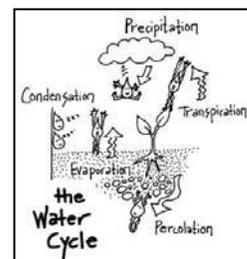
**Draw a diagram of the sulfur cycle.**

You may also want to search the internet for a diagram of the sulfur cycle to help you. Explain the formation, common sources, and ecological importance of the following sulfur compounds/molecules



► **WATER CYCLE** Visit the websites → <http://www.montereyinstitute.org/noaa/lesson07.html>  
<http://ga.water.usgs.gov/edu/watercyclesummary.html>

Watch the animations on the water cycle, and draw a simplified diagram of the water cycle. **Write a paragraph explaining the role of condensation, precipitation, infiltration, runoff, and evapotranspiration.**



OVER →

► *Select a cycle. Become the role of the molecule OR element that circulates through your cycle and compose a story from the perspective of that substance. You will work individually, NOT with your lab partner OR others working on the same cycle. Be creative and have fun, but...keep it school appropriate. (Examples Below!!!)*

### **Rosie the Water Molecule**

I knew I could do it! Just if I moved around a little more, flapped my molecule wings a little harder, I knew that eventually, I would evaporate up, up and away from here! And I did! Higher and higher I evaporated, until I was up in the atmosphere! From way up there, all my friends down in the ocean looked like little molecules...which, actually, they were. Once I was finally up in the atmosphere, it was like the greatest roller coaster ever. I was transported to all sorts of amazing places with a whole tour group of other water molecWe called ourselves VAPOR, because the group consisted of Velma, Adam, Paul, Oren, and me, Rosie. We all became really close in our tour. So close, in fact, that after we were done traveling around the atmosphere, we fused together, and in a bond of friendship known to some as condensation, we became liquidized. It was so much fun! After such high paced movement, it was great to relax to a lower energy state. We knew that the atmosphere had been fun, but it had taken a lot out of us, so we fell back to earth in our condensed form. On the trip home, we saw all the giants pull out crazy contraptions that they called "umbrellas." We were careful to avoid those! When we reached earth's surface, we knew that we had to go our separate ways. Some of us decided to runoff into unknown landOthers decided to take a tour of underground, on something called the Infiltration/ Percolation Train. I think I'll join them. I had so much fun on this trip, who knows, may do it again sometime.

### **My Purpose In Life**

Thank Goodness I was out of there! I couldn't stand it in that mouth for another second! It was so hot and stifling. But now that I was out, I wondered what there was to do around here. I took a little trip up to the atmosphere to see what was going on, but nothing was particularly interesting, so I returned, unchanged by my experience. Suddenly though, this funny looking creature grabbed me! It was green, with lots of leaves. Oh, no, I had been warned about those things! I was scared, but I had no choice...it was like I was overpowered by the sheer size of it. It took me in, and before I knew it, I was changed. I felt cheap and used. I knew that somehow, I just wasn't the same. I was angry with the thing for changing me! But the thing, which told me its name was Mr. Plant said that he was grateful, because he had truly needed someone like me, and without me, he would have felt suffocated. I forgave him, and in honor of my change, changed my name to Glucose, (isn't it pretty?) After that, I spent a while searching for my purpose in life. I dabbled in Hindu mysticism, neuroscience, and the performing arts. One day, however, I came upon a little bug, and suddenly, I knew my destiny! My destiny was to be used for energy by that bug! And then, the bug would be used for energy by a bird, the bird by a wolf, the wolf by a bear, and it would continue and continue, until I had fulfilled a grand destiny! And then, one day, one shining day, I would leave this earth, in a glorious burst of aerobic respiration, and begin my journey anew, with perhaps, a new purpose.

### **The Phosphorous Ion**

I was so incredibly bored. I felt as though I had been there my entire life! I had to move, but I couldn't. I was so barred in by this stupid rock! I feel myself practically dissolving with boredom. One day though, a flood came. Kids in Phosphate School called it "The Great Leaching." I knew an opportunity when I saw one! I jumped into the flood, allowing it to carry me away. I needed to find a new home, somewhere that I felt I truly belonged. Finally, I found a crowd of big green things with leafy attachments. They looked friendly enough, and so I introduced myself. They readily welcomed me into their circle. Soon, they had up taken me as a part of their group. I felt really one with them, really and truly organic. One day, my plant friend and I embarked on yet another journey. A tour through what was booked as "The Goodtime Food Chain". It sounded interesting, but unfortunately, it was just very dark, with the vague sensation of being moved around a lot. Finally, the tour ended. Sadly, I was alone. My friend had gotten lost along the way, oddly enough. Desolate and sad, I ran into a crowd of decomposers. In my depressed mood, they were able to easily break me down. Not only was I alone now, I was broken down. All I wanted to do was go under a rock and cry. I decided to do just that. I went under the ocean sediment, surrounded by the distinct feeling that I would be there for quite a while, and cried and cried.