Campbell's Biology, 9e **(Reece et al.)**
Chapter 33 An Introduction to Invertebrates

Almost half of the questions in the Test Bank for this chapter are synthetic questions that comprise three different scenarios, including a new scenario based on sea slugs. Fun!

Multiple-Choice Questions

1) A sponge's structural materials (spicules, spongin) are manufactured by the
A) pore cells.
B) epidermal cells.
C) choanocytes.
D) amoebocytes.
Answer: D
Topic: Concept 33.1
Skill: Knowledge/Comprehension

2) How many of the following can be observed in the mesohyl of various undisturbed sponges at one time or another?
1. amoebocytes
2. spicules
3. spongin
4. zygotes
5. choanocytes
A) one of these
B) two of these
C) three of these
D) four of these
E) five of these
Answer: D
Topic: Concept 33.1
Skill: Knowledge/Comprehension

3) Which chemical is synthesized by some sponges and acts as an antibiotic?
A) streptomycin
B) spongin
C) calcium carbonate
D) silica
E) cribrostatin
Answer: E
Topic: Concept 33.1
Skill: Knowledge/Comprehension

4) In terms of food capture, which sponge cell is most similar to the cnidocyte of a cnidarian?
A) amoebocyte
B) choanocyte
C) epidermal cell
D) pore cell
Answer: B
Topic: Concepts 33.1, 33.2
Skill: Knowledge/Comprehension

5) Sponges are most accurately described as
A) marine predators.
B) marine filter feeders.
C) freshwater scavengers.
D) aquatic filter feeders.
E) aquatic predators.
Answer: D
Topic: Concept 33.1
Skill: Knowledge/Comprehension

6) How many of the following are characteristics of at least some members of the phylum Cnidaria?
1. a gastrovascular cavity
2. a polyp stage
3. a medusa stage
4. cnidocytes
5. a pseudocoelom

A) one of these
B) two of these
C) three of these
D) four of these
E) five of these
Answer: D
Topic: Concept 33.2
Skill: Knowledge/Comprehension

7) Which of the following is true of members of the phylum Cnidaria?
A) They are not capable of locomotion because they lack true muscle tissue.
B) They are primarily filter feeders.
C) They have either, or both, of two body forms: mobile polyps and sessile medusae.
D) They may use a gastrovascular cavity as a hydrostatic skeleton.
E) They are the simplest organisms with a complete alimentary canal (two openings).
Answer: D
Topic: Concept 33.2
Skill: Knowledge/Comprehension

8) The members of which clade in the phylum Cnidaria occur only as polyps?
A) Hydrozoa
B) Scyphozoa
C) Anthozoa
D) Cubozoa
Answer: C
Topic: Concept 33.2
Skill: Knowledge/Comprehension

9) Which clade in the phylum Cnidaria includes "jellies" with rounded (as opposed to boxlike) medusae?
A) Hydrozoa
B) Scyphozoa
C) Anthozoa
D) Cubozoa
Answer: B
Topic: Concept 33.2
Skill: Knowledge/Comprehension

10) Corals are most closely related to which group?
A) jellies
B) freshwater hydras
C) sea anemones
D) sponges
E) barnacles
Answer: C
Topic: Concept 33.2
Skill: Knowledge/Comprehension

11) Which characteristic(s) is (are) shared by both cnidarians and flatworms?
A) dorsoventrally flattened bodies
B) true muscle
C) radial symmetry
D) a digestive system with a single opening
E) two of these
Answer: D
Topic: Concepts 33.2, 33.3
Skill: Knowledge/Comprehension

12) The organ(s) of respiratory gas exchange in oligochaetes is (are)
A) parapodia.
B) gills.
C) the skin.
D) book lungs.
E) pairs of hollow bristles.
Answer: C
Topic: Concept 33.3
Skill: Knowledge/Comprehension

13) Against which hard structure do the circular and longitudinal muscles of annelids work?
A) bristles
B) cuticle
C) shell
D) endoskeleton
E) hydrostatic skeleton
Answer: E
Topic: Concept 33.3
Skill: Knowledge/Comprehension

14) The excretory organs of annelids are
A) protonephridia.
B) flame bulbs.
C) metanephridia.
D) skin gills.
E) malpighian tubules.
Answer: C
Topic: Concept 33.3
Skill: Knowledge/Comprehension

15) Planarians lack dedicated respiratory and circulatory systems because
A) none of their cells are far removed from the gastrovascular cavity or from the external environment.
B) they lack mesoderm as embryos and, therefore, lack the adult tissues derived from mesoderm.
C) their flame bulbs can carry out respiratory and circulatory functions.
D) their body cavity, a pseudocoelom, carries out these functions.
Answer: A
Topic: Concept 33.3
Skill: Knowledge/Comprehension

16) What would be the most effective method of reducing the incidence of blood flukes in a human population?
A) reduce the mosquito population
B) reduce the freshwater snail population
C) purify all drinking water
D) avoid contact with rodent droppings
E) carefully wash all raw fruits and vegetables
Answer: B
Topic: Concept 33.3
Skill: Application/Analysis

17) The larvae of many common tapeworm species that infect humans are usually found
A) encysted in freshwater snails.
B) encysted in the muscles of an animal, such as a cow or pig.
C) crawling in the abdominal blood vessels of cows and pigs.
D) crawling in the intestines of cows and pigs.
Answer: B
Topic: Concept 33.3
Skill: Knowledge/Comprehension

18) While sampling marine plankton in a lab, a student encounters large numbers of fertilized eggs. The student rears some of the eggs in the laboratory for further study and finds that the blastopore becomes the mouth. The embryo develops into a trochophore larva and eventually has a true coelom. These eggs probably belonged to a(n)
A) chordate.
B) echinoderm.
C) mollusc.
D) nematode.
E) arthropod.
Answer: C
Topic: Concept 33.3
Skill: Application/Analysis

19) A brachiopod can be distinguished from a bivalve by the presence of
A) two hinged shells.
B) a digestive system with separate mouth and anus.
C) a lophophore.
D) suspension feeding.
E) a distinct head.
Answer: C
Topic: Concept 33.3
Skill: Knowledge/Comprehension

20) If a lung were to be found in a mollusc, where would it be located?
A) mantle cavity
B) coelom
C) incurrent siphon
D) visceral mass
E) excurrent siphon
Answer: A
Topic: Concept 33.3
Skill: Knowledge/Comprehension

21) Which mollusc clade includes members that undergo embryonic torsion?
A) chitons
B) bivalves
C) gastropods
D) cephalopods
Answer: C
Topic: Concept 33.3
Skill: Knowledge/Comprehension

22) A terrestrial mollusc without a shell belongs to which clade?
A) chitons
B) bivalves
C) gastropods
D) cephalopods
Answer: C
Topic: Concept 33.3
Skill: Knowledge/Comprehension

23) A radula is present in members of which clade(s)?
A) chitons
B) bivalves
C) gastropods
D) cephalopods
E) both chitons and gastropods
Answer: E
Topic: Concept 33.3
Skill: Knowledge/Comprehension

24) Which of the following is found only among annelids?
A) a hydrostatic skeleton
B) segmentation
C) a clitellum
D) a closed circulatory system
E) a cuticle made of chitin
Answer: C
Topic: Concept 33.3
Skill: Knowledge/Comprehension

25) Which of the following is a characteristic of nematodes?
A) All species can be characterized as scavengers.
B) They have only longitudinal muscles.
C) They have a true coelom.
D) They have a gastrovascular cavity.
E) Many species are diploblastic.
Answer: B
Topic: Concept 33.4
Skill: Knowledge/Comprehension

26) Humans most frequently acquire trichinosis by
A) having sexual contact with an infected partner.
B) eating undercooked pork.
C) inhaling the eggs of worms.
D) eating undercooked beef.
E) being bitten by tsetse flies.
Answer: B
Topic: Concept 33.4
Skill: Knowledge/Comprehension

27) How many of the following can be used to distinguish a nematode worm from an annelid worm?
1. type of body cavity
2. number of muscle layers in the body wall
3. presence of segmentation
4. number of embryonic tissue layers
5. shape of worm in cross-sectional view

A) one of these
B) two of these
C) three of these
D) four of these
E) five of these
Answer: C
Topic: Concept 33.4
Skill: Knowledge/Comprehension

28) Nematode worms and annelid worms share which of the following features?
A) use of fluid in the body cavity as a hydrostatic skeleton
B) ecdysis
C) presence of a circulatory system
D) presence of segmentation
E) absence of species with parasitic lifestyles
Answer: A
Topic: Concept 33.4
Skill: Knowledge/Comprehension

29) A student observes a wormlike organism crawling about on dead organic matter. Later, the organism sheds its outer covering. One possibility is that the organism is a larval insect (like a maggot). However, it might be a member of the phylum _____, and one way to distinguish between the two possibilities is by looking for _____.
A) Platyhelminthes; a cuticle of chitin
B) Nematoda; an alimentary canal
C) Annelida; a body cavity
D) Nematoda; a circulatory system
E) Annelida; muscle in the body wall
Answer: D
Topic: Concept 33.4
Skill: Application/Analysis

30) The heartworms that can accumulate within the hearts of dogs and other mammals have a pseudocoelom, an alimentary canal, and an outer covering that is occasionally shed. To which phylum does the heartworm belong?
A) Platyhelminthes
B) Arthropoda
C) Nematoda
D) Acoela
E) Annelida
Answer: C
Topic: Concept 33.4
Skill: Application/Analysis

31) Infection with which parasite might cause excessive elasticity in human skeletal muscles?
A) trichinella worms
B) tapeworms
C) copepods
D) blood flukes
E) rotifers
Answer: A
Topic: Concept 33.4
Skill: Knowledge/Comprehension

32) Which of the following are entirely, or partly, composed of calcium carbonate?
A) spicules of siliceous sponges
B) coral animals' exoskeletons
C) molluscs' mantles
D) insects' cuticles
E) nematodes' cuticles
Answer: B
Topic: Concepts 33.1-33.4
Skill: Knowledge/Comprehension

33) How many of the following are characteristics of arthropods?
1. protostome development
2. bilateral symmetry
3. a pseudocoelom
4. three embryonic germ layers
5. a closed circulatory system
A) one of these
B) two of these
C) three of these
D) four of these
E) five of these
Answer: C
Topic: Concept 33.4
Skill: Knowledge/Comprehension

34) Among the invertebrate phyla, phylum Arthropoda is unique in possessing members that have
A) a cuticle.
B) a ventral nerve cord.
C) open circulation.
D) wings.
E) segmented bodies.
Answer: D
Topic: Concept 33.4
Skill: Knowledge/Comprehension

35) A shared derived characteristic for members of the arthropod subgroup that includes spiders would be the presence of
A) chelicerae.
B) an open circulatory system.
C) an exoskeleton.
D) a cuticle.
E) a cephalothorax.
Answer: A
Topic: Concept 33.4
Skill: Knowledge/Comprehension

36) You find a small animal with eight legs crawling up your bedroom wall. Closer examination will probably reveal that this animal has
A) simple, but not compound, eyes.
B) two pairs of antennae.
C) a head, thorax, and abdomen.
D) tracheae and spiracles.
E) more than one of these.
Answer: A
Topic: Concept 33.4
Skill: Knowledge/Comprehension

37) What distinguishes complete metamorphosis from incomplete metamorphosis in insects?
A) the presence of wings in the adult, but not in earlier life stages
B) the presence of sex organs in the adult, but not in earlier life stages
C) the radically different appearance between adults and earlier life stages
D) Three of these responses are correct.
E) Two of these responses are correct.
Answer: C
Topic: Concept 33.4
Skill: Knowledge/Comprehension

38) A terrestrial animal species is discovered with the following larval characteristics: exoskeleton, system of tubes for gas exchange, and modified segmentation. A knowledgeable zoologist should predict that the adults of this species would also feature
A) eight legs.
B) two pairs of antennae.
C) a sessile lifestyle.
D) an open circulatory system.
E) parapodia.
Answer: D
Topic: Concept 33.4
Skill: Application/Analysis

39) The possession of two pairs of antennae is a characteristic of
A) spiders.
B) insects.
C) centipedes.
D) millipedes.
E) crustaceans.
Answer: E
Topic: Concept 33.4
Skill: Knowledge/Comprehension

40) One should expect to find the "9 + 2 pattern" of microtubules in association with the feeding apparatus of which of the following?
A) annelids
B) coral animals
C) tapeworms
D) sponges
E) terrestrial insects
Answer: D
Topic: Concepts 33.1-33.4
Skill: Application/Analysis

41) Which of the following is a characteristic of adult echinoderms?
A) bilateral symmetry
B) spiral cleavage
C) gastrovascular cavity
D) exoskeleton
E) lophophore
Answer: A
Topic: Concept 33.5
Skill: Knowledge/Comprehension

42) Which of the following describe(s) echinoderms?
A) They have an exoskeleton of hard calcareous plates.
B) Tubefeet provide motility in most species.
C) Digestion occurs completely outside of the organism.
D) Hemolymph circulates in the water vascular system.
E) They are found in both freshwater and saltwater environments.
Answer: B
Topic: Concept 33.5
Skill: Knowledge/Comprehension

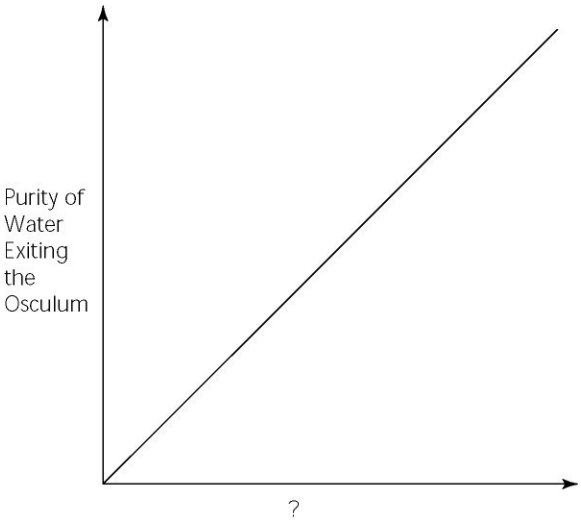
43) A stalked, sessile marine organism has several feathery feeding structures surrounding an opening through which food enters. The organism could potentially be a cnidarian, a lophophorate, a tube-dwelling worm, a crustacean, or an echinoderm. Which of the following traits, if found in this organism, would allow the greatest certainty of identification?
A) the presence of what seems to be radial symmetry
B) a hard covering made partly of calcium carbonate
C) a digestive system with mouth and anus separate from each other
D) a water vascular system
E) a nervous system
Answer: D
Topic: Concepts 33.2-33.5
Skill: Application/Analysis

44) Which of the following animal groups is entirely aquatic?
A) Mollusca
B) Crustacea
C) Echinodermata
D) Nematoda
E) Platyhelminthes
Answer: C
Topic: Concepts 33.2-33.5
Skill: Knowledge/Comprehension

45) In a tide pool, a student encounters an organism with a hard outer covering that contains much calcium carbonate, an open circulatory system, and gills. The organism could potentially be a crab, a shrimp, a barnacle, or a bivalve. The presence of which of the following structures would allow for the most certain identification of the organism?
A) a mantle
B) a heart
C) a body cavity
D) a filter-feeding apparatus
E) eyes
Answer: A
Topic: Concepts 33.2-33.5
Skill: Application/Analysis

46) Which of the following is a diploblastic phylum of aquatic predators?
A) Cnidaria
B) Annelida
C) Mollusca
D) Arthropoda
E) Echinodermata
Answer: A
Topic: Concepts 33.2-33.5
Skill: Knowledge/Comprehension

Art Questions



47) Which of the following factors, when used to label the horizontal axis of the previous graph, would account most directly for the shape of the plot?
A) spongin concentration (gm/unit volume)
B) rate of cribrostatin synthesis (molecules/unit time)
C) number of pores per sponge
D) number of spicules per sponge
E) number of choanocytes per sponge
Answer: E
Topic: Concept 33.1
Skill: Synthesis/Evaluation

This nudibranch, a type of sea slug, has many reddish cerata on its dorsal surface, as well as two, white-tipped rhinophores located on the head.

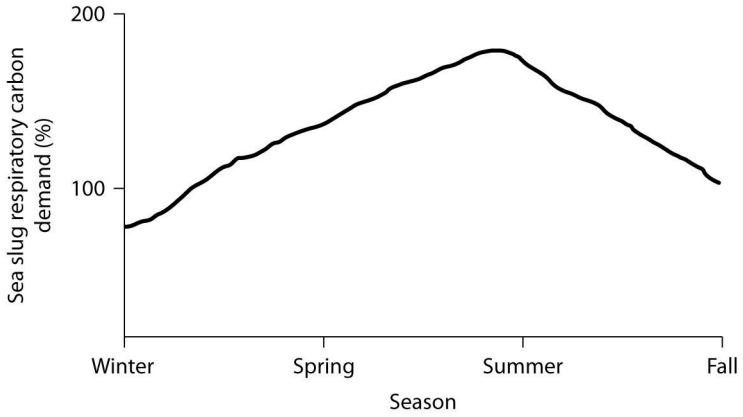
The nontaxonomic term *sea slug* encompasses a wide variety of marine gastropods. One feature they share as adults is the lack of a shell. We might think, therefore, that they represent defenseless morsels for predators. In fact, sea slugs have multiple defenses. Some sea slugs prey on sponges and concentrate sponge toxins in their tissues. Others feed on cnidarians, digesting everything except the nematocysts, which they then transfer to their own skins. Whereas the most brightly colored sea slugs are often highly toxic, others are nontoxic and mimic the coloration of the toxic species. Their colors are mostly derived from pigments in their prey. There are also sea slugs that use their coloration to blend into their environments.

48) Sea slugs can obtain nematocysts by preying on sea
A) anemones.
B) urchins.
C) daisies.
D) cucumbers.
E) lilies.
Answer: A
Topic: Concepts 33.3, 33.5
Skill: Application/Analysis

49) Which structure do sea slugs use to feed on their prey?
A) nematocysts
B) a sharp beak
C) an incurrent siphon
D) a radula
E) a mantle cavity
Answer: D
Topic: Concept 33.3
Skill: Application/Analysis

50) By which structures are nematocysts most likely to reach the skin of sea slugs?
A) the closed circulatory system
B) branches of the intestine
C) branches of the excurrent siphon
D) branches of the nephridium
E) branches of the pseudocoelom
Answer: B
Topic: Concept 33.3
Skill: Application/Analysis

51) The nematocysts of sea slugs should be most effective at protecting individual sea slugs from predation if the predators
A) remove small bites of flesh from sea slugs, and have long-term memory.
B) remove small bites of flesh from sea slugs, and have no long-term memory.
C) consume entire sea slugs in one gulp, and have no long-term memory.
D) consume entire sea slugs in one gulp, and have long-term memory.
Answer: A
Topic: Concepts 33.3, 54.1
Skill: Synthesis/Evaluation



Percent of sea slug respiratory carbon demand provided by indwelling dinoflagellates.

52) According to the graph, during which season(s) of the year is the relationship between the sea slug and its dinoflagellates closest to being commensal?
A) winter
B) spring
C) summer
D) fall
E) spring and fall
Answer: A
Topic: Concepts 27.1, 33.3
Skill: Synthesis/Evaluation

53) If we assume that carbon is the sole nutrient needed by sea slugs to drive their cellular respiration, then based on the graph, during which season(s) is it *least* necessary for *P. ianthina* to act as a chemoheterotroph?
A) winter
B) spring
C) summer
D) fall
E) spring and fall
Answer: C
Topic: Concepts 27.3, 33.3
Skill: Synthesis/Evaluation

54) Aside from the density of dinoflagellates in *P. ianthina* skin, how many of the following factors can affect whether or not the endosymbiotic dinoflagellates promote the sea slug's survival (assuming latitudes above or below Earth's equator)?
1. day length
2. height of sun above the horizon
3. cloud cover
4. depth at which *P. ianthina* lives
5. water clarity

A) two of these
B) three of these
C) four of these
D) five of these
Answer: D
Topic: Concept 33.3
Skill: Synthesis/Evaluation

55) If the dinoflagellate-containing sea slug, *P. ianthina*, otherwise preys on coral animals, then it would be *least* surprising to find that
A) *P. ianthina* has no tolerance to the toxin in the nematocysts of its prey.
B) *P. ianthina* can locate its coral prey by chemicals released into the water by corals.
C) The coral prey harbor dinoflagellates in their tissues.
D) The coral prey transform themselves into medusas to flee from approaching *P. ianthina*.
Answer: C
Topic: Concept 33.3
Skill: Synthesis/Evaluation

56) The sea slug, *Elysia chorotica*, has no nematocysts or dinoflagellates but, rather, has "naked" chloroplasts in its skin. The chloroplasts are all that remain of the seaweed (*Vaucheria* sp.) that *Elysia* feeds upon. The chloroplasts are transferred to the skin; consequently, this slug is green. It spends most of its time basking in shallow water on the surface of seaweeds. How should we expect its chloroplasts to benefit the *Elysia* sea slug?
1. provide *Elysia* with fixed CO_2
2. provide *Elysia* with fixed N_2
3. provide *Elysia* with protective coloration

A) 1 only
B) 2 only
C) 3 only
D) 1 and 3
E) 1, 2, and 3
Answer: D
Topic: Concept 33.3
Skill: Application/Analysis

Scenario Questions

The sea slug, *Pteraeolidia ianthina*, can harbor living dinoflagellates (photosynthetic protists) in its skin. These endosymbiotic dinoflagellates reproduce quickly enough to maintain their populations. Low populations do not affect the sea slugs very much, but high populations ($> 5 \times 10^5$ cells/mg of sea slug protein) can promote sea slug survival.

57) If 100,000 sea slug cells together contain 1.0 mg of protein, then what is the minimum number of dinoflagellates per sea slug cell that constitutes a "high," and therefore beneficial, population?
A) 1 cell
B) 5 cells
C) 10 cells
D) 50 cells
E) 100 cells
Answer: B
Topic: Concept 33.3
Skill: Synthesis/Evaluation

Nudibranchs, a type of predatory sea slug, can have various protuberances (i.e., extensions) on their dorsal surfaces. Rhinophores are paired structures, located close to the head, which bear many chemoreceptors. Dorsal plummules, usually located posteriorly, perform respiratory gas exchange. Cerata usually cover much of the dorsal surface and contain nematocysts at their tips.

58) The claws on the foremost trunk segment of centipedes have a function most similar to that of
A) rhinophores.
B) dorsal plummules.
C) cerata.
D) more than one of these.
Answer: C
Topic: Concepts 33.3, 33.4
Skill: Application/Analysis

59) The feet of certain insects, notably of female butterflies, have a function most similar to that of
A) rhinophores.
B) dorsal plummules.
C) cerata.
D) more than one of these.
Answer: A
Topic: Concepts 33.3, 33.4
Skill: Application/Analysis

60) The stingers of honeybees have a function most similar to that of
A) rhinophores.
B) dorsal plummules.
C) cerata.
D) more than one of these.
Answer: C
Topic: Concepts 33.3, 33.4
Skill: Application/Analysis

61) The spiracles and tracheae of insects have a function most similar to that of
A) rhinophores.
B) dorsal plummules.
C) cerata.
D) more than one of these.
Answer: B
Topic: Concepts 33.3, 33.4
Skill: Application/Analysis

62) The antennae of insects have a function most similar to that of
A) rhinophores.
B) dorsal plummules.
C) cerata.
D) more than one of these.
Answer: A
Topic: Concepts 33.3, 33.4
Skill: Application/Analysis

63) The lateral flaps of planaria heads have a function most similar to that of
A) rhinophores.
B) dorsal plummules.
C) cerata.
D) more than one of these.
Answer: A
Topic: Concept 33.3
Skill: Application/Analysis

64) The parapodia of polychaetes have a function most similar to that of
A) rhinophores.
B) dorsal plummules.
C) cerata.
D) more than one of these.
Answer: B
Topic: Concept 33.3
Skill: Application/Analysis

65) The spines of sea stars have a function most similar to that of
A) rhinophores.
B) dorsal plummules.
C) cerata.
D) more than one of these.
Answer: C
Topic: Concepts 33.3, 33.5
Skill: Application/Analysis

66) The small, thin extensions of the skin on the aboral surfaces of sea stars have a function most similar to that of
A) rhinophores.
B) dorsal plummules.
C) cerata.
D) more than one of these.
Answer: B
Topic: Concepts 33.3, 33.5
Skill: Application/Analysis

67) If nudibranch rhinophores are located at the anteriors of these sea slugs, then they contribute to the sea slugs'
A) segmentation.
B) lack of torsion.
C) cephalization.
D) identity as lophotrochozoans.
E) ability to successfully carry out a sessile lifestyle.
Answer: C
Topic: Concepts 32.3, 33.3
Skill: Application/Analysis

68) Nudibranchs usually have two rhinophores. However, if they had a single rhinophore, it could still carry out the function of two rhinophores, and with similar effectiveness, if this single rhinophore
A) had two branches, one directed to the left, the other to the right.
B) had two branches, one directed toward the head, the other directed toward the tail.
C) was as long as two rhinophores placed end to end.
D) had cilia whose power strokes directed water away from the surface of the slug.
E) was located within the mantle cavity.
Answer: A
Topic: Concept 33.3
Skill: Synthesis/Evaluation

69) The crown-of-thorns sea star, *Acanthaster planci*, preys on the flesh of live coral. At times, these sea stars undergo poorly understood population explosions. What impact should such explosions have on those sea slugs that bear cerata (cerata contain nematocysts)? Population explosions of this sea star should
A) benefit sea slugs by distracting their prey.
B) benefit sea slugs by helping subdue their prey.
C) harm sea slugs by competing with them for food.
D) harm sea slugs by consuming them as food.
E) harm sea slugs by fouling the water with their feces.
Answer: C
Topic: Concepts 33.3, 54.1
Skill: Application/Analysis

70) The sharp, inch-long thorns of the crown-of-thorns sea star are its spines. These spines, unlike those of most other sea stars, contain a potent toxin. If it were discovered that crown-of-thorns sea stars do not make this toxin themselves, then the most likely alternative would be that this toxin is
A) derived from the nematocysts of its prey.
B) absorbed from the surrounding seawater.
C) an endotoxin of cellulose-digesting bacteria that inhabit the sea star's digestive glands.
D) injected into individual thorns by mutualistic corals which live on the aboral surfaces of these sea stars.
Answer: A
Topic: Concepts 33.2, 33.5
Skill: Application/Analysis

71) The crown-of-thorns sea star, *Acanthaster planci*, preys on the flesh of live coral. If coral animals are attacked by these sea stars, then what actually provides nutrition to the sea star, and which chemical (besides the toxin within their nematocysts) do the corals rely on for protection?
A) medusas; silica
B) exoskeleton; silica
C) exoskeleton; calcium carbonate
D) polyps; calcium carbonate
E) polyps; silica
Answer: D
Topic: Concept 33.2
Skill: Application/Analysis

72) The reason their exoskeletons cannot protect the corals from sea stars is that the sea star
A) is immune to the toxin of the nematocysts.
B) thorns are sharp and toxic.
C) tubefeet act as tiny syringes that suck the corals out of their exoskeletons.
D) stomach can be everted, and can release digestive juices directly onto the corals.
Answer: D
Topic: Concepts 33.2, 33.5
Skill: Application/Analysis

73) A natural predator of the crown-of-thorns sea star is a mollusc called the Giant Triton, *Charonia tritonis*. If the triton uses a radula to saw into the sea star, then to which clade should the triton belong?
A) chitons
B) bivalves
C) gastropods
D) cephalopods
Answer: C
Topic: Concept 33.3
Skill: Application/Analysis

74) Which human profession is most analogous to the lifestyle of the sea slugs described in this scenario?
A) physician
B) pirate
C) pharmacist
D) plumber
E) painter
Answer: B
Topic: Concept 33.3
Skill: Application/Analysis

A farm pond, usually dry during winter, has plenty of water and aquatic pond life during the summer. One summer, Sarah returns to the family farm from college. Observing the pond, she is fascinated by some six-legged organisms that can crawl about on submerged surfaces or, when disturbed, seemingly "jet" through the water. Watching further, she is able to conclude that the "mystery organisms" are ambush predators, and their prey includes everything from insects to small fish and tadpoles.

75) From this description, one can conclude that the organisms that have caught Sarah's attention are
A) insects.
B) crustaceans.
C) aquatic spiders.
D) myriapods.
E) eurypterids.
Answer: A
Topic: Concept 33.4
Skill: Application/Analysis

76) Sarah noticed the presence of many empty exoskeletons attached to emergent vegetation. These exoskeletons looked exactly like those of the largest of the "mystery organisms" she had seen in the pond. They also looked similar to the bodies of the dragonflies that patrolled the surface of the pond. If Sarah had learned a lot from her college biology class, what should she have concluded about the mysterious pond organisms?
A) They are larval dragonflies, destined to undergo incomplete metamorphosis.
B) They are larval dragonflies, destined to undergo complete metamorphosis.
C) They are adult dragonflies, so old that they can no longer fly, have fallen into the pond, but have not yet drowned.
D) They are adult dragonflies that must, like many amphibian species, return to water in order to mate.
Answer: A
Topic: Concept 33.4
Skill: Application/Analysis

77) If the pond organisms are larvae, rather than adults, Sarah should expect them to have all of the following structures, *except*
A) antennae.
B) an open circulatory system.
C) an exoskeleton of chitin.
D) complex eyes.
E) sex organs.
Answer: E
Topic: Concept 33.4
Skill: Application/Analysis

78) Sarah observed that the mystery pond organisms never come up to the pond's surface. If she catches one of these organisms and observes closely, perhaps dissecting the organism, she should find
A) gills.
B) spiracles.
C) tracheae.
D) book lungs.
Answer: A
Topic: Concept 33.4
Skill: Application/Analysis

79) Sarah had learned that ancestral (Carboniferous era) dragonfly species were much larger than extant dragonfly species are, with wingspans of 70 cm. This struck her as odd, because she had also learned that one of the things that keeps insects small is their relatively inefficient respiratory system. Which *two* hypotheses might help account for the large size of ancestral dragonflies?
1. If the atmosphere during the Carboniferous era had featured a higher oxygen content than the modern atmosphere, then the tracheae might have been a sufficient means for oxygen delivery to the interior tissues.
2. If large size was a drawback, then the large dragonflies underwent extinction, which explains why all extant dragonflies are smaller.
3. If the ancestral dragonflies had possessed muscles that permitted effective ventilation of the tracheae, then the tracheae might have been a sufficient means for oxygen delivery to the interior tissues.
4. If ancestral dragonflies existed during greenhouse conditions, then they must have survived by decreasing their activity levels, such as no longer capturing prey in flight. Thus, for them, an ineffective respiratory system was sufficient.
A) 1 and 2
B) 1 and 3
C) 1 and 4
D) 2 and 3
E) 2 and 4
Answer: B
Topic: Concept 33.4
Skill: Synthesis/Evaluation

An elementary school science teacher decided to liven up the classroom with a saltwater aquarium. Knowing that saltwater aquaria can be quite a hassle, the teacher proceeded stepwise. First, the teacher conditioned the water. Next, the teacher decided to stock the tank with various marine invertebrates, including a polychaete, a siliceous sponge, several bivalves, a shrimp, several sea anemones of different types, a colonial hydra, a few coral species, an ectoproct, a sea star, and several herbivorous gastropod varieties. Lastly, she added some vertebrates–a parrotfish and a clownfish. She arranged for daily feedings of copepods and feeder fish.

80) One day, little Tommy (a student in an undersupervised class of 40 fifth graders) got the urge to pet Nemo (the clownfish), who was swimming among the waving petals of a pretty underwater "flower" that had a big hole in the midst of the petals. Tommy giggled upon finding that these petals felt sticky. A few hours later, Tommy was in the nurse's office with nausea and cramps. Microscopic examination of his fingers would probably have revealed the presence of
A) teeth marks.
B) spines.
C) spicules.
D) nematocysts.
E) a radula.
Answer: D
Topic: Concepts 33.2-33.5
Skill: Application/Analysis

81) How many of the following organisms possess bilateral symmetry as adults?
1. sponges
2. molluscs
3. echinoderm
4. sea anemones
5. ectoprocts
A) one of these
B) two of these
C) three of these
D) four of these
E) five of these
Answer: D
Topic: Concepts 33.2-33.5
Skill: Application/Analysis

82) If the teacher wanted to show the students what a lophophore is and how it works, the teacher would point out a feeding
A) hydra.
B) sponge.
C) bivalve.
D) gastropod.
E) ectoproct.
Answer: E
Topic: Concepts 33.2-33.5
Skill: Application/Analysis

83) The bivalves started to die one by one; only the undamaged shells remained. To keep the remaining bivalves alive, the teacher would have to remove the
A) sea anemones.
B) sea star.
C) gastropods.
D) ectoprocts.
E) parrotfish.
Answer: B
Topic: Concepts 33.2-33.5
Skill: Application/Analysis

84) If the teacher had used a dissecting microscope to examine the outer surfaces of the empty bivalve shells, the teacher would probably have seen marks that had been left by
A) jaws.
B) nematocysts.
C) tubefeet.
D) a lophophore.
E) a madreporite.
Answer: C
Topic: Concepts 33.2-33.5
Skill: Application/Analysis

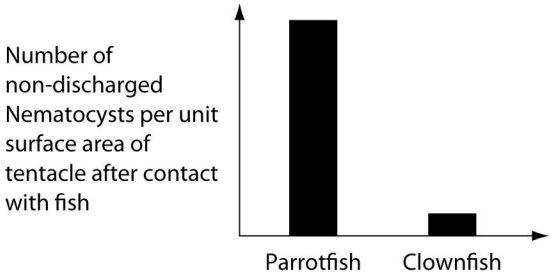
85) The teacher was unaware of the difference between suspension feeding and predation. The teacher thought that providing live copepods (2 mm long) and feeder fish (2 cm long) would satisfy the dietary needs of all of the organisms. Consequently, which *two* organisms would have been among the first to starve to death (assuming they lack photosynthetic endosymbionts)?
A) sponges and corals
B) sea stars and sponges
C) shrimp and bivalves
D) corals and bivalves
E) bivalves and sponges
Answer: E
Topic: Concepts 33.2-33.5
Skill: Application/Analysis

86) If the teacher had wanted to demonstrate that some invertebrates possess a closed circulatory system, the teacher should have removed and dissected a
A) mollusc.
B) sea star.
C) shrimp.
D) polychaete.
E) parrotfish.
Answer: D
Topic: Concepts 33.2-33.5
Skill: Knowledge/Comprehension

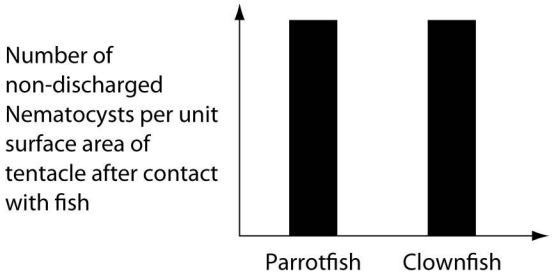
87) Had the teacher wanted to point out organisms that belong to the most successful animal phylum, the teacher should have chosen the
A) bivalves and gastropods.
B) sea anemones and hydra.
C) shrimp and copepods.
D) polychaete.
Answer: C
Topic: Concepts 33.2-33.5
Skill: Knowledge/Comprehension

88) The clownfish readily swims among the tentacles of the sea anemones; the parrotfish avoids them. One hypothesis for the clownfish's apparent immunity is that they slowly build a tolerance to the sea anemone's toxin. A second hypothesis is that a chemical in the mucus that coats the clownfish prevents the nematocysts from being triggered. Which of the following graphs supports the second, but not the first, of these hypotheses?

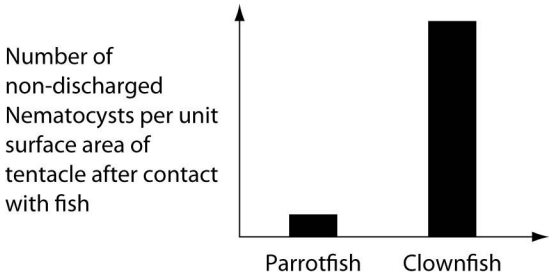
A)



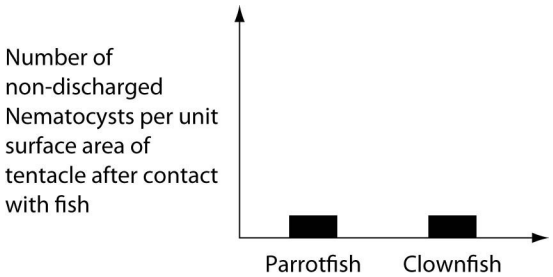
B)



C)



D)



Answer: C
Topic: Concepts 33.2-33.5
Skill: Synthesis/Evaluation

89) The teacher and class were especially saddened when the colonial hydrozoan died. They had watched it carefully, and the unfortunate creature never even got to produce offspring by budding. Yet, everyone was elated when Tommy (now recovered) noticed a small colonial hydrozoan growing in a part of the tank far from the location of the original colony. The teacher was apparently unaware that these hydrozoans exhibit
A) spontaneous generation.
B) abiogenesis.
C) alternation of generations.
D) ecdysis.
E) a medusa stage.
Answer: E
Topic: Concepts 33.2-33.5
Skill: Application/Analysis

End-of-Chapter Questions

The following questions are from the end-of-chapter "Test Your Understanding" section in Chapter 33 of the textbook.

90) A land snail, a clam, and an octopus all share
A) a mantle.
B) a radula.
C) gills.
D) embryonic torsion.
E) distinct cephalization.
Answer: A
Topic: End-of-Chapter Questions
Skill: Knowledge/Comprehension

91) Which phylum is characterized by animals that have a segmented body?
A) Cnidaria
B) Platyhelminthes
C) Porifera
D) Arthropoda
E) Mollusca
Answer: D
Topic: End-of-Chapter Questions
Skill: Knowledge/Comprehension

92) The water vascular system of echinoderms
A) functions as a circulatory system that distributes nutrients to body cells.
B) functions in locomotion and feeding.
C) is bilateral in organization, even though the adult animal is not bilaterally symmetrical.
D) moves water through the animal's body during suspension feeding.
E) is analogous to the gastrovascular cavity of flatworms.
Answer: B
Topic: End-of-Chapter Questions
Skill: Knowledge/Comprehension

93) Which of the following combinations of phylum and description is *incorrect?*
A) Echinodermata–bilateral symmetry as a larva, coelom present
B) Nematoda–roundworms, pseudocoelomate
C) Cnidaria–radial symmetry, polyp and medusa body forms
D) Platyhelminthes–flatworms, gastrovascular cavity, acoelomate
E) Porifera–gastrovascular cavity, coelom present
Answer: E
Topic: End-of-Chapter Questions
Skill: Knowledge/Comprehension