

# Biomimicry Worksheet

## Learning outcomes

By doing this activity you'll learn what biomimicry is and how scientists and engineers have used it to solve some everyday problems. You'll also learn more about connected job roles and the skills you need.

## Activity

### Introduction - What is Biomimicry?

It's when people that take inspiration from nature to solve every day issues.

### Uses in Healthcare

#### Learning from mosquitoes!



Most people don't like needles, but did you know modern day needles are like a mosquito's mouth? Most of the time, you aren't even aware that you've been bitten by a mosquito until the next day when it feels painful. Materials researchers studied the mosquitoes' mouth and using advanced engineering techniques, produced a needle that penetrates the skin like a mosquito, making it less painful.

Materials engineers and biologists need skills such as problem solving, communication and the ability to come up with new ideas. Have a look at the job profiles on My World of Work to learn more.

[Biologist](#) (1), [Materials engineer](#) (2)

Activity on next page...

## Inspired by sharks!

Scientists created a synthetic surface through studying shark skin. The diamond pattern formation means that bacteria can't grow on it or cover its surface. They've used this idea to make adhesive backed films that can be applied to medical equipment and surfaces, reducing the need for deep chemical cleaning.

Marine engineers use skills such as problem solving, researching and have attention to detail. Learn more about the role here.

[Marine Engineer](#) (3)

## Uses in Engineering



The Japanese bullet train was a great invention but had a problem - it made a loud sonic boom whenever it travelled through tunnels. Air built up in front of the train and that compressed air created a sound wave as it left the tunnel. This caused a loud sonic boom and it also slowed the train down.

Engineers took inspiration from the kingfisher's beak. As a kingfisher dives through the air into water to catch fish, it doesn't cause any ripple effect in the water due to the long, narrow shape of its beak. The front of the bullet train was redesigned to resemble this beak and successfully stopped the sonic boom.

Design engineers must be creative, innovative with good attention to detail. Learn more about the role here:

[Design Engineer](#) (4)

**Activity on next page...**

## Whales and wind turbines

Humpback whales hunt fish, meaning that they must make fast, tight turns in the water. They can manoeuvre their flippers (which have bumpy edges or tubercles on them), allowing them to develop lift and make those fast turns.

Using this knowledge, engineers and biologists have created wind turbine blades with scalloped edges, like the tubercles bumps on the whale's flippers. This means that the turbines can be designed to spin faster and generate more energy.

Energy engineers that work with wind turbines must be good with numbers and analysing their designs. Marine biologists need excellent observation and research skills.

[Energy Engineer](#) (5), [Marine Biologist](#) (6)

## Biomimicry in construction

### Termite mounds

When an architect was asked to design a new office and retail building in Zimbabwe but didn't have budget to put in an expensive air conditioning system, he took inspiration from termite mounds. These mounds, sometimes 30ft high, have millions of tiny holes covering the surface that allow air to pass through keeping the temperature inside constant. The new office building was designed in a similar way although made mostly of concrete. Outside air is drawn into the building and cooled before venting through into the offices.

### Singapore's Super trees

The structures look like trees, are between 25-50m tall, and have many uses including generating solar power, rainwater collection and help ventilate the buildings below. They're also look amazing and are a tourist attraction in the area of Singapore where they have been built.

Architects, structural engineers and civil engineers are some of the roles that would have been involved in building these structures. These roles require excellent team working, innovation and attention to detail.

[Architect](#) (7), [Structural Engineer](#) (8),

[Civil Engineer](#) (9)



## Activity

### Answer these questions.

- Can you think of other examples of biomimicry?
- Can you think of advantages and disadvantages of the concept?

Now come up with your own biomimicry designs and ideas based on these examples. You can write or draw your ideas on a piece of paper.

- ★ Gecko feet
- ★ A Lotus flower
- ★ A beehive

What skills have you used in today's activity?

Can you see how these skills are important in the job profiles you've explored?

## Follow up

If you'd like to learn more about biomimicry, check these links out.

<http://y2u.be/iMtXqT>

<https://bit.ly/2Xs47J9>

<https://bit.ly/2Zo507U>

<https://academy.cobiom.com/pages/biomimicryacademy>

## Website references

1. Biologist – <https://bit.ly/2WNI68w>
2. Materials Engineer – <https://bit.ly/3cPfG3g>
3. Marine Engineer – <https://bit.ly/36hSMYy>
4. Design Engineer – <https://bit.ly/3bOd9VZ>
5. Energy Engineer – <https://bit.ly/36fe28J>
6. Marine Biology – <https://bit.ly/2X9HGIm>
7. Architect – <https://bit.ly/3cQudMb>
8. Structural Engineer – <https://bit.ly/2TnZILe>
9. Civil Engineer – <https://bit.ly/2TmVEFL>