

# Bay Area Scientists in Schools Presentation Plan

Lesson Name \_\_\_\_\_ Support and Protect! Our Skeletal System at Work \_\_\_\_\_

Presenter(s) \_\_\_\_\_ Anatomy DeCal: Manreet, Juhi, and Alice \_\_\_\_\_

Grade Level \_\_\_\_\_ 3 \_\_\_\_\_ Standards Connection(s) \_\_\_\_\_ Structures and Functions of Life \_\_\_\_\_

## Current California Standards Connection:

3-LS3 Adaptations in physical structure or behavior can improve an organism's chance for survival.

- a. Students know plants and animals have structures that serve different functions in growth, survival, and reproduction.

## Next Generation Science Standards:

3-LS1 From Molecules to Organisms: Structures and Processes

- 3-LS1-1. Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death.

3-LS3 Heredity: Inheritance and Variation of Traits

- 3-LS3-1. Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms.

3-LS4 Biological Evolution: Unity and Diversity

- 3-LS4-1. Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago.

Science & Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
<p><b>Developing and Using Models</b> Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions.</p> <ul style="list-style-type: none"> <li>Develop models to describe phenomena. (3-LS1-1)</li> </ul> <p><b>Engaging in Argument from Evidence</b> Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s). Construct an argument with evidence, data, and/or a model. (3-LS2-1)</p>	<p><b>LS3.B: Variation of Traits</b></p> <ul style="list-style-type: none"> <li>Different organisms vary in how they look and function because they have different inherited information. (3-LS3-1)</li> </ul> <p><b>LS4.A: Evidence of Common Ancestry and Diversity</b></p> <ul style="list-style-type: none"> <li>Some kinds of plants and animals that once lived on Earth are no longer found anywhere. (<i>Note: moved from K-2</i>) (3-LS4-1)</li> <li>Fossils provide evidence about the types of organisms that lived long ago and also about the nature of their environments. (3-LS4-1)</li> </ul> <p><b>LS1.A: Structure and Function</b></p> <ul style="list-style-type: none"> <li>Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction. (4-LS1-1)</li> </ul>	<p><b>Patterns</b></p> <ul style="list-style-type: none"> <li>Patterns of change can be used to make predictions. (3-LS1-1)</li> <li>Similarities and differences in patterns can be used to sort and classify natural phenomena. (3-LS3-1)</li> </ul> <p><b>Systems and System Models</b></p> <ul style="list-style-type: none"> <li>A system can be described in terms of its components and their interactions. (3-LS4-4)</li> </ul>

**FOSS Connections:**

3<sup>rd</sup> Grade Module: Structures of Life Investigation  
4: Human Body

**Teaser:**

Skeletons aren't just for Halloween! Our skeletal systems are a major part of what make us healthy human beings! In this lesson, students will learn how the skeletal system supports our bodies and also protects our fragile organs. We will have fun, hands-on stations for students to learn about bones and the organs they protect- including a real brain!

**Objective:**

Students will learn 1.) The skeletal system supports our bodies and helps us do complex things, like pick up a pencil, type and email, or do a backbend and 2.) The skeletal system protects our sensitive and fragile organs from injury so they can function properly to maintain our health.

**Vocabulary/Definitions:** 3 – 6 important (new) words

**Skeletal system-** The framework of the body, consisting of bones and other connective tissues, which protects and supports the body tissues and internal organs.

**Organs-** A part of the body that has a specific, important function like the heart, brain or liver

**Wet Specimens (“Wet Specs”)-** soft organs (or sometimes whole animals!) that are stored in alcohol or another liquid for scientific research

**Materials:**

<i>What will you bring with you?</i>
Skeleton cut outs & brads Skeleton Model (aka Frank) Organ Model (aka Jessie) Heart Wet Specimen Brain Wet Specimen Gloves, Tray and Pointer Engineering Materials: Pipe cleaners, Straws, Tape Model Hand

**Classroom Set-up:** Student grouping, Power/Water, Projector, Light/Dark, Students will start out as a whole group for the introduction and will need to split into 3 groups for the stations.

**Classroom Visit**

**1. Personal Introduction:** \_\_\_\_\_ **3** \_\_\_\_\_ **Minutes**

Hi everyone! We are scientists from UC Berkeley. We are all interested in studying something all of us are familiar with- the human body!

**Topic Introduction:** \_\_\_\_\_ **10** \_\_\_\_\_ **Minutes**

**Juhi:** “This is Frank, he’s going to help us learn about the body today. Does anyone know how’re able to stand up even though there’s gravity? Well the way we do that is that we have things that help us stand. Do you guys know what helps us stand? ‘Bones’. That’s right! Everybody raise your hands. You see, your bones help hold your hand up when you answer a question.”

**Alice:** “Can you name some bones in your body? Okay that’s great! Do you guys know what bone of your skeleton protects your brain? How many bones do you guys think are in this part of your arm? [Flex biceps] Do you guys know what bones protect your heart? [Ask around for answers] Your ribs! When we talk about all of our bones together, we call it the skeletal system. One of our stations today is going to be a “Make your skeleton.” So you can make some friends for Frank. You guys are also going to be able to make your own hands!

**Manreet:** Can someone tell me what an organ is? [**Define organ**] Does anybody know the name of an organ in your body? What organ do you think helps you breathe? ‘Lungs’ How about one that helps you see? ‘The eye!’ Maybe one that helps you eat? The stomach! [Go to organ model and point to a few of them] This is my friend Jessie! One of our stations today is going to be seeing real organs! Scientists call them wet specimens. This means that they are stored in rubbing alcohol or some other liquid so we can use them for scientific research.

## 2. Learning Experience(s):

\_\_\_30-40\_ Minutes

*What will you do, what will kids do? Demonstrations, hands-on activities, images, games, discussion, writing, measuring... Describe in order, including instructions to kids.*

### Station 1: Make your own Skeleton (Manreet)

Tell them the name of certain bones like humerus, femur, radius, and ulna.

Possible questions during this station:

How many bones are in your leg?

When you raise your hand, which bones do you use?

How many bones are in your hand?

Has anybody broken a bone? Share. Where?

What does the clavicle do?

### Station 2: Engineer your own Hand (Juhi)

Ok everyone, can someone tell us which part of the body is important for using tools and grabbing things? That’s right, your hand! Everyone look at your hands, how many bones do you think there are in each of your hands? Anybody want to guess? Is it 5? 10? 50? Everyone close your hand. Do you guys see how your hand is able to make a fist? We can do this because we have many bones in our hand. Every joint (section) is actually a bone, here look at Frank, do you see how many bones he has in his hands? Let’s see if we can find them all on our own hand. Great Job!

Ok everyone, so at this station we’re going to making our own hands with some of this stuff we brought with us. (show example hand) Your goal is to make a hand, and then we’re going to see if we can use our toy hands to pick up these plastic cups!

### Station 3: Model and Wet Specs (Alice)

Wet Spec of Eye:

The eye is a very important part of our body. Can anyone tell me what the eye helps us do? Yes, it helps us to see! Everything you see right now in your classroom actually enters your eye as light. The

light enters your eye first through the cornea-- you can't really see it because it is clear! Then, it enters through the pupil-- if you look here in the cow eye, it is this big black dot. Inside of your eye, you have the lens, think of it like a magnifying glass! The light will bounce off of the lens, allowing us to see things that are far away, and things that are really close to us! The light continues going through our eye until it reaches the retina-- it is this colorful part on the cow eye. This part of the eye helps us to see the different colors that we see everyday!

At the back of the eye, you see this funny part sticking out-- this is called the optic nerve. Actually, this is what connects the eyes to our brain! So our brains help us see as well!  
Any questions about the eye?

### Wet Spec of Brain:

The brain is a really important organ. Everybody point to where your brain is, we actually went over it in the beginning! The brain is the organ that helps us have thoughts! When you see a crayon and you want to pick it up, the brain helps you make that plan and tells your body parts to make the motion and do it! These are the two different parts of the brain, the LEFT lobe and the RIGHT lobe. It looks really squishy and has all these squiggly lines on it! Your brain rests in your skull, a bunch of bones that cover and protect your brain. Does anybody know why you would want to have a lot of protection for your brain? It's because it controls so much of the other parts of your body and you want to keep it nice and safe! That's why we wear helmets when we ride bikes.

### **3. Wrap-up: Sharing Experiences**

\_\_\_\_\_5\_\_\_\_\_ Minutes

*Putting the pieces together – how will students share learning, interpret experience, build vocabulary?*

### **Juhi:**

Who can tell me one thing that they learned at Manreet's skeleton building station? [Ask for answers]

Who can tell me one thing that they learned at Julie's wet specimen building station? [Ask for answers]

Who can tell me one thing that they learned at my hand building station? [Ask for answers]

Everybody, before we go, think about one thing you learned today that you would want to learn more about! Turn to a partner and tell them what you would like to learn more about. [If time, ask for some examples].

### **4. Connections & Close:**

\_\_\_\_\_5\_\_\_\_\_ Minutes

*What else might kids relate this to from their real-life experience? How can they learn more?  
Thanks and good-bye! Clean-up.*

**Alice:** As you guys can see, we have a lot of different bones that help us move and do different things. The human body is so cool and our bones can help us move and can protect some of our organs which help us survive. So what kind of jobs do you guys think would need to know a lot about our bodies and our bones? Doctors? Nurses? Teachers? Does anybody have a parent who is a doctor?

**Manreet:** Why do we have these professions? So that we can get fixed and healthy if we break something or get sick or get hurt! Our friends Jessie and Frank would like to thank you guys for being such good students and we hoped you learned a lot.

**Total 50 – 60 Minutes**

## **Follow-up – After Presentation**

Suggest students write a letter explaining what they learned about bones and the skeletal system.

Community Resources for Science  
1611 San Pablo Ave  
Suite 10B  
Berkeley, CA 94702

### **Reading Connections:**

- The Complete Human Body by Alice Roberts DK Publishing. 512pp. Trade ISBN 9780756667337, \$50. (6–12) DVD enhanced, this ambitious volume examines human evolution, anatomy, function, reproduction, and disease in an orderly, up-to-the-minute visual format. Glossary, Index. (NHM) IV. Supplemental Material: Virtual labs on cardiology, neurology and other topics (The Howard Hughes Medical Institute)  
<http://www.nsta.org/recommends/ViewProduct.aspx?ProductID=20606>
- Understanding Your Muscles and Bones: A Guide to What Keeps You Up and about (Usborne Science for Beginners) by Rebecca Treays - Uncovering the frame of the human body, this text takes a close look at the tissues that keep us up and about. It explains the structure of the skeleton and the mechanics of movement. It also examines the importance of involuntary muscles in the smooth working of the human body. The book is part of the "Science for Beginners" series which aims to give clear, simple explanations backed up by diagrams, photographs and comic-strip cartoons. <http://www.amazon.com/Understanding-Your-Muscles-Bones-Beginners/dp/0746027397>
- Muscles: Our Muscular System by Seymour Simon <http://www.amazon.com/Muscles-Muscular-System-Seymour-Simon/dp/0688177204/>
- Bones: Our Skeletal System by Seymour Simon <http://www.amazon.com/Bones-Skeletal-System-Seymour-Simon/dp/0688177212/>

### **Mathematics Activity:**

Students can create and solve math problems using the number of parts in their aliens. Also, the number of alien parts (bones, muscles, joints, etc.) can be shown on a bar graph.

### **Other Follow Up Activities:**

Inner Strength (National Space Biomedical Research Institute) In this activity about endoskeletons (page 8 of PDF), learners observe, compare and contrast different kinds of chicken bones, and relate their chicken bone observations to human bones. The bones must be prepared a day ahead of time. Learners also use a poem to identify the major bones of the human body and discuss the importance of bilateral symmetry. This guide includes background information, extensions, and data sheets.

[http://www.nsbri.org/default/Documents/EducationAndTraining/Muscles/MB\\_Guide.pdf#page=14](http://www.nsbri.org/default/Documents/EducationAndTraining/Muscles/MB_Guide.pdf#page=14)

Rubber Bones (Children's Museum of Houston) Over 1 or 2 days, learners use vinegar to remove the calcium from a chicken bone. They then explore how the bones have changed. An accompanying video with Mr. O further explores the relationship between cartilage and bone and explains how bones grow. <http://www.cmhoustonblog.org/2011/02/01/rubber-bones/>

Ask a Biologist – Busy Bones Website from (Arizona State University):

<http://askbiologist.asu.edu/busy-bones>

Includes online activities, printable activity sheets, and coloring pages related to bones and skeletons.

Crayola Human Skeleton Free Printable Coloring Page

<http://www.crayola.com/free-coloring-pages/print/human-skeleton-coloring-page/>