



## Student Packet

# Animal Behavior Studies

Scientists use animal behavior studies to understand why animals do what they do, predict how human actions will affect them, and protect animals in the wild. This authentic scientific inquiry will give you practice using animal behavior study tools.

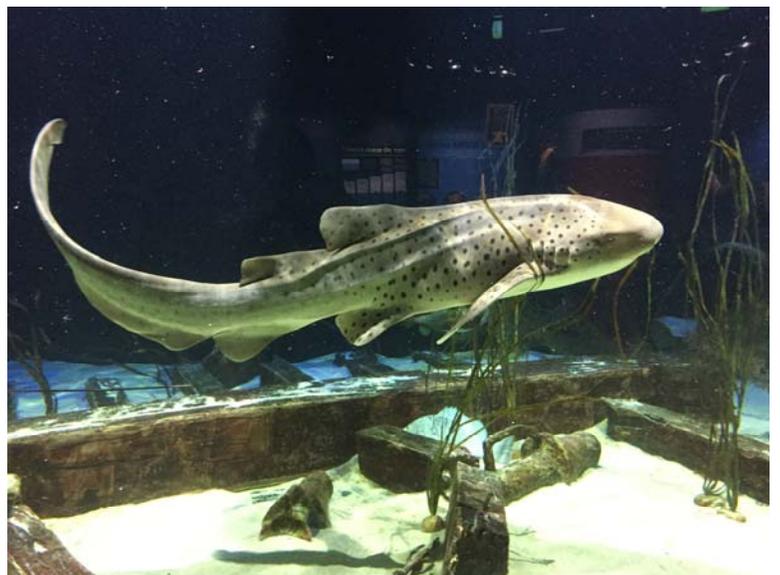


Name: \_\_\_\_\_

Date: \_\_\_\_\_

### Animal Behavior Study Checklist

- Ad-Libitum Data Sampling
- One-Zero Data Sampling
- Time Budget Data Sampling
- Data Synthesis and Reflection Questions



# Ad-libitum ('At liberty') Data Sampling

Name: \_\_\_\_\_ Date: \_\_\_\_\_

**READ ALL Instructions before you begin!**

1. Choose a fish exhibit to observe. Watch the **whole tank** for 3 minutes.
2. During this time select **1 fish the group is most interested to learn more about** to be the focal fish.
3. Set a timer for **5 minutes** of observation. (*You need to be writing or sketching this whole time.*)
4. Record your start and end time, so you can reference the time of day these behaviors were observed.

**Start Time:** \_\_\_\_\_ **End Time:** \_\_\_\_\_

5. Watching your focal fish, record as much detail about the behavior you see. **Note:** It will be impossible to catch EVERY behavior, do your best with descriptions and sketches.
6. At the end of the observation, use species signs near the exhibit to determine the species of your focal fish.

**Species of Focal Fish Observed:** \_\_\_\_\_

**Observation Notes and Sketches:**

# Observations Continued

# Ad-libitum ('At liberty') Data Sampling Evaluation Name: \_\_\_\_\_

**Instructions:** Consider the scientific value of the Ad-libitum data collection method. Did you get data you could use? Can you easily compare your observations with someone else? **List 3** benefits and constraints to using this method to capture animal behavior data.

Benefits (Pros)	Constraints (Cons)

Ad-lib data is used as a starting point in animal behavior research. You likely observed a lot of behaviors. Looking back over your notes and sketches consider what was most interesting or surprising during your observation. Now develop an experimental question to give you more information on this focal fish species behavior. Be sure to include which observations lead you to ask this question.

**Testable Question:**

**Related Observations:**

**A good scientific question** can be answered and tested through experiment and measurements. Avoid questions that can be answered by Googling, i.e. how long does this fish live? Keep how and what questions in mind over why questions.

# One-Zero Data Sampling

Name: \_\_\_\_\_ Date: \_\_\_\_\_

## Instructions:

- Pick** a focus fish your team wants to observe.
- Fill in** the species name to define the question for this observation.
- Watch** this fish for 3-5 minutes to determine which hiding spots it uses the most in the tank. If you do not see any hiding behavior in 5 minutes, choose a new focus fish and start again.

**You will need a team to:**

1. Watch the timer
2. Watch the fish (1-2 people)
3. Record data

**Remember:** Hiding is defined as **1/4 of the body being inside, underneath or behind a structure.**

- Select and name** the 5 likely hiding locations for your focal fish. **Write** these locations on Table 1, too.
- Write a detailed description** of the hiding spots (detailed enough that another student could find it).
- Set the timer** for 15 seconds. The Time Keeper will need to **IMMEDIATELY** restart the 15 second timer, so your observations are continuous over a 4 minute observation period.
- Record Data** on Table 1 every 15 seconds.

**Record a 1** for each hiding location your focal fish hid in during each 15-second period.

**Record a 0** for each hiding location your focal fish did not hide in during each 15-second period.

**Note:** You can fill in the zeros at the end.

- Calculate** your totals for each hiding location to use in answering analysis questions and to graph your data.

## Sample One-Zero Data Collection:

Name/Sketch of Possible Hiding Locations	Description of Hiding Structure
Left Lower Rock	Looking at the cichlid tank left to right, this is the first rock stack on the left side of the tank. We are specifying the largest rock laying on the sand in the middle of this pile.
Behind Left Rocks	Looking at the cichlid tank from left to right, this is behind the entire rock pile on the left side of the tank.

**KEY: 1 = Fish DID hide 0 = Fish did NOT hide**

## Sample Data Table

Possible Hiding Location	15 sec	30 sec	45 sec	1 min	1 min 15 sec	1 min 30 sec	1 min 45 sec	2 min	2 min 15 sec	2 min 30 sec	2 min 45 sec	3 min	3 min 15 sec	3 min 30 sec	3 min 45 sec	4 min	Total
Left Lower Rock	0	0	0	1	1	1	0	0	0	1	0	0	0	0	1	0	5
Behind Left Rocks	0	1	1	0	0	1	0	1	1	1	0	0	0	1	1	0	8

Collect Data:

Define Question: Where does \_\_\_\_\_ hide within its tank?

Start Time: \_\_\_\_\_ End Time: \_\_\_\_\_

Name/Sketch of Possible Hiding Locations	Description of Hiding Structure
1.	
2.	
3.	
4.	
5.	

**KEY: 1 = Fish DID hide 0 = Fish did NOT hide**

Table 1

Possible Hiding Location	15 sec	30 sec	45 sec	1 min	1 min 15 sec	1 min 30 sec	1 min 45 sec	2 min	2 min 15 sec	2 min 30 sec	2 min 45 sec	3 min	3 min 15 sec	3 min 30 sec	3 min 45 sec	4 min	Total

Additional Observation Notes:

**Get More Data:** Continue your research by observing the same fish a second time (did the behaviors change?), a different fish of the same species (is there a difference among individuals?), or a new fish species in the same tank (does species A use the same hiding locations as species B). **Note:** Use the same hiding locations from Table 1.

**Define Question:** \_\_\_\_\_

**Start Time:** \_\_\_\_\_ **End Time:** \_\_\_\_\_ **Species Observed:** \_\_\_\_\_

**Table 2**

**KEY: 0 = Fish did NOT hide      1 = Fish DID hide**

Possible Hiding Location	15 sec	30 sec	45 sec	1 min	1 min 15 sec	1 min 30 sec	1 min 45 sec	2 min	2 min 15 sec	2 min 30 sec	2 min 45 sec	3 min	3 min 15 sec	3 min 30 sec	3 min 45 sec	4 min	Total

**Additional Observation Notes:**

**Instructions:** Consider the scientific value of the one-zero data collection method, list 2-3 benefits and constraints to using this method to capture animal behavior data.

Benefits (Pros)	Constraints (Cons)

# One-Zero Data Sampling - Analysis

Name: \_\_\_\_\_

Date: \_\_\_\_\_

**Summarize and Synthesize:** Using graph paper, graph the total number of times each hiding spot was used during each observation. Identify any changes, trends or differences you see in the graph. **Draw arrows pointing out what you see, and write one sentence describing what you see next to each arrow.**

**Make a Claim:** Answer your question, where did your focal fish hide in the tank? What evidence was used to make your claim? Reference specific parts of the tables or graph.

**Application:** When new fish are added to a tank, Aquarist must make changes to accommodate the new needs of the existing fish community and new additions. Consider that Great Lakes Aquarium will be receiving 10 more of your focal fish species from Table 1. Citing the data you collected during your observation, write a recommendation for what changes (i.e. materials added or removed, relocated, etc.) should be made to the current exhibit so ALL the fish species in the tank will have what they need.

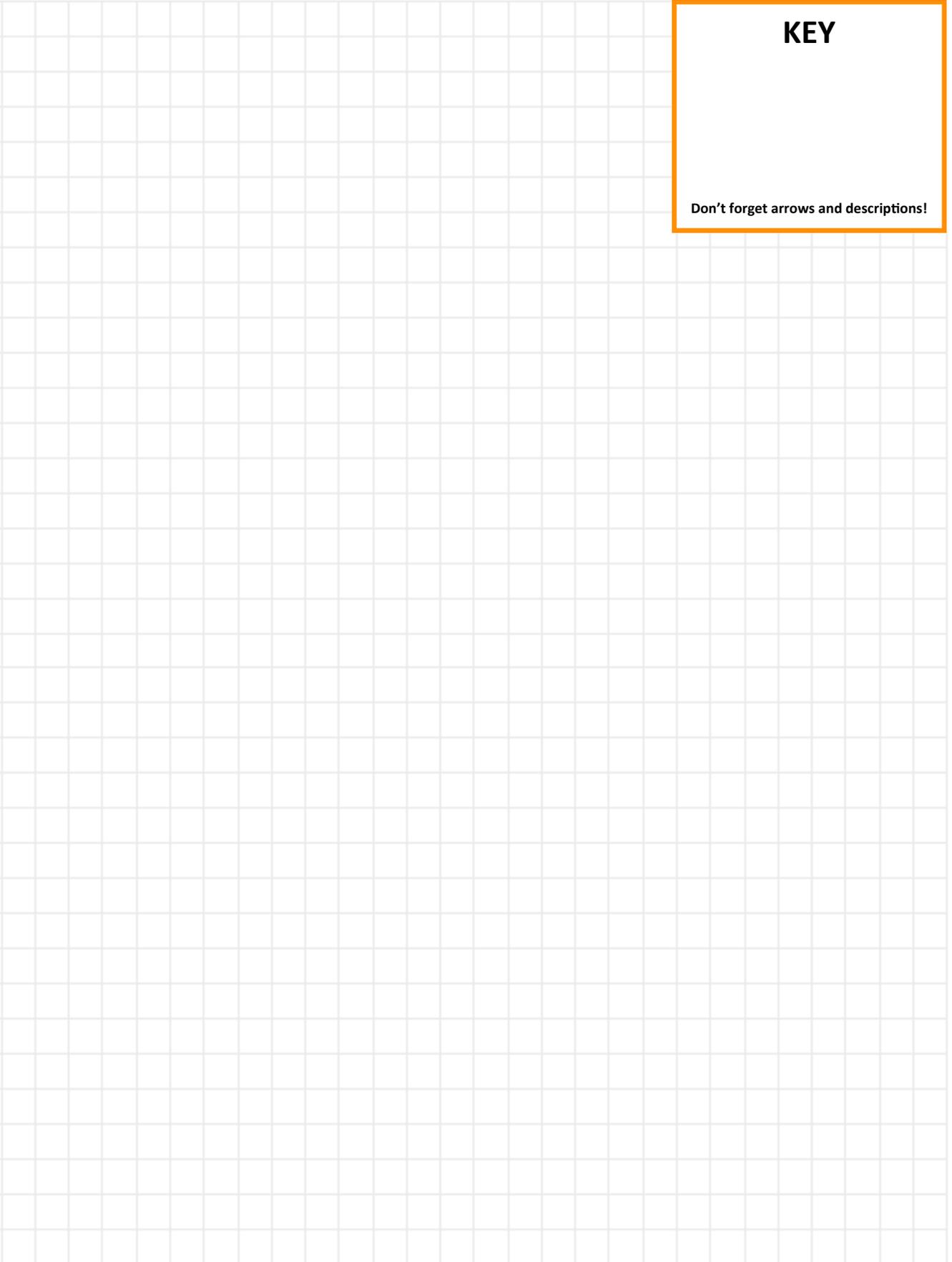
**Next steps as a scientist:** Science is an ongoing process. What new question(s) should be investigated to build on this research? What future data should be collected to answer your question?

# One-Zero Data Sampling - Analysis

Name: \_\_\_\_\_ Date: \_\_\_\_\_

**KEY**

Don't forget arrows and descriptions!



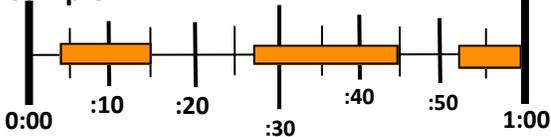
# Time Budget Data Sampling

Name: \_\_\_\_\_ Date: \_\_\_\_\_

**Background:** We can now further our understanding of your focal fish species by developing a time budget, or looking at what it spends time doing. Recording everything your fish does is nearly impossible, especially when several behaviors can happen simultaneously, we will focus on just one behavior, *hiding*.

**We will ask:** How much time does \_\_\_\_\_ fish spend in hiding? \*List the species of your focal fish.

**Sample:**



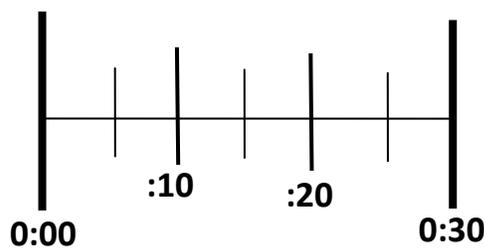
In this sample, our fish hid from 4 seconds to 15 seconds (11 seconds), then from 27 seconds to 45 seconds (18 seconds), and again from 52 seconds until the timer went off (8 seconds) to give us a **total of 36 seconds or 60% of its time budget was spent hiding.**

## Practice Round 1 : At school or the Aquarium

- With your teacher and a model fish (or with live fish), practice working as a team to mark the start and stop times when hiding is observed.
- Remember, the **Time Keeper will only be watching the timer, the Recorder will need to keep their eyes on the data sheet to mark the timeline, and the Observer must keep their eyes on the focal fish the WHOLE observation period.**
- Everyone on your team should replicate the data on their own page for later analysis.

**Start Time:** \_\_\_\_\_ **End Time:** \_\_\_\_\_

**Species Observed:** \_\_\_\_\_



**You will need a team to:**

1. Watch the timer
2. Watch the fish (1-2 people)
3. Record data

**Show any math work here:**

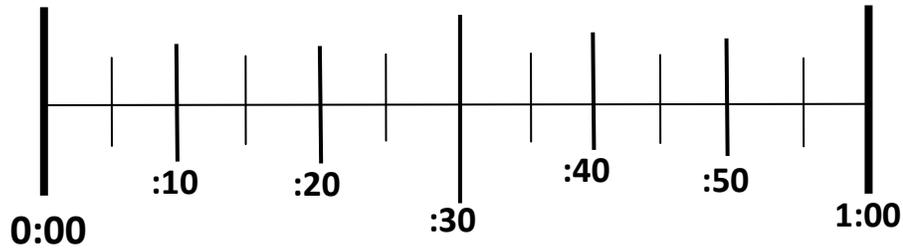
Total Seconds Hiding: \_\_\_\_\_ Time Budget Percentage: \_\_\_\_\_ (total seconds hiding/30 seconds)

## Practice Round 2: At the Aquarium

- **Watch your fish** and **practice working as a team** to mark the start and stop times when hiding is observed.
- Once you have all start and stop times marked, you can **color in a box to visually show** the time spent hiding.
- **Don't forget to calculate your hiding budget percentage!**

Start Time: \_\_\_\_\_ End Time: \_\_\_\_\_ Species Observed: \_\_\_\_\_

My Role Was: \_\_\_\_\_



Show any math work here:

Total Time Hiding : \_\_\_\_\_  $\frac{\text{Total seconds}}{60 \text{ seconds}}$  \_\_\_\_\_ = \_\_\_\_\_ %

Additional Observation Notes:

# Time Budget Data Sampling

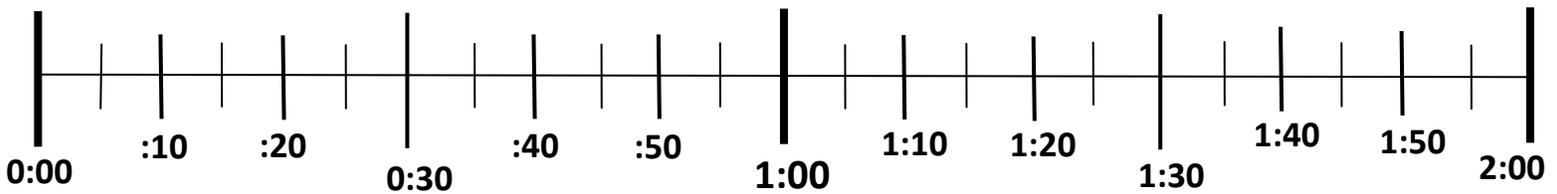
Name: \_\_\_\_\_ Date: \_\_\_\_\_

## Instructions:

1. Make sure you **know your** role on your team. (Time Keeper/Observer/Recorder)
2. **Identify the focal fish** for these observations. (If you lose your focal fish, pick another of the same species.)
3. Working as a team **mark the start and stop times when hiding is observed.**
4. Note the start and stop time of your whole trial so you can refer back to the time of day during your analysis of this time budget.
5. Calculate total time hiding and overall percentage of time spent hiding—This is the hiding behavior budget.
6. Complete the analysis questions on page 4.

My Role Was: \_\_\_\_\_

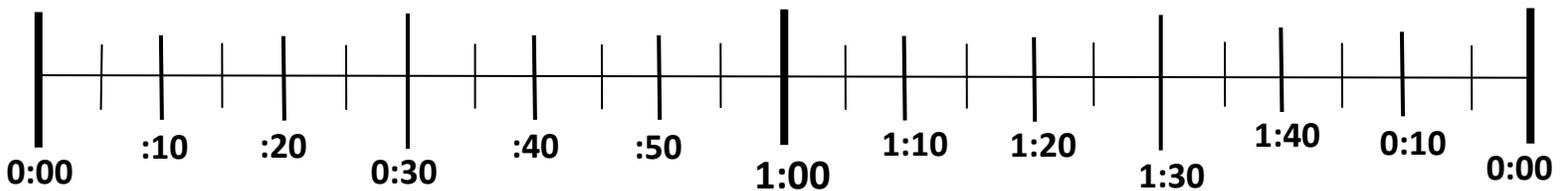
**Trial 1** Start Time: \_\_\_\_\_ End Time: \_\_\_\_\_ Species Observed: \_\_\_\_\_



Total Time Hiding : \_\_\_\_\_  $\frac{\text{Total seconds}}{120 \text{ seconds}}$  = \_\_\_\_\_ %

Put this % in the data chart on the next page!

**Trial 2** Start Time: \_\_\_\_\_ End Time: \_\_\_\_\_ Species Observed: \_\_\_\_\_

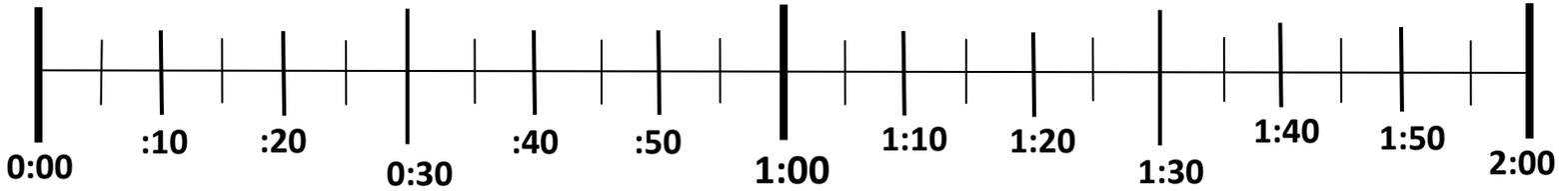


Total Time Hiding : \_\_\_\_\_  $\frac{\text{Total seconds}}{120 \text{ seconds}}$  = \_\_\_\_\_ %

Name: \_\_\_\_\_

### Trial 3

Start Time: \_\_\_\_\_ End Time: \_\_\_\_\_ Species Observed: \_\_\_\_\_

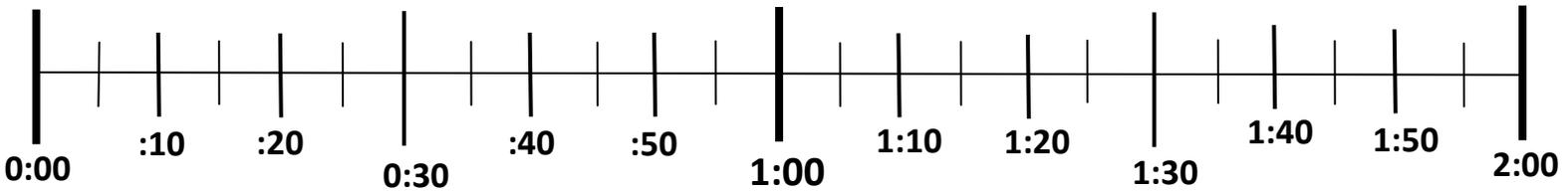


Total Time Hiding : \_\_\_\_\_  $\frac{\text{Total seconds}}{120 \text{ seconds}}$  = %

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### Trial 4

Start Time: \_\_\_\_\_ End Time: \_\_\_\_\_ Species Observed: \_\_\_\_\_



Total Time Hiding : \_\_\_\_\_  $\frac{\text{Total seconds}}{120 \text{ seconds}}$  = %

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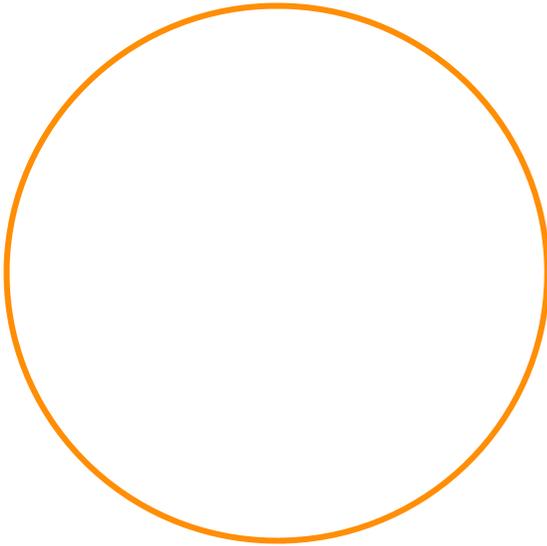
- Record the percentage of time spent hiding observed in each trial.
- Then calculate an average to use for your analysis on the next page.

Trail 1	Trail 2	Trail 3	Trail 4	Average
Hiding Budget %	Hiding Budget %	Hiding Budget %	Hiding Budget %	% Hiding Budget

# Time Budget Data Analysis

Name: \_\_\_\_\_

**Create** a pie chart to show the average percentage of time your focal fish spent hiding compared to non-hiding behaviors. You can get specific and use a protractor or make your estimate the size of each section. **Hint:** think of your percentage as a fraction, i.e. 70% is just less than  $3/4$ .



1. **Make a claim:** state how much time your focal fish spent hiding.
  
  
  
  
  
  
  
  
  
  
2. From your observations and knowledge about this fish and its current exhibit, explain why you think your fish spent so much or so little time hiding. Consider habitat needs, body structures, and the larger ecological community (in this case, other plants/animals/structures in the tank!). Give at least 3 pieces of evidence to support your response.
  
  
  
  
  
  
  
  
  
  
3. **Next steps as a scientist:** What new question(s) should be investigated to build on this research?

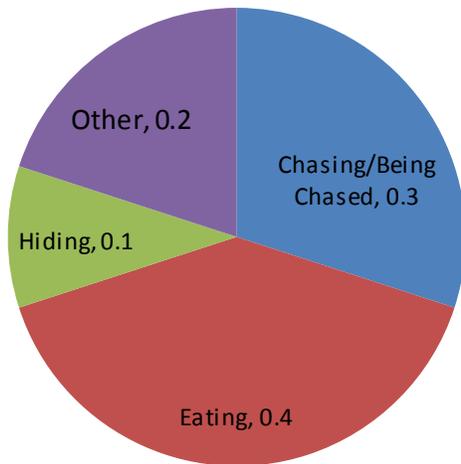
# Data Synthesis and Reflection Questions

Name: \_\_\_\_\_

Date: \_\_\_\_\_

1. Look at the time budget of a regal blue tang from the Aquarium below. \*Remember time budgets show what percentage of time is spent doing different behaviors like hiding, eating, nest building, and more.

Regal Blue Tang Time Budget



Explain how you expect this regal blue tang's time budget would change in the following scenarios and **why** you expect the change. Then share what data you could observe/record to collect evidence in support of your claim.

- A. More regal blue tangs are added to the tank.

Expected changes/WHY:

Observations needed:

- B. A stingray is added to the tank. (Stingray diets include shrimp, fish, and small crustaceans.)

Expected changes/WHY:

Observations needed:

- C. More coral is added to the tank. (Coral reefs create fish habitat and regal blue tangs eat excess algae that grows on coral.)

Expected changes/WHY:

Observations needed:

2. **Problem:** The number of lake trout in Lake Superior is decreasing.

**Observations:** Jorie was SCUBA diving around a new boat landing on Lake Superior. To look for young lake trout, he focused on areas with lots of rocks because he knows young lake trout use hiding spots. Jorie found no lake trout on any of his dives. He did notice mud, possibly from constructing the boat landing, had filled in all of the spaces between the rocks. Jorie predicts the young lake trout have fewer spots to hide and now more predators are eating them.

**Possible Solution:** To protect the young lake trout, Jorie wants to put up a large net to stop the predators from coming near the new boat landing.

**Question:** Is this the best possible solution to this problem? If not, suggest an alternative solution. Either way, include at least 3 pieces of evidence to support your claim. \*Consider that Lake Superior is also home to lake sturgeon, river otters and many other fish.

**Claim (and possible alternative solution if needed):**

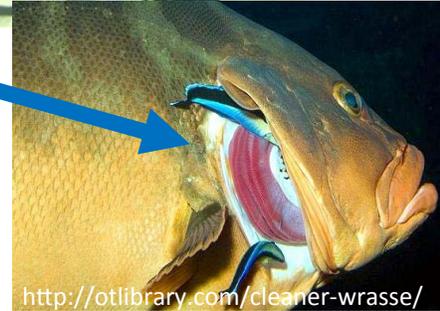
**Evidence:**



3. Cleaner wrasse are small fish that eat parasites and dead tissue off of large predator fish such as groupers. In the past the Aquarium, has added cleaner wrasse to the predator tank (home to sharks, stingrays and larger fish) in order to have cleaning stations for the groupers. Unfortunately, all of these cleaner wrasse disappeared.



A. What reasons could have lead to the cleaner wrasse disappearing?

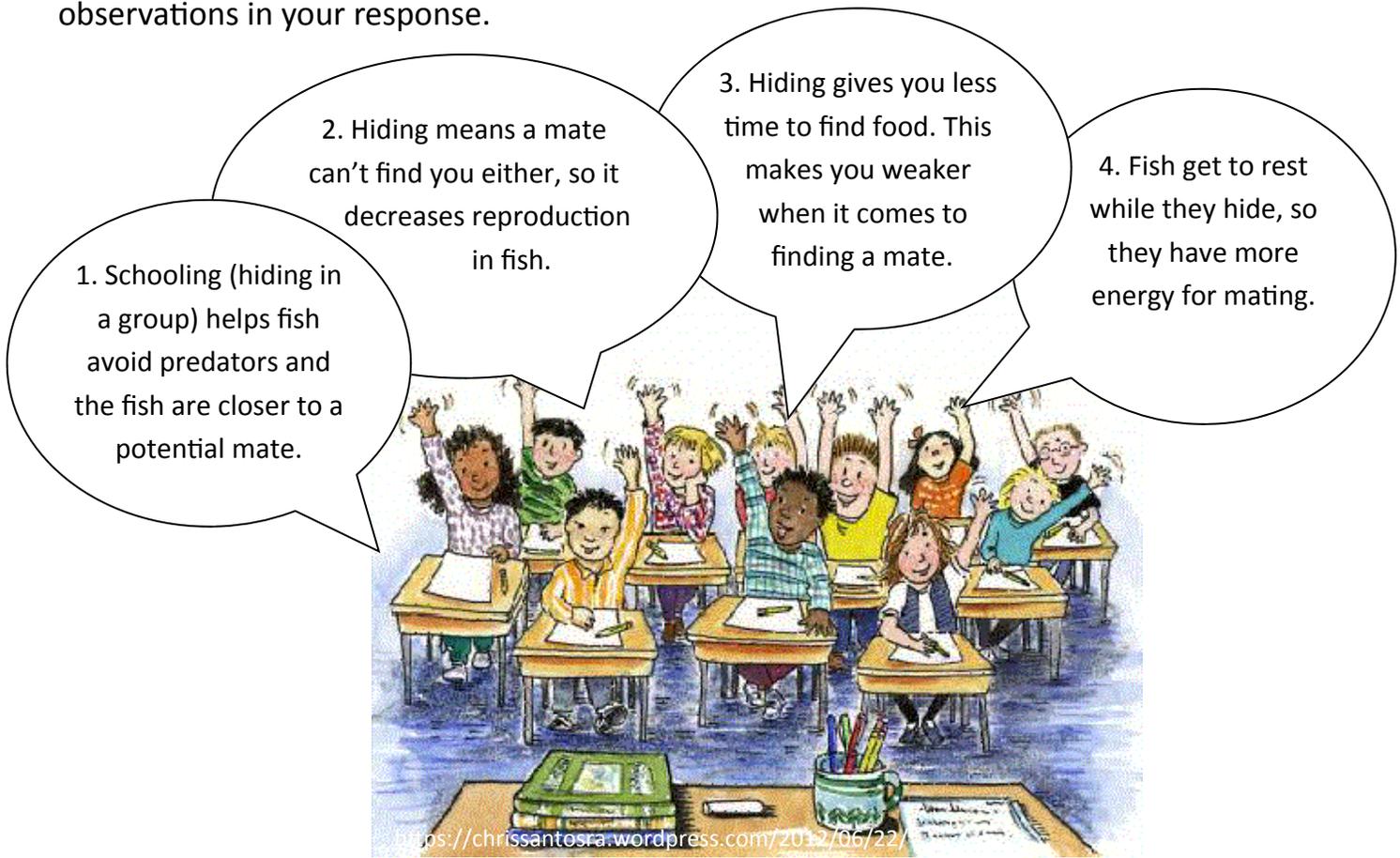


B. What physical changes could Great Lakes Aquarium Aquarist, Miranda, make to the predator tank to help cleaner wrasse be more successful?

C. The Aquarium is researching different species of cleaner wrasse to try again in the predator tank. What behaviors should be considered when searching for a new species to better survive in the tank? List at least 2 needed behaviors and why you think each behavior is needed based on your observations.

#### 4. How does hiding allow for increased survival and reproduction in fish?

The students below have shared some answers to this questions. Choose **two** of the statements and write what you agree and disagree with. Include your Aquarium observations in your response.



Statement # \_\_\_\_\_

I agree with ...

I disagree with...

Statement # \_\_\_\_\_

I agree with ...

I disagree with...