

1. What is the difference between an open and a closed system? Give an example.

open = transfer energy and matter (open jar of sun tea)  
Closed = transfer energy only

2. Is the Earth an open or closed system?

3. Give all the evidence that you can come up with to defend your answer for question # 2.

- Sun's rays absorbed and radiated back out.
- Carbon cycle
- water cycle

4. What are the 4 different Spheres that Earth consists of? Give a simple explanation of each.

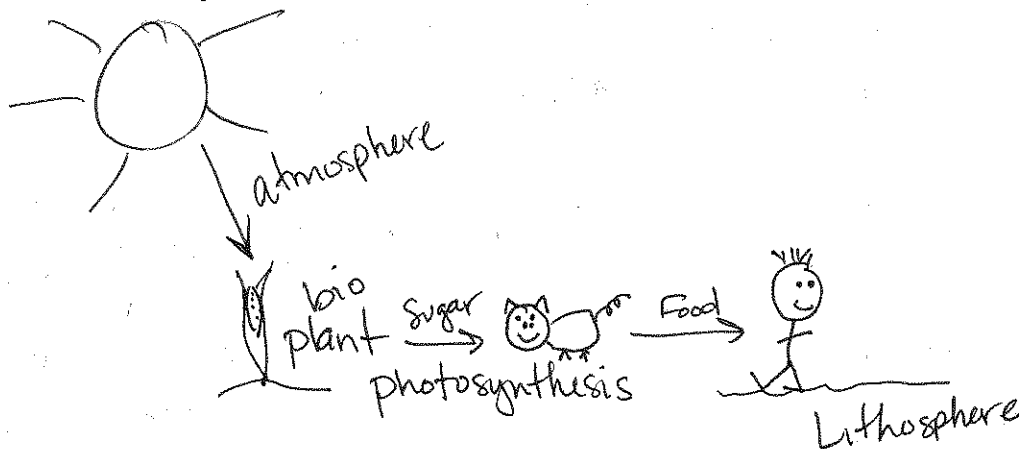
atmosphere = air  
hydrosphere = water  
litho/geosphere = earth (land)  
biosphere = living things

5. Do interactions occur between the above 4 spheres (systems)? yes

6. Give at least 2 examples of interactions between different spheres (systems), and explain them.

7. Does energy get transferred from one system to another? Yes like when plants take CO<sub>2</sub> and make sugar.

8. Explain the transfer of Energy that starts from the sun and moves through the spheres to us humans? Draw a picture to illustrate your answer.



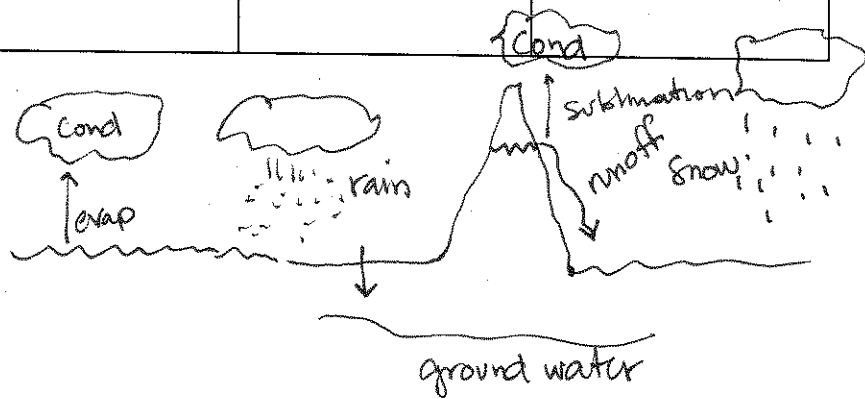
9. Think back to how we talked about a change in one system can cause a chain of events throughout the other systems. Complete the following chart below describing how events can cause a change from system to system.

	Atmosphere	Lithosphere (land)	Hydrosphere (water)	Biosphere (living)
Tornado	<p><b>Changing weather system causes tornado</b></p> <p>Gasses can be released into the air possibly GHG's.</p>	<p>Land is ripped up, habitats can be destroyed, pollution can be distributed, and destruction to industrial plants can release pollutants into land, water, and air.</p>	<p>Floods can occur, pollutants can be released into bodies of water</p>	<p>Habitat destruction for animal, food resources can be depleted.</p>
Volcano Eruption	<p>Clouds of ash + gasses released</p>	<p>new land created rock can be added to lito changes inside</p>	<p>pollution of water thermal pollution</p>	<p>Habitat destruction</p>
Greenhouse gasses are let into the atmosphere.	<p>↑ amount <math>CO_2</math> + <math>NO_x</math> + <math>SO_x</math></p> <p>smog</p>	<p>global warming</p>	<p>acid rain</p>	

10. What systems interact during the water cycle?

hydro/litho/atmo/bio (transpiration)

11. Draw the water cycle include labels.



12. Define evaporation.

$l \rightarrow g$

13. Define condensation.

$g \rightarrow l$

14. When water evaporates from the ocean does salt evaporate with it?

No NaCl stays in the ocean

15. Explain a carbon atom moves through each of Earth's Systems.

$CO_2 \rightarrow$  Plant  $\rightarrow$  sugar  $\rightarrow$  cow  $\rightarrow$  waste or decay to soil

16. What are the 4 layer of the earth? Crust, mantle, outer core, inner core

17. What is each layer made of?

Cont. Crust = granite (hard, solid rock) oceanic crust (basalt) mantle rock

18. As you move from the crust into the core what happens to the temperature of the layers?

As depth  $\uparrow$  Temp  $\uparrow$

asthenosphere  
"plastic like"  
Core = Fe and Ni  
outer = liquid

19. As you move from the crust into the core what happens to the density of the layers?

As depth  $\uparrow$  Density  $\uparrow$

20. What is the difference between the lithosphere and the asthenosphere?

rock — plastic like — higher and Dens.

21. What is the difference between the inner and outer core?

lower T and Dens. — outer mantle — inner mantle

22. Explain why the inner core remains solid even though it is very hot?

solid — liquid — pressure pushes molecules together

23. What is isostasy?

24. Which part of the crust is more dense, the continental or the oceanic?

25. Which part of the crust is thicker, the continental or the oceanic?

20-40 km — 4-7 km

26. What is the density equation that we used in the density lab?

$D = m/V$

27. What are the units that density is measured in?

g/mL or g/cm<sup>3</sup>

28. What will more dense liquids do when mixed with less dense liquids (lab)?

bottom — top

29. Why is it colder at the top of a mountain rather than the bottom? as Alt ↑ Temp ↓ in trop because further away from Earth (core = heat / surface = heat)

30. In high altitude aviation research (i.e. spy planes) why doesn't ice form on the wings of the aircraft? (hint - what layer

of the atmosphere would this be?)

There is very little water in the stratosphere.

31. If the mesosphere is so cold, how cold is the thermosphere and above it?

warmer because of the sun

32. Aurora is the Roman goddess of the dawn. What is an aurora and how is it related to Northern Lights?

ionized particle emitting colored lights attracted to magnetic field

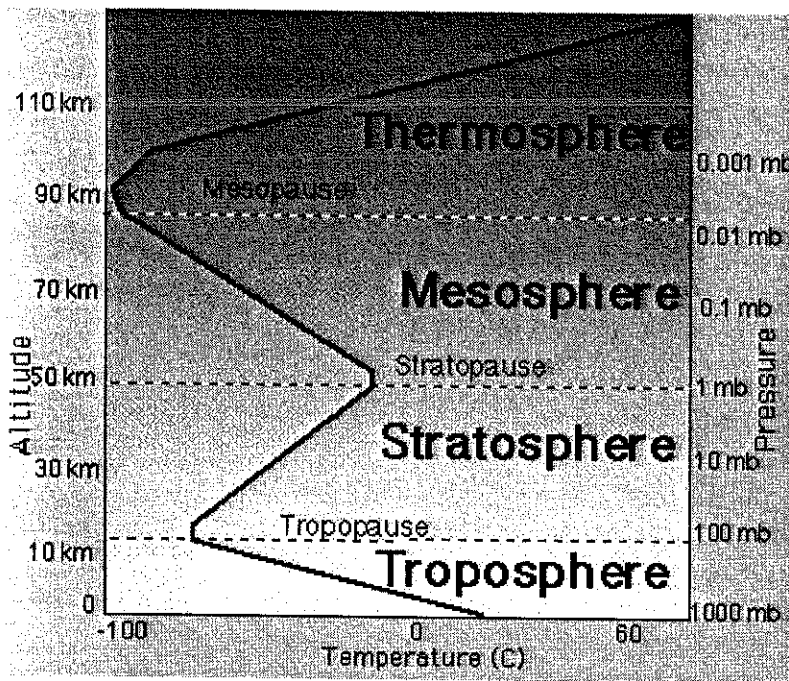
33. What layer of the atmosphere does weather occur in? List different weather events that can occur.

Troposphere — Tornado — thunderstorms — hurricane

34. Fill in the following information about the layers of the Earth.

Name of Layer (Most dense to least dense)	Altitude (km)	Temperature range	Composition (What particles are found in this layer)	An example of what objects can be found there.
Troposphere	0-15km			bi planes, helicopters, birds weather, hot air balloon
Stratosphere				weather balloons
Mesosphere				burning meteors
Thermosphere				ionosphere, northern lights, meteors
Exosphere				satellites, moon, space shuttle

35. Explain the following graph focusing on how temperature and altitude are related. What is happening at the pauses?



Trop as alt ↑ temp ↓  
 Strato as alt ↑ temp ↑  
 because of Ozone  
 layer absorbing UV  
 radiation.

Meso as alt ↑ temp ↓  
 middle layer = coldest  
 layer

Thermo as alt ↑ temp ↑

pauses - temp remains  
 constant.