BIO 105 LAB SIGN OFF PAGE — UNIT 4

Name _______________________________

Please staple all of your lab pages for this Unit together with this page as the top You will use this page to get your Labs for Unit 4 signed off by the Biology Learning Center staff. You need to have all of the following steps initialed by a staff member before you can receive your 25 labs points for Unit 4 and be allowed to take the Unit 4 Exam.

After you have obtained all of your sign offs for this Unit, be sure that a BLC staff member indicates on your Lab Card that you are OK to take the Unit 4 Exam. Also, keep this sign off page, along with your completed lab worksheets, as proof of your lab completion. If your Lab Card indicates that you have not completed the required Labs for this Unit and you believe that you have, it is up to you to provide proof that you have indeed completed the Labs. Keep this page!

_________ UNIT 4, STEP 2A: ECOBEAKER: THE BARNACLE ZONE (in BLC)

_________ UNIT 4, STEP 2B: ECOBEAKER: THE BARNACLE ZONE (in BLC)

_________ UNIT 4, STEP 3: RULE OF SEVENTY (online)

_________ UNIT 4, STEP 4: “QUESTIONS AND HYPOTHESES: MORE PRACTICE” (online)

*BLC Staff: After the student receives his/her last initial on this page, please indicate on his/her Lab Card that s/he is OK to take the Unit 4 Exam.
STEP 2: WORKSHEETS FOR THE ECOBEAKER LAB: BARNACLES

Use the EcoBeaker software program to complete the lab activity entitled “The Barnacle Zone.” To complete this assignment, you must use the computers in the Biology Learning Center. The EcoBeaker manual with instructions for this activity is located on the shelf behind the World of Microbes in the Biology Learning Center for use in the Biology Learning Center. While you read the instructions and run the simulations, you will answer the following questions. The instructions will tell you when to take your worksheets to the front desk in the Biology Learning Center for lab points.

1. Describe your observations of where each species can be found and fill in the figure with “b” for *Semibalanus* and “c” for *Chthamalus*.

2. Write down at least three hypotheses to explain your observations.

3. *Semibalanus* tends to be found lower on the rock, below the tide line. What happens if you remove a patch of *Semibalanus*, and leave exposed bare rock?

4. What happens if you transplant a patch of *Chthamalus* on top of *Semibalanus* low on the rock?

5. *Chthamalus* tends to be found higher on the rock, above the tide line and above *Semibalanus*, where *Chthamalus* is regularly exposed to air. What happens if you remove a patch of *Chthamalus*, and leave exposed bare rock?
6. What happens if you transplant a patch of *Semibalanus* on top of *Chthamalus* high on the rock?

7. How do your observations from Questions 3-6 affect your hypotheses from Question 2? Are some hypotheses no longer valid? Do you have new hypotheses?

8. Describe where *Chthamalus* is found in the absence of *Semibalanus*? Fill in the figure with “b” for *Semibalanus* and “c” for *Chthamalus*.

   ![Diagram](image)

   This is the **fundamental niche** of *Chthamalus*; where it lives in the absence of all other species.

9. Describe where *Semibalanus* is found in the absence of *Chthamalus*? Fill in the figure with “b” for *Semibalanus* and “c” for *Chthamalus*.

   ![Diagram](image)

   This is the **fundamental niche** of *Semibalanus*; where it lives in the absence of all other species.

10. How do your observations from Questions 8 & 9 affect your hypotheses? Are some hypotheses no longer valid? Do you have new hypotheses? What is currently your most strongly supported hypothesis for the observations you have made?

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**BRING YOUR WORKSHEETS TO THE FRONT DESK IN THE BIOLOGY LEARNING CENTER FOR THE FIRST SET OF LAB POINTS.**

(Bio 105, Unit 4, Step 2A)

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11. Describe what happens when *Nucella*, the predatory snail, is added to the ecosystem. What is the distribution of *Nucella*? How have the distributions of *Semibalanus* and *Chthamalus* changed? Fill in the figure with “b” for *Semibalanus*, “c” for *Chthamalus*, and “n” for *Nucella*.

12. State a hypothesis that explains your observations in Question 11.

13. What is a **niche**?

14. What is a **fundamental niche**? What determines fundamental niches: physical limitations or biological factors (like predation and competition for space)?

15. What is the **fundamental niche** of *Semibalanus* (the larger barnacle)? What physical limitation, if any, determines its fundamental niche?

16. What is the **fundamental niche** of *Chthamalus*? What physical limitation, if any, determines its fundamental niche?

17. What is a **realized niche**? What determines realized niches: physical limitations or biological factors (like predation and competition for space)?
18. To answer Question 18, look at your answers to questions 1 and 11 and compare them to the fundamental niches of both barnacle species. How does the presence of *Chthamalus* (the smaller barnacle) affect the realized niche of *Semibalanus*?

19. How does the presence of *Semibalanus* affect the realized niche of *Chthamalus*?

20. How does the presence of *Nucella* (the predatory snail) affect the realized niches of *Semibalanus* and *Chthamalus*?

21. Do you agree or disagree with Connell’s hypotheses? If you disagree, explain how your hypotheses differ from his.

22. What did you learn about where organisms live from this lab activity?

BRING YOUR WORKSHEETS TO THE FRONT DESK IN THE BIOLOGY LEARNING CENTER FOR THE REMAINDER OF THE LAB POINTS.

(Bio 105, Unit 4, Step 2B)
STEP 3: WORKSHEETS FOR “THE RULE OF 70” LAB ACTIVITY

Do the lab activity entitled “The Rule of 70.” This activity can be completed at home. The instructions for the lab activity are on the Biology 105 website. When you have completed the activity, take your worksheets to the front desk in the Biology Learning Center for lab points.

Use the space below to record the equation for the rule of 70. (You can just copy the three forms of the equation from page 2 of the webpage for the rule of 70 lab. You may also wish to copy down the numbers that, when multiplied, equal 70.)

PROBLEMS TO SOLVE FOR LAB POINTS:

PROBLEM 1: If the population growth rate is 0.7 percent, how many years will it take for the size of the population to double?
PROBLEM 2: If a country has a population of 10,000 people and a population growth rate of 2%, how many years will it take until the population reaches 80,000 people?

PROBLEM 3: If there are 1 million people in a population that has a population growth rate of 2.5%, how large will the population be in 112 years?

PROBLEM 4: 40 years ago, the population of a particular country was 25 million. Today the population is 100 million. What is that country’s population growth rate?

BRING YOUR RESULTS TO THE FRONT DESK IN THE BIOLOGY LEARNING CENTER FOR LAB POINTS.

(Bio 105, Unit 4, Step 3)
STEP 4: WORKSHEETS FOR “QUESTIONS AND HYPOTHESES: MORE PRACTICE” LAB ACTIVITY

Do the lab activity entitled “Questions and Hypotheses: More Practice.” This lab activity can be done at home, and the instructions are on the Biology 105 website. When you have completed the activity, take your worksheets to the front desk in the Biology Learning Center for lab points.

1. Define hypothesis.

2. Define null hypothesis.

3. Define alternate hypothesis.

4. What makes a hypothesis “testable”?

5. Write down your testable null and alternate hypotheses for Scenario 1: Hiking in the Catalina Mountains:
   a. null hypothesis
   b. alternate hypothesis
6. Write down your testable null and alternate hypotheses for Scenario 2: Sea urchins on a rocky beach:
   a. null hypothesis
   b. alternate hypothesis

7. Write down your testable null and alternate hypotheses for Scenario 3: Finding money on the street:
   a. null hypothesis
   b. alternate hypothesis

WHEN YOU HAVE COMPLETED THIS ACTIVITY, BRING YOUR WORKSHEETS TO THE FRONT DESK IN THE BIOLOGY LEARNING CENTER FOR LAB POINTS.
(Bio 105, Unit 4, Step 4)