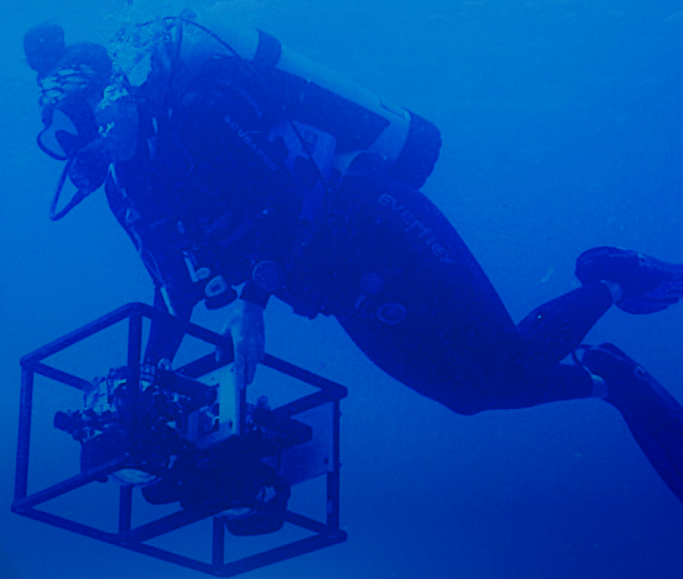


OCEANX



OCEANXPERIENCE



INSTRUCTIONAL SEQUENCE

MARINE LIFE PROSTHETIC 3-5 (POST)

Science

GRADE LEVEL: 3-5



Never stop wondering.
Never stop imagining.™

Presented for Australian audience by:

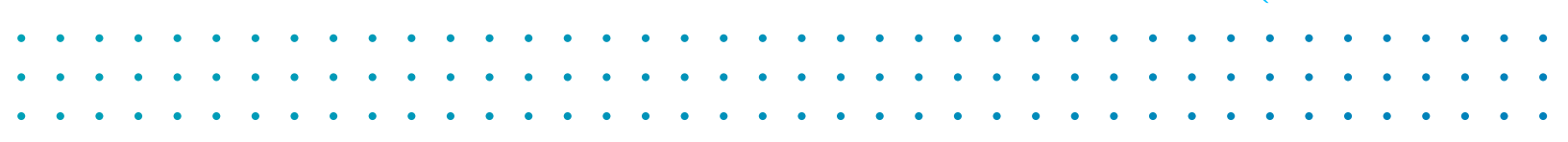


PURPOSE

Elicit students' ideas about prosthetics as an aide for improving an organisms life..

EXHIBITION LEARNING OBJECTIVE

The students will create a prosthetic for marine life and investigate if the prosthetic will help the marine life they selected.



YEAR 3

SCIENCE

Science Inquiry Skills - Planning and conducting:

WA3SSIPL1 - Plan and conduct investigations, including elements of fair tests, and consider the material and equipment risks.

Science Inquiry Skills - Evaluating:

WA3SSIE1 - Compare findings with those of others, and to predictions; consider if investigations were fair; and identify questions for further investigation.

Science Inquiry Skills - Communicating:

WA3SSICM1 - Communicate ideas using scientific vocabulary.

Science Inquiry Skills - Collaborating and applying:

WA3SSICL1 - Use science knowledge to propose explanations for observed phenomena and solutions to problems.

DESIGN AND TECHNOLOGIES

Contexts - Materials & Technologies Specialisations:

WA3TDECMT1 - Properties of materials, suitability and safe practice using given technologies to create a product to achieve a purpose.

Design thinking skills - Investigating and defining:

WA3TDEDTID1 - Define ideas and design opportunities for individual and/or local needs.

Design thinking skills - Designing:

WA3TDEDTD1 - Design solutions through use of labelled drawings, technical terms and/or a sequence of steps.

YEAR 3 - CONTINUED

Design thinking skills - Producing and implementing:

WA3TDEDTPI1 - Use appropriate technologies and components with given equipment and follow agreed protocols to produce a designed solution.

Design thinking skills - Evaluating:

WA3TDEDETE1 - Use given criteria to evaluate diagrams, technologies and the components used for the designed solution.

YEAR 4

SCIENCE

Science Inquiry Skills - Planning and conducting:

WA4SSIPL1 - Plan and conduct investigations, including elements of fair tests, and consider the material and equipment risks.

WA4SSIPL2 - Make and record observations, including formal measurements using familiar scaled instruments.

Science Inquiry Skills - Evaluating:

WA4SSIE1 - Compare findings with those of others, and to predictions; consider if investigations were fair; and identify questions for further investigation.

Science Inquiry Skills - Communicating:

WA4SSICM1 - Communicate ideas using scientific vocabulary.

Science Inquiry Skills - Collaborating and applying:

WA4SSICL1 - Use science knowledge to propose explanations for observed phenomena and solutions to problems.

DESIGN AND TECHNOLOGIES

Contexts - Materials & Technologies Specialisations:

WA4TDECMT1 - Properties of materials and components for a range of purposes affect suitability and function in a system.

Design thinking skills - Investigating and defining:

WA4TDEDTID1 - Define the features of a design brief and the requirements of a design task for a community need.

WA4TDEDTID2 - Investigate and select resources based on properties for the given task.

YEAR 4 - CONTINUED

Design thinking skills - Designing:

WA4TDEDTD1 - Design solutions through use of labelled drawings, technical terms, decision-making and/or a sequence of steps.

Design thinking skills - Producing and implementing:

WA4TDEDTPI1 - Use appropriate technologies, components and/or equipment and follow agreed protocols to produce a designed solution.

Design thinking skills - Evaluating:

WA4TDEDETE1 - Use given criteria to evaluate design features, selected resources, decision-making processes and the designed solution.

YEAR 5

SCIENCE

Science Understanding – Biological Science:

WA5SSUB1 - Living things have structural and behavioural adaptations that enable their survival in their environment.

Science Inquiry Skills – Planning and conducting:

WA5SSIPL1 - Use equipment to observe, measure and record data.

Science Inquiry Skills – Evaluating:

WA5SSIE1 - Compare findings with those of others, and to predictions; evaluate the fairness of an investigation and suggest improvements; and pose questions for further investigation.

Science Inquiry Skills – Communicating:

WA5SSICM1 - Communicate ideas in a variety of ways, including scientific reports with appropriate language features.

Science Inquiry Skills – Collaborating and applying:

WA5SSICL1 - Use science knowledge to develop considered responses to problems, at a local and global level, through investigation and research.

DESIGN AND TECHNOLOGIES

Contexts – Materials & Technologies Specialisations:

WA5TDECMT1 - Properties for a range of materials, related components and use of given technologies to achieve a purpose.

Design thinking skills – Investigating and defining:

WA5TDEDTID1 - Break down a design brief to define the purpose and requirements for a given task.

WA5TDEDTID2 - Investigate and select resources based on properties and functions for the given task.

YEAR 5 – CONTINUED

Design thinking skills – Designing:

WA5TDEDTD1 - Design solutions considering competing factors, with annotated diagrams, storyboards and/or a sequence of steps, using technical terms and an iterative process.

Design thinking skills – Producing and implementing:

WA5TDEDTPI1 - Use technologies, components and/or equipment to implement agreed protocols to produce a designed solution.

Design thinking skills – Evaluating:

WA5TDEDETE1 - Use given criteria to evaluate design features, with consideration of competing factors, processes and the designed solution.

VOCABULARY

ADAPTATIONS

A structure or behavior that helps an organism survive in its environment

CHARACTERISTICS

A distinguishing quality, trait or feature of an organism

ECOSYSTEM

All the living and nonliving things that interact with each other in an environment

ENVIRONMENT

The surroundings and conditions in which an organism lives

INHERITED

Derived or passed down genetically from parents or ancestors

MIGRATION

A seasonal movement of organisms from one region to another

POPULATION

All the members of a species living in a particular area at a particular time

PREDATOR

An organism that hunts, catches and eats another organism

PREY

Organisms that are killed and eaten by another organisms

PROTOTYPE

The first model of something in which later forms are developed or copied from

TOOL

A device, item or piece of equipment that is used for a specific purpose; something that assists a particular activity or accomplishes a goal

TRAITS

Characteristics of an organism based on its genes

VARIETY

The quality of being diverse or having many options/ differences

MATERIALS

CRAFT STICKS

SPOONS

STRING

PIPE CLEANERS

PAPERCLIPS

RUBBER BANDS

CONSUMABLES

ETC.

ONLINE RESOURCES

FREE GAME: [DEFENDER: NATURAL SELECTION](#)

LITERARY CONNECTIONS

Think Like a Scientist: Animal Adaptations by NSTA Kids

The Beaks of Birds by Richard Konicek-Moran & Kathleen Konicek-Moran

Adaptations by Teacher Created Materials

Desert Animal Adaptations by Julie Murphy

Animal Adaptations by Peter Winkler

ENGAGE

STRUCTURES AND FUNCTIONS:

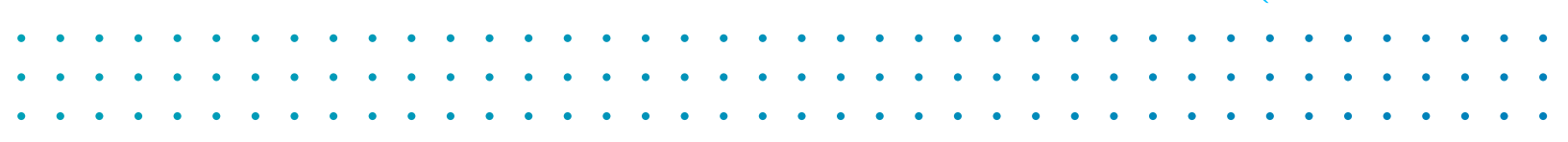
Have students explore marine animal images and discuss the various structures and functions the animals have. Record observations on a whole class chart paper.

How do these structures and functions help them survive?

What could happen to an animals ability to function if the structure was altered or missing? (Example: a turtle with no flipper) and what does that do for survival?

VIDEO

- [Sea Turtle With One Flipper Gets Rudder Prosthetic](#)
- [Thai Researchers Develop Prosthetic Flipper for Sea Turtle](#)



EXPLORE

MARINE LIFE PROSTHETIC (CHALLENGE)

We watched an example of a turtle missing a flipper.

Consider how scientists and engineers are helping animals to survive when one of their structures is missing or not functioning.

For today's challenge you are going to make a prototype of a prosthetic for a marine life animal.

Preferably, a marine animal you saw at *OceanXperience*.

- Orca with a missing left fin after a boat collision near the Caribbean.
- Hammerhead Shark with a missing tail after escaping fishermen in the Bahamas.
- Humpback Whales with a missing right fin after escaping a fishing net in the Bahamas.

Optional: Students can work in groups or individually.

ENGINEERING DESIGN PROCESS

Instruct students to discuss with their groups how they want to build their prosthetics. Students should be instructed to make a drawing of their design following the engineering design challenge.

Identify the problem

- What is the problem?
- What have others done?

Optional: Allow time for research.

EXPLAIN

ENGINEERING DESIGN PROCESS

Imagine ideas for a solution.

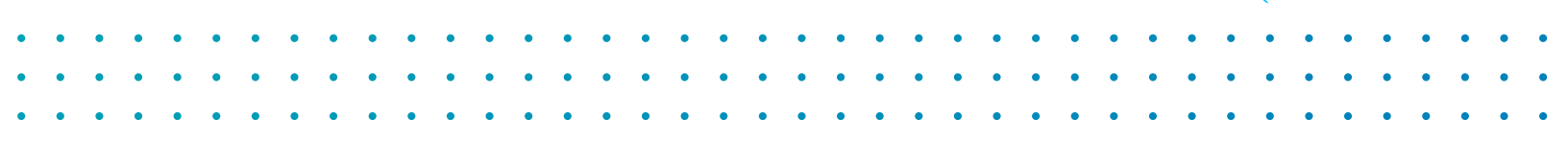
- What are some solutions? (at least 2)
- Select a solution.

Build your design. Build the prototype of a prosthetic for a marine life animal.

Send one person from each group to gather materials.

Materials: Feel free to grab what you have available and join in on the fun!

- Suggested materials: cardboard, craft sticks, spoons, string, pipe cleaners, paper plates, aluminum foil, etc.
- Improve upon your design: If time permits, allow students to reflect and make changes to their prototype.
 - What worked well?
 - What didn't work so well?
 - How can I make my design better? Try again!



EXTEND

WRITING

Allow students to be creative with their prosthetic prototype.

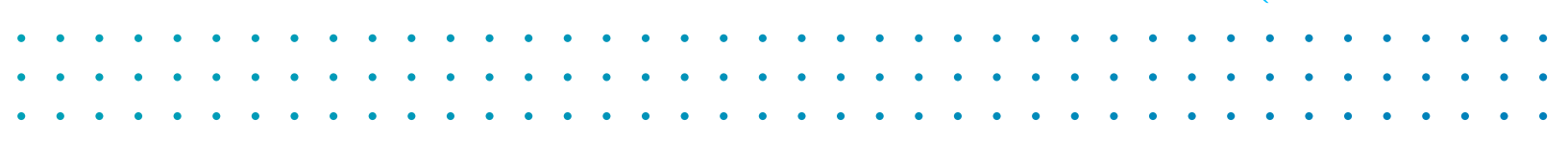
Students may write a story on what caused their marine life animal to need a prosthetic.

EVALUATE

SHARE AND PRESENT IDEAS:

Students will be able to:

- Present prototype
- Respond to audience questions
- Explain their thought process and discoveries
- Explain the prior knowledge they used



THIS GUIDE IS INTENDED FOR THE USE OF EDUCATORS, GROUP LEADERS, AND FAMILIES IN CONJUNCTION WITH THE *OCEANXPERIENCE* EXHIBITION. IT IS PROVIDED ON AN "AS IS" BASIS, AND FLYING FISH AND OCEANX DISCLAIM ALL WARRANTIES, WHETHER EXPRESS OR IMPLIED, REGARDING THE GUIDE. BY UTILIZING THIS GUIDE YOU RELEASE FLYING FISH AND OCEANX, ALONG WITH THEIR OFFICERS, EMPLOYEES, DIRECTORS, TRUSTEES, AGENTS, AND VOLUNTEERS, FROM ANY AND ALL LIABILITY, CLAIMS, ACTIONS, COSTS, EXPENSES, DAMAGES, ATTORNEY FEES, BREACH OF CONTRACT ACTIONS, AND ANY OTHER CAUSES OF ACTION THAT YOU MAY CURRENTLY HAVE OR MAY ACQUIRE IN THE FUTURE. THIS RELEASE PERTAINS TO ANY LOSS, DAMAGE, OR INJURY THAT MAY OCCUR TO YOU, THE INDIVIDUALS YOU ARE EDUCATING, OR ANY PROPERTY ASSOCIATED WITH YOU OR THE INDIVIDUALS YOU ARE EDUCATING AS A RESULT OF USING THE GUIDE. THE EXHIBITION, BASED ON A FORTHCOMING TELEVISION SERIES PRODUCED BY BBC STUDIOS NATURAL HISTORY UNIT AND OCEANX IN ASSOCIATION WITH EARTHSHIP PRODUCTIONS FOR NATIONAL GEOGRAPHIC, IS CREATED AND TOURED INTERNATIONALLY BY FLYING FISH.