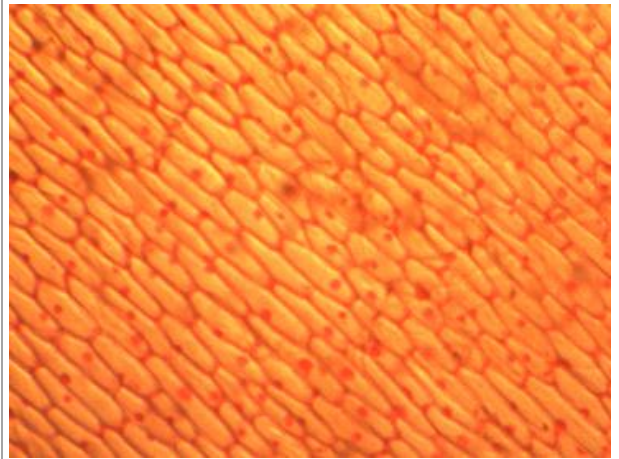
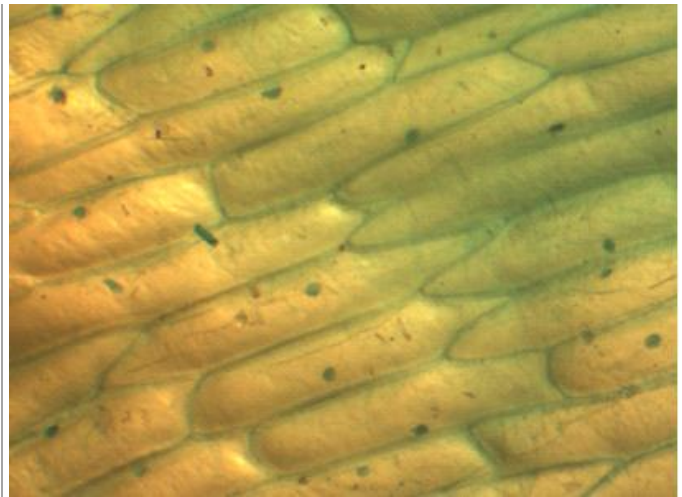


M06 Labs and Angry Red Planet

Monday, March 02, 2009
1:43 PM

VoiceThread <http://voicethread.com/share/558840/>

Slides	Notes
 <p>Module 06: The Cell</p> <p>Lecture 1: Cellular Structure Lecture 2: Cellular Transport System Lecture 3: How Cells Produce Energy Lecture 4: Protein Synthesis</p> <p>👉 Lab Day Interactive Practice</p>	
<h2>Apologia Biology Module 6.1 Lab</h2>	
 <p>Cork Cell Structure</p>  <p>Onion Cell Structure</p>	





Make and Explore the Use of a

RESPIROMETER

http://www.phschool.com/science/biology_place/labbench/lab5/assemble.html

<http://www.jdenuno.com/PDFfiles/Respiration.pdf>

 Not Actual Image	<p>Potassium hydroxide, 30g Corrosive and poison; read warning labels carefully. more</p> <p>Price: \$4.25 Add to Cart</p>	
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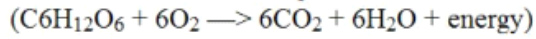
http://www.hometrainingtools.com/catalog/chemistry/chemicals/cat_chemicals-m-p.html?products_begin=20

Design a lab that can measure the rate of Respiration

What is rate?

How could we measure ...

Cellular Respiration



About 20.8% of what we breathe in is oxygen

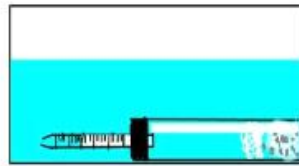
Exhale into an inverted graduated bottle that is initially filled with water.



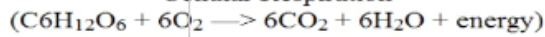
Volumetric Exerciser



Respirometer



Cellular Respiration



About 20.8% of what we breathe in is oxygen

DATA: Volume of each breath: 1,000 mL
of breaths in one minute: 12

ANALYSIS:

How many liters of oxygen breathed in 1 minute:

How many molecules will that convert to?

If everything in the equation were a gas, we could just use the ratios directly. Do we have all gases?

$$PV=nRT$$

P = pressure (1 atm)

V = volume in L

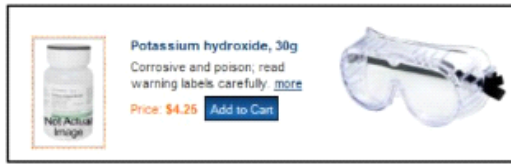
n = number of molecules

R = gas constant (0.082 L*atm/K*mol)

T = temperature in K (C+273)

body temp = 38 degrees C

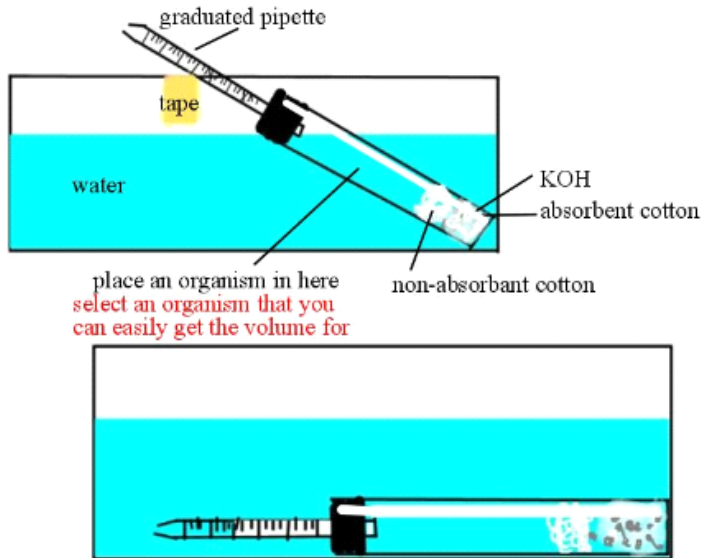
Let's Think through a Respirometer Lab



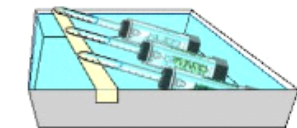
Potassium hydroxide, 30g
Corrosive and poison, read warning labels carefully [more](#)
Price: \$4.25 [Add to Cart](#)

Not Actual Image

http://www.bonetrainingtools.com/catalog/chemistry/chemicals/cat_chemicals-m-p.html?products_begin=2



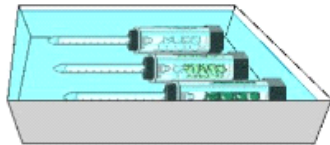
Think through the lab design



What could be your hypothesis?

What could be your controls?

How can you organize your data?

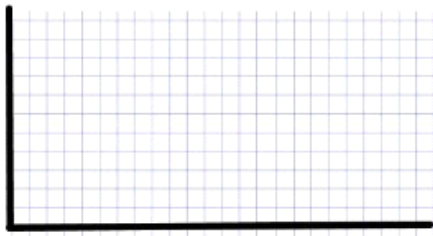


Think Through Your Data

		Beads Alone		Germinating Peas			Dry Peas and Beans		
Temp (°C)	Time (min)	Reading at time X	Diff*	Reading at time X	Diff*	Corrected Diff. ^	Reading at time X	Diff*	Corrected diff ^
25°	Initial - 0	0.93		0.91			0.92		
	0-5	0.91	0.02	0.84	0.07	0.05	0.89	0.03	0.01
	5-10	0.90	0.03	0.77	0.14	0.11	0.87	0.05	0.02
	10-15	0.90	0.03	0.71	0.20	0.17	0.87	0.05	0.02
	15-20	0.90	0.03	0.64	0.27	0.24	0.85	0.07	0.04

What general patterns do you see in the data?

		Beads Alone		Germinating Peas			Dry Peas and Beans		
Temp (°C)	Time (min)	Reading at time X	Diff*	Reading at time X	Diff*	Corrected Diff. ^	Reading at time X	Diff*	Corrected diff ^
25°	Initial - 0	0.93		0.91			0.92		
	0-5	0.91	0.02	0.84	0.07	0.05	0.89	0.03	0.01
	5-10	0.90	0.03	0.77	0.14	0.11	0.87	0.05	0.02
	10-15	0.90	0.03	0.71	0.20	0.17	0.87	0.05	0.02
	15-20	0.90	0.03	0.64	0.27	0.24	0.85	0.07	0.04



ANGRY RED PLANET



When you volunteered to help oversee the simulated spaceflight to Mars, everyone warned you the job would be boring.

Of course that was before the oxygen started getting low...



\$16.25 plus tax

My job is to monitor our simulated spaceship

Months long

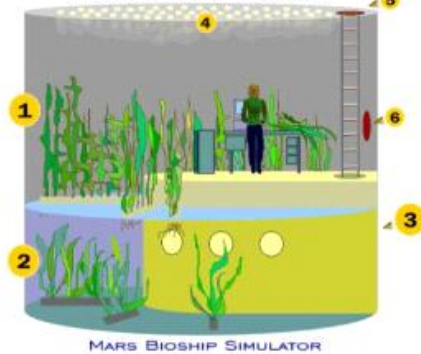
I come on duty at 5pm

Paul always sticks me with pizza bill

10 minutes after he leaves, pizza guy arrives

Curious? Tour for the pizza guy.

BIOREGENERATING POD



MARS BIOSHIP SIMULATOR

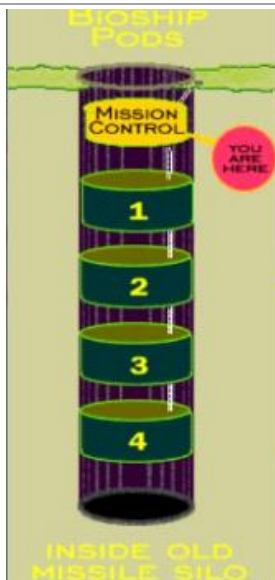
- 1 and 2 - Aquaculture (food and oxygen)
- 3 - living quarters
- 4 - Full spectrum lights to simulate sun
- 5 - The chamber is sealed for the simulation
- 6 - Emergency Hatch (opens if CO₂ reaches 0.5%)





Diagram on the wall.

Old missile silo with 4 chambers

Self-sustained

Not allowed to open the door until the simulation



 HEIDI	Pod 1: O ₂ : 21.05% CO ₂ : 0.040% H ₂ O Temp: 75
 JERROLD	Pod 2: O ₂ : 21.02% CO ₂ : 0.043% H ₂ O Temp: 73
 SAMARA	Pod 3: O ₂ : 21.23% CO ₂ : 0.038% H ₂ O Temp: 76
 FOSTER	Pod 4: O ₂ : 20.51% CO ₂ : 0.44% H ₂ O Temp:

Another diagram

1 volunteer per pod

CO2 ALARM

Which chamber?

CO₂ Poisoning

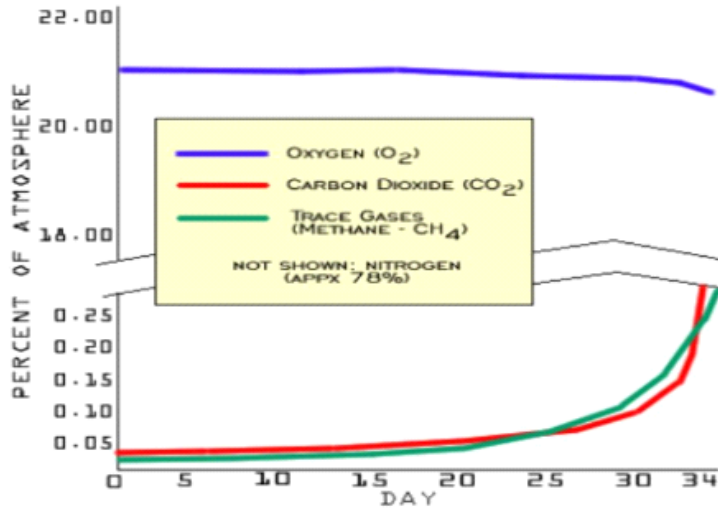
The Simulator Emergency Hatch will open at 0.5% and the simulation would have to be restarted.

	stuffy air shortness of breath rapid pulse rate
0.5%	headaches hearing loss sweating fatigue
1.5%	nausea dizziness depression shaking visual disturbances pass out dies

Couldn't reach Foster

Symptoms

Atmosphere History Pod 4

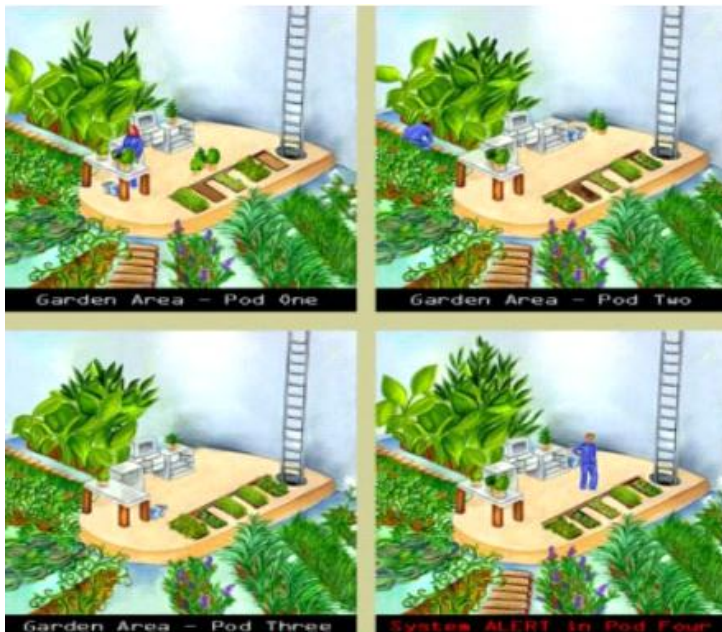


Foster is supposed to be monitoring.

Data!

I know. I don't want to be the one to bring the simulation to an end.

I am ready to throw in the towel. What a headache!



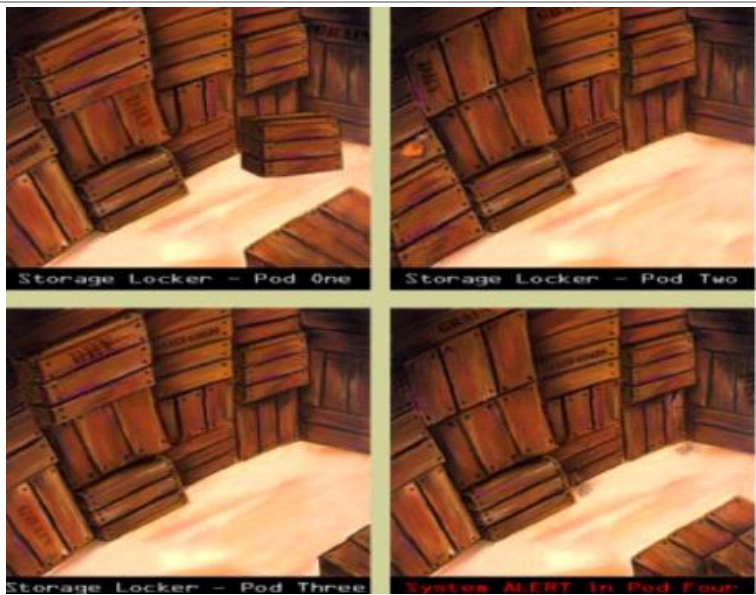
Hedei!

Can you help us?



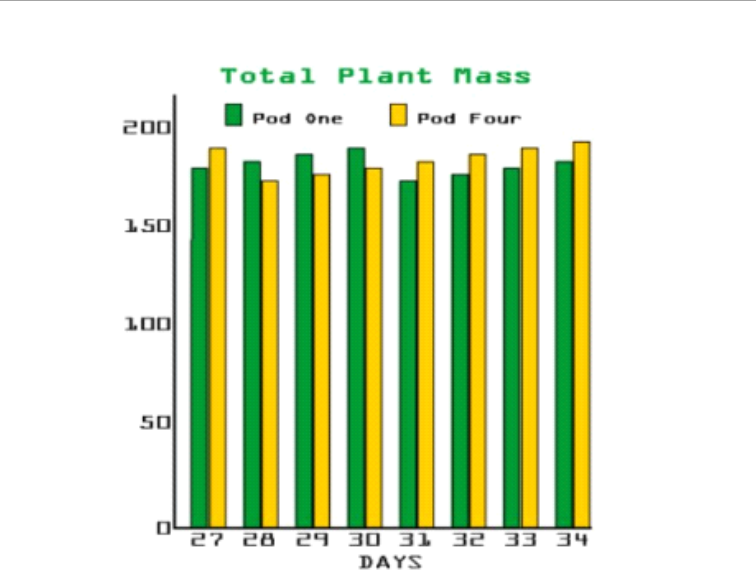
Samara was up and stirring in her quarters.

Help too!



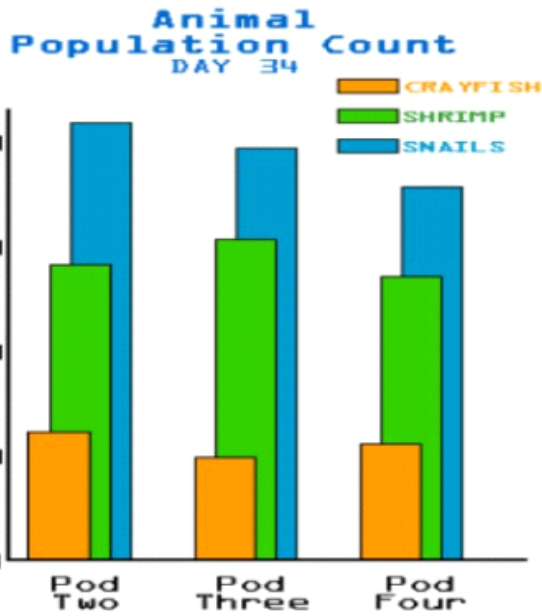
Anything?

Cargo Bay

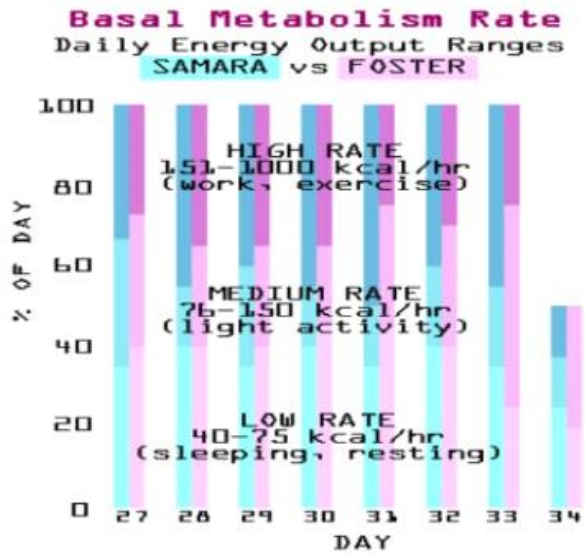


Any hints here from the plant mass indicator?

Animal count done by the volunteers by sampling and estimation.



Energy levels? Maybe Foster is using up a lot of energy?



Hey,
can ya like isolate each section
of the pod?

Maybe if you can figure out
what part the problem is in
it would help you find it out
man.

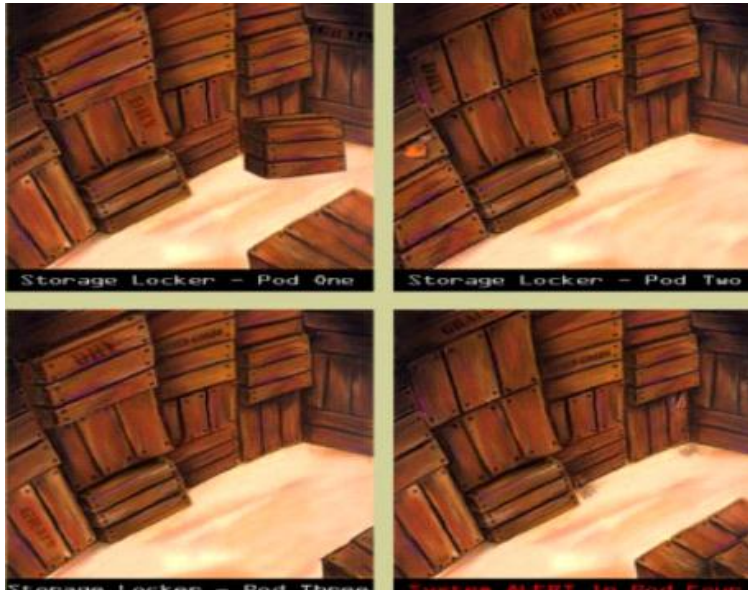


Which compartment should I stay in?

Foster - Garden



	Garden	Sleeping	Cargo
before seal		O ₂ 20.51% CO ₂ 0.44%	
after seal	O ₂ 21.02% CO ₂ 0.43%	O ₂ 20.51% CO ₂ 0.44%	O ₂ 20.02% CO ₂ 0.46%



Anything we missed.

Foster, take a look.



Look what I
Found!

How do we fix this?

Termites! They were not in population counts.

Here is one - <http://www.pbs.org/wgbh/nova/sheppard/analyze.html>