Estimated Time
20 – 40 Minutes

Materials
- “How Does Nature...” Game cards
- Bell or buzzer (optional)

Background Information
Once a designer has clearly defined the challenge they want to solve, they are ready for the next step in biomimicry: reframing the challenge into a biological context. We call this “biologizing” the design challenge. The goal of this step is to arrive at one or more “How does nature...?” questions that can guide research for biological models. It’s this step that makes it possible to begin looking to nature for strategies to solve specific problems. This activity helps students practice identifying the needs or functions inherent to a particular problem, and re-stating them as “How does nature...” questions.

Getting Ready
- Print and cut out the “How Does Nature...” Game cards and laminate them, if desired.
- Determine how you will arrange the class for the game. If desired, make it like a game show and put three desks at the front of the class with a bell or buzzer at each one.

Facilitation
1. Tell students that we are now going to play a game to help them practice creating “How does nature...” questions. Explain that you will need three contestants.

2. Ask for three volunteers to play the contestants, and direct them to take their seats at the front of the room. You could draw names from a bowl/hat (with TV game-show fanfare) to select contestants.

3. Explain that you are going to read aloud a simple design problem. The contestants are to respond by identifying the essential function related to the design problem and phrase it as a “How does nature [function]?” question. For example, the design problem might be: Light bulbs waste a lot of energy in the form of heat. The “How does nature...” question might be: “How does nature produce light?”

4. Tell contestants they should ring, buzz, or raise their hand (depending on how you’ve set up the game) as soon as they think they have a good “How does nature...” question.

5. Explain that you will read one of the design problems from the “How Does Nature?” cards aloud. The first contestant to ring, buzz, or raise his or her hand gets to try answering first.
"How Does Nature..." Game Facilitation

6. The audience (students who are not contestants) will then get to determine if the contestant’s “How does nature...” question is suitable for the given design problem (i.e., it identifies a function relevant to that problem). If the consensus is that the question is a good fit, that contestant can remain in the game.

7. If the consensus is that the question is not a good fit for the given design problem, another contestant can try to “steal” the show by offering his or her own question.

8. Whoever has the best question gets to stay and play again. However, the other two contestants must leave the “stage” and join the audience.

9. Then you will call on two new contestants from the audience to replace those who have left. You may wish to have all students’ names in a hat and randomly draw to replace contestants each round. (Or you could have only those students who wish to participate add their names to the hat.)

10. You could call on an assistant to write each function on the board, as well as the winning “How does nature...” question and the initials of the person who came up with it.

11. Play several rounds, so that as many students as possible get a chance to participate in the game show. You are likely to run out of time before all students have had a chance to participate. You may wish to choose (or have the class choose) a winner by determining who had the best question.

12. Wrap-Up: Wrap up the class by inviting students to share their thoughts about what they learned today. Facilitate a discussion with questions such as: How does framing a design problem as a “How does nature...” question help us think differently about the problem? (It gets us focused on function and thinking about how nature does things as opposed to how we might do things.)

Teaching Tips

Good responses refer to simple functions that can be found in nature. The “How does nature...” question should make sense, so that it will be possible to search biology for answers to that question. There can be more than one correct response to each design problem because often there is more than one function involved. If a student provides an answer not listed on the game card, ask for an explanation and accept the answer if it makes sense.

Modifications

Instead of a buzzer/bell, you could have a pad of paper at each desk and, using a timer, give each contestant the same amount of time to come up with a “How does nature...” question. Each contestant could write down his or her question and then have the studio audience determine the best “How does nature...” question.