1. ________________  In fishes and amphibians, gills develop from slits that form in these structures.

2. ________________  structures fish use to obtain oxygen from water.

3. ________________  a vertebrate that is aquatic as a larva and terrestrial as an

4. ________________  Skin structures that prevent amphibians from drying out.

5. ________________  In a frog, blood from the body enters this part of the heart.

6. ________________  Individual segments of the backbone are called

7. ________________  internal skeleton that contains living as well as dead cells

8. ________________  blood vessel that carries blood towards the heart

9. ________________  blood vessel that carries blood away from the heart

10. ________________  internal gas-filled organ that allows fish to adjust their Buoyancy

11. ________________  form of reproduction where internal fertilization produces Embryos that are never inside an egg during development.

12. ________________  form of reproduction where eggs hatch outside the mother’s body

13. ________________  form of reproduction where eggs hatch inside the mother’s Body

14. ________________  membrane located inside the regular eyelid, which can be closed over the eye
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15.
A. ______________
B. ______________
C. ______________
D. ______________
E. ______________

16. What happens to the structures labeled D in fishes and amphibians?

17.
A. ______________
B. ______________
C. ______________
D. ______________
E. ______________
F. ______________
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18.
A. _________________________________________
B. _________________________________________
C. _________________________________________
D. _________________________________________
E. _________________________________________
F. _________________________________________
G. _________________________________________
H. _________________________________________
I. _________________________________________

19.
A. _________________________________________
B. _________________________________________
C. _________________________________________
D. _________________________________________
E. _________________________________________
F. _________________________________________
20. Describe the structure and list two functions of the pyloric ceca of fishes.

21. Describe the composition of the skeleton of each fish in the figures to the right.

22. In which of the three main groups of fishes do the animals in the figures belong?

23. List the four characteristics of chordates.

24. What are the three groups of modern amphibians
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25. ________ Which of these chordate characteristics exists as paired structures?
A. Tail
B. Notochord
C. pharyngeal pouch
D. nerve cord

26. ________ Which of the following statements about a vertebrate’s skeleton is INCORRECT?
A. It supports and protects the body.
B. It is an endoskeleton.
C. It grows as the animal grows.
D. It is made entirely of nonliving material.

27. ________ Lancelets belong to the phylum
A. Urochordata
B. Cephalochordata
C. Vertebrata
D. Chordata

28. ________ In most fishes, the structures that are most important for obtaining oxygen from the water are the
A. Scales
B. Gills
C. lungs
D. vertebrae

29. ________ After passing through the gills of a fish, blood circulates through the rest of the body and then collects in the
A. atrium
B. ventricle
C. bulbus arteriosus
D. sinus venosus

30. ________ Most fishes get rid of nitrogenous wastes by
A. Taking in ammonia through the gills and eliminating from the kidneys
B. Taking in water through the kidneys and eliminating ammonia from the gills
C. Eliminating ammonia from the gills and from the kidneys
D. Eliminating urine from the gills and ammonia from the kidneys

31. ________ All fishes in the class Chondrichthyes are alike in the
A. Foods that they eat
B. Size and form of their teeth
C. shape of their bodies
D. composition of their skeletons

32. ________ Which feature distinguishes most fishes from most amphibians?
A. A vertebral column
B. Scales
C. Breathing with gills during at least part of the life cycle
D. Living in water during at least part of their life cycle
33. ________ Which of the following is NOT an amphibian adaptation that provides support against the pull of gravity?
   A. Strong bones in the limbs
   B. Strong bones in the pelvic girdle
   C. A bony cage around internal organs
   D. Lungs for breathing air

34. ________ Which of the following structures are missing from many salamanders that live on land?
   A. Lungs
   B. Kidneys
   C. Legs
   D. Eggs

35. ________ Which of the following is NOT a characteristic of an amphibian’s circulatory system?
   A. Two loops
   B. Heart with three chambers
   C. Right atrium and left atrium
   D. Complete separation of oxygen-rich and oxygen-poor blood

36. ________ A frog’s tympanic membranes would be most useful for
   A. Enabling the frog to jump long distances.
   B. Filtering wastes from the frog’s blood
   C. Listening to the mating calls of other frogs.
   D. Keeping the frog’s eyes from drying out on land.

37. ________ Amphibians like the one in the figure. (SALAMANDER) are
   A. Herbivores as larvae and carnivores as adults
   B. Carnivores as larvae and herbivores as adults.
   C. Herbivores as larvae and adults.
   D. Carnivores as larvae and adults.

38. ________ In chordates, the long supporting rod that runs through the body is called the
   A. Nerve cord
   B. Notochord
   C. Pharyngeal pouch
   D. Tail

39. ________ A vertebrate is any chordate that has a
   A. Backbone
   B. Notochord
   C. Hollow nerve cord
   D. Tail that extends beyond the anus

40. ________ The two groups of nonvertebrate chordates are
   A. Tunicates and lancelets
   B. Skates and rays
   C. Frogs and toads
   D. Lungfishes and coelacanths
41. ________ Most fishes are characterized by each of the following EXCEPT
   A. A cartilaginous skeleton                     C. paired fins
   B. Scales                                      D. gills

42. ________ In fishes with gills, oxygen-rich water enters through the
   a. Mouth and leaves through openings in the pharynx
   b. Mouth and leaves through the bladder
   c. Openings in the pharynx and leaves through the mouth.
   d. Openings in the pharynx and leaves through the anus.

43. ________ Blood flows through the body of a fish in a
   a. Single-loop, open circulatory system
   b. Single-loop, closed circulatory system
   c. Double-loop, open circulatory system
   d. Double-loop, closed circulatory system

44. ________ The organ that adjusts the buoyancy of many bony fishes is the
   a. Swim bladder                               c. ventricle
   b. Cerebellum                                 d. kidney

45. ________ Modern jawless fishes include:
   a. Skates                                      c. lampreys
   b. Sharks                                     d. lungfishes

46. ________ Which of the following is NOT a characteristic of most amphibians?
   a. They live on land as adults
   b. They breathe with lungs as adults
   c. They have moist skin that contains mucous glands
   d. They have scales and claws

47. ________ In the digestive system of a frog, where does food go after it leaves the mouth?
   a. To the gallbladder                         c. to the cloaca
   b. To the esophagus                           d. to the pancreas

48. ________ In a frog, the cavity through which digestive wastes, urine, and eggs or sperm
   leave the body is the
   a. Cloaca                                     c. gallbladder
   b. Colon                                      d. pancreas
49. The eggs of amphibians can dry out easily because they
   a. Are never encased in jelly               c. are always laid on land
   b. Do not have shells                       d. are always fertilized externally

50. The amphibian in the figure is a
   a. Caecilian
   b. Frog
   c. Salamander
   d. Toad

51. Contrast the structure of an adult lancelet and an adult tunicate.

52. Name the five main parts of the fish’s brain and describe the function of each part.
53. How are worldwide amphibian populations changing today? What possible explanations have been proposed to explain the change?

54. Describe the circulation of blood through the body of an adult amphibian. Include the chambers of the heart in your description.
1. Pharyngeal pouches
2. Gills
3. Amphibian
4. Mucous glands
5. Right atrium
6. Vertebrae
7. Endoskeleton
8. Vein
9. Artery
10. Swim bladder
11. Viviparous
12. Oviparous
13. Ooviviparous
14. Nictitating membrane

15. A. muscle segments
    B. tail
    C. anus
    D. pharyngeal pouches
    E. mouth
    F. notochord

16. They develop slits that connect to the outside of the body. The slits may then develop into gills.

17. A stomach
    B. Pyloric cecum
    C. Esophagus
    D. Mouth
    E. Intestine
    F. Anus

18. A. mouth
    B. Esophagus
    C. Liver
    D. Pancreas
    E. Stomach
    F. Large intestine (colon)
    G. Cloaca
    H. Small intestine
    I. Gall bladder

19. A. right atrium
    B. conus arteriosus
C. pulmonary vein  
D. left atrium  
E. sinus venosus  
F. ventricle

20. The pyloric ceca are fingerlike pouches located near the stomach. They secrete digestive enzymes and absorb nutrients from digested food.

21. A. cartilage and fibers  
   B. cartilage  
   C. bone

22. A. jawless fish  
    B. cartilaginous fish (chondroichthyes)  
    C. bony fish (osteoichthyes)

23. (1) a dorsal, hollow nerve cord  
    (2) a notochord  
    (3) pharyngeal pouches  
    (4) a tail that extends beyond the anus

24. salamanders, frogs and toads, caecilians  
25. C. pharyngeal pouch  
26. D. it is made entirely of nonliving material  
27. D. Chordata  
28. B. Gills  
29. D. sinus venosus  
30. C. eliminating ammonia from the gills and from the kidneys  
31. D. composition of their skeletons  
32. B. scales  
33. D lungs for breathing air  
34. A. lungs  
35. D. complete separation of oxygen-rich and oxygen-poor blood  
36. C. listening to the mating calls of other frogs  
37. D. carnivores as larvae and adults  
38. B. notochord  
39. A. backbone  
40. A. tunicates and lancelets  
41. A. cartilaginous skeleton  
42. A. mouth leaves through openings in the pharynx  
43. B. single-loop, closed circulatory system  
44. A. swim bladder  
45. C. lampreys  
46. D. they have scales and claws  
47. B. to the esophagus
48. A. cloaca
49. B. do not have shells
50. C. salamander

51. An adult lancelet is a fishlike animal with a hollow nerve cord, a notochord, and segmented muscles that run the length of the body. It has a definite head region and tail. An adult tunicate has a body that is covered by a tough, non-living tissue. The tunic is flattened at the base, where the animal is typically attached to a solid surface, and it has two large openings called siphons. An adult tunicate does not have a hollow nerve cord, a notochord, segmented muscles, a head region, or a tail.

52. The main parts are the olfactory bulbs, cerebrum, optic lobes, cerebellum, and medulla oblongata. The olfactory bulbs and cerebrum are both involved with the sense of smell, or olfaction. The optic lobes process information from the eyes. The cerebellum coordinates body movements. The medulla oblongata controls the functioning of many internal organs.

53. The number of living species of amphibians in the world is decreasing. Possible explanations for the decline include environmental threats, such as decreasing habitat, depletion of the ozone layer, acid rain, water pollution, fungal infections, introduced aquatic predators, and an increasing human population.

54. Adult amphibians have a double loop circulatory system and a heart with three chambers. One loop carries oxygen poor blood from the ventricle to the lungs and takes oxygen-rich blood from the lungs to the left atrium. The left atrium empties this blood into the ventricle. The other loop transports oxygen-rich blood from the ventricle to the rest of the body and oxygen-poor blood from the body to the right atrium. The right atrium also empties blood into the ventricle.