**SATURDAY SCIENCE LESSON PLAN SPRING, 2010**

**WEEK FOUR**

**LEARNING OBJECTIVES**

* Students will able to illustrate different muscles performing along with different body motions based on physical exercise activity within 10 minutes.
* Students will be able to explain bicep and triceps muscles based on arm activity and teacher explanations.
* They will be able to compare and contrast their project data within 90% accuracy.
* They will be able to evaluate the differences of bones in adults and babies based on the discussion.
* They will be able to analyze the data of their projects.
* They will be able to transfer the data into posters or power points at least within 85% accuracy.

**INDIANA STATE STANDARTS**[The Nature of Science and Technology: Scientific View and Inquiry (Option B)](http://www.indianastandardsresources.org/files/sci/ca_sci_3_1_1_b.pdf) **This is a classroom assessment covering The Nature of Science and Technology: Scientific View and Inquiry (Option B).** [The Nature of Science and Technology: Scientific View and Inquiry (Option A)](http://www.indianastandardsresources.org/files/sci/ca_sci_3_1_1_a.pdf) **This is a classroom assessment covering The Nature of Science and Technology: Scientific View and Inquiry (Option A).** [Color Burst](http://www.sciencenetlinks.com/lessons.cfm?DocID=117) **SOURCE: American Association for the Advancement of Science. In this Science NetLinks lesson, students gain experience in asking questions and conducting inquiries by exploring the separation of colors in water and other solvent. This lesson uses a technique called paper chromatography. This activity helps students gain experience in conducting simple investigations of their own while working in small groups.**

[Properties of Air](http://www.sciencenetlinks.com/lessons.cfm?DocID=156) **SOURCE: American Association for the Advancement of Science. The purpose of this lesson, from Science NetLinks, is to demonstrate that air takes up space, and puts pressure, or pushes, on everything around it. To start the lesson students are asked to write an explanation of what air is. At various points in the lesson they are be asked to revisit their explanations and refine them based on the phenomena they have experienced in the lesson.**

[Physical Health](http://www.sciencenetlinks.com/lessons.cfm?DocID=49) **SOURCE: American Association for the Advancement of Science. The purpose of this lesson, from Science NetLinks, is to identify how germs are spread, the diseases they can cause, and how hand washing can help prevent the spread of germs. In the lesson, students learn about some of the health habits that are essential for maintaining good health. Students engage in both online and hands on activities related to the topic of germs. Students learn that germs cause some, but not all diseases. They also learn the importance of hand washing for preventing the spread of germs, and thereby, the spread of disease.**

[Sink It](http://www.sciencenetlinks.com/lessons.cfm?DocID=125) **SOURCE: American Association for the Advancement of Science. This Science NetLinks lesson is designed to develop students' understanding of sinking and floating. Students first classify a group of common objects by a characteristic of their own choosing. Then they reclassify the same group of objects by their predictions about whether each item will float or sink in water. As a group, they design an experiment to test their predictions (hypotheses).**

[Reaction Time](http://www.sciencenetlinks.com/Esheet.cfm?DocID=22) **SOURCE: American Association for the Advancement of Science. This E-sheet, from a Science NetLinks lesson, has students work in pairs to complete two reaction time activities. They record data during each activity and analyze their results at the end. Click "Display Full Record" and see the Relation field for a link to the lesson this E-sheet supports.**

[Falling](http://www.sciencenetlinks.com/lessons.cfm?DocID=158) **SOURCE: American Association for the Advancement of Science. This Science NetLinks lesson introduces students to gravity as a force, focusing on the concept of falling. They discuss the role of "falling" in relation to everyday objects such as swings, see-saws, water fountains, and more.**

* 3.1.3

Keep and report records of investigations and observations using tools, such as journals, charts, graphs, and computers. (Core Standard)

Explain: Students will transfer their project data (tables or graphs) into power points or posters.

* 3.1.4

Discuss the results of investigations and consider the explanations of others.

Explain: They will discuss about skeletal system when they are clustered around the skeleton.

The nutrition group will discuss and compare nutrition labels.

The physical exercise groups will compare three different activity results.

The mind exercise group will discuss why they get faster when they solve more puzzles.

* 3.1.5

Demonstrate the ability to work cooperatively while respecting the ideas of others and communicating one's own conclusions about findings. (Core Standard)

Explain: While working on their projects, they will discuss their own findings and solution with the other members of the groups.

* 3.2

### Students use a variety of skills and techniques when attempting to answer questions and solve problems. They describe their observations accurately and clearly, using numbers, words, and sketches, and are able to communicate their thinking to others.

Explain: Students will use different techniques as working on projects such as; they will use number to show their data and they will use word to transfer their results on posters or power points.

**MATERIALS**

* skeleton model
* 25 chocolates
* 5 posters
* glue
* crayons
* photocopies
* stopwatch
* soccer ball
* jump rope
* voice recorder

**Teacher Content Knowledge**

**Skeletal System; Bones and Muscles**



Every single person has a skeleton which has many bones. Each baby has over 300 bones and each adult has 206 bones. That is because as we grow, some of these bones begin to fuse together.

Bones have two purposes. Some bones enable us to stand erect and avoid us to fall. (Our backbones) Some other bones protect the sensitive parts of our bodies. (Your skull plays like a helmet and protects your brain and your rib plays like a cage to protect your heart and lungs)

Are bones alive?

They are absolutely alive. Have you ever seen a skeleton? You might think that your bones are dead like the bones on skeleton. On the other hand, our bones are different than the bones on a skeleton.The bones that in our body is all much more alive; they are growing and changing all the time like other parts of your body.

The bones in our body

Our spine: Our spine is one part of the skeleton. The spine lets us twist and bend, and it holds our body upright. Besides, it protects the spinal cord, a large bundle of nerves that sends information from your brain to the rest of your body. The spine is special because it is made of 26 bones. These bones are called [vertebrae](http://kidshealth.org/kid/word/v/word_vertebrae.html) and the shape of each [vertebra](http://kidshealth.org/kid/word/v/word_vertebrae.html) is like a ring.

Our ribs: It is one of the important parts of our skeletal system since it protects our two important organs;heart and lungs, by surrounding them. When we breathe in deeply, we can easily feel the existence our ribs in front of our body. We have 12 pairs of ribs.

Our skull: It is another important part of our skeletal system because it protects our brain. The skull is made of different bones and some protects the brain and some others give the shape of our face. The skull is pretty cool and unique. For example, the smallest bone of our body is in our head behind the eardrum. (it s only .1-.13 inches). The shape of skull changes over time. The babies are born with spaces between the bones of their skulls. As the baby grows, the bones get close to each other and the spaces disappear.

Our hands: Most of the time we use our hands to do something. The bones in our hands help us to hold or squeeze something, write something, or play or throw something. The center part of our hand is made up of five separate bones. Each finger on our hand has three bones, except for your thumb, which has two. Therefore, between our wrists, hands, and all our fingers, we've got a grand total of 54 bones.

Our legs: The other important movement part of our body is our legs. Our leg bones are very large and strong to help support the weight of our body We walk, run, lean across to something by using our legs. Our legs are attached to a circular group of bones called our **pelvis**. The pelvis is a bowl-shaped structure that supports the spine. We have total 52bones in our feet and ankles.

Our joints: The place where two bones meet is called a joint. Some joints in our body move and others don't. Fixed joints are fixed in place and don't move at all. Our skull has some of these which close up the bones of the skull in a young person's head.

Our moving joints are the ones that let us ride your bike, eat cereal, and play a video game — the ones that allow us to twist, bend, and move different parts of your body. Some moving joints, like the ones in our spine, move only a little. Other joints move a lot. One of the main types of moving joints is called a **hinge joint.** Our elbows and knees each have hinge joints, which let us bend and then straighten our arms and legs. These joints are like the hinges on a door. Just as most doors can only open one way, you can only bend your arms and legs in one direction. You also have many smaller hinge joints in your fingers and toes. Another important type of moving joint is the **ball and socket joint**. We can find these joints at our shoulders and hips. Ball and socket joints allow for lots of movement in every direction. Our joints come with their own special fluid called synovial fluid which helps them move freely.

Taking Care of Bones

* Protect those skull bones (and your brain inside!) by wearing a helmet for bike riding and other sports.
* If you play sports like football, soccer, lacrosse, or ice hockey, always wear all the right equipment
* Strengthen your skeleton by drinking milk and eating other dairy products (like low-fat cheese or frozen yogurt
* Be active! Another way to strengthen your bones is through exercise like running, jumping, dancing, and playing sports.

Muscles

We need muscles to pull on bones so that we can move. Along with muscles and joints, bones make us move. Our muscles are attached to bones. When muscles contract, the bones to which they are attached act as levers and cause various body parts to move.

Biceps and triceps

The elbow joint lets our forearm move up or down. It is controlled by two muscles, the biceps on the front of the upper arm, and the triceps on the back of the upper arm. The biceps and the triceps are antagonistic muscles. When the biceps muscle contracts, the forearm moves up and when the triceps muscle contracts, the forearm moves down.

This solves the problem. To lift the forearm, the biceps contracts and the triceps relaxes. To lower the forearm again, the triceps contracts and the biceps relaxes.

How do I strengthen my muscles?

* Eat Strong; take enough nutrition.
* Any physical activity you like to do - from dancing to playing football - can make you stronger.

**Description of lesson**

**ENGAGE**

**Warm-up Activity; Quiz**

Since we will open it online, we expect them to engage in the quiz easily. The quiz will come along with a fun music.

**EXPLORE**

**Activity 1**

* The teacher will begin to tell all students to stand up to make a physical activity.
* First, the teacher will tell them to simply turn their head as far to one side as possible.
* Second, the teacher will ask students to flex their arms by bending their lover arms from the elbow.
* And then the teacher will say them extend their arms by raising their arms straight above their heads.
* Later, the teacher will tell them to walk without moving.
* In the next step, the teacher will tell students to raise their knees up toward their breast.
* Second, the teacher will tell them to slowly raise themselves up on their toes and lower heels back down.
* Then, the teacher will tell them to pull the heel of their foot slowly and gently towards their buttocks, the quads get a good stretch.
* Finally, the teacher will tell to keep their back straight while hands at side. Then, the instructor will tell to bend their knees slowly. Next, she will explain them to raise themselves and exhale while feet are approximately shoulder-width apart.

We will make the activity above to introduce the skeletal and muscle system to students. We will try to make sense of the topic by making them do physical exercise. We expect them to understand the basic function of their skeletons and muscles. We will ask the big question;

How does your body move and keep your straight?

Then, we will introduce the topic; Skeletal and Muscle System.

**EXPLAIN**

 We will tell students to come closer to the model skeleton. Then, we will pose some other questions to make them create new questions about the skeletal system of our body.

The first question we will pose the following question;

 “What would happen if humans did not have skeleton?”

The teacher will give enough time for discussion and she will expect them to answer this question. If not, she will explain you'd be floppy like a beanbag. Could you stand up? Forget it. Could you walk? No way. Without bones you'd be just a puddle of skin and guts on the floor.

Next, the instructor will pose the following question: “What do they do?”

The teacher expects them to answer as the following; bones enable us move, stay up right, and protect some our organs.

Then teacher will ask another interesting question; “Are there any difference between the bones of skeleton model and our bones?”

The teacher expect students to ask new questions such as “Are our bones alive?” Then, the instructor expects some students to answer this question. If any students respond the question, we will give the answer and say “Absolutely. Bones are made of a mix of hard stuff that gives them strength and tons of living cells which help them grow and repair themselves. Like other cells in your body, the bone cells rely on blood to keep them alive.”

Then, the teacher will ask another question which is related to previous question;

“What happened if bones were not made of living cells?”

Then the teacher expects students to answer the question and say; we would not grow, we would not ride a bicycle, we would not store calcium in our bones and so on. Next, the instructor will give a detailed explanation; “If bones weren't made of living cells, things like broken toes or arms would never mend. That's because your bone cells are busy growing and multiplying to repair the break.”

After giving the explanation, the teacher will ask another question; “How?”

The teacher does not expect students will answer this question. She will give this following explanation: when you break your toe, blood clots form to close up the space between the broken segments. Then your body mobilizes bone cells to deposit more of the hard stuff to bridge the break.”

Next, the teacher will pose another question: Have you ever wondered how many bones we have?”

The teacher will wait until several students guess the answer and students’ answers will be written on the board. If someone estimates or gets closer to the right number, the teacher will give a candy or chocolate. And then, the teacher will pose other questions; “Do you think all of us have the same numbers of bones in our body?” “Do you think basketball players have more bones than us?” “Do you think babies have less bone than us?”

The instructors will guide them to give answers the questions above. If they do not answer the questions, the answers will be given. “Every single person has a skeleton which has many bones. Each baby has over 300 bones and each adult has the same number of bones, 206 bones.

We expect students to ask “Why do babies have more bones than us?”

Then we will explain; “that is because as we grow, some of these bones begin to fuse together.”

Later, the teacher will pose the following question:

“Have you ever seen someone paste their bones with glue?” If not, how do our bones meet? After student discussion, the teacher will explain two bones meet at one place which is called a joint. And then the teacher will ask another question:

“Do all joints move?”

 Next, the teacher will explain some joints move and others don’t. Fixed joints are fixed in place and do not move at all. Think about your skull which has some of these joints. Do they move? If yes, how do we protect our brain? After students discussed this question: the teacher will move on to moving joints by asking the following question:

“Who likes riding a bike?”

 Next she will question next statement: what happened when you’re riding a bike? After student discussion the teacher will mention moving joints. Moving joints allow you to twist, bend, and move different parts of your body. Some moving joints such as one in your spine move only a little. On the other hand, other joints move a lot. For instance, everybody think about his/her elbow and knees. And then the teacher will pose another question: does anybody know what kind of joint we have at our legs or arms? After giving enough time, the teacher will point out our elbows and knees have hinge joint. These joints are like the hinges on a door. Most doors can only open one way. Our arms like most doors; you can only bend your arms in one direction. You have also similar type of joints at your fingers. Then the teacher will ask other questions:

“What about our shoulders or hips? How they can move?” After student discussion, the teacher will explain our shoulders and hips are made up of the round end of one bone fitting into a small cup-like area of another bone. This type of joint is called ball and socket joint. Ball and socket joints allow for lots of movement in every direction.

After we will move on to muscles by asking; “how do our bones move?’

The teacher will give enough time for students and then she will point out children need muscles to pull on bones so that they can move. She will also explain that along with muscles and joints, bones are the responsible body part for being able to move. Their muscles are attached to bones. When their muscles contract, their bones, which are attached to the bone, causes body movement.

Before the break, we will open a video about muscles from the following link; http://kidshealth.org/PageManager.jsp?lic=1&article\_set=59302&cat\_id=20607

**BREAK**

**ELABORATE**

In the second part of the class, the students will work on their projects. They will analyze their data, draw their tables/graphs and write their conclusions. Then, they will answer their project questions. Finally, they will stick/add the pictures/graphs/tables on the posters or power points. We expect them to complete their projects this week in order to make presentations next week.

**EVALUATION/ASSESSMENT**

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| **Assessment** | **Assessment format** | **Teacher Notes** |
| **Summative assessment** | **Quiz:**  The quiz will be opened from a website. There are 10 questions which basically measure their knowledge on nervous system and brain. The teacher will give 5 minutes to students to answer these 10 questions.Students will be assessed on the basis of their answers to questions and content.  |  |
| **Formative****assessment** | **Interview:** 5 project groups will be interviewed related to their project working. The following questions will be asked in 20 minute. We would like to review taped interviews with special attentions to understand students literature review stages, analyzing data, and come up with a appropriate solutions. Why did you choose this topic to work? How did you choose the research question?Did you need any sub questions to find the answer easily?Which sources did you use to answer the question?Did you find something interesting while you were working on your projects?What did you learn from the project? |  |
| **Formative****assessment** | **Projects; Posters/ Power Points:** The posters/ power points will be collected at the end of the class to evaluate until next week. The groups will be evaluated on the basis on their data collection, the sources they used, the results that they come with, and meeting deadlines. Each student in the groups will be assessed on the basis of their contribution to the project. We will consider our observations; look at their ability to work in a group and independently.(we will use interviews along with the projects)The report will be assessed based on several criteria including difficulty of projects, quality of diagrams/tables, statement of problem, clarity of explanation, logical development of the project. |  |

**References**

http://dc.doe.in.gov/Standards/AcademicStandards/StandardSearch.aspx

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