

4.1: Tiny Pool and Flux Game Worksheet

Ecosystems include carbon **pools**—different forms of organic carbon and CO₂—and carbon **fluxes**—processes that move carbon atoms from one pool to another. Carbon fluxes cause pools to get bigger or smaller. You can see how this works by playing the Tiny Pool and Flux Game. This game has a tiny ecosystem that has 10 carbon atoms, two carbon pools (Atmospheric and Organic Carbon) and two carbon fluxes (Photosynthesis and Cellular Respiration).

A. Playing the Game

Here's what you will need besides this worksheet:

- The Tiny Pool and Flux Placemat
- 10 carbon atoms (from your molecule kits, or other counters such as pennies)

Each scenario in the tables below is a different game. Here's how to play:

- You start the game by looking at the numbers for Year 0 in the table. If it has numbers, put those numbers of atoms in the Organic and Atmospheric Pools if there are no numbers, decide how many atoms to put in each pool. Put two different-colored dots on the graph showing how many atoms are in each pool.
- Each game has five turns of one year each. For each turn you:
 - Move the numbers of atoms showing in the two fluxes.
 - Record the new numbers of atoms in each pool
 - Put new dots on the graph for each pool and connect the dots with lines.

Scenario #1: Balanced Fluxes			
Photosynthesis: 2 carbon atoms/year		Graph Key	
Cellular Respiration: 2 carbon atoms/year		 organic pool	 atmospheric pool
Year	Organic Pool (# carbon atoms)	Atmospheric Pool (# carbon atoms)	
0	6	4	
1			
2			
3			
4			
5			
<p>What is happening in this ecosystem to the amount of organic carbon?</p> <p>Find some different fluxes that will produce the same graph: Photosynthesis: _____ Cellular respiration: _____</p>			

Scenario #2: Unbalanced Fluxes			
Photosynthesis: 2 carbon atoms/year		Graph Key	
Cellular Respiration: 3 carbon atoms/year		 organic pool	 atmospheric pool
Year	Organic Pool (# carbon atoms)	Atmospheric Pool (# carbon atoms)	
0	5	5	
1			
2			
3			
4			
5			
<p>What is happening in this ecosystem to the amount of organic carbon?</p> <p>Find some different fluxes that will produce the same graph: Photosynthesis: _____ Cellular respiration: _____</p>			

Scenario #3: Crossing lines. Can you choose pools and fluxes that will make the graph lines cross each other?			
Photosynthesis: __ carbon atoms/year		Graph Key	
Cellular Respiration: __ carbon atoms/year		 organic pool	 atmospheric pool
Year	Organic Pool (# carbon atoms)	Atmospheric Pool (# carbon atoms)	
0	_____	_____	
1			
2			
3			
4			
5			
<p>What is happening in this ecosystem to the amount of organic carbon?</p> <p>Find some different fluxes that will produce the same graph: Photosynthesis: _____ Cellular respiration: _____</p>			

Scenario #4: Your choice. Try your own pools and fluxes and record what happens.

Photosynthesis: ___ carbon atoms/year		Graph Key	
Cellular Respiration: ___ carbon atoms/year		 organic pool	 atmospheric pool
Year	Organic Pool (# carbon atoms)	Atmospheric Pool (# carbon atoms)	
0	_____	_____	
1			
2			
3			
4			
5			
<p>What is happening in this ecosystem to the amount of organic carbon?</p> <p>Find some different fluxes that will produce the same graph: Photosynthesis: _____ Cellular respiration: _____</p>			

B. Questions about Patterns

What patterns did you notice as you played the game? Use the space below to explain the patterns you saw in how fluxes can change the sizes of pools (or keep them the same).
