Survival of the Fittest

bioLAB
VICTORIAN BIOSCIENCE
EDUCATION CENTRE

**Name:**   Suggested Answers

1. **Find definitions and examples to complete the vocabulary table below.**

Term	Definition	Example
Adaptation	A physical or behavioural trait that improves an organism's ability to survive and reproduce in its environment. Adaptations are the result of evolution.	Camouflage to avoid predators. Beak size and shape - nectar eating hummingbird long beak and tongue to extend into flower.
Evolution	The theory that all plants and animals developed gradually from earlier forms over a long period of time and that variations within a species are the result of adaptive traits passed on from generation to generation.	Evolution of humans.
Natural Selection	The mechanism that drives evolutionary change in which individuals that are better suited to their environment survive and reproduce most successfully.	Antibiotic resistant bacteria
Biomimicry	Biomimicry is the science of applying nature-inspired designs in human engineering and invention to solve human problems	Di Vinci's flying machine was modelled inspired the eagle and owl. Shape of the bullet train nose inspired by the kingfisher.

2. **Complete the table by stating which of the pictured organisms inspired the product design and outlining the feature of the organism that is being 'mimicked'.**

Which organism do you think inspired the design?
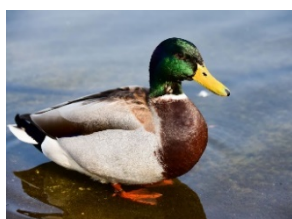
Duck

Burdock plant seed (burr)

Flying Squirrel

Product	Inspired by	Mimicked Adaptation
Swimming Finns	Duck	Webbed feet of duck to propel through water.
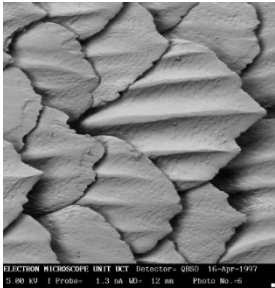
	Wingsuit	Flying Squirrel	Membrane that results in "wings" when legs are spread during jumping.
	Velcro	Burdock seeds	Hooks resulting in seeds adhering to objects.

Biomimetic Design

In the field of biomimetic design, biomimicry is used to enhance sports equipment design in order to improve participant safety and comfort or to enhance performance. Some examples include running shoes for greater grip designed on cheetah claws and utilising the design of a pine cone to develop fabrics that allow better ventilation and sweat evaporation.

You will need to read the information about "Biomimetics in Sport" at this web link to complete the following questions. You may also like to watch this short you tube video on biomimicry.

1. **Read about LZR speedo swimsuits and fill in the gaps to complete the biomimicry design brief below.**

Project name: LZR speedo swimsuits	**Target sport(s):** Swimming

Biomimicry summary: Speedo LZR designed swimsuits to improve performance by reducing drag. The swimsuit fabric incorporated the same structures as seen in shark skin. Shark skin contains tiny scale like structures called denticles which reduce both drag and turbulence allowing sharks to move through the water efficiently.

Design diagram:

Denticle pattern of shark skin incorporated into panels to reduce drag.

2. **Complete a design brief for a sports biomimetic design of your choice. You can use the information provided or do your own research.**
   Any suitable sports biomimicry design brief.
3. **Come up with other possible applications of the adaptations used in the biomimetic designs above.**
   Many possible responses.

Adaptation	Target Sport	Biomimetic Sport Design Idea
Choose an item. If other specify: enter text.	enter text.	enter text.
Choose an item. If other specify: enter text.	enter text.	enter text.

Is it fair?

The Speedo LZR Elite swimsuit was marketed as "the fastest swimming suit in the world" and was launched at the 2008 Olympic Games.

1. **At the 2008 Olympic Games, some, but not all swimmers competed in the suit. Outline some reasons why not all swimmers would have used the swimsuit, even though it was "the fastest swimsuit in the world".**

   Sponsorship constraints – money or being contracted to wear sponsor brand only. Lack of funds to purchase equipment. Not being aware of the technology.

2. **Do you think it's fair that some swimmers were able to utilise biomimetic design to gain a performance advantage? Explain why/why not.**

   Any justified response.