

Inspired by Nature



An activity adapted from the book, Family Engineering: An Activity Event Planning Guide, by Mia Jackson, David Heil, Joan Chadde, and Neil Hutzler

The Power of **Afterschool** and the Future of **Learning**

A Nebraska Afterschool Conference

September 28, 2012

**Planning and Implementing Family Science Events : Presented by
Kathryn Phillips**

Curriculum Specialist, Lincoln Community Learning Centers

INSPIRED BY NATURE

Engineering Fields

- general engineering

Engineering Concepts & Skills

- engineering design process
- invention/innovation

Supplies

- set of Human Invention Cards (Appendix B)
- set of Nature's Inspiration Cards (Appendix B)
- sheet of paper (12" x 42")
- Inspired by Nature activity sign (Appendix A)

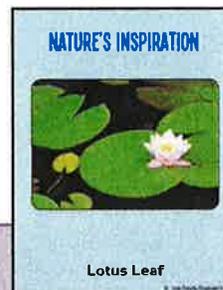
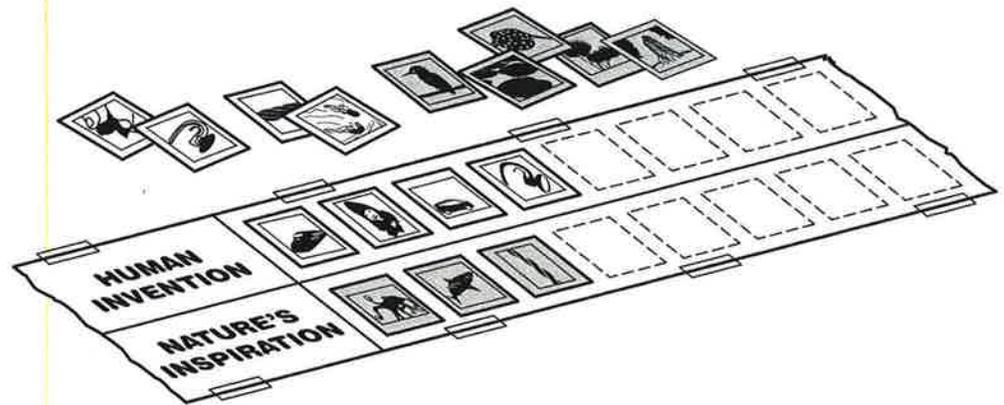
Advance Preparation Supplies

- marker
- masking tape

How have sharks and termites helped engineers?

Advance Preparation

- Make color copies of the *Human Invention Cards* on cardstock and cut them apart. Laminating is recommended.
- Make two-sided color copies of the *Nature's Inspiration Cards* on cardstock and cut them apart. These cards are double-sided and must be copied so that the matching Human Invention information appears on the back of each card. Laminating is recommended.
- Divide the sheet of paper into two rows labeled "Human Invention" and "Nature's Inspiration" and tape the paper to the table. See the illustration below.
- Place all the cards on the table with pictures facing up.



Eight different Human Invention cards and eight matching Nature's Inspiration cards are available in Appendix B.

Activity Steps

1. Select a Human Invention card.
2. Next, select a Nature's Inspiration card to match this invention.
3. After all the cards have been matched and placed on the mat, read the backs of the Nature's Inspiration cards to find out how engineers are inspired by nature.
4. Can you think of other engineered inventions that might have been inspired by nature?
5. Remove the cards from the mat when you are finished.



ENGINEERING CONNECTION

Sometimes engineers come up with a new idea for an invention by observing something in nature.

All of the inventions on the Human Invention cards have been inspired by something in nature. The story of the inventions can be found on the back of the Nature's Inspiration cards.

Next time you're outdoors, take some time to look around and wonder.

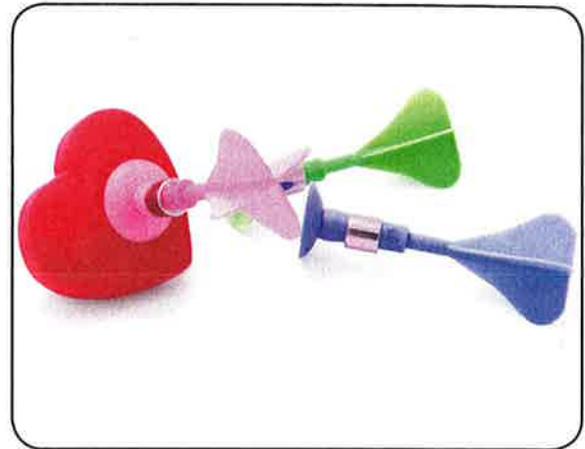
HUMAN INVENTION



Velcro

© 2011 Family Engineering

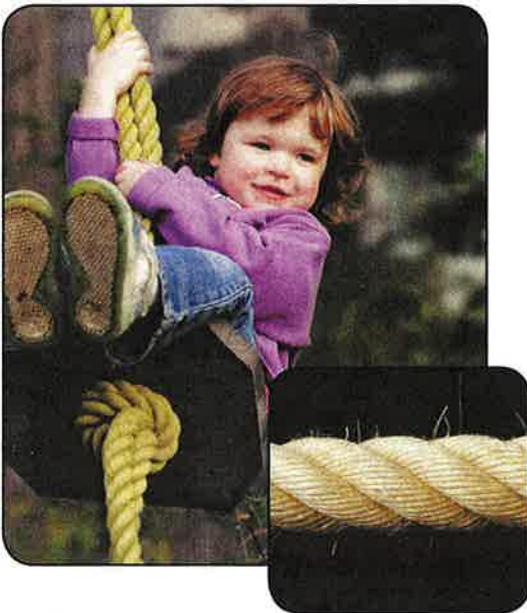
HUMAN INVENTION



Suction Cup

© 2011 Family Engineering

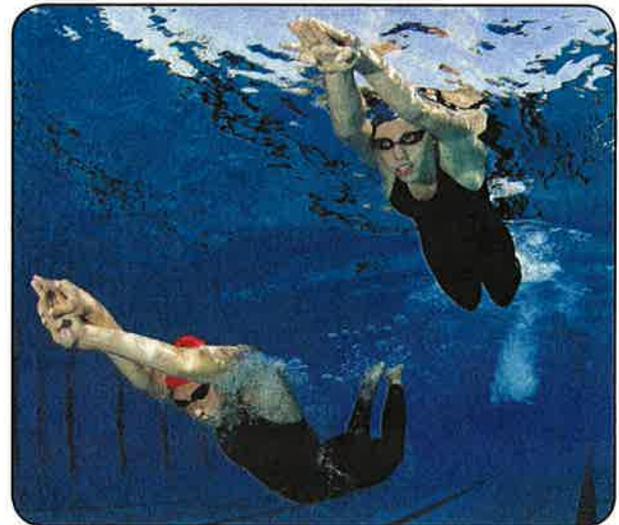
HUMAN INVENTION



Rope

© 2011 Family Engineering

HUMAN INVENTION



Racing Swimsuit

© 2011 Family Engineering



HUMAN INVENTION



Bullet Train

© 2011 Family Engineering

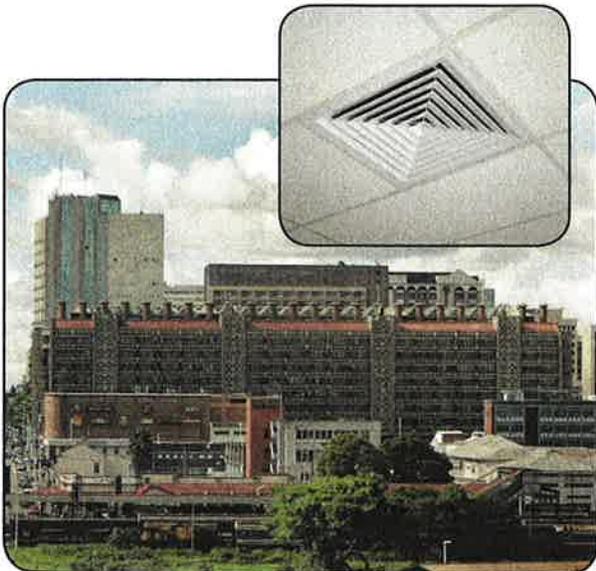
HUMAN INVENTION



Water-Repellent Fabric

© 2011 Family Engineering

HUMAN INVENTION



Passive Air Conditioning

© 2011 Family Engineering

HUMAN INVENTION



Bionic Car

© 2011 Family Engineering

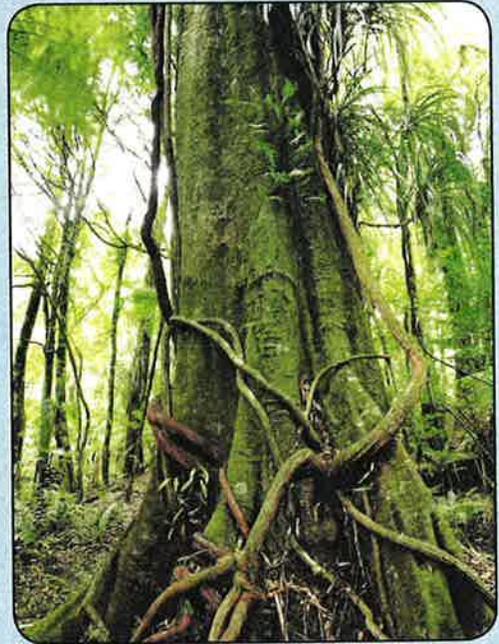
NATURE'S INSPIRATION



Burdock

© 2011 Family Engineering

NATURE'S INSPIRATION



Vines

© 2011 Family Engineering

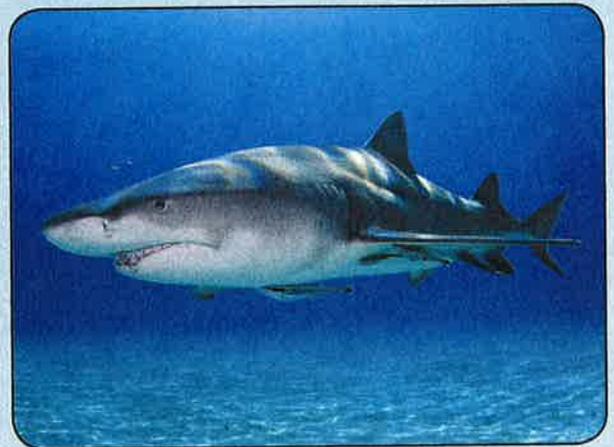
NATURE'S INSPIRATION



Octopus

© 2011 Family Engineering

NATURE'S INSPIRATION



Shark

© 2011 Family Engineering

Inspired by Nature: Nature's Inspiration Cards (back)

Vines inspired:

Rope

The earliest ropes date back to prehistoric times, and were made from plant fibers, such as vines. The vines were twisted or braided together to form stronger and longer ropes, similar to the way that some vines wrap themselves around a stronger, solid support to continue growing. Engineers have designed many different types of rope for a variety of uses and situations.

Burdock Seeds inspired:

Velcro

In 1948, a Swiss engineer, George de Maestral, took a walk with his dog and came home with plant burrs (seed pods) stuck all over his pants and his dog. After examining these burrs under a microscope, he got the inspiration for creating a new kind of fastener—Velcro! It took eight more years of experimenting to develop and perfect his invention.

Sharks inspired the:

Racing Swimsuit

The V-notch ridges on a shark's skin reduce drag, allowing it to swim fast with less effort. Engineers have designed swimsuits made from materials based on the varying shape and texture of sharkskin. These suits made their debut at the 2000 Olympics in Sydney, Australia and are now commonly used in competitive swimming worldwide.

The Octopus inspired:

Suction Cups

The suction-cup appendages on the legs of an octopus were the inspiration for the modern suction cup, patented in 1882.

NATURE'S INSPIRATION



Kingfisher

© 2011 Family Engineering

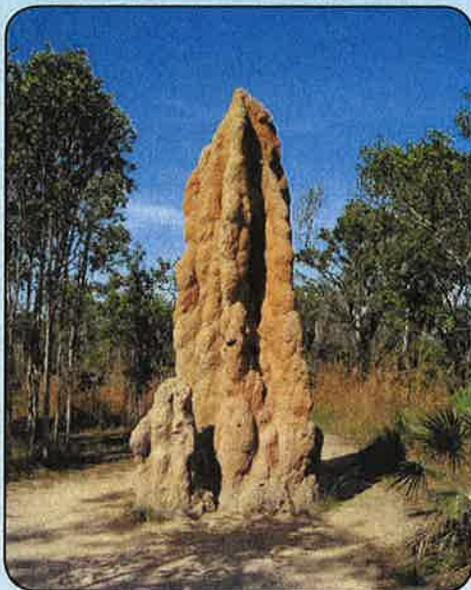
NATURE'S INSPIRATION



Lotus Leaf

© 2011 Family Engineering

NATURE'S INSPIRATION



Termite Mound

© 2011 Family Engineering

NATURE'S INSPIRATION



Boxfish

© 2011 Family Engineering

The Lotus Leaf inspired:

Water-Repellent Fabric

A lotus leaf naturally repels water. Engineers have developed a way to chemically treat the surface of fabrics so that they repel water much like the surface of a lotus leaf, making the fabrics more waterproof.

The Kingfisher inspired the:

Bullet Train

A kingfisher bird can dive into water without making a splash. Engineers designed the front of the bullet train to look like the beak of a kingfisher bird so that the train could move through the air more efficiently. When a high-speed train goes through a tunnel, it builds up a cushion of air in front of it that suddenly expands when exiting the tunnel, causing a loud sonic boom. The shape of the bullet train allows it to move through the air in a tunnel without building up that large cushion of air, making it quieter when exiting the tunnel.

The Boxfish inspired the:

Bionic Car

This concept car was designed by Engineers at Mercedes-Benz® to mimic the streamlined profile and sturdy, boxy frame of the boxfish. The bionic car turned out to be stable, fuel efficient, and durable. The company plans to use more of these design elements in future cars.

Termite Mounds inspired:

Passive Air Conditioning

African termites keep their mounds cool by constantly opening and closing vents throughout the mound to direct the flow of air from the bottom to the top. Engineers designed the cooling system of the Eastgate Center in Zimbabwe to mimic the way tower-building termites construct their mounds.