

Lesson Plan: Solving Problems Through Biomimicry

Stages	Procedure	Materials Requested
Beginning Ideas (3-5 minutes)	Background Information: Students answer a question related to form and function: <ul style="list-style-type: none"> How are airplane wings similar to bird wings? OR <ul style="list-style-type: none"> Why do pelicans have expandable beaks? 	- projector for facilitating/showing lesson directions
Engage (10 minutes)	Field Observation: <ul style="list-style-type: none"> Form groups of 2 or 3 people Observe and Record <ul style="list-style-type: none"> Find something that you think is <i>fascinating, amazing, cool, interesting, beautiful, or curious</i> Use your phone or an iPad to take pictures of it Discuss: Shape and function <ul style="list-style-type: none"> What parts does your object have? What is the purpose or role of these parts? Is there any part of the object that you see that is similar to things what we use or see in our daily lives? 	iPads or student cell phones (1 device per team of 2-3 students)
Inquiry Exploration (20-25 minutes)	Form & Function Station Labs <ul style="list-style-type: none"> Station 1: Pollinator Attraction <ul style="list-style-type: none"> Investigate strategies for attracting pollinators Reverse engineer flowers to identify flower features for attracting pollinators Station 2: Beaks and Dinner <ul style="list-style-type: none"> Relationship between shape and function of bird beaks Inquiry challenge: use variety of tools to pick up/catch meal Station 3: Flying High <ul style="list-style-type: none"> Investigate engineering of plane wings based on bird wings 	Station 1: <ul style="list-style-type: none"> 10-12 flowers for dissection (assorted mix?) toothpicks plastic knives magnifying glasses Station 2: <ul style="list-style-type: none"> 1 tablespoon rice grains ¼ cup dry beans chopsticks (1 pair) pair scissors garlic press or juice press

	<ul style="list-style-type: none"> ○ Design wings for different situation based on birds with flying abilities that match situation ● Station 4: Structures and Shapes <ul style="list-style-type: none"> ○ Investigate shapes involved in different structural properties in nature and architecture ● Team Jigsaw - Station Debrief <ul style="list-style-type: none"> ○ Share out about your experience & the reflection questions from your station ○ Why should we observe nature in order to help us solve problems? 	<ul style="list-style-type: none"> - nut cracker - tweezers - slotted spoon - collapsible colander - fine-mesh strainer - 2 rectangular plastic bins (wide enough to fit the colander or strainer, and deep enough to add 2-3 inches of water) <p>Station 3: none Station 4:</p> <ul style="list-style-type: none"> - toothpicks - plastic knives - magnifying glasses
Research/ Investigate (20 minutes)	<p>Scientists' Ideas: Introduction to Biomimicry & Nature-Inspired Design</p> <ul style="list-style-type: none"> ● Mini-lesson on vocabulary and engineering design <p>Biomimicry Videos</p> <ul style="list-style-type: none"> ● 3-4 minute video introducing biomimicry-based innovations <p>Biomimicry Photosort</p> <ul style="list-style-type: none"> ● Match the innovation with the natural object that inspired its design 	
Design Challenge (30 minutes)	<p>"How Could We...?" Board Game</p> <ul style="list-style-type: none"> ● Match species with situational problem <p>Shoot the Moon Design</p> <ul style="list-style-type: none"> ● Select favorite or best match to develop into a product ● Create poster to show design and describe design inspiration & how it works <p>Gallery Walk</p> <ul style="list-style-type: none"> ● Hang posters ● Provide sticky-note celebration and wondering feedback 	<ul style="list-style-type: none"> - 8.5 x 11 blank paper (at least 1 paper per student) - markers or colored pencils (1 set per team or table) -tape or pins to hang up posters