

CHALLENGE YOURSELF:

Engineering Match-Up

You don't have to be an engineer to invent something, but it helps. Engineers use creativity and their knowledge of science and math, to create something new or to improve upon an existing design or process ♦ See if you can match up the famous and not-so-famous engineers and inventors with their achievement:



Answers: 1-C; 2-F; 3-A; 4-E; 5-B; 6-D

1. Elvia Niebla (C. Developed a way to test poisons in soil to keep it safe for growing food.)

2. Mary Anderson (B. Invented the lawn mower)

3. Katherine Blodgett (A. Created a way to make invisible glass for eye-glasses, cameras and telescopes.)

4. Meredith Gourdine (D. Astronaut and college professor: first African American woman to travel in space.)

5. John Albert Burr (F. Invented the windshield wiper.)

6. Mae Jemison (E. Developed a way to remove smoke from buildings.)

Web Sites to Check Out

There are hundreds of web sites dedicated to helping you discover the world of design, innovation, invention, and engineering. Here are a few that you can start with. You'll find many more links as you explore.

- Discover Engineering On-line www.discoverengineering.org
- Get Tech www.gettech.org
- NASA for Kids www.nasa.gov/kids.html
- Try Science www.tryscience.org
www.hhmi.org/coolscience/
- Imagination Place!
www.edc.org/CCT/imagination_place
- How Stuff Works <http://express.howstuffworks.com/express-free.htm>
- Women In Engineering www.wieo.org

Happy surfing!



ACKNOWLEDGEMENTS

Connections, is part of the "Making the Connection" series. It has been produced by WEPAN through a grant from the Lucent Technologies Foundation. In addition to this newsletter, a series of engineering-focused classroom activities and a presenter's guide are available from WEPAN.

Special thanks to the following organizations for background information, ideas and facts about engineering.

Reebok, Inc., Nike, Inc., IBM Women in Technology, Imagination Place!, UselessKnowledge.com, Get Tech!, Discover Engineering!, How Stuff Works, TryScience.org, American Society for Engineering Education, American Society of Mechanical Engineers, National Academy of Engineering, National Engineers Week, Society of Women Engineers

WEPAN Administration Center
Lore-EI Center
Stevens Institute of Technology
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CONNECTIONS

3RD
AND 4TH
GRADES

CONNECTING KIDS TO THE WORLD OF ENGINEERING

Welcome to Connections!

Do you like to play with puzzles? Do you look at everyday items and wonder why they are made a certain way? Did you ever think you could make them better?

If you answered "yes" to some of these questions, engineering may be in your future.

What do engineers do? While there are many fields of engineering and many kinds of engineers, they all share some things in common:

- 1 Engineers like to solve problems.
- 2 Engineers are creative and curious about the world around them.
- 3 Engineers try to make the world a better place, by designing things that will make life easier, make it safer, or preserve the environment.
- 4 Engineers work with computers and use technology, science, and math, as well as language arts and other subjects to solve problems.



SNEAKERS: A Feat of Engineering

Sneakers are one of the most commonly worn shoes in America. Did you know that they were "invented" nearly 100 years ago? ♦ Today, sneaker companies design specialized shoes for all sports and even for different players within a sport. Take basketball player Shaquille O'Neal. At 7'1" and 315 pounds, the



SNEAKERS:

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sneakers he wears are designed much differently than WNBA guard Teresa Weatherspoon, at 5'8", 161 pounds. Sneaker companies do research to know that centers like Shaq are normally heavier than the other players, spend a fair amount of their time pushing, and are under the basket nearly half of the game. Guards like Teresa Weatherspoon are either sprinting, cutting side to side, or accelerating, and slowing down.

The engineer's role is to design sneakers that will fit the athlete's feet, protect them from

injury, and improve performance. They look at the bones and muscles of the foot and leg, and the movements made while playing the game. It can take 18 months to three years for a sneaker to go from the drawing board to an athlete's foot!



SNEAKER SNIPPETS

U. of Oregon track coach Bill Bowerman poured rubber into a waffle iron—an electric appliance for homemade waffles—to make the first "waffle sole" for runners in 1971. Bowerman, one of the founders of Nike, figured that every ounce he subtracted from the shoe, would mean hundreds of pounds less carried over the distance of a race.

MEET

Jen Ocif,

Reebok

"Performance Engineer"



Jen Ocif is a biomedical engineer at Reebok who helps design and test

sneakers. She guides the "birth" of a new sneaker from a designer's sketch to an engineering blueprint, to a 3-D model, to several "field tests". For the "field tests", Reebok invites about 20 people to come in and wear a new type of sneaker while playing a game of basketball or soccer, for example. Then the players give their feedback or opinion about the sneakers. The players tell Jen and her team what they liked and didn't like about the shoe: Was it flexible enough? Was there enough

support? Was it comfortable? Did it cushion enough?

Then Jen takes all this information back to her lab and, with her co-workers, improves the shoe's design. Next, they ask another group of about 20-50 people to wear the shoe for about six weeks and really give it a workout. Again, Jen gets feedback from the players and improves the design. Finally, if lots of stores ordered this sneaker, then Jen and her team pass along this final design to manufacturers, who make the shoe and ship it out to stores to sell.

Sneaker Engineering

E E C T N M G F R I N E E R S
 H C S U O E E L E P P E O P L
 E E N D S E A N F N D S O L V
 T E E A D H O P I R O B L E M
 S L M B M I I L N X C F R M T
 Q S A L T R W O E P L J I Z E
 F C K C D V O C N E H I D C Y
 K E A R H Y O F X I M Y E Y B
 Y R C A H H V I R C N O S L K
 T M D S C X B H B E E G I X J
 B X B T E I Z E F T P D G F S
 V Q E W L R J X T B E T N Q M
 Z K J I X O N V L I B R U F C
 S T T G W G M U K N D N D T P
 C Y B H B T E Y J D L H H X N

Find these words in the letters above.

CUSHIONING
 FEEDBACK
 MODEL
 REFINE
 TEST

DESIGN
 FLEXIBILITY
 PERFORMANCE
 SKETCH
 TRACTION

In the 1600's an incorrect translation of the French fairy tale, Cinderella, forever changed her fur (vair) slipper to a glass one (verre). Not a very good shoe for dancing and running home at the stroke of midnight!



Fun Forms & Fascinating Functions

Imagine your team has just been hired by BigShoe Worldwide Corp. to work on a new project. Choose one of the tasks and make a sketch of the shoe that will work!

1 A team of explorers has discovered a new region of the earth, that has a ground like Jello®. Since the team will be spending a year there, they need shoes that will help them walk on this surface.

2 Last year, the winners of a hip-hop dance contest danced 14 hours but got blisters and sore feet! Design a shoe that will help the dancers beat the record without hurting their feet.

3 Melissa's cat keeps climbing up a huge tree but is afraid to come down. She needs a shoe that will help her safely climb the tree, but will not damage the tree bark.

