SPONGES- Vocabulary, Concepts:

1. "Primitie " metazoans- "cellular level of organization"
2. limited cell types- no nerve cells, spicules
3. 5,000 species- mostly marine
4. water flow, filtration- driven by choanocytes
5. adaptations for sessile existence
6. skeletons of spicules, sponging (spicules calcium carbonate and/or silica)
7. 3 levels of body wall infolding- increases support, size, filtration potential
8. sexual reproduction-monoecious; ciliated larvae (motile), planktonic
9. asexual reproduction- related to regeneration? Basis? - colonies form -
10. fresh water gemmules - use of archeocytes (stem cells?)
11. 3 (4) classes
    a- Demospongia- 90%, spongin (some with chitin!) and/or Si O2 spicules, usually 8 pointed
    b- Calcarea- Ca Co3 spicules- (no sponging), mostly small irregular shapes
    c- Hectanellida- SiO2 spicules with 6 points- Venus' Flower Basket (shrimp inside)
    d- Sclerospongia (separate class?) , have sponging + Ca CO3 and Silica spic.
12. Recognition of self- reaggregation, also tissue plug experiments
13. chemical defense mechanisms- ex is Fire Sponge

Questions:

1. What characteristics of sponges are adaptations for a sessile existence?
2. Why are there many more species of marine sponges that fresh water ones?
3. Which would be a better skeletal material- Ca Co3 or SiO2? Why?
4. Is "simple" a good description of sponge structure and function?
5. Which organisms might have been the ancestors of sponges?
6. Why are the sponges called "Parazoa? and Porifera?
7. What are the ecological and other roles of Spones?
8. What are the advantages and disadvantages of sexual versus asexual reprod.?
9. Why might chemical defense mechanisms be especially valuable for sponges?

CNIDARIA Vocabulary , Concepts:

1. few cell types yet complex forms,etc- roles of interstitial cells
2. nameatocyst- organelle secreted by cnidocysts
3. 3 major classes = Hydrozoa , Scyphozoa (incl former separate class Cubozoa), Anthozoa (greatest representation at San Sal)
4. Jellyfish and Corals best known (Hydra in H.S. / college classes- aberrant)
5. Lifestyle involves alternating diploid stages= polyp and medusa - process is called metagenesis (medusae lost in Anthozoans, other aberrances too)
6. alternate sexual and asexual with egg, sperm, larvae involved
7. polymorphism- Port. Man-o-War best known- about 20 morphs: feeding, reprod, defensive, secretory morphs plus others)
8. Many Cnidaria have intracellular zooxanthellae: corals, Green Hydra, Cassiopea

9. terms/definitions to know: jellyfish, mesoglea,perisarc,hydroskeleton,colonial, oral/aboral,soft coral, hard coral, statocyst, siphonopora, pedal laceration, septa, hermatypic

CTENOPHORA: Vocabulary and Concepts

1. Similar to Cnidaria medusa but also different
2. no nematocysts- some have sticky colloblasts
3. 8 comb rows of cilia- name of group
4. apical sense organs with statoliths and balancers control cilia beat
5. major predators of fish and other plankton
6. free swimming larvae- adults also planktonic
7. well known for bioluminescence

Questions:

1. Why do some people consider nematocysts "the most complex organelles in the animal kingdom"?
2. What is the advantage of metagenesis? Polymorphism? Is Poly common in other groups of animals?
3. What are the advantages and disadvantages of colonialism versus solitary forms?
4. Are most Cnidarians motile or sessile?
5. Why might some Cnidarians have nematocysts and intracellular algae?
6. Are Cnidarians at the "tissue level of organization"?
7. How does competency in asexual reproduction correlate with regeneration capability?
8. Why might Cnidaria be good models to study nervous systems?
9. Other than corals, are Cnidarians ecologically important?

(Ctenophore questions)

1. What Cnidarian ancestor might have given rise to the Ctenophores?
2. Would loss of nematocysts have been an evolutionary advance or regression?
3. How might bioluminescence be related to survival in Ctenophores?
4. Are cilia equally important in Cnidaria and Ctenophores?

ANNELID - Vocabulary and Concepts:

1. 3 major classes; Polychaete (only important ones in marine evronment), Oligochaete, Hirudinea
2. segmentation (metameric organization) of body plus tentacles, gills, proboscis, cuticle/chitin-covered body wall
3. multifunction of parapodia- often with setae
4. large coelom allows hyudrostatic skeleton and hydraulic locomotion- tube within a tube
5. fluids in closed system- muscle driven- pigments useful

6. well developed organs- digestive, nervous, excretory systems
7. usually dioecious (earthworm + leeches exceptions) - internal or external fert.
8. trochophore larvae- phylogenetic significance ("little tops spinning")
9. Siboglinidae is subgroup of Polychaegtes - formerly in phylum Pogonophora - thermal vent communitiy members use chemosynthetic bacteria for nutrition
10. Variety of lifestyles in Polychaetes: crawling, swimming, burrowing, tube dwelling, pelagic
11. sexual reproduction may utilize epitokes- attracted to light, spawning masses

Questions:

1. Would you expect removal of some of the coelomic fluid from an annelid to increase or decrease its speed of burrowing? Why?
2. Since the trochophore of annelids closely resembles the trochophore of mollusks, can one infer that one gave rise to the other?
3. Should the Siboglinidae (Pogonophorans) be placed in a separate phylum or remain as a class of Polychaetes?
4. Why are annelids such optimal food items for other animals?
5. What are some possible reasons why polychaetes might have evolved chitinjous setae rather than calcium carbonate or silica based ones?
6. The "worm shape" has evolved in several distant groups- what is there about this body form that makes it keep appearing in evolution?
7. Are annelids ecologically significant organisms?

ARTHROPODS- Vocabulary and concepts:

1. Major groups- Chelicerates, Mandibulates (Insecta, Crustacea) , other smaller reps. in marine environment- mostly Crustacea
2. Hard exoskeleton very important- chitin + $CaCO_3$- implications of exoskeleton. specializations?
3. Variety of appendages- good example of form and function . mandibles define this large group=Mandibulata: insects and crustacea (also Myriopoda)
4. sensory mechanisms show interesting adaptations because of exoskeleton- vision, chemo, tactile, etc
5. Defining character of Crustacea= second antennal pair (plus other Crust.char)
6. Includes
    a. Cirripedia- barnacles- two types are acorn and goose-neck- related to mollusks? NO, "little shrimp-like animals glued to the substrate in a hard case and using its feet to kick food into its mouth" L. Agassiz
    b. Copepoda- lost abdominal appendages, some use antennae to swim, numerous species, important plankton/food web organisms, most small
    c. Malacostracea (75% all Crustacea) :
        1. Stomatopoda- "Mantis Shrimp" and "Thumb Splitters"
        2. Euphausiacea- "Krill" -8, not 5 pair walking legs
        3. Isopoda- Dorso-ventrally flat, small and large species
        4. Amphipoda- laterally flat, small size, numerous

5. crawling, burrowing, etc- have several larval stages during development - lobsters and shrimps- elongate; shrimp mainly swimming, lobsters crawling

QUESTIONS:

1. What is the correlation between size and thickness of cuticle in different Arthropods?
2. How is growth accomplished in organisms with a cuticle?
3. Which characteristics of Arthropods play the most important function in their niche partitioning?
4. Why are there so many Arthropod representatives in marine and fresh water plankton?
5. What time of the day is most effective for collecting Arthropod plankton? Why?
6. What are the characteristics of Insects and Arachnids which have led to their success and those of Crustacea which have led to their success in aquatic environments?
7. How does one define success most precisely?

MINOR PHYLA- Vocabulary and Concepts:

1. "Minor" is subjective term.
2. Phylum Sipuncula- worm shape; prominent proboscis, burrow or drill into rock; use mucus laden tentacles to feed; related to Annelids ? - not segmented but trochophore-like larva; several species on San Sal
3. Phylum Nemertea "Ribbon Worms"- prominent eversible proboscis- soft and fragile body, autotomize easily, feed by proboscis and body wall absorption- pilidium larvae- affinity to other protostomes not clear- related to Annelids? (sometimes now placed within Annelids along with echiruians and pogonophorans)
4. Phylum Chaetognatha- "Arrow Worms"- voracious carnivores with massive jaws and quick movements- old species found recently but affinities not clear- deutereostomes but arises differently-maybe related to nematodes with similar cells and cuticle-
5. Phylum Brozoa- "Moss Animals"- grow attached to hard substrates- numerous species in fresh and marine habitats- colonial; lopohophores (ringlet of tentacles) have zooid structure; sexual and asexual modes reproduction
6. Phylum Hemichordata- "Acorn Worms" ("Invertebrate Chordates" ?)-lack some of Chordate characteristics found in others- link between Echinoderms and Chordates? (larvae resemble Echinoderm larvae)
7. Phylum Chordata (Minor phylum?)-
    a. Subphylum Urochordata= "Tunicata" = cellulose - like covering or tunic- all of chordate characteristics in swimming LARVAL stage but not in adult- may be solitary or colonial- filter feeders- lots of representatives at San Sal
8. OTHERS:

QUESTIONS:

1. What are some of criteria that are used to designate phyla as "major" or "minor"?
2. Would you agree or not agree with the following quote:" Life as we know it could not exist without mucus"? Why or why not?
3. What is there about the worm shape that has made it such a recurring theme in animal evolution? Do any Vertebrates use this general body form?
4. Why has an environment as constant as the marine one lead to the evolution of such a huge variety of forms and functions as seen in the invertebrates?
5. Which group of invertebrates in those above are most interesting to you and why?