Unit 06: Marine Invertebrates

Content Area: **Science**
Course(s):
Time Period: **Marking Period 2**
Length: **3 weeks**
Status: **Published**

Brief Summary of Unit

Students will learn the life functions, body systems, and habitats of several phyla of marine invertebrates. Life functions include ingestion, digestion, respiration, mobility, sensitivity, and reproduction. Preserved specimens, models, and video segments will be used for observations of body systems. Students will learn how marine animals are classified, how their adaptations enable them to survive in the marine environment and the role of each invertebrate group in the marine food web.

June 2024

Essential Questions

Essential Questions:

What are marine invertebrates and what characteristics define each phylum?

What are the major body structures and functions of marine invertebrates?

How did invertebrate marine life evolve and adapt to their environments?

How do invertebrates interact with other organisms in marine environments?

Enduring Understandings:

Invertebrates make up a majority of organisms in the animal kingdom and were the first animal life forms to evolve on Earth.

Invertebrates have specific bodily structures that function to aid their survival over geologic time.

Invertebrates are an important part of oceanic ecosystem food chains and biological processes.

Students Will Know / Students Will Be Skilled At

Students will know about marine invertebrates by defining the following key terms: poriferans, cnidarians, nematodes, annelid, mollusk, bivalve, gastropod, cephalopod, arthropod, echinoderm, cnidoblasts, nematocyst, coral polyp, coelom, ganglia, parapodia, byssal threads, chromatophores, mantle, operculum, radula, carapace, crustacean, exoskeleton, and zooplankton.

Students will know the characteristics used in classifying marine invertebrates.

Students will know the functions of major body parts in each class of marine invertebrates.

Students will know the role of invertebrates in the marine food web.

Students will know the evolutionary trends within the marine invertebrate phylum.

Students will be skilled at sea star biology through specimen dissection.

Students will be skilled at crayfish biology through specimen dissection.

Learning Plan

Meaningful participation in guided question/answer sessions, individual/group discussions, demonstrating an understanding of the purpose of the unit lesson(s), key terms, and concepts.

Preview the essential questions, provide answers, and connect to learning throughout the unit.

Video Series: The Shape of Life - worksheet and discussion

Present various illustrations, preserved specimens of invertebrates to the class. Compare and contrast these organisms with the understanding that they are all marine invertebrates.

Outline and discuss the major life functions of marine invertebrates.

Organize groups of students and assign each group one invertebrate phylum. Students should use a multimedia approach to their presentations: internet, PowerPoint, video clips, etc.

Present detailed information of structure, function, diversity, and role in the food web of each invertebrate phylum.

Evidence / Performance Tasks

Formative Assessments:

Worksheets

Do Nows

Exit Tickets

Class Discussions

Complete daily classwork and regular homework assignments related to the identification of concepts learned in the natural

setting, vocabulary, problem solving, and critical thinking.

Quiz topics: name each major group of invertebrates and how each uses different methods to perform life functions, how pollution is affecting marine invertebrates, & how each phylum has displayed major adaptations to survive in their environments.

Summative:

Unit test: how marine invertebrate life evolved from the simple poriferans to arthropods and the dissection of the sea star and the crayfish.

Bench Marks:

Midterm / Final Exam

Alternative:

Research and create a presentation about a specific marine invertebrate

Materials

Textbook, *Essentials of Oceanography (13th Ed.), Trujillo and Thurman and ancillary materials*

Earth Science, Merrill, and ancillary resource materials

Earth Science, Prentice-Hall, and ancillary resource materials

quantitative/qualitative lab equipment for activities, experiments

related oceanography maps, ocean current charts

Informational & interactive Website: noaa.gov

Standards

L.SS.11–12.1	Demonstrate command of the system and structure of the English language when writing or speaking.
S.ID.A	Summarize, represent, and interpret data on a single count or measurement variable
9.4.12.CI.1	Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).
	Innovative ideas or innovation can lead to career opportunities.
9.4.12.CI.2	Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8).

9.4.12.CI.3	Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).
L.KL.11–12.2	Apply knowledge of language to understand how language functions in different contexts, to make effective choices for meaning or style, and to comprehend more fully when reading or listening.
	Collaboration with individuals with diverse experiences can aid in the problem-solving process, particularly for global issues where diverse solutions are needed.
9.4.12.CT.1	Identify problem-solving strategies used in the development of an innovative product or practice (e.g., 1.1.12acc.C1b, 2.2.12.PF.3).
9.4.12.CT.2	Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).
L.VL.11–12.3	Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grades 11–12 reading and content, including technical meanings, choosing flexibly from a range of strategies.
S.ID.C	Interpret linear models
S.IC.A	Understand and evaluate random processes underlying statistical experiments
RL.CR.11–12.1	Accurately cite strong and thorough textual evidence and make relevant connections to strongly support a comprehensive analysis of multiple aspects of what a literary text says explicitly and inferentially, as well as interpretations of the text; this may include determining where the text leaves matters uncertain.
S.IC.B	Make inferences and justify conclusions from sample surveys, experiments, and observational studies
RI.CR.11–12.1	Accurately cite a range of thorough textual evidence and make relevant connections to strongly support a comprehensive analysis of multiple aspects of what an informational text says explicitly and inferentially, as well as interpretations of the text.
	Solutions to the problems faced by a global society require the contribution of individuals with different points of view and experiences.
	Advanced search techniques can be used with digital and media resources to locate information and to check the credibility and the expertise of sources to answer questions, solve problems, and inform the decision-making.
	Digital tools such as artificial intelligence, image enhancement and analysis, and sophisticated computer modeling and simulation create new types of information that may have profound effects on society. These new types of information must be evaluated carefully.
W.AW.11–12.1	Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.
	Accurate information may help in making valuable and ethical choices.
	Digital tools differ in features, capacities, and styles. Knowledge of different digital tools is helpful in selecting the best tool for a given task.
	Collaborative digital tools can be used to access, record and share different viewpoints and to collect and tabulate the views of groups of people.
W.WR.11–12.5	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
SL.PE.11–12.1	Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with peers on grades 11–12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.
SL.PI.11–12.4	Present information, findings and supporting evidence clearly, concisely, and logically. The

	content, organization, development, and style are appropriate to task, purpose, and audience.
SL.UM.11–12.5	Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
HS-LS2-3	Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions.
HS-LS2-6	Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.
HS-LS2-7	Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.
HS-LS2-8	Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce.
HS-LS3-2	Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.
HS-LS3-3	Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.
HS-LS4-1	Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence.
HS-LS4-2	Construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment.
HS-LS4-3	Apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait.
HS-LS4-4	Construct an explanation based on evidence for how natural selection leads to adaptation of populations.
HS-ESS1-6	Apply scientific reasoning and evidence from ancient Earth materials, meteorites, and other planetary surfaces to construct an account of Earth's formation and early history.
HS-ESS2-1	Develop a model to illustrate how Earth's internal and surface processes operate at different spatial and temporal scales to form continental and ocean-floor features.
HS-ESS2-2	Analyze geoscience data to make the claim that one change to Earth's surface can create feedbacks that cause changes to other Earth systems.
HS-ESS2-7	Construct an argument based on evidence about the simultaneous coevolution of Earth's systems and life on Earth.
HS-ESS3-1	Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and climate change have influenced human activity.
HS-ESS3-3	Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.
HS-ESS3-4	Evaluate or refine a technological solution that reduces impacts of human activities on climate change and other natural systems.
HS-ESS3-5	Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth systems.
HS-ESS3-6	Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity (i.e., climate

change).

Suggested Strategies for Modification

https://docs.google.com/spreadsheets/d/1BoXlgGboaurkHWyNqQpnIzl77z6Lb7Dg_ExD7n7FQJw/edit?usp=sharing

Additional modifications may be made based on individual needs of students as stated in student IEP (Individualized Education Program) documentation and as observed by the teacher:

Student directed research/presentation (power point, skit, demonstration) - Recent Scientific Contributions.

Design your own lab experiment

modified tests

cooperative learning groups

one-to-one instruction and assistance

additional time on task

alternative outcome options

individualized student assessment

preferential seating

handouts of class materials

guided notes

visual aides

computer web search