What's Going On?

Batter Up: You couldn't even sit still, much less hit a baseball if it weren't for your joints. Your joints are found where two bones meet. Stretchy ligaments help hold the bones together and your muscles pull on the bones so that you can move. You will find a ball and socket joint in your hip and shoulder, a pivot joint in your elbow, a hinge joint in your knee and gliding joints in your wrist and ankle.

Slam Dunk: Your pulse is the sound of your heart muscle pumping blood through your body. If your age is 10 years or older, the average pulse rate is in the range of 60 to 100 beats per minute. When you run regularly like an athlete does, you exercise your heart muscle and it gets stronger so that it doesn't need to pump so many times to keep your blood flowing. Even a professional basketball player, though, has a higher heart rate when running than when sitting, just like you did in this activity.

Goal: In respiration, the lungs give your body the oxygen it needs for any activity, even lying around. The average respiration rate, if your age is 7 years or older, is 12 to 24 breaths per minute. If you are running instead of lying down, you need more oxygen so your respiration rate goes up. The harder you work your muscles, the more heat they generate. Sweat is your body's way of cooling down. Sweat comes out of your body through tiny holes in your skin called pores. It is very important to drink plenty of water when you play sports, so that you can replace the water you lose when you sweat.

Touchdown: A football player's helmet (or your bicycle helmet) is designed with layers of protective material inside and a hard covering on the outside. The layers absorb the force of your head hitting the ground so that your brain doesn't bounce around inside your skull. But helmets and pads aren't the only protection you need to prevent sports injuries. Warm up exercises stretch the muscles that you are going to use, so that they have a good oxygen supply and are ready to move when you are.

Want to Know More?

Try these books and websites…

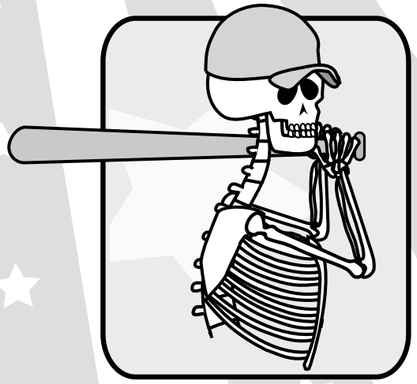
Berning, J. and Steen, S. *Nutrition for Sports and Exercise.* Colorado Springs, CO: Aspen Publishers, 1998.
Frost, S. and Troussieux, A. *Throw Like a Girl.* Hillsboro, OR: Beyond Words Publishing, 2000.
Ontario Science Centre. *Sportworks: More than 50 Fun Games and Activities that Explore the Science of Sports.* Ontario: Kids Can Press, 1988.
Parker, S. and Dowell, P. *Eyewitness: Skeleton.* New York, NY: DK Publishing, 2000.
Piven, Hanoch. *What Athletes are Made Of.* New York, NY: Ginee Seo Books, 2006.
Rau, Dana M. *What's Inside Me?* New York, NY: Benchmark Books, 2004.
VanCleave, Janice. *The Human Body for Every Kid.* Hoboken, NJ: John Wiley & Sons, 1995.
Walker, Richard. *Guide to the Human Body.* Ontario: Firefly Books, 2004.

www.exploratorium.edu/sport
www.fitness.gov
www.slsc.org
www.sciencemuseum.org.uk/exhibitions/sport/site/education-001.asp

written by Jennifer Boxer
illustrated by Dennis Smith

On Your Mark, Get Set, Go!

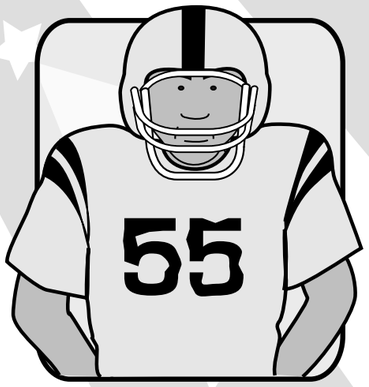
science and health activities for BJC SportsWorks



How many joints do you have to move to hit a baseball?

What is your heart doing when you're racing down the court to make a lay-up?

Why do you huff and puff and sweat when you play soccer?



Why do football players wear so much padding and do all those stretches?

Try the activities inside to find out.....

BJC SPORTSworks THE EXHIBITION

BJC SportsWorks THE EXHIBITION
June 2, 2006 through March 25, 2007

SAINT LOUIS sciencenter

Batter Up

You stand alert at home plate, bat ready. The pitch is good… But wait, none of your joints are moving! Can you hit the ball?

You will need: plastic baseball bat, skeleton line drawing included in this activity, pencil, a partner

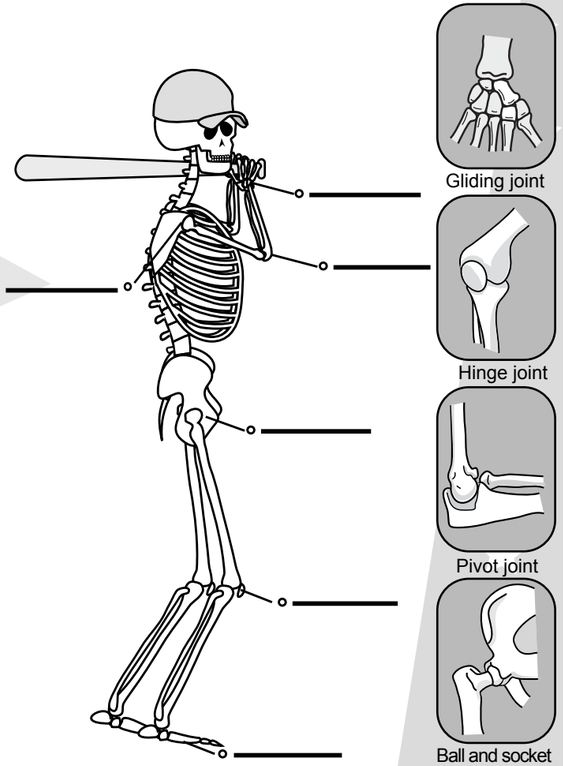
1. Using the plastic bat, stand ready, as if the baseball were coming towards you. In slow motion, move through the actions you would take to hit the ball. Have your partner watch you closely.

2. On the skeleton drawing, work with your partner to mark every spot where you moved. These are your joints. Write the name of the joint next to the spot.

3. Look at the pictures of the gliding, hinge, pivot and ball and socket joints. When you move your arms and legs, can you feel the different types of joints in action?

4. Now it's your partner's turn. Have him or her slowly wind up as if to pitch you the ball. Which joints are in action now?

5. Is there any joint you don't use when you're playing baseball?



Gliding joint

Hinge joint

Pivot joint

Ball and socket joint

Slam Dunk

You race down the court for your famous lay-up shot, but what is that pounding you feel?

You will need: stop watch or watch with second hand, basketball, room to run, a partner

1. You don't have to be running down the basketball court to feel your heart-beat. To feel your pulse, put your index and middle finger on the inside of your wrist. When you can feel the beat, ask your partner to time you with the stop watch.

2. When your partner says "go" start counting every time you feel a beat. Ask your partner to say "stop" after 15 seconds.

3. To find out your beats per minute, multiply your number by 4. Athletes have such strong hearts that their pulse can be as low as 40 beats per minute. How was yours?

4. Now, grab your basketball and dribble and run for one minute. If you have a basketball court to run on, even better. When one minute is up, sit back down and take your pulse again. What is your number this time?

5. Repeat the same activity, but this time it's your partner's turn. How do your pulse rates compare?

6. The heart is a hard-working muscle. Don't believe it? Try squeezing your hand as many times per minute as your pulse rate. Your heart muscle has to do that all the time, without taking any breaks!

Goal

You kick the ball past the goalie and, breathing hard, you raise your arms in triumph! Eeeew. Look at those big dark stains under your arms. Wouldn't life be better without sweat? Nope.

You will need: stop watch or watch with second hand, plastic bag, your hand, light-colored T-shirt, spray bottle of water, fan

1. This first activity is very relaxing. All you have to do is set your stop watch for 60 seconds, lie quietly on the floor, push the start button and count how many times you breathe in and out.

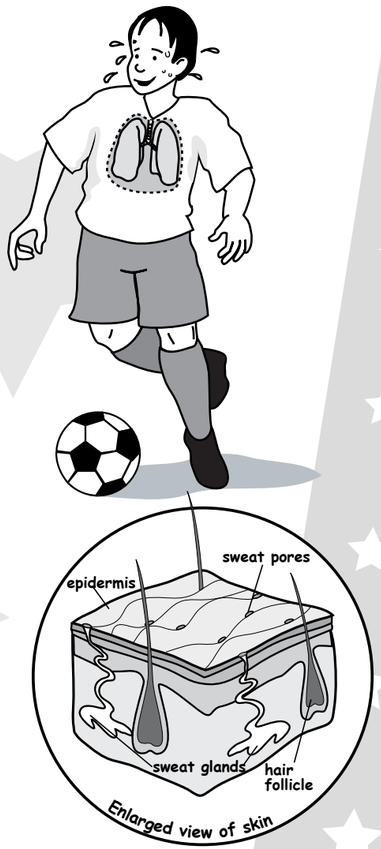
2. The number of breaths you take in a minute is your respiration or breathing rate. How do you think it's different now from when you are playing soccer?

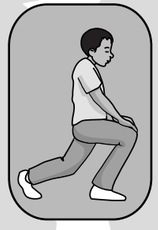
3. You knew you were breathing right now, but did you know that you are also sweating? Try putting a plastic bag completely over one hand and sealing it around your wrist with your other hand so air can't get in. What happens inside the plastic bag?

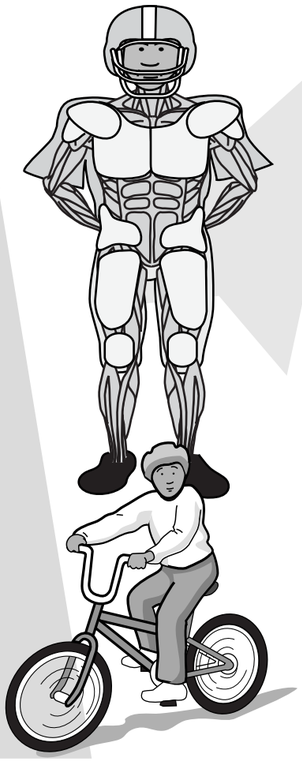
4. Here's another sweat experiment. Put on a light-colored T-shirt and stand in front of a fan. Notice how cool you feel.

5. Spray your T-shirt with water so that it looks like you have been sweating. You can spray some on your face, too, to really feel the effect. Now stand in front of the fan again. What do you notice?

6. Breathing hard and sweating are part of playing a sport. Why does your body need to do these things?







Touchdown

Even a 300-pound football player needs to play it safe. How can he make that touchdown if he doesn't warm up first? And, does he ever forget his helmet? No way.

You will need: pillows, blankets, bed or couch

1. Ready for football? Not yet. Do not begin this activity without warming up first! After you do the toe touches, leg stretches and side bends in the illustrations, you will be ready.

.

2. Notice what you feel inside your body while you stretch. Did your first stretch feel different from your second or third?

3. Now you're ready for football. Dive onto a couch or bed. (Make sure no one is sleeping in it.) Notice what part of your body hits first. Did you use your arms? Did you hit your head on a comfy cushion?

4. Imagine that you are diving onto the frozen ground on a football field on top of other people. Not nearly as comfy, huh?

5. Now use pillows and blankets to make padding on your body for a softer landing on the couch. Think about which parts of your body need the most protection

.

6. Create your own design for a helmet. What materials would you use?