

Planner

Activity	Description	<u>Materials and Technology</u>	<u>Additional Materials</u>	<u>Approximate Timing</u>	<u>Page Number</u>
Task 1: What are our connections to the ocean?					
Discover	Develop a personal identity map showing the different parts of who you are and explore your connections to the ocean.	<ul style="list-style-type: none"> • Paper • Pens or pencils 		45 minutes	6
Understand	Create an ocean identity map and gather oral histories about the ocean from your community.	<ul style="list-style-type: none"> • Class board or poster paper • Paper • Pens or pencils • Art and craft materials (optional) 	<u>Personal Identity Map</u>	25 minutes + Oral history gathering time	9
Act	Design a museum exhibit to help others better understand the ocean and their connection to it.	<ul style="list-style-type: none"> • Paper • Markers, pens, or pencils • Art and craft materials (optional) 	<u>Personal Identity Map</u> <u>Ocean Identity Map</u>	25 minutes	15
Task 2: What are ocean systems and why are they important?					
Discover	Use a system you are familiar with to create a system diagram.	<ul style="list-style-type: none"> • Paper • Pens or pencils 		20 minutes	19
Understand	Investigate ocean systems from small to global, using pictures as a tool.	<ul style="list-style-type: none"> • Paper • Pens or pencils 		25 minutes	24
Act	Consider different perspectives and create team goals for the future of the ocean. Use these goals to decide which guide parts you will use.	<ul style="list-style-type: none"> • Paper • Pens or pencils 	<u>Ocean Identity Map</u>	25 minutes	28



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Task 1: How does water move around our planet?					
<i>Discover</i>	Search for elements of your community's water system and map your watershed.	<ul style="list-style-type: none"> • Paper • Pen or pencil • Digital or physical map of your area 	<u><i>Ocean and Water System Diagram</i></u>	40 minutes	43
<i>Understand</i>	Model surface currents and analyze a map of global ocean currents.	<ul style="list-style-type: none"> • Shallow basin, preferably clear • Water • Ground pepper or small bits of paper • Rock or similar item (optional) 	<u><i>Ocean Identity Map</i></u>	30 minutes	50
<i>Act</i>	Connect ideas about local and global water systems and share what you have learned.	<ul style="list-style-type: none"> • Paper • Pencil 	<u><i>Ocean and Water System Diagram</i></u> <u><i>Ocean Identity Map</i></u>	20 minutes	55



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Task 2: How do circulating water pollutants affect our planet?					
Discover	Model types of water pollution and search for evidence of pollutants in your community that may be affecting the ocean.	<ul style="list-style-type: none"> • Shallow basin, preferably clear • Water • Flat, waterproof surface • Piece of scrap plastic • Scissors • Watering can or cup • Cooking oil • Food coloring • Sponge • Salt or sugar (optional) • Paper • Pen or pencil 	<u><i>Ocean and Water System Diagram</i></u>	30 minutes + community investigation time	57
Understand	Investigate the impact of water pollution on ocean organisms.	<ul style="list-style-type: none"> • Paper • Poster board (optional) • Pen or pencil 	<u><i>Ocean Identity Map</i></u>	25 minutes	63
Act	Determine which pollution problem you would like to help solve and take action.	<ul style="list-style-type: none"> • Paper • Pen or pencil 	<u><i>Ocean Identity Map</i></u> <u><i>Ocean and Water System Diagram</i></u>	25 minutes + action time	72



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Task 1: How do ocean systems help regulate Earth's air?					
Discover	Connect with your breath and the ocean through mindfulness, and examine data about oxygen production on Earth.	<ul style="list-style-type: none"> • Paper • Pen or pencil 	<u>Ocean Identity Map</u>	20 minutes	85
Understand	Learn about the carbon cycle, examine data about atmospheric carbon, and investigate blue carbon sinks.	<ul style="list-style-type: none"> • Paper • Pen or pencil • Blue Carbon Game cards • Scissors • Colored tape (optional) • 2 sets of 20 small items each— paper clips, small stones, blocks, etc. 	<u>Ocean and Air System Diagram</u> <u>Ocean Identity Map</u> <u>Notice, Think Wonder</u>	40 minutes	89
Act	Consider different perspectives on ways to take action to reduce carbon dioxide in the air.	<ul style="list-style-type: none"> • Paper • Pen or pencil 	<u>Ocean and Air System Diagram</u> <u>Ocean Identity Map</u>	15 minutes	101



Activity	Description	Materials and Technology	Additional Materials	Approximate Timing	Page Number
Task 2: How can we prevent ocean acidification?					
Discover	Reflect on carbon dioxide emissions from your community and investigate how carbon dioxide in the air leads to ocean acidification.	<ul style="list-style-type: none"> • 4 clear plastic or glass cups (5 if doing options 1 and 2) • Markers • Natural pH indicator (such as red cabbage, blueberries, raspberries, blackberries, grapes or plums) and boiling water and a strainer, or pH meter or strips • Acid, such as vinegar or lemon juice • Base, such as baking soda • For option 1: straw • For option 2: foil, plastic wrap (cling film) 	<u><i>Ocean and Air System Diagram</i></u>	45 minutes	104
Understand	Investigate the impact of an acidifying ocean on the shells of ocean organisms.	<ul style="list-style-type: none"> • 5 shells (such as oyster, mussel, or egg) • 5 clear glass or plastic cups • Small digital scale (optional) • Markers • Acid, such as vinegar or lemon juice • Water 	<u><i>Ocean Identity Map</i></u> <u><i>Ocean and Air System Diagram</i></u>	30 minutes + overnight + 15 minutes	110
Act	Find consensus and take action on ocean acidification.	<ul style="list-style-type: none"> • Paper • Pen or pencil 	<u><i>Ocean Identity Map</i></u> <u><i>Ocean and Air System Diagram</i></u>	25 minutes + action time	113



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Task 1: How do ocean systems help regulate Earth's temperature?					
Discover	Explore how temperature affects you and your community, and begin to diagram this system.	<ul style="list-style-type: none"> • Paper or poster board • Pen, marker, or pencil 	<u>Personal Identity Map</u>	25 minutes	129
Understand	Model how water acts as a heat sink and how density due to differences in temperature and salinity cause deep water currents.	<ul style="list-style-type: none"> • 2 identical boxes • 3 transparent water containers • Plastic wrap • Tape or rubber bands • Heat source • thermometers (optional) • Hot and cold water • Food coloring • Salt 	<u>Ocean and Temperature System Diagram</u> <u>Ocean Identity Map</u>	45 minutes	133
Act	Analyze the ocean and global temperature system from different perspectives and share the important role the ocean plays in keeping Earth habitable.	<ul style="list-style-type: none"> • Markers, colored pencils, or crayons • Paper 	<u>Ocean Identity Map</u>	25 minutes	140



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Task 2: How will a warming ocean affect people and the planet?					
Discover	Using real-world data as a basis, explore the changes caused by rising ocean heat energy in ocean systems and in your community.	<ul style="list-style-type: none"> • Colored pens or markers 	<u><i>Ocean and Temperature System Diagram</i></u> <u><i>Ocean Identity Map</i></u>	20 minutes + investigation time	142
Understand	Investigate the concept of feedback loops in systems and model a feedback loop related to ice and reflectivity.	<ul style="list-style-type: none"> • White paper • Black paper • 10 to 20 ice cubes or 2 cupfuls of ice or snow • Timer • Sunlight 	<u><i>Ocean and Temperature System Diagram</i></u>	35 minutes	147
Act	Decide what you think is important to know about the changing ocean and why we need to change our behavior. Create and share a way of expressing yourself.	<ul style="list-style-type: none"> • Any materials you need for your method of expression 	<u><i>Ocean Identity Map</i></u> <u><i>Personal Identity Map</i></u> <u><i>Ocean and Temperature System Diagram</i></u>	15 minutes + Creation time	152



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Task 1: How are the organisms of the ocean linked in a system?					
Discover	Use existing knowledge of the ocean to create ocean food web diagrams and assign trophic levels to them.	<ul style="list-style-type: none"> • Paper • Pen or pencil 		25 minutes	165
Understand	Play the Level Up Game and reflect on trophic levels and system removals.	<ul style="list-style-type: none"> • A pack of playing cards, or homemade cards from cardstock for each player • Items for the table, such as spoons or chunky markers • Class board or piece of paper and something to write with that can be erased 	<u>Ocean and Food System Diagram</u>	25 minutes	169
Act	Consider baseline shifts in ocean ecosystems and decide on potential actions.	<ul style="list-style-type: none"> • Paper • Pen or pencil 	<u>Ocean and Food System Diagram</u> <u>Food Web System Diagram</u>	20 minutes + action time	173



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Task 2: How can people be a sustainable part of ocean food webs?					
Discover	Investigate how living things from the ocean are used in your community.	<ul style="list-style-type: none"> • Paper • Pen or pencil 	<u>Ocean and Food System Diagram</u>	20 minutes + investigation time	176
Understand	Use data and a game to understand the problem of unsustainable fisheries and investigate possible solutions.	<ul style="list-style-type: none"> • 3 types or colors of items, such as paper clips, small coins, small blocks, or pieces of popcorn • Class board or piece of paper and something to write with • 1 die or 6 pieces of paper and a small container 		30 minutes	179
Act	Learn more about fisheries policies and determine how you will take action.		<u>Ocean and Food System Diagram</u> <u>Ocean Identity Map</u>	20 minutes + action time	184



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<u>Activity</u>	<u>Description</u>	<u>Materials and Technology</u>	<u>Additional Materials</u>	<u>Approximate Timing</u>	<u>Page Number</u>
Task 1: What are the conflicts over coastal spaces and how could they be resolved?					
<i>Discover</i>	Find personal connections to the coast and use a photo collage to help create a system diagram.	<ul style="list-style-type: none"> • Paper • Pen or pencil 	<u><i>Ocean Identity Map</i></u>	25 minutes	198
<i>Understand</i>	Investigate coastal conflicts that are most relevant to you.	<ul style="list-style-type: none"> • Paper • Pen or pencil • Computer (optional) or access to information sources such as a library 		40 minutes	202
<i>Act</i>	Analyze coastal conflicts and reimagine them to be fairer and more balanced.	<ul style="list-style-type: none"> • Paper • Pen or pencil 	<u><i>Ocean Identity Map</i></u>	25 minutes	206



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Task 2: How can we conserve coastal ecosystems and the benefits they provide?					
Discover	Explore coastal ecosystem services and add them to your <u><i>Ocean and Coastal System Diagram</i></u> .	<ul style="list-style-type: none"> • Pen or pencil • Paper 	<u><i>Ocean and Coastal System Diagram</i></u> <u><i>People and Coasts</i></u>	20 minutes	211
Understand	Learn more about environmental ecosystem services and model how mangroves and coral reefs can help absorb wave energy.	<ul style="list-style-type: none"> • Long, shallow container • Something to absorb water • Water • Small heavy blocks, rocks, or other items • Tape • Piece of colored paper • Scissors 	<u><i>Coastal Ecosystem Services</i></u>	40 minutes	213
Act	Explore and decide on different policy solutions to help resolve the coastal conflict you identified.	<ul style="list-style-type: none"> • Pen or pencil • Paper 	<u><i>Ocean and Coastal System Diagram</i></u> <u><i>Ocean Identity Map</i></u>	20 minutes	219



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Task 1: How are different ocean systems interconnected?					
Discover	Use systems diagrams from previous parts to draw connections.	<ul style="list-style-type: none"> • Tape • String or yarn • Pens or markers • Sticky notes or a class board 	<u>System Diagrams</u> (from Parts 2, 3, 4, 5, 6—whichever ones you created)	25 minutes	228
Understand	Analyze the complex ocean system to identify problems you could help to solve.	<ul style="list-style-type: none"> • Sticky notes • Pens or markers 	<u>Complex Ocean System Diagram</u>	20 minutes	230
Act	With your team, come to consensus on the problem you will work to help solve.		<u>Ocean Identity Map</u> <u>Complex Ocean System Diagram</u>	20 minutes	230
Task 2: How will I contribute to a healthy ocean?					
Discover	Identify different action possibilities to address the problem you identified.	<ul style="list-style-type: none"> • Paper • Pens or pencils 	<u>Complex Ocean System Diagram</u>	20 minutes	232
Understand	Pick and plan your action.	<ul style="list-style-type: none"> • Paper • Pens or pencils 	<u>Personal Identity Map</u>	30 minutes	233
Act	Implement your action plan and reflect on your action.		<u>Action Plan</u> <u>Ocean Identity Map</u>	15 minutes + action time	236

