

BIOLOGY 183 MARINE BIOLOGY
PIMA COMMUNITY COLLEGE, DOWNTOWN CAMPUS

WORKSHEETS FOR UNIT 2

UNIT 2 LEARNING OBJECTIVES

Define energy and metabolism. List the four basic properties of life. Describe organic compounds, carbohydrates, proteins, lipids, and nucleic acids. Describe photosynthesis in detail, including photosynthetic pigments and the reaction of photosynthesis. Describe respiration in detail, including the reaction of respiration. Define autotrophs and heterotrophs. Describe primary production and relate it to primary producers. Briefly describe a cell and compare and contrast prokaryotic and eukaryotic cells. List and describe the levels of organization of life from cellular to organ systems. List and briefly describe the levels of organization of organisms from individuals to ecosystems. Define the term habitat. Define the term planktonic, benthic, and nektonic. List three challenges for life in the ocean. Describe how salinity is a challenge for life in the ocean, including a discussion of the roles of osmosis and selectively permeable membranes. Give two examples of how organisms regulate their salt and water balance. Define osmoconformer and osmoregulator. Describe how temperature is a challenge for life in the ocean, including examples and definitions of ectotherm, poikilotherm, endotherm, and homeotherm. Describe how surface-to-volume ratio is a challenge for life in the ocean, including a discussion of how the ratio affects cell and organism size. Compare and contrast asexual and sexual reproduction in the ocean. Describe asexual fission and budding. List and briefly describe reproductive strategies in the ocean. Briefly outline natural selection and adaptation and their role in evolution. Define the term species. Describe binomial nomenclature, including both genus and species. List the taxonomic levels of classification from Domain through species. List and briefly describe the three Domains of life. List and briefly describe the four kingdoms within the Domain Eukaryota.

UNIT 2 ACTIVITIES

Step 1: Read Chapter 4 in your textbook (*Marine Biology*, 7th ed., by Castro and Huber) and answer the questions in these worksheets. For hints or to double-check your answers, go to the Biology 183 website.

Step 2: For lab points, do the lab activity entitled "The Importance of Surface Area." There are worksheets for this activity later in this packet. Directions are on the Biology 183 website. This lab must be completed at the Biology Learning

Center. When you have completed the lab activity, take your results to the front desk in the Biology Learning Center to receive lab points.

Step 3: Do the optional lab activity entitled "Primary Production." This lab may be completed at home or anywhere with Internet availability. When you have completed the lab activity, check your answers on the class website. This material will be on your exam!

Step 4: For lab points, do the lab activity entitled "Osmosis and Diffusion." This lab must be completed at the Biology Learning Center. When you have completed the lab activity, take your results to the front desk in the Biology Learning Center to receive lab points.

Step 5: Prepare for the Unit 2 exam. The exam will consist of 40 multiple-choice questions. All 40 questions will be "factual" in nature (to assess whether you learned the facts in this unit). Some of these 40 questions may come from material you learned during your lab activities. To prepare for the 40 "factual" questions, try the multiple-choice practice quiz for Unit 2. Go to the Biology 183 website for the link to this practice quiz. The answers are at the end of the practice quiz. The critical thinking questions at the end of your worksheets will help you understand the material in this chapter.

Step 6: Come in to the Biology Learning Center to take your Unit 2 exam. The exam will consist of 40 multiple-choice questions.

STEP 1: TEXTBOOK WORKSHEETS

Introduction

1. Define the term energy.

2. Define the term metabolism

The Ingredients of Life: The Building Blocks

3. Describe the four properties of living things.

4. What are organic compounds?

5. What are the four main groups of organic molecules?

6. What are carbohydrates? What are some examples of carbohydrates?

7. What are proteins? What are some examples of proteins?

8. What are lipids? What are some examples of lipids?

9. What are nucleic acids? What are some examples of nucleic acids?

The Ingredients of Life: The Fuel of Life

10. Describe photosynthesis (in words), including its significance to life.

11. Describe photosynthetic pigments and chlorophyll

12. Describe the chemical process of photosynthesis both in words and with its chemical formula. (Fig. 4.4)

13. What are autotrophs? What are heterotrophs?

14. Describe respiration (in words) and its significance to life.

15. What is the chemical formula for respiration? (Fig. 4.5)

16. What is primary production?

17. What are nutrients? What are the most important nutrients in the ocean?

Living Machinery: Cells and Organelles

18. Describe and define the terms cell and organelles.

19. What are the two types of cells?

**20. Describe prokaryotic cells. What types of organisms are prokaryotes?
(Fig. 4.7)**

21. Describe eukaryotic cells. What types of organisms are eukaryotes? (Fig. 4.8)

Living Machinery: Levels of Organization

22. Compare unicellular and multi-cellular organisms.

23. What is "level of organization"?

24. Describe the levels of organization within multi-cellular organisms, in order of increasing complexity. (Table 4.1)

Cellular level:

Tissue level:

Organ level:

Organ system level:

25. Describe the levels of organization among individuals, in order of increasing complexity. (Table 4.1)

Individual level:

Population level:

Community level:

Ecosystem level:

Challenges of Life in the Sea

26. What is a habitat?

27. What are three challenges to life in the ocean habitat, as discussed in the textbook?

28. Define the terms planktonic, benthic, and nektonic.

Planktonic:

Benthic:

Nektonic:

Challenges of Life in the Sea: Salinity

29. Describe the process of diffusion. (Fig. 4.12)

30. If the concentration of sodium ions is higher in the water surrounding a cell than it is within the cell, how will diffusion occur? How does this present a problem for cells?

31. What is a selectively permeable membrane? How does it solve some of the problems of diffusion for a cell?

32. What is osmosis? How does it affect cells? (Fig. 4.13)

33. What is active transport? How do cells deal with osmosis?

34. Preview: What are ions? What is salinity? What is a solute? (p. 43-44)

35. What are two strategies that marine organisms use to regulate salt and water balance within their cells and bodies?

36. Give two examples of how some osmoregulators control their internal concentrations of solutes. (Fig. 4.14)

Challenges of Life in the Sea: Temperature

37. How do most organisms deal with temperature? (Fig. 4.16)

38. Define the terms ectotherm and poikilotherm.

39. Define the terms endotherm and homeotherm.

Challenges of Life in the Sea: Surface-to-Volume Ratio

40. Why is surface-to-volume ratio an important consideration for life? (Fig. 4.17)

Perpetuating Life

41. Why is perpetuating life an important characteristic of life?

42. What is heredity?

Perpetuating Life: Modes of Reproduction

43. What are the two dominant modes of reproduction?

44. Describe asexual reproduction and give three examples.

45. Describe sexual reproduction.

Perpetuating Life: Reproductive Strategies

46. Why do marine organisms display a variety of reproductive strategies?

47. Describe broadcast spawning.

The Diversity of Life in the Sea: Natural Selection and Adaptation

48. Describe the process of natural selection.

49. What is evolution?

50. How does natural selection relate to the theory of evolution?

The Diversity of Life in the Sea: Classifying Living Things

51. What is biological nomenclature?

52. Use dogs, wolves, and coyotes to give an example of biological nomenclature.

53. Why do scientists use biological nomenclature to name species instead of using common names (like "dog")?

54. What is phylogeny? (Fig. 4.23)

55. What are the three domains of life? How are they different? How are they alike? (Fig. 4.24)

56. What are the four kingdoms within the Domain Eukaryota? (Fig. 4.24)
[Note: the "missing" 4th Kingdom in the figure is the Kingdom Protista]

57. List the 8 taxonomic levels (in order of most inclusive to least inclusive) used by scientists to group organisms by their degree of relatedness. (Table 4.2)

Critical Thinking Questions

58. During the day, primary producers like seaweeds carry out both photosynthesis and respiration, but at night, when there is no light, they perform only respiration. Small, isolated tide pools on rocky shores are often inhabited by thick growths of seaweeds. Would you expect the amount of oxygen to differ between night and day? How?

59. Is breathing the same thing as respiration?

60. Where in the ocean would you expect rates of primary production to be highest? Lowest?