I. Ocean science briefing, activity carts and textbook reading study questions
<u>Climate Change</u>
1. What is the main cause of the increase in CO_2 in the atmosphere and how do scientists know this?
2. Describe how the greenhouse effect on Earth works.
3. What are 4 major greenhouse gases? In what ways do the greenhouse gases differ from one another?
4. What are the three possible interactions when a photon hits a molecule? How does a greenhouse gas molecule react compared to those that are not greenhouse gases? Why does this matter?
5. Greenhouse gases make up a small proportion of the atmosphere. Why do they have such a huge effect on the atmosphere?

<u>Ocean Currents & Circulation</u>
1. What are surface currents driven by?
2. What is deep ocean circulation driven by?
3. Define density in words. What seawater properties affect density and in what ways?

<u>Adaptations & Evolution</u>
1. Define adaptation.
2. Define evolution.
3. Why is it important to use the right language in talking about adaptations?
4. What are some words you might want to avoid in talking about adaptations, and why?
5. What are some common misinterpretations of adaptation the public often have?

<u>Carbon Cycle</u>
1. Describe the "enhanced" greenhouse effect.
2. What is the relationship between temperature and CO_2 levels?
3. Name three reservoirs and describe three flows between reservoirs.
4. Describe the relationship between ocean temperature and the greenhouse effect. What is the mechanism that causes this?

II. Learning Science Study questions

<u>Learning in informal environments</u>
1. Why do you think informal environments may be valuable for learning and for learning science in particular?

<u>Nature of Science</u>
1. What is science?
2. How does science work? Why is it important for the public to understand how science works?
3. Explain three common misinterpretations of the scientific process.
4. What are the practices of science?

<u>How learning happens</u>
1. What are the five foundational ideas on how learning happens? What do they mean? How would you use them when interacting with the public?
2. What can you do to access and connect with learners' prior knowledge? Why is doing this important?
3. Learners need to expend considerable mental effort and persistence in order to learn complex ideas deeply. Describe the various types and levels of engagement required.
4. Describe what it means to say that learning, especially of complex science concepts, occurs within social activities. What is meant by social activities and why are they important?
5. Describe three social interactions that support learning.
6. Why is it important for learning opportunities to be situated in everyday experiences?
7. Compare and contrast working and long-term memory. What are mental models and how is this related to expertise?

<u>Teaching & Learning</u>
1. Explain the five phases of the learning cycle.
2. Pick a COSIA Exemplar Activity. Explain how the learning cycle is incorporated into the design of the activity.
3. Explain how each of the Active Learning Designs takes into account how people learn.

<u>Conversations & Questions</u>
1. Why is talking an important part of learning?
2. Describe two things that you can do to facilitate a conversation so that is not an Educator Monologue but more Reflective Discourse.
3. What are the characteristics of and the value of engaging in Reflective Discourse?
4. What is the value of peer-to-peer discourse? How would you allow for it when interacting with the public?
5. Explain how the Discussion Map takes into account how people learn.