Student Worksheets

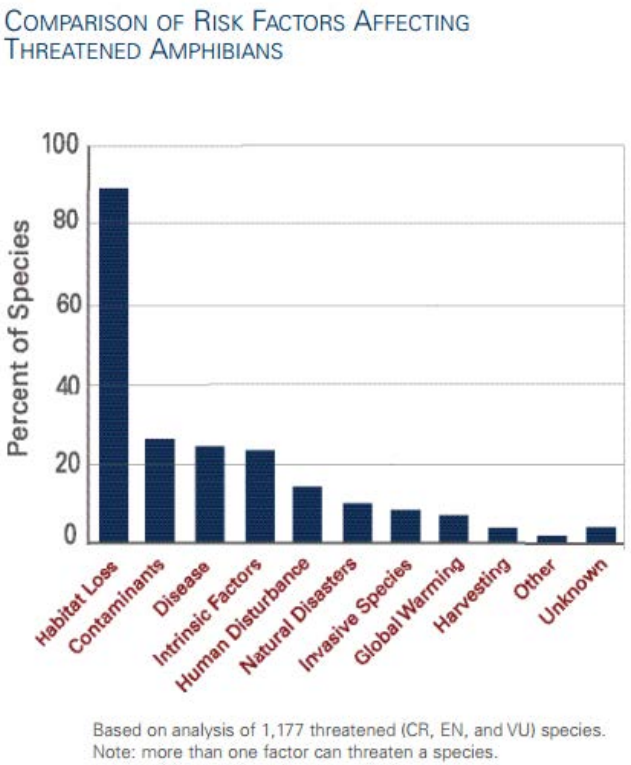
Ectotherm ER: Frogs Under the Weather
Student Brainstorm Challenge Name _____

1. Look at the bar graph and answer the following question. What are the 3 largest threats to threatened amphibian species?

_____

_____

_____



2. **Brainstorm Challenge**:
What kinds of things could change in a frog's habitat or environment that could impact survival? List at least 3 things.

_____

_____

_____

3. **Brainstorm Challenge**:

What life processes of a frog might climate change affect? _____

_____

What could a frog do to maximize its chance for survival in a warmer climate? _____

_____

_____

In a more variable climate? _____

_____

_____

4. **Brainstorm Challenge:** Design an experiment that would test how microhabitat conditions affect body temperature of an ectotherm. Use a numbered list to explain your procedure.

   HELPFUL HINTS:

   - The habitat will be your school grounds.
   - We can use a temperature gun or ibutton temperature sensors to measure temperature in different microhabitats.
   - We can't use actual live frogs.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

What are some microhabitats a frog might live in? How would different microhabitats affect an ectotherm? _____

_____

_____

_____

Group Members: _____

Ectotherm ER: Frogs Under the Weather
Experimental Design
Using the Scientific Method

Problem: _____

_____

Independent Variable: _____

Dependent Variable: _____

Question:

1. How could microhabitat affect an ectotherm? _____

   _____

   _____

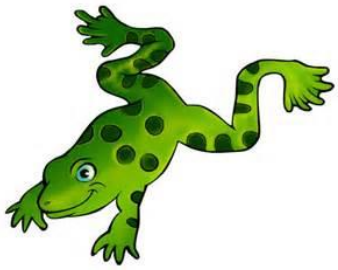
   _____

Hypothesis:

Microhabitat Hypothesis:
Microhabitat choices are **sun** versus **shade**. Fill in the blanks to complete the following hypothesis:

Frogs in the _____ warm up faster than frogs in the _____.

Protocol:
Follow the directions to make your agar frog model.



Time of day: Temperature: Cloud cover (circle one): cloudy partly cloudy clear
Date:

Group Members: _____ _____

_____ _____

Ectotherm ER: Frogs Under the Weather
Data Collection

Directions: Be as specific as possible as you complete this form. Provide accurate details.

	Frog 1	Frog 2	Frog 3	Frog 4
Frog Coloration				
Microhabitat (Circle One)	Sun Shade	Sun Shade	Sun Shade	Sun Shade

Sketch your frogs in their microhabitats:

Sun Frog(s)	Shade Frog(s)
Use words to describe the location you sketched above. Include a description of the area to the **left and right of the frog, in front of and behind the frog, and above and below the frog.**	Use words to describe the location you sketched above. Include a description of the area to the **left and right of the frog, in front of and behind the frog, and above and below the frog.**

Time of day: Temperature: Cloud cover (circle one): cloudy partly cloudy clear
Date:

Time	Temperature (°C)			
(e.g., 1:05pm)	**Shade #1**	**Shade #2**	**Sun #1**	**Sun #2**

Name: _____

Frogs that can take the heat expected to fare better in a changing world

Climate change may outpace deforestation as habitat threat in tropics

1. True or False: Frogs are disappearing globally. _____

2. What is thermal tolerance? _____

   _____

3. What is the full scientific name for the fungus referred to as Bd, or the amphibian chytrid?

   _____ _____

   (Genus) (species)

4. Why is this fungus being studied? _____

   _____

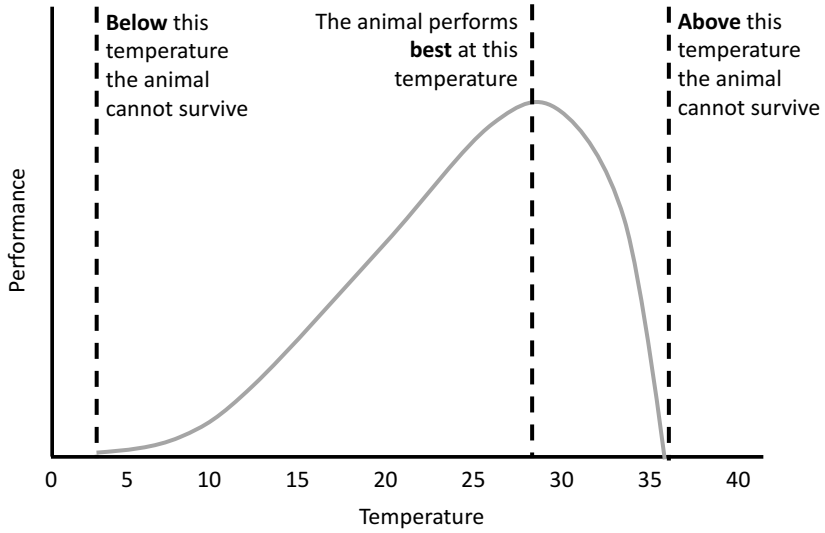
5. In which environment does Bd grow best?
   a. hot environment
   b. cool environment

6. Which frog would be more likely to escape infection by the fungus?
   a. a frog with high thermal tolerance
   b. a frog with low thermal tolerance

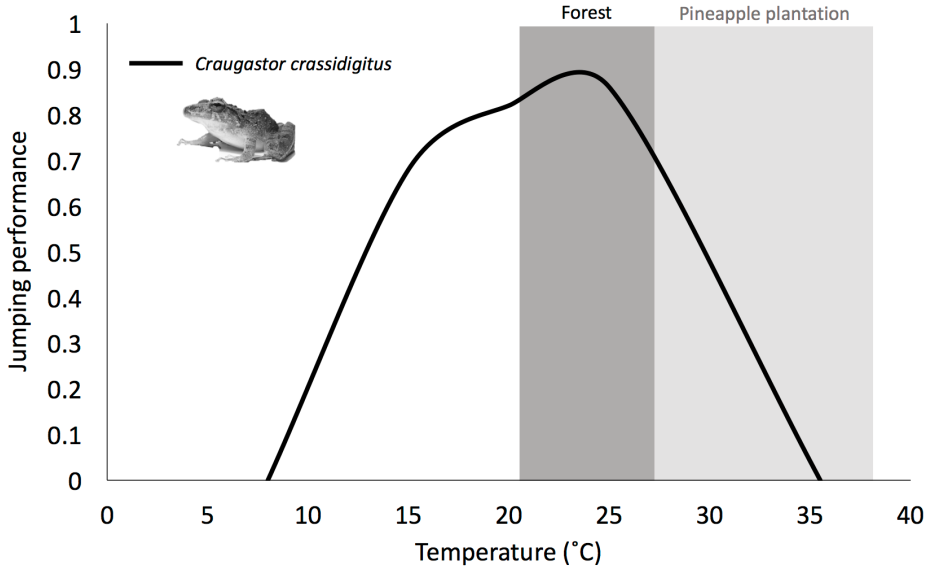
7. What two factors may lead to more frog disease outbreaks, according to Brian Todd, Associate Professor of Conservation Biology in the UC Davis Department of Wildlife, Fish, and Conservation Biology?
   a. climate change
   b. pollution
   c. pathogen transport facilitated by globalization
   d. increasing numbers of mosquitos

8. According to the research findings presented in the article, which may occur faster?
   a. loss of thermally suitable habitat due to climate change
   b. loss of habitat due to deforestation

9. Biologists use **thermal performance curves** to understand how well animals' bodies work at different temperatures. Performance can be measured for any activity that an animal's body needs to do that could affect the animal's survival, such as jumping distance or swimming speed. Scientists then measure differences in the animal's ability to do these activities, such as jumping far, at different temperatures. Here is an example of a thermal performance curve:



Using the thermal performance curve for the tropical frog species *Craugastor crassidigitus* below, answer questions a-c. On this graph, the vertical axis is jumping performance, where higher values (near 1) correspond to longer jumps by the frog.



a. The highest temperature this species can survive in is _____˚C.
b. This species jumps the farthest at _____˚C.
c. This species usually lives in a forest, which has daytime temperatures of 20-27˚C (dark grey shading on graph). Pineapple plantations have daytime temperatures of 27-37˚C (light grey shading on graph). If the forest is cleared for a pineapple plantation, do you think this species will be able to survive? Explain your answer.

_____

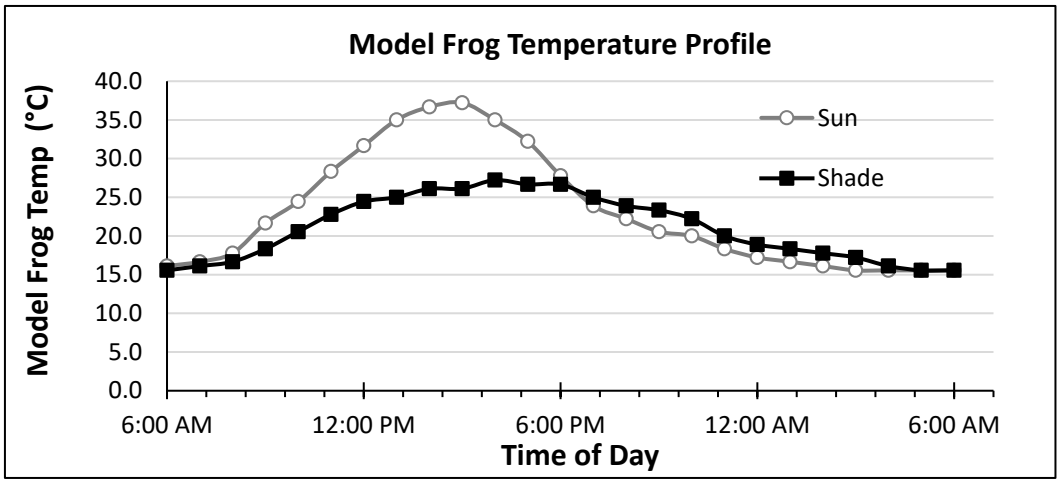
_____

Name _____

Ectotherm ER: Frogs Under the Weather – ANALYSIS

I. Model Frog Temperature Profile

The data below reflects frog temperatures collected over a 24 hour period. Shade the portion of the graph that corresponds to the time of day when your model frogs were deployed.



II. Create Your Own Histogram

Use the infrared thermometer data you collected to create a histogram showing the number of times each model frog was recorded in a certain body temperature range.

Step 1: Complete the following chart to tally how many times each frog's body temperature was within the given ranges.

Histogram Tally Chart					
Bin	**Range**	**Shade #1 Tally**	**Shade #2 Tally**	**Sun #1 Tally**	**Sun #2 Tally**
1	0 - 2 ˚C				
2	2.1 - 4 ˚C				
3	4.1 - 6 ˚C				
4	6.1 - 8 ˚C				
5	8.1 - 10 ˚C				
6	10.1 - 12 ˚C				
7	12.1 - 14 ˚C				
8	14.1 - 16 ˚C				
9	16.1 - 18 ˚C				
10	18.1 - 20 ˚C				
11	20.1 – 22 ˚C				
12	22.1 - 24 ˚C				
13	24.1 - 26 ˚C				
14	26.1 - 28 ˚C				
15	28.1 - 30 ˚C				
16	30.1 - 32 ˚C				
17	32.1 - 34 ˚C				
18	34.1 - 36 ˚C				
19	36.1 - 38 ˚C				
20	38.1 - 40 ˚C				

Step 2: Now use the Histogram Tally Chart to create a histogram on a separate sheet provided by your teacher.

Step 3: Use your histogram to answer the following questions.

1. What was the range of body temperatures that the 'sun' frogs experienced? _____
2. How did the range of body temperatures that the 'shade' frogs experienced compare to those of the 'sun' frogs? _____

Remember that biologists use thermal performance curves to assess an organism's overall ability to survive at given temperatures. Let's take a look at how the frog's performance in the different microhabitats is impacted and how they may be impacted by disease:

Place the Frog's Jumping Performance Curve over your histogram.

1. Did any of your data fall outside the upper temperature limit for this species? _____

   Explain _____

   _____

   _____

2. Look back at the Model Frog Temperature Profile in I, at what time of day and in which habitat did this occur? _____
3. What day-to-day activities might be affected by the frog's jumping performance? _____

   _____

   _____

4. What other environmental factors could affect a frog's behavior? _____

   _____

Next, place the Chytrid Fungus Thermal Performance Curve over your histogram.

5. At what temperature was the fungal population growing fastest? _____
6. Above what temperature does the fungus no longer grow? _____
7. For how many hours of the day was each frog too hot for the fungus to grow on its body?

   # of hours for the 'shade' frog _____ # of hours for the 'sun' frog _____

Next, place both the Frog's Jumping Performance Curve and Chytrid Fungus Thermal Performance Curve over your histogram.

8. Keeping in mind the chytrid fungus doesn't grow above 30°C, look at the jumping performance curve again. How does each frog perform:

   Below 30°C? _____

   At 30°C? _____

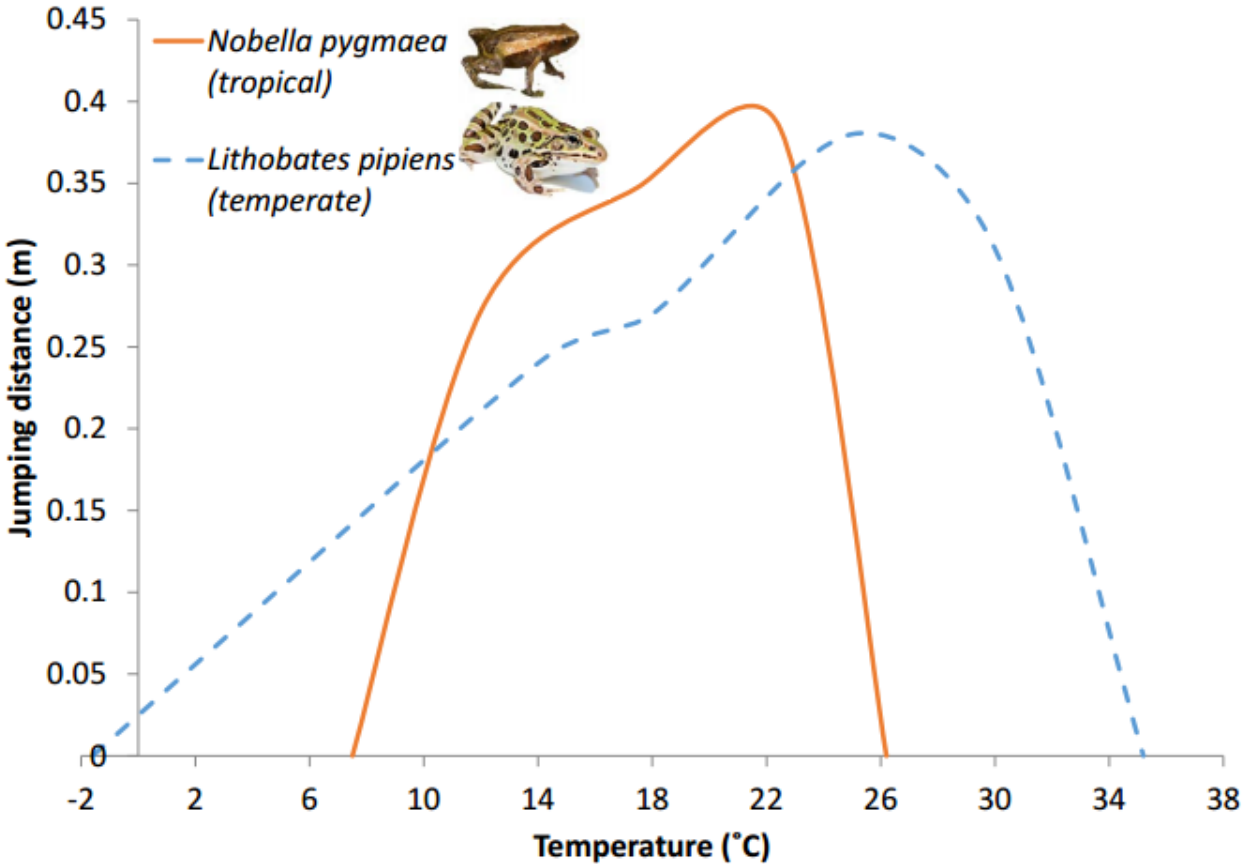
   Above 30°C? _____

Now let's take a look at two species of frogs from different climates:

Directions: Read each statement carefully. Answer the question in the space provided or perform the requested task.

1. Look below at the Jumping Distance Performance Curves for a Tropical vs. Temperate frog.
   At what high temperature is the tropical frog's jumping performance zero? _____
   At what high temperature is the temperate frog's jumping performance zero? _____
   What does this indicate about the frog's health at this temperature? _____
2. At 30°C, draw a straight vertical line that extends from the x-axis until it reaches the temperate frog performance curve. As you learned, the chytrid fungus cannot survive above 30°C. Shade the area of the frog's performance curve where it is too hot for the chytrid fungus to grow.
3. Can the tropical frog survive at a temperature outside of the upper limit for the chytrid fungus? _____
4. What does this indicate about the tropical frog's ability to fight infection? _____
   _____

How might climate change affect the relationship between the frog and the fungus? _____
_____
_____



Ectotherm ER: Frogs Under the Weather

Note to Teachers: Each student will need a 'Sun' frog and 'Shade' frog data set to compile tally marks for their histogram.

Agar Model Data	
Sun Frog	
Time	Temperature °C
6:00 AM	16.1
7:00 AM	16.7
8:00 AM	17.8
9:00 AM	21.7
10:00 AM	24.4
11:00 AM	28.3
12:00 PM	31.7
1:00 PM	35
2:00 PM	36.7
3:00 PM	37.2
4:00 PM	35
5:00 PM	32.2
6:00 PM	27.8
7:00 PM	23.9
8:00 PM	22.2
9:00 PM	20.6
10:00 PM	20.2
11:00 PM	18.3
12:00 AM	17.2
1:00 AM	16.7
2:00 AM	16.1
3:00 AM	15.6
4:00 AM	15.6
5:00 AM	15.6
6:00 AM	15.6

Agar Model Data	
Shade Frog	
Time	Temperature °C
6:00 AM	15.6
7:00 AM	16.1
8:00 AM	16.7
9:00 AM	18.3
10:00 AM	20.6
11:00 AM	22.8
12:00 PM	24.4
1:00 PM	25
2:00 PM	26.1
3:00 PM	26.1
4:00 PM	27.2
5:00 PM	26.7
6:00 PM	26.7
7:00 PM	25
8:00 PM	23.9
9:00 PM	23.3
10:00 PM	22.2
11:00 PM	20.2
12:00 AM	18.9
1:00 AM	18.3
2:00 AM	17.8
3:00 AM	17.2
4:00 AM	16.1
5:00 AM	15.6
6:00 AM	15.6

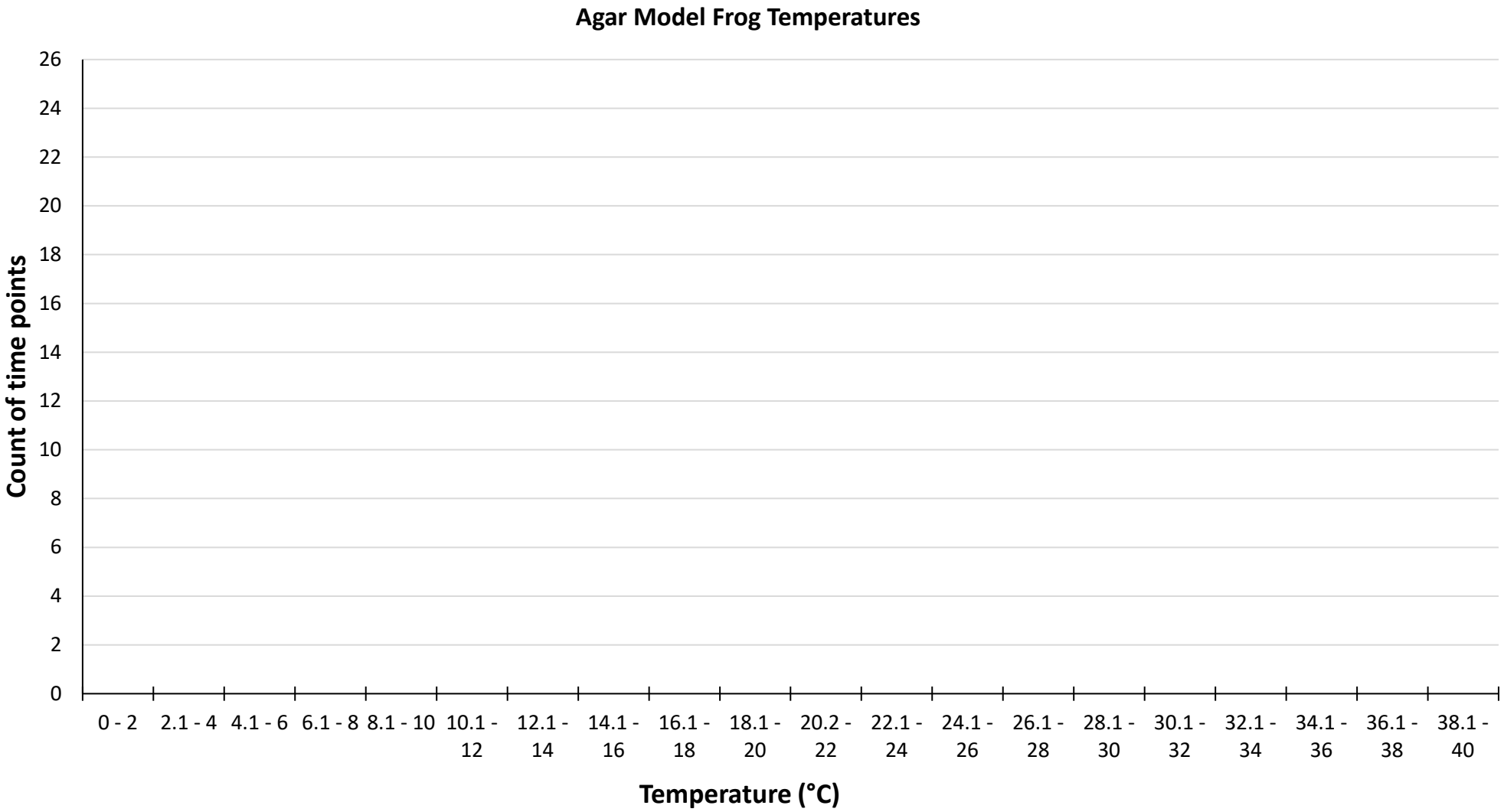
Agar Model Data	
Sun Frog	
Time	Temperature °C
6:00 AM	16.1
7:00 AM	16.7
8:00 AM	17.8
9:00 AM	21.7
10:00 AM	24.4
11:00 AM	28.3
12:00 PM	31.7
1:00 PM	35
2:00 PM	36.7
3:00 PM	37.2
4:00 PM	35
5:00 PM	32.2
6:00 PM	27.8
7:00 PM	23.9
8:00 PM	22.2
9:00 PM	20.6
10:00 PM	20.2
11:00 PM	18.3
12:00 AM	17.2
1:00 AM	16.7
2:00 AM	16.1
3:00 AM	15.6
4:00 AM	15.6
5:00 AM	15.6
6:00 AM	15.6

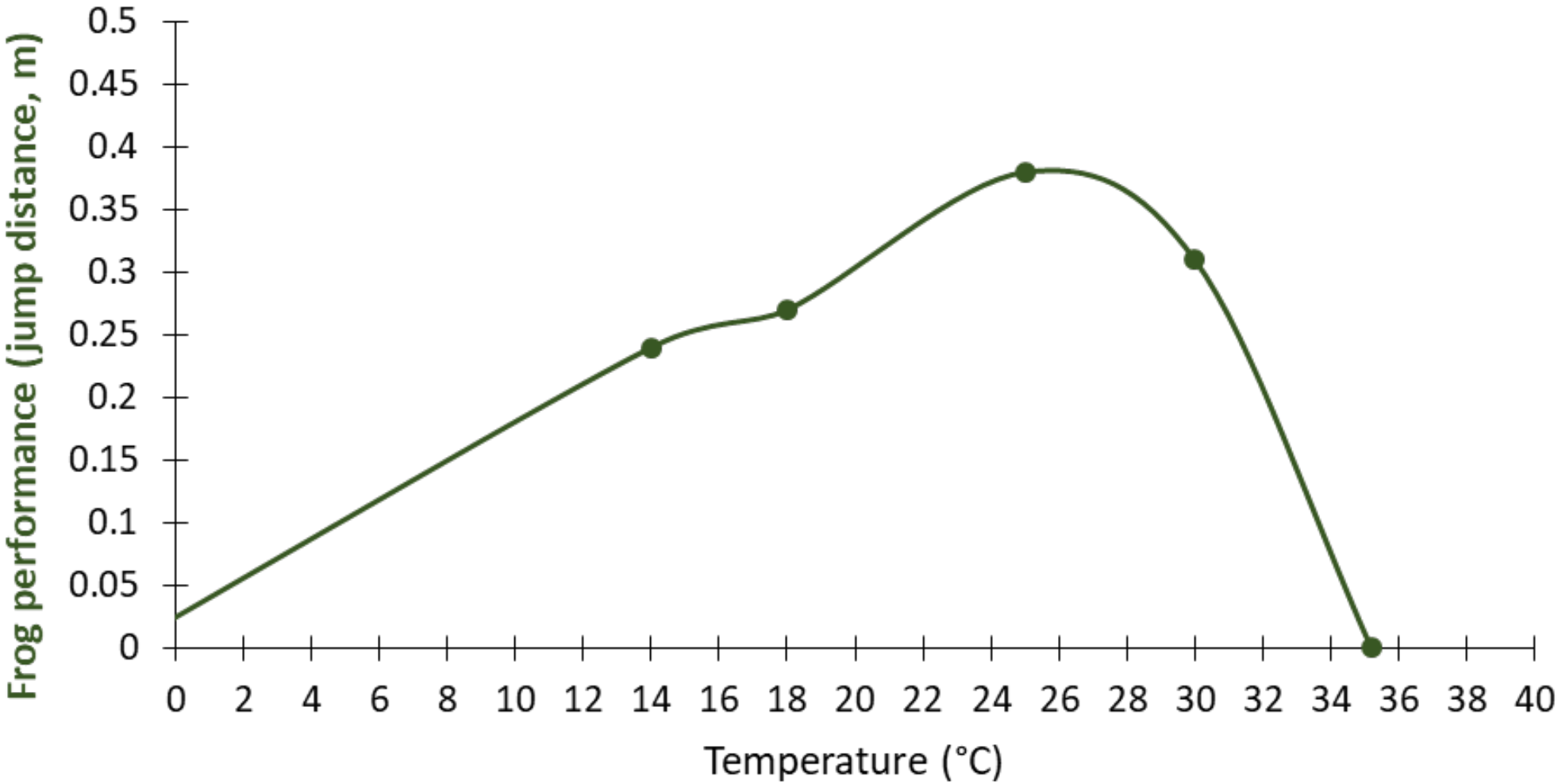
Agar Model Data	
Shade Frog	
Time	Temperature °C
6:00 AM	15.6
7:00 AM	16.1
8:00 AM	16.7
9:00 AM	18.3
10:00 AM	20.6
11:00 AM	22.8
12:00 PM	24.4
1:00 PM	25
2:00 PM	26.1
3:00 PM	26.1
4:00 PM	27.2
5:00 PM	26.7
6:00 PM	26.7
7:00 PM	25
8:00 PM	23.9
9:00 PM	23.3
10:00 PM	22.2
11:00 PM	20.2
12:00 AM	18.9
1:00 AM	18.3
2:00 AM	17.8
3:00 AM	17.2
4:00 AM	16.1
5:00 AM	15.6
6:00 AM	15.6

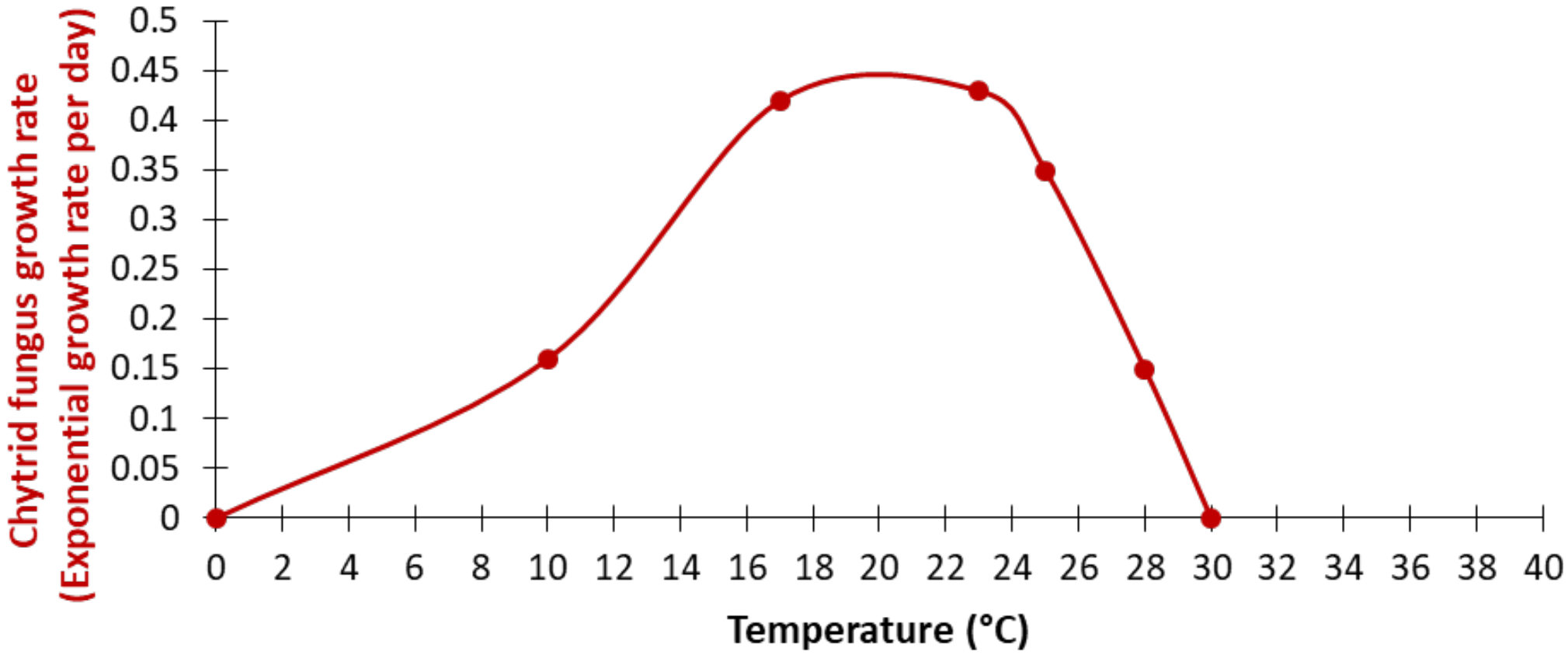
Name: _____ Date: _____

Ectotherm ER: Frogs Under the Weather
Histogram Worksheet

Directions: Use the 'Totals' from the Histogram Tally Chart to plot the number of hours spent at each temperature range. You will draw a separate column for the 'sun' and 'shade' data for each temperature bin, if there is at least one tally mark. Use one color for plotting the sun data and a different color for shade data. Include a legend.




Frog performance (jump distance, m)
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40
Temperature (°C)


Chytrid fungus growth rate
(Exponential growth rate per day)
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40
Temperature (°C)

Ectotherm ER: Frogs Under the Weather
Claim-Evidence-Reasoning

Directions: Read the prompt carefully. Write a scientific explanation in response to the prompt. Be sure to 1. state your **claim**, a conclusion that answers the prompt, 2. Use **evidence**, data that support your claim, and 3. Provide **reasoning**, a justification that links the claim with the evidence.

Prompt: Explain how climate change might affect frog performance and the relationship between a frog and the chytrid fungus and how that could impact frog species' survival. Be sure to include evidence from the 'Ectotherm ER: Frogs Under the Weather' module.

HINT: Use your analysis worksheet to obtain data you can use to support your answer.

Scoring Rubric:

Component	Level		
	0	1	2
Claim: A conclusion that answers the original question	Does not make a claim, or makes an inaccurate claim.	Makes an accurate but incomplete claim.	Makes an accurate and complete claim.
Evidence: Scientific data that support the claim. The data need to be appropriate and sufficient to support the claim.	Does not provide evidence, or only provides inappropriate evidence (Evidence that does not support claim).	Provides appropriate, but insufficient evidence to support claim. May include some inappropriate evidence.	Provides appropriate and sufficient evidence to support claim.
Reasoning: A justification that links the claim and the evidence. It shows why the data counts as evidence by using appropriate and sufficient scientific principles.	Does not provide reasoning, or only provides reasoning that does not link evidence to claim.	Provides reasoning that links the claim and evidence. Repeats the evidence and/or includes some scientific principles, but not sufficient.	Provides reasoning that links evidence to claim. Includes appropriate and sufficient scientific principles.

(McNeill and Krajcik, 2008)

Group Members _____

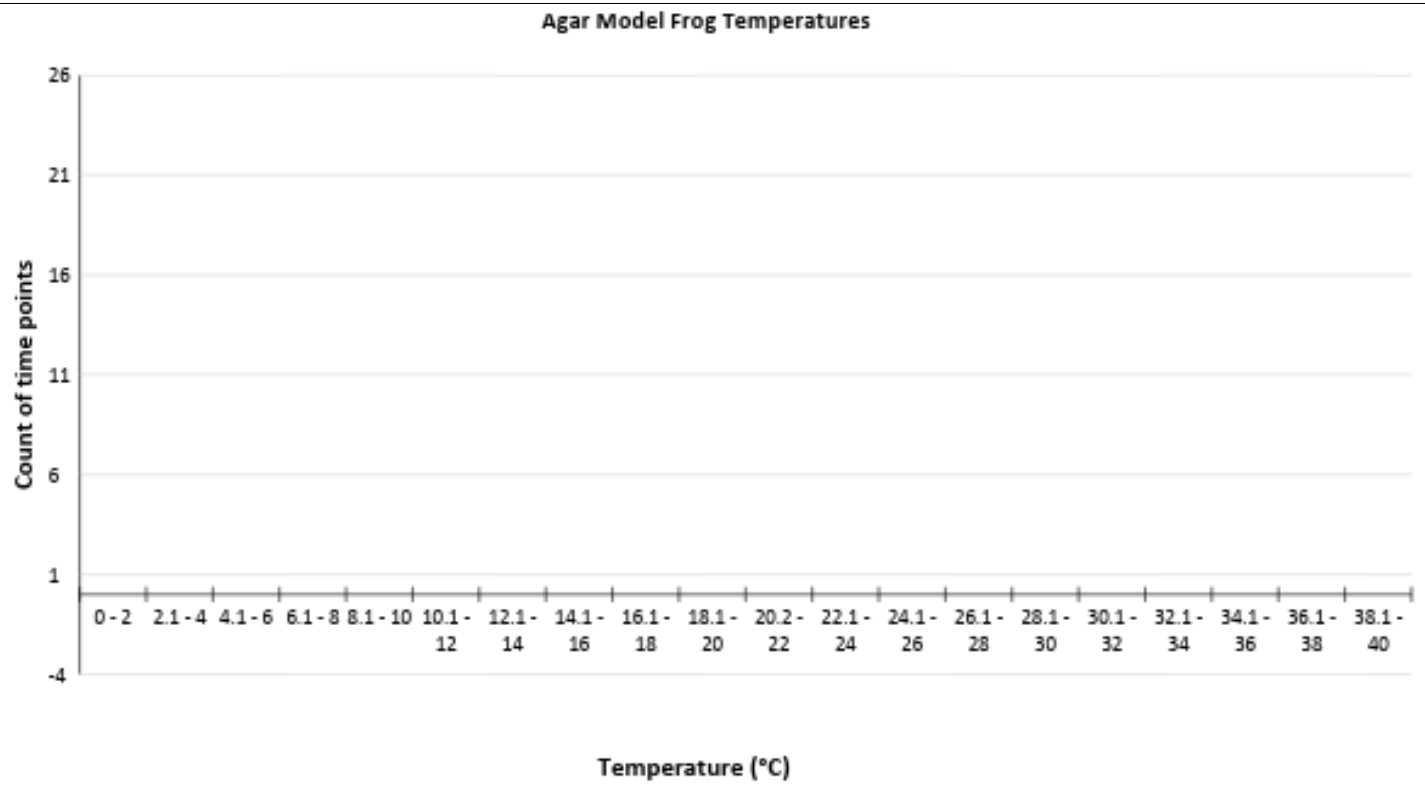
Project Title: _____

Problem: _____

_____.

Include your data and histogram below. Make sure to make labels for shade versus sun frogs.

Histogram Table		
Temp (°C)	Shade	Sun
0 - 2		
2.1 - 4		
4.1 - 6		
6.1 - 8		
8.1 - 10		
10.1 - 12		
12.1 - 14		
14.1 - 16		
16.1 - 18		
18.1 - 20		
20.2 - 22		
22.1 - 24		
24.1 - 26		
26.1 - 28		
28.1 - 30		
30.1 - 32		
32.1 - 34		
34.1 - 36		
36.1 - 38		
38.1 - 40		



Group Members _____

Project Title: _____

Claim (hypothesis): _____

_____.

Evidence: *Our data shows that...*_____

_____

_____.

Reasoning: *This means that....* _____

_____

_____.

Name: _____ Period: _____ Date: _____

Ectotherm ER: A Final Report (Total: 15 pts)

Explain how climate change might affect the relationship between a frog and the chytrid fungus. Be sure to include evidence from the 'Ectotherm ER: Frogs Under the Weather' module.

STEP 1: Use a graphic organizer to plan your response.

Topic: _____

Reasons	Evidence (Include temperature references from graphs)
Reason 1 **Optimal thermal performance of chytrid fungus overlaps with frog's optimal performance temperature**	
Reason 2 **With unexpected climate changes, an increase in temperature may affect the number of areas with a chytrid fungus outbreak.**	
Concluding Sentence:	

STEP 2: Use your graphic organizer to write your final report.

Friendly Reminders:

- ➢ Include a topic and concluding sentence
- ➢ Skip lines as you write. Indent 1st line of a new paragraph.
- ➢ Capitalize the beginning of sentences, all proper nouns & the word "I".
- ➢ Check spelling, grammar, and punctuation.
- ➢ Read your work aloud and make any necessary changes before turning it in.
- ➢ Use formal language, not slang or texting-type words.
- ➢ <u>If typing it, use Times font, 12 pt font, double-space. Type full name & title at top.</u>

<u>NOTE:</u> You may hand write in class and type it at home, if you would like it to be typed, but that is not necessary.

Due Date: _____

Ectotherm ER: A Final Report
Peer Review/ Grading Rubric

Peer Reviewer:_____ Date: _____

Directions: Identify if the student completed the following items. If they did mention the item in their paragraph, mark their points in the 'Your Score' column. If it is missing, circle the item description so they can revise their paper.

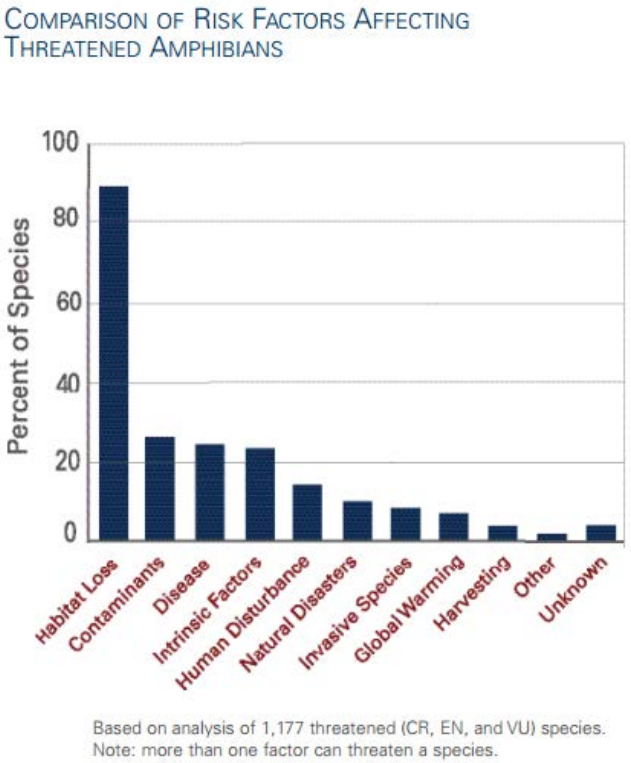
Student Name:	**Your Score**	**Points Possible**
I. Reason 1: The student should mention…..		
A. optimal thermal performance of a frog including temperature(s)		2
B. optimal thermal performance of chytrid fungus including temperature(s)		2
C. the overlap of the temperatures and what that means (in separate sentence(s).		3
II. Reason 2: The student should mention…..		
A. definition of climate change		2
B. what can cause climate change		2
C. how chytrid affects a frog's body		2
D. how quickly a frog can perish when affected with chytrid		2
Additional Remarks:		
Final Score		

Answer Keys

Ectotherm ER: Frogs Under the Weather
Student Brainstorm Challenge

Name **ANSWER KEY**

1. Look at the bar graph and answer the following question. What are the 3 largest threats to threatened amphibian species?



Habitat Loss

Contaminants

Disease

2. **Brainstorm Challenge**:
What kinds of things could change in a frog's habitat or environment that could impact survival? List at least 3 things.

Answers will vary but could include: pollution, introduction of predator/competitor, habitat loss or modification, climate changes, loss of food resources, etc.

3. **Brainstorm Challenge**:
What life processes of a frog might climate change affect? **Answers will vary but could include: foraging (hunting for food), escaping predators, mating/reproduction, metabolism, immune defenses, ...**

What could a frog do to maximize its chance for survival in a warmer climate? **Answers will vary, could include: seek shade when temperatures are too hot, burrow to find cooler temperatures, aestivate, enter cool water, migrate to an area with a cooler climate (e.g., higher latitude, higher elevation), come out of hibernation earlier in spring...**

In a more variable climate? **Answers will vary, could include: move back and forth between microhabitats, live near a variety of microhabitats, be able to adjust timing of hibernation and breeding accordingly, be able to find shelter from both heat and cold and to find water when needed.**

4. **Brainstorm Challenge:** Design an experiment that would test how microhabitat conditions affect body temperature of an ectotherm. Use a numbered list to explain your procedure.

   HELPFUL HINTS:

   - The habitat will be your school grounds.
   - We can use a temperature gun or ibutton temperature sensors to measure temperature in different microhabitats.
   - We can't use actual live frogs.

Open ended. Answers will vary. Students should be encouraged to be creative.

What are some microhabitats a frog might live in? How would different microhabitats affect an ectotherm? **Answers will vary, may include: burrows, ponds, streams, dry ground, moist ground, under a tree, in the open, in a tree, etc. Each microhabitat may be good for heating or cooling, conserving water or evaporating it to keep cool, but no particular microhabitat is likely to have all the frog needs to keep its body temperature and water balanced all the time.**

Group Members: **ANSWER KEY**

Ectotherm ER: Frogs Under the Weather
Experimental Design Teacher Answer Key
Using the Scientific Method

Problem: How do we investigate the impact of microhabitat on frog temperature?

Independent Variable: Microhabitat

Dependent Variable: Frog's Body Temperature (°C)

Question:

1. How could microhabitat affect an ectotherm? (Answers may vary)

   Sample response:

   Different microhabitats offer frogs different availability of:

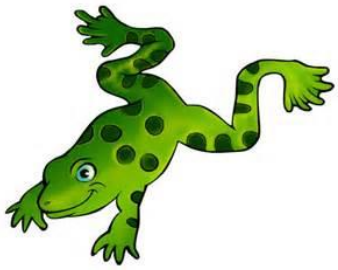
   - **heat** - **water/moisture** - **cooling** - **camouflage** - **exposure to predators**

Hypothesis:

Microhabitat Hypothesis:
Microhabitat choices are **sun** versus **shade**. Fill in the blanks to complete the following hypothesis:

Frogs in the **sun** warm up faster than frogs in the **shade**.

Protocol:
Follow the directions to make your agar frog model.



Name: **ANSWER KEY**

Frogs that can take the heat expected to fare better in a changing world

Climate change may outpace deforestation as habitat threat in tropics

1. True or False: Frogs are disappearing globally. **TRUE**

2. What is thermal tolerance? **"the ability to withstand higher temperatures" according to the article.**

   The range of temperatures that an organism can withstand and still survive is also acceptable.

3. What is the full scientific name for the fungus referred to as Bd, or the amphibian chytrid?

   Batrachochytrium (Genus) **dendrobatidis** (species)

4. Why is this fungus being studied? **Because it threatens the health of amphibian populations.**

   It is a rather newly discovered pathogen and scientists are still learning about it.

5. In which environment does Bd grow best?
   a. hot environment
   ✓ b. cool environment

6. Which frog would be more likely to escape infection by the fungus?
   ✓ a. a frog with high thermal tolerance
   b. a frog with low thermal tolerance

7. What two factors may lead to more frog disease outbreaks, according to Brian Todd, Associate Professor of Conservation Biology in the UC Davis Department of Wildlife, Fish, and Conservation Biology?
   ✓ a. climate change
   b. pollution
   ✓ c. pathogen transport facilitated by globalization
   d. increasing numbers of mosquitos

8. According to the research findings presented in the article, which may occur faster?
   ✓ a. loss of thermally suitable habitat due to climate change
   b. loss of habitat due to deforestation

Ectotherm ER: Frogs Under the Weather
Claim-Evidence-Reasoning

Directions: Read the prompt carefully. Write a scientific explanation in response to the prompt. Be sure to 1. state your **claim**, a conclusion that answers the prompt, 2. Use **evidence**, data that support your claim, and 3. Provide **reasoning**, a justification that links the claim with the evidence.

Prompt: Explain how climate change might affect frog performance and the relationship between a frog and the chytrid fungus and how that could impact frog species' survival. Be sure to include evidence from the 'Ectotherm ER: Frogs Under the Weather' module.

HINT: Use your analysis worksheet to obtain data you can use to support your answer.

Scoring Rubric:

Component	Level		
	0	1	2
Claim: A conclusion that answers the original question	Does not make a claim, or makes an inaccurate claim. States that climate change will not impact the relationship or generalizes that it's "all good" or "all bad"	Makes an accurate but incomplete claim. States that frogs will be affected differently by the fungus in different environments but neglects to address the performance cost of being in a warmer climate	Makes an accurate and complete claim. States that frogs in warmer climates may be better suited to fight the infections, but they may not be able to perform basic survival tasks, so only the subset of species that can perform at high temperatures will survive in warmer climates
Evidence: Scientific data that support the claim. The data need to be appropriate and sufficient to support the claim.	Does not provide evidence, or only provides inappropriate evidence (Evidence that does not support claim). Does not use the performance data from the frogs and growth curve of the fungus to consider ideal temperatures for survival	Provides appropriate, but insufficient evidence to support claim. May include some inappropriate evidence. Only takes into account one piece of the evidence, for example that warmer temperatures kill the fungus, but does not address the performance curve of the frog	Provides appropriate and sufficient evidence to support claim. Uses the histogram with the frog performance curve plus the fungus growth curve to argue that increasing temperatures will impact the organisms differently: The fungus dies at higher temperatures, but some frog species cannot perform survival

			activities at those high temperatures, while others would be able to survive.
Reasoning: A justification that links the claim and the evidence. It shows why the data counts as evidence by using appropriate and sufficient scientific principles.	Does not provide reasoning, or only provides reasoning that does not link evidence to claim. Provides an inappropriate reasoning like "warming climates will be bad for all organisms"	Provides reasoning that links the claim and evidence. Repeats the evidence and/or includes some scientific principles, but not sufficient. Repeats the evidence or provides an incomplete generalization like "frogs will no longer be affected by the fungus, so increasing temperatures should be beneficial for frog species"	Provides reasoning that links evidence to claim. Includes appropriate and sufficient scientific principles. Includes a complete reasoning that takes into account that some frog species will survive with warming climates because they will not be impacted by the fungus and are acclimated to warm temperatures. However, other species will die as a result of low performance at high temperatures rather than fungal infection.

(adapted from: McNeill and Krajcik, 2008)

Group Members __ANSWER KEY_____

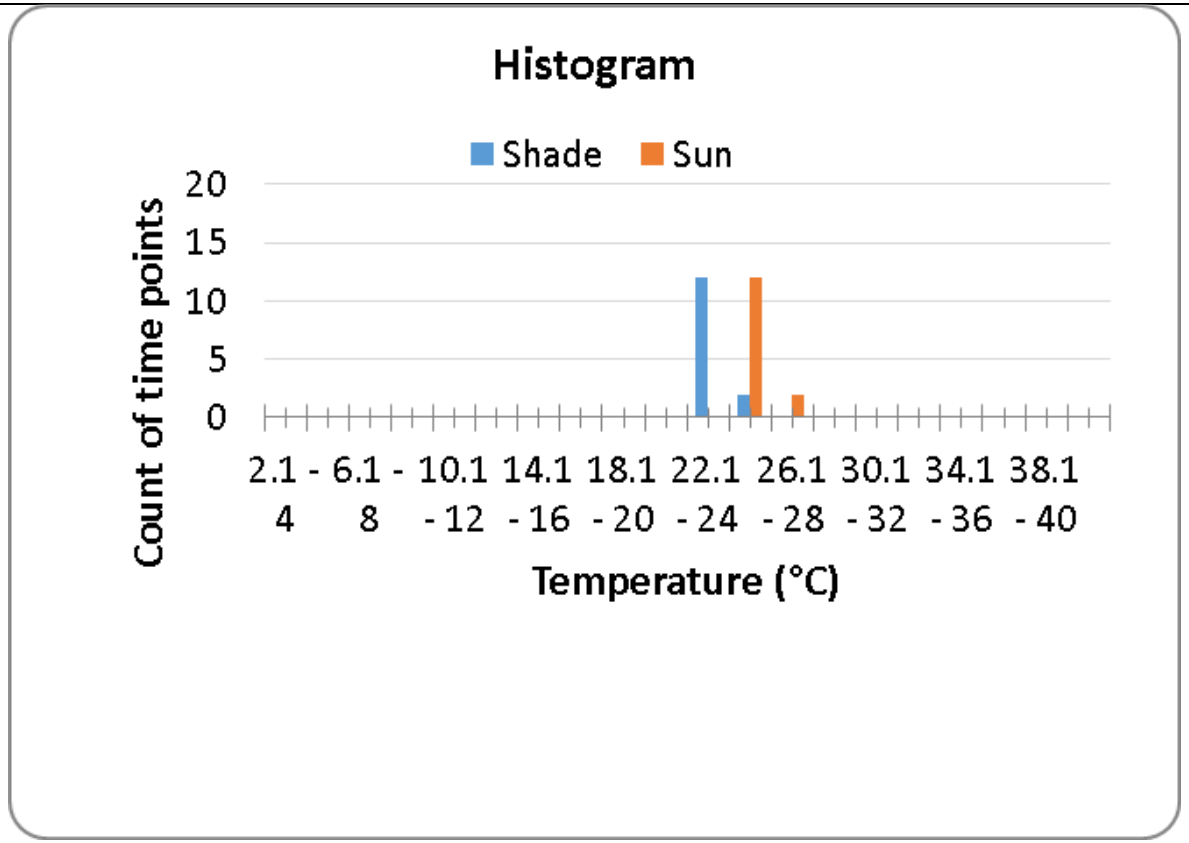
Project Title: __ECTOTHERM ER: FROGS UNDER THE WEATHER_____

Problem: How do we investigate the impact of microhabitat on frog temperature?_____

_____.

. Include your data and histogram below. Make sure to make labels for shade versus sun frogs.

Histogram Table		
Temp (°C)	Shade	Sun
0 - 2	0	0
2.1 - 4	0	0
4.1 - 6	0	0
6.1 - 8	0	0
8.1 - 10	0	0
10.1 - 12	0	0
12.1 - 14	0	0
14.1 - 16	0	0
16.1 - 18	0	0
18.1 - 20	0	0
20.2 - 22	12	0
22.1 - 24	0	12
24.1 - 26	0	0
26.1 - 28	0	0
28.1 - 30	0	0
30.1 - 32	0	0
32.1 - 34	0	0
34.1 - 36	0	0
36.1 - 38	0	0
38.1 - 40	0	0



Group Members __ANSWER KEY_____

Project Title: __ECTOTHERM ER: FROGS UNDER THE WEATHER_____

Claim (hypothesis): Frogs in the sun warm up faster than frogs in the shade._____

_____.

Evidence: *Our data shows that…*_the frogs in the shade were 20.2-22 degrees Celsius a total of 12 times, whereas the frogs in the sun were 22.1-24 degrees Celsius 12 times._____

_____.

Reasoning: *This means that….* the frogs that live in a sunny microhabitat experience average temperatures that are a few degrees warmer than frogs that live in a shady microhabitat. This might impact the frog's physiological performance including its susceptibility to the chytrid fungus.