

Biomimicry Card Matching Activity

The cards are a good way to introduce students to some of the different ways biomimicry has been used to address human challenges.

The cards can be used in a simple card matching activity – matching the image/clue cards with the problem each address.

The cards can be printed double-sided and then cut up using the prepared pdf.

Below, we provide a description of each card pair together with more information about the human design solution. Use the information about each human design solution to provide an explanation to students about how nature has inspired it.

You can also relate each card to one or more of the Sustainable Development Goals.

Organism	Peacock
Clue	The male peacock attracts its mate using colourful feathers.
Problem Statement	Create a fabric with bright blue and green colours without using chemical products.
Human Design Solution	Clothing manufactures use chemical dyes to create colour, but the residue is harmful for the environment and the colours fade. Can we create clothing which remains colourful their whole life and do not create any toxic residue?
Related SDGs	SDG 6 - clean water and sanitation; SDG 12 - responsible consumption and production.
Background Stories	https://www.seas.harvard.edu/news/2016/11/new-technique-structural-color-inspired-birds

Organism	Termites
Clue	Termites live in hot places and make their houses in wet mud.
Problem Statement	Cool a building naturally with minimal energy consumption.
Human Design Solution	The climate crisis has brought hotter summer temperatures. Rather than using more air conditioning and more energy, can we design buildings which stay cool without using additional energy but just by redesigning their shape and the flow of wind?
Related SDGs	SDG 11 - sustainable cities and communities; SDG 13 - climate action
Background Stories	https://grist.org/article/these-self-cooled-buildings-were-inspired-by-termites-and-frogs/

Organism	Woodpecker
Clue	Woodpeckers carve their nests in trees.
Problem Statement	Absorb the large amount of energy produced when two objects crash together.
Human Design Solution	Bicycle and motorcycle helmets with better protect riders in the event of an accident.
Related SDGs	SDG 3 - good health and well-being.
Background Stories	https://www.newscientist.com/article/dn20088-woodpeckers-head-inspires-shock-absorbers/

Organism	Mussels
Clue	Mussels attach to rocks where the water current is strong.
Problem Statement	Produce a strong, water-resistant glue that can be used on wooden panels for a boat.
Human Design Solution	Creating a non-toxic adhesive which can work underwater.
Related SDGs	SDG12 - responsible consumption and production.
Background Stories	https://biomimicry.org/solution/mussel-polymers/

Organism	Humpback Whale
Clue	The bumps on a humpback whales' flippers allows for increased agility in the water.
Problem Statement	Create a turbine that is able to move its blades using less energy than traditional wind turbines.
Human Design Solution	Wind turbines that create more energy without increasing the wind speed.
Related SDGs	SDG 7 - affordable and clean energy.
Background Stories	http://www.biosphereonline.com/2019/02/06/efficient-wind-turbine-blades-inspired-humpback-whale-fins/

Organism	Boxfish
Clue	The box fish moves without much energy expenditure.
Problem Statement	Develop a car that has a lot of interior space and reduces fuel use.
Human Design Solution	The climate crisis means we need to radically reduce energy use. The Boxfish has excellent hydrodynamic properties, in other words exceptionally low drag. The shape also creates excellent stability. This is of interest to car manufacturers who need to reduce the energy required to power their cars. Creating sustainable transport necessitates looking at all elements of design, not just the engine or power source.
Related SDGs	SDG 9 - industry, innovation and infrastructure; SDG13 - climate action.
Background Stories	https://slate.com/technology/2015/03/mercedes-benz-bionic-car-boxfish-stability-and-agility-paradox-finally-solved.html

Organism	Duck
Clue	Ducks' feathers insulate them from cold temperatures.
Problem Statement	Create a warm but light blanket for cold nights.
Human Design Solution	Feathers trap warmer air next to the skin. Mimicking this in materials such as fleece results in clothes which keep us warm and are lightweight at the same time.
Related SDGs	SDG 12 - responsible consumption and production.
Background Stories	N/A

Organism	Burdock
Clue	The way burdocks spread their seeds is by attaching themselves to animals.
Problem Statement	Produce a way to 'tie' shoes and coats that is easy enough for a child to use.
Human Design Solution	Velcro is one of the most commonly used fasteners for the clothing industry and many other uses. It allows users to quickly fasten clothes and shoes. Imagine a mountain climber in sub-zero temperatures trying to use buttons?
Related SDGs	SDG 12 - responsible consumption and production.
Background Stories	https://www.kew.org/read-and-watch/biomimicry

Organism	Pine Cone
Clue	Pine seeds germinate when they open, when exposed to high temperatures.
Problem Statement	Ventilate a building using an energy-free mechanism which allows air in when it is hot and closes when it is cold.
Human Design Solution	Clothes designers are working on materials which adapt to environmental conditions. They are using the principle of hygro-nasty to create cloth with 'closes' in response to moisture to keep rain out and then 'open' to let air in when warm.
Related SDGs	SDG 12 - responsible consumption and production.
Background Stories	https://www.bbc.co.uk/teach/class-clips-video/design-and-technology-ks4-gcse-a-smart-fabric-inspired-by-pinecones-biomimetics/zjh76v4

Organism	Namib Beetle
Clue	These beetles live in the desert.
Problem Statement	Collect water in places where it is scarce.
Human Design Solution	Creating hydrophobic surfaces can help reduce waste, for example on the inside of bottles and liquid containers. And hydrophilic surfaces could have application in moving water upwards using capillary action.
Related SDGs	SDG 6 - clean water and sanitation; SDG 12 - responsible consumption and production.
Background Stories	https://www.wired.com/2012/11/namib-beetle-bottle/

Organism	Rainforest
Clue	Recycle all waste so it becomes food for something else.
Problem Statement	Waste from different factories leads to environmental damage.
Human Design Solution	In Kalundborg industrial estate, businesses seek industrial symbiosis by ensuring any 'waste' they produce becomes 'food' for another business nearby.
Related SDGs	SDG 9 - industry, innovation and infrastructure; SDG13 - climate action.
Background Stories	http://www.symbiosis.dk/en/