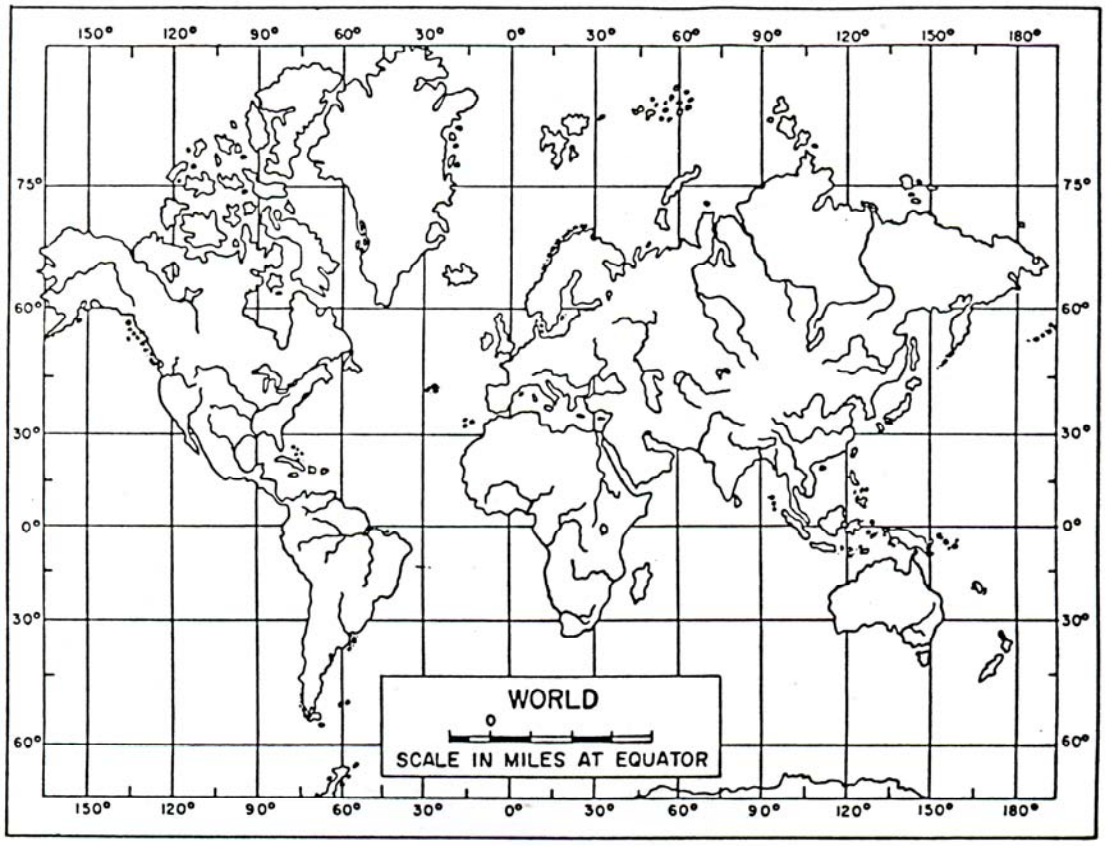
EXERCISE 16—Self-Guiding Field Trip

Go to the San Francisco Zoo or Steinhart Aquarium and complete the appropriate assignment.
Date due:_____ 50 points possible

References

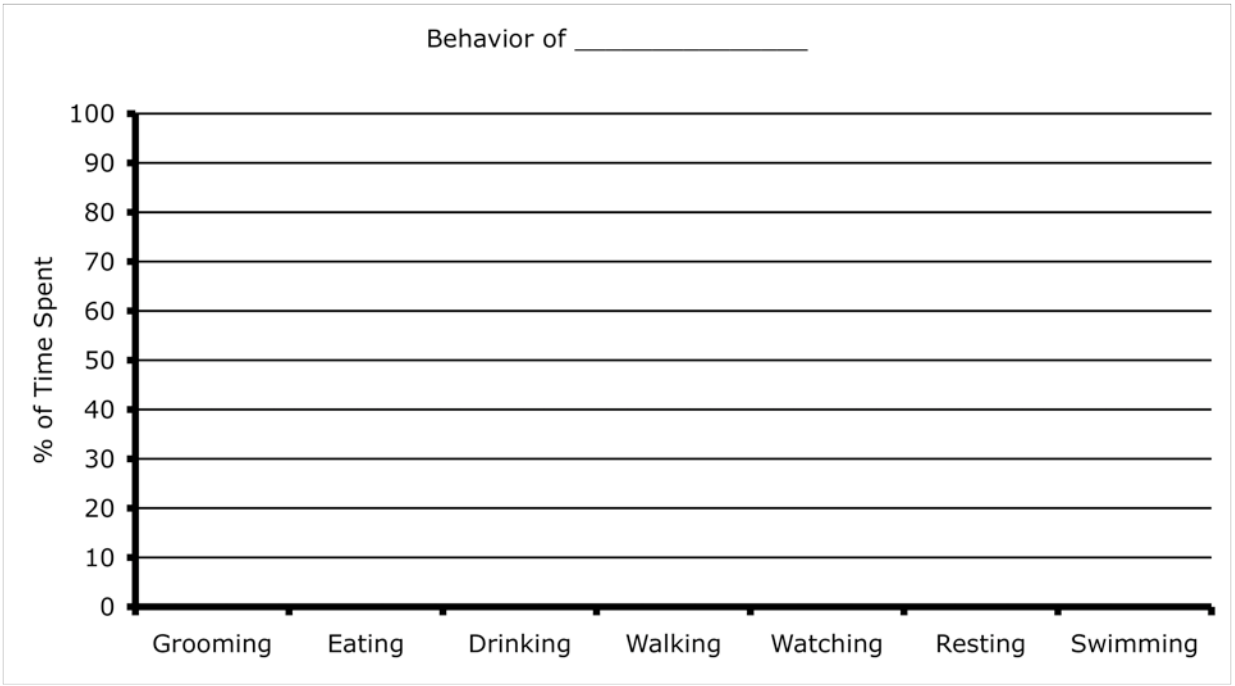
1. You **must** cite at least 3 references with current publication dates (no older than 1985).
2. At least two references **must** be articles from scientific or technical journals *(Scientific American, Science News, National Geographic, and Discover* are acceptable).
3. Be sure to evaluate whether your internet references are from academic sources. Wikis, encylocpedia, dictionaries, and search engines are not appropriate references.
4. All citations **must** be in the proper format. See the Style Sheet on the BIOL 101 web site.



Answer these questions for a Mammal, Bird, or Invertebrate

- Write a report in **your own words** addressing the items listed below. You must write your own, individual paper and the paper must be **typed.** Note point value (#) for each item.
- **Attach** this page to your report.

1. **Write a record** of your observations during your tour. Not all of the animals will be active. At least list the animals that you see and any information that seems important to you. (10 points)
2. **Write a 1-2 page report** about an animal that you observed. This report should include the following/
   a) The scientific name, the family, and the common name. (3)
   b) Identify the animal's range on the accompanying map (page 113). (2)
   c) Animal's niche. (2)
   d) Climate in the animal's range, vegetation present. (4)
   e) Special adaptations for survival. (5)
   f) Is this animal endangered? Why/why not? (3)
   g) What did you find interesting about the animal? (3)
   h) Include a picture, photograph, or drawing of the animal. (2)
   i) Record the behavior of your animal for one hour. *Define each behavior* you used in your report. For example: Resting-sitting with head down; watching: sitting with head up and moving. After you have defined behaviors, *observe your animal* for an hour and *draw a graph* showing time spent in the various activities. The graph below is a model, you may have to change the behavior categories to suit your animal. (10)
   j) References you used; citations must be in the correct format. (6)



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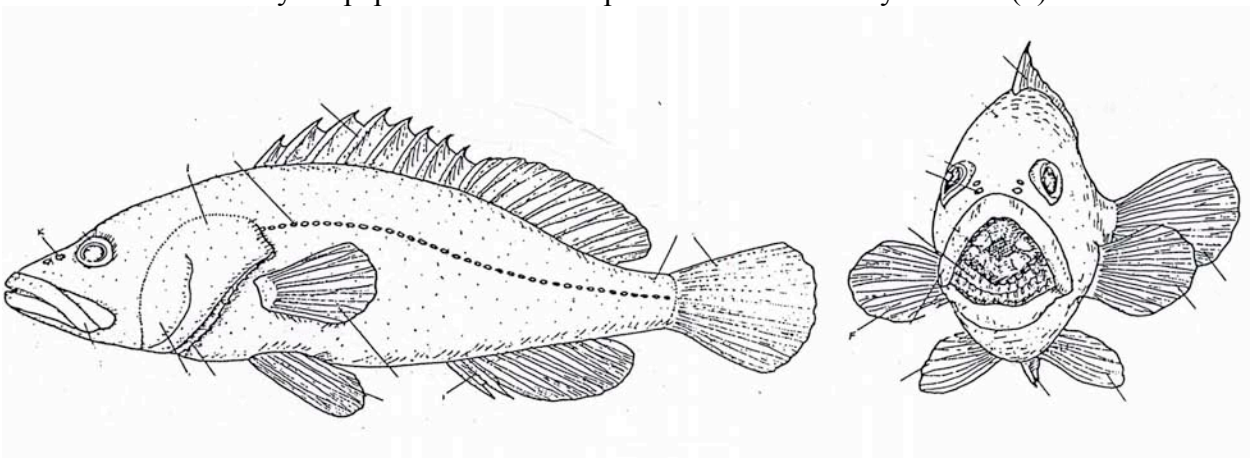
Answer these questions for a Fish

- Write a report in **your own words** addressing the items listed below. You must write your own, individual paper and the paper must be **typed.** Note point value (#) for each item.
- **Attach** this page to your report.

1. **Write a record** of your observations during your tour. At least list the animals that you see and any information that seems important to you. (10 points)
2. **Write a 1-2 page report** about a fish that you observed. This report must include:
   a) The scientific name, the family, and the common name. (3)
   b) Identify the fish's range on the accompanying map (page 113). (2)
   c) Animal's niche. Describe your fish's feeding. Is it an attacker, ambusher, picker, prober, sucker, grazer, or grubber? (3)
   d) Does your fish have a lateral line? What is the function of the lateral line? (3)
   e) Note anatomical differences between your fish and the "typical" fish shown below. Describe in your paper how these adaptations are useful to your fish. (4)



   f) Describe the adaptive advantage of your fish's coloration. Is it an advertiser, cryptic, or does it change color? (3)
   g) Part of the secret of speed of fish such as marlin and mako sharks is in the *high* **aspect ratio** of the caudal (tail) fin. A fast fin is designed to minimize disturbance of the water and therefore minimize resistance.

   ① Estimate the caudal fin size* of your fish and calculate the aspect ratio of the caudal fin of your fish

   ②How would you modify the caudal fin to make your fish faster? (4)

	Your fish	Caudal fin height (h), cm	Caudal fin length (L), cm	Caudal fin width (w), cm	Aspect ratio = $\frac{h^2}{L \times w}$
①	Your fish				
②	Your fish modified				

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h) The **swimming speed (V, cm/sec)** can be equated to the length (L, in cm) and frequency of the tail movement (*f*, in beats/sec) by the following formula:

$$V = \frac{1}{4}[L(3f-4)]$$

Add your fish to the data table below and calculate V for each fish. (3)

Species	***f***	**L**	**V**
Goby *(Gobinus minutus)*	12	5	
Wahoo *(Acanthocybium solandri)*	12	183	
Your fish			

i) Approximately how many times its own length does a goby travel per second? A wahoo?_____If these ratios were constant, a 6 meter great white shark would travel in excess of 120 mph! However, the shark's large mass creates drag. This introduces the aspect of **fineness ratio**. The fineness ratio is the ratio of the length of the body (L) to the average of the maximum height and breadth. In designing airplanes, the optimum fineness ratio is 2.5.

①Estimate the size of your fish* and determine the fineness ratio of your fish.

②Consider your calculations in g, h, and i—what anatomical changes would make your fish faster? (4)

	Your fish	Length of body (L) in cm	Maximum height (H) in cm	Maximum breadth (b) in cm	Fineness = $\frac{L}{(H+b)}$
①	Your fish				
②	Your fish modified				

j) What did you find interesting about the animal? (3)

k) Include a picture, photograph, or drawing of the animal. (2)

l) References you used; citations must be in the correct format. (6)

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* Hold a ruler or even your hand up to the aquarium to estimate the size. What is the length of your index finger? Your outstretched hand?