

## THINK ABOUT IT

What do chicken eggs, caterpillar cells, robots, and computers have in common? Two very big words: Biomedical Engineering!

When you're hurt or sick, two very big words are there to help. Biomedical Engineering!

But what is Biomedical Engineering?

- When teams of doctors, scientists, and engineers work together to find new ways to cure sick people, that's Biomedical Engineering.
- When those teams find new ways to help people who are hurt, that's Biomedical Engineering.
- When those teams find new ways to help you stay healthy, that's Biomedical Engineering.
- When those teams invent new tools or machines for doctors and nurses, that's Biomedical Engineering.

Did you know that Biomedical Engineering is not new? It goes back to ancient times. Archeologists found a mummy with an artificial toe that is 3,000 years old! 5,000 year old skulls show that people way back then had brain surgery! Doctors, scientists, and engineers have been working together for a long, long time.

Did you know that vaccines—those shots you get to keep you from getting sick—are made of dead or really weak germs? Those dead or really weak germs get your body ready to fight live germs. Did you know that the dead or weak germs are grown in chicken eggs? Did you know that

Biomedical Engineers are studying caterpillar cells? They think that the germs will grow faster in caterpillar cells than they do in chicken eggs. They think that if they grow the germs in caterpillar cells then vaccines can be ready help people quicker. Imagine that! Medicine grown in caterpillar cells!

Did you know that newer, faster, smaller computers might make artificial arms and legs feel hot and cold and move more like real ones? Biomedical Engineers are working on that right now!

Now, think about the last time you were sick or got hurt. Did you know that it took many doctors, scientists, and engineers to help you get better?

Think about the last time you needed a Band-Aid. A team of doctors had to figure out how big and thick to make the Band-Aid so it would cover the scrape and stop the bleeding. Did you know that scientists—chemists and physicists—had to work with those doctors to make the glue that stuck the Band-Aid to your skin? They even figured out how to make it not hurt when you peel the Band-Aid off! Did you know that engineers worked with the doctors, chemists, and physicists to figure out where to put the pad and how big to make the sticky part? More engineers figured out how to seal up the Band-Aid and keep it clean until you needed it.

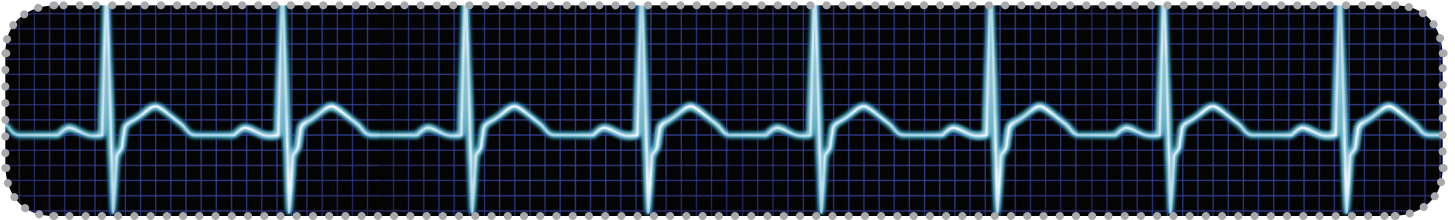
If all those people worked together on something like a Band-Aid, how many do you think it took to make an X-Ray machine?

Your challenge this season is to discover how Biomedical Engineering helps you and your team get and stay healthy. Think about the last time you went to the doctor, a hospital,

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or a first aid station. Think about the last time you saw a first aid kit, an ambulance or a helicopter (a flying ambulance). What did you see? How did it help you?

## LEARN ABOUT IT

Begin your project by creating a list of body parts. Think about the things that could go wrong with each one. Be creative. Be silly. Be serious. Think about everything that makes you—YOU!

Next, think about the things your doctor, the school nurse, your teachers, your coaches, and your family used to help you (or other people) when those body parts were sick or hurt. Think hard.

Did you see a tool? A thermometer? Special scissors? A stethoscope? An inhaler? A tongue depressor? A cast? A bandage?

Did you see a machine? An X-ray machine? A microscope? A wheel chair?

Once your list is complete, pick one thing—a tool or machine—and learn how it works!

Now, hunt for the answers. Who uses it? Where do they use it? How does it help? Who invented it? Ask everybody you know—your family, teachers, and friends. Read books. Look at websites. Ask people who help others stay healthy in and around your town. Go on a field trip. Write letters. Who makes or sells your thing? What can they tell you? Be ready to share where you hunted and what you learned.

## BUILD IT

Time to build your model. Show where and how your tool or machine is used or show how or where your tool is made. Show all or part of how it helps people. Make something in your model move. Here are the rules:

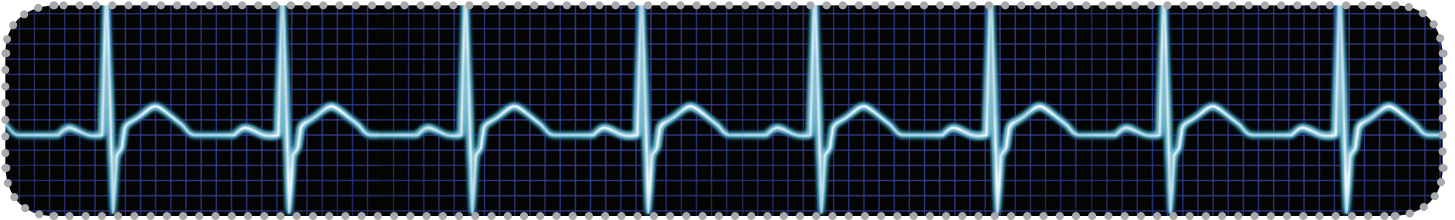
- Design your own model. Be creative! Be original! Don't just put together a kit that anyone could buy in a store or on the web.

- The model must be no bigger than 15-inches x 15-inches—a LEGO® baseplate or other premeasured footprint makes it easier to keep the model the right size.
- The model should be made of LEGO® parts—you can use any LEGO® bricks, figures, or moving parts you need except DUPLO bricks.
- The model must have at least one piece that can move—it can move by hand or using a motor like the one available in the optional Jr.FLL base kit. You can program your model to move using a LEGO® WeDo™ kit
- The model should include one simple machine—you can build it using any LEGO® ramps, levers, pulleys, gears, wheels and axles, screws, or wedges; you can find many of these parts (and more) in the optional Jr.FLL base kit.
- You cannot paint or decorate the LEGO® parts; you cannot use other art or craft materials in your model.

## SHOW IT

Make a Show Me! poster. Show your team and tell something nice about each member. Show the tool, machine or material you picked. Show how it helps people. Show how you learned about it. Show how others can learn more. Here are the rules:

- Use a 22-inch x 28-inch flat poster board or a 36-inch x 48-inch tri-fold presentation board—no bigger!
- You can use words, drawings, photos, and small objects attached to the poster to tell about what your team learned.
- Tell about your team—your team name, your team members (remember to make space to share something special about each one), and your coach.
- Tell about the places you hunted for answers, the people you asked.
- Tell about your tool or machine and show where it is used, how it is used, who uses it, and how it helps people.



- Tell about one doctor, scientist, or engineer (a person or their job) who helped make your tool or machine.
- Tell about your model and your machine—what is moving, where, and how.

And remember, the most important thing is to have fun while you show what you know about your tool or machine.

## SHARE IT

Now, share what you learned. You decide how to share what you've learned. Invite parents, teachers, people who helped you find answers, team sponsors, and other kids to see your poster and your model. Get permission and put your poster up at school, the library, or another public building. Tell the story. Answer questions. Sing a song. Put on a play. Be serious. Be funny. But find a way to share what you know! If you attend a Jr.FLL event, reviewers will visit with you for 5 to 10 minutes. Be prepared to:

- Listen to the reviewers and answer their questions
- Tell the reviewers about your team
- Tell the reviewers about the tool or machine you picked and your hunt for answers
- Tell the reviewers about your poster
- Show the reviewers how your model works
- Tell the reviewers about how you shared what you learned
- Be sure you have lots to share; the reviewers are looking forward to learning from you!

## NEED HELP GETTING STARTED?

This season's Jr.FLL Challenge builds an understanding of the complex network of medical, scientific, and engineering cooperation required to bring even the tiniest medical advances to us. The most mundane items may bring the biggest surprises. The sheer scope can be mind-boggling, even for adults, but the Challenge lays the groundwork for understanding the roles that all kinds of careers play in keeping us strong and healthy. The Junior FLL Coaches' Guide contains more information about Junior FIRST LEGO® League, community events and awards, along with hints for a successful season, as well as scheduling and activity suggestions. The BODY FORWARD 2010 Coaches' Resources contains discussion topic ideas, a glossary, and a wide variety of age-appropriate resources, both print and online.

Information and resources are also available online.

- At <http://www.usfirst.org/jrfl> you will find the Event Guide and other helpful information.
- At <http://jrfirstlegoleague.org> you will find more information about the Jr.FLL program.

If you have more questions, e-mail [jrflteams@usfirst.org](mailto:jrflteams@usfirst.org) for support.