

Community in the Classroom Presentation Plan

Lesson Name Bones

Presenter(s) Martha Singer MD

Grade Level 5th Standards Connection(s) Physical sciences- Calcium is an element; Life Sciences-bones are part of a specialized system of the human body, help in mobility; Earth Sciences- Gravity helps form strong bones! Measurement and Geometry-Long bones are hollow tubes

Abstract: *Kids' bones are different from adult bones. Bones grow longer and stronger during elementary school. Strong bones come from a combination of good food choices (calcium) and weight bearing exercise (running, jumping, dancing). The long, weight-bearing bones have a special design (cylinder) that helps them support body weight. Gravity helps bones become strong. Astronauts who spend time away from earth's gravity have to exercise in a special way to keep their bones strong.*

Vocabulary/Definitions:

3 – 6 important (new) words:

Calcium-the mineral in your body that makes your bones and keeps them hard and strong (also an element)

Cylinder-a geometric shape like a bone

Orthopaedic Surgeon – A doctor who specializes in bone and joint injuries and surgeries.

Weight bearing exercise-an activity in which your body works against gravity so your feet, legs, or arms are carrying your weight. Jogging, walking, stair climbing, dancing and soccer are some weight-bearing physical activities you can do alone or with friends

Femur- thigh bone

Humerus-bone of the upper arm

Tibia and fibula-bones of the lower leg

Materials:

What you'll bring with you

I will bring in plastic bones, x-rays, magnifying lenses and cow bones for the kids to examine with the lenses,

What students should have ready (pencils, paper, scissors): Pencil, ability to wash hands after inspecting bones.

Classroom Set-up:

Students will start as a group (discussion) will then break up into smaller groups

Classroom Visit

1. Personal Introduction: _____ 5 _____ Minutes

Who are you? What do you want to share with students and why? How will you connect this with students' interests?

I am an orthopaedic surgeon (bone doctor) and take care of kids and adults. Orthopaedists take care of broken bones as well as other problems like sports injuries and joint replacements. Bones are interesting because they help us to grow and move.

Topic Introduction: _____ 10 _____ Minutes

Big Idea(s), vocabulary, assessing prior knowledge. What questions will you ask to learn from students?

Is a bone an animal vegetable or mineral?

Who knows what calcium is?

Will show some plastic human bone models, kids guess which part of the body they are from and learn names of some bones.

Kids bones are different from adult bones-will show some photos or x-rays- kid bones have special areas where they are still growing longer. Kids are also growing their bones stronger (putting down more dense, calcified bone) up until the bones are at their strongest around age 20.



What makes bones strong? Calcium and weight bearing exercise.
What foods have calcium in them? How does the calcium in the foods you eat get to your bones?

In order to grow stronger bones, weight-bearing exercise is important. Bones that rest inside a cast start to lose density quickly. What can astronauts do to keep their bones strong?

2. Learning Experience(s): 35 **Minutes**

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

- 1) Show poster of human skeleton (handout: labeled skeleton diagram). Pass around bone models for observations: what do they observe? Where do they think bones fit into the human skeleton? Can they name the bones they found? Show femur, humerus, tibia, fibular. What other bones/names interest you? Which is your funny bone?
- 2) Tubular strength: demo – with kid volunteers kids try balancing a book on the end of a thin tube-even a toilet paper roll can hold a book. But when the book is placed on the tube that lies on its side, the book easily crushes the tube. Why? A tube or cylinder shape allows your bones to hold up a lot of weight—the weight of your body—but is lighter than if the bone was a solid tube.
- 3) Pass around X-rays of kid and adult bones – what is different about kid bones? See what a growth plate looks like on an x-ray
- 4) Observation of real specimens: Kids go to table groups. Each table group gets bone specimen(s) to inspect with lenses and diagrams of different parts of bones. On a blank page, draw a picture of the bone(s) and show how it is organized into different areas- hopefully seeing it is shaped like a hollow tube or cylinder. Guess what part of the animal the bone comes from. (Is it from a mature or a young animal? – *this might be a gross-out question! but would link to their previous observations...*) Label the parts of the bone you can observe. What might be missing from your specimen? ...

3. Wrap-up: Sharing Experiences and Building Connections 5 **Minutes**

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

Ask about what kids observed when they inspected the bones. Was it what you expected? Are bones dead or alive? Do you think your bones look like these? What happens when bones don't get used- like when they are in a cast or in space and there is no gravity?

Bendy Bones-Show (I hope) a “pickled” bone or egg, where the bone or eggshell has had the calcium removed—it is wiggly and soft-to demonstrates how calcium makes bones hard.

Ask about what food are good for bone strength, and what exercises build bone strength.

4. Close: 5 **Minutes**

How can kids learn more? Thanks and good-bye! Clean-up.

List of calcium containing foods to share with family-attached

TOTAL 50 – 60 **Minutes**

Follow-up – After Presentation

Suggest students write a letter explaining “How we learned about _____?”

List or attach examples of activities, websites, connections for additional learning.

Attach worksheets, hand-outs, visuals used in classroom presentation.



For girls: <http://www.cdc.gov/powerfulbones/boneup/index.html>

About broken bones (for kids)

http://kidshealth.org/kid/ill_injure/aches/broken_bones.html

For kids (museum): http://kidshealth.org/kid/ill_injure/aches/broken_bones.html

For teachers:

<http://yucky.discovery.com/teachercenter/pg000064.htm>

Calcium content of foods: <http://ods.od.nih.gov/factsheets/calcium.asp>

Staying Strong: Where to get calcium

For strong bones, kids need plenty of calcium and lots of weight-bearing physical activity every day. Here are some great tasting ways to get the calcium you need. Calcium content varies depending on ingredients for many foods. That means a food may have a little more or a little less calcium than what is listed on this chart. This is because different brands sometimes have slightly different ingredients. Check **food labels** to see how much calcium is in different foods. Choose fat-free or low-fat versions of these foods most often. Aim for 1300 milligrams or 130% of the **daily value (DV)** everyday.*

Add it up!

Food	Porti
Milligrams	%DV
Plain, fat-free yogurt	1 cup
Grilled cheese sandwich* *	1 sandwich
American cheese	2 ounces
Ricotta cheese, part skim	1/2 cup
Fruit yogurt	1 cup
Cheddar cheese	1 1/2 ounce
Milk (fat free or low fat)	1 cup
Orange juice with added calcium	1 cup
Soy beverage with added calcium	1 cup
Mozzarella cheese, part skim, low moisture	1 ounce
Tofu (with calcium sulfate on ingredient list)	1/2 cup
Waffle, homemade with milk, 7-inch	1
Macaroni and cheese	1/2 cup
Collards, boiled, frozen	1/2 cup
English muffin, whole wheat	1
Rice beverage, with added calcium	1 cup
Pudding, made with milk — chocolate, vanilla, lemon, banana	1/2 cup



Cheese pizza	1 slice
Collards, boiled	1/2 cup
Frozen yogurt (fat free or low fat)	1/2 cup
Broccoli, cooked or fresh	1 cup
Kale, boiled	1/2 cup
Seeds, sesame seeds, whole, dried	1 tablespo
Ice cream	1/2 cup
Bok choy, cooked or fresh	1/2 cup
Cottage cheese, 2% fat	1/2 cup
Almonds, dry roasted	1 ounce
White bread	2 slices
Cottage cheese, 1% fat	1/2 cup
French toast, made with milk	1 slice
Oatmeal, instant with added calcium	1 packet
Cereal with added calcium	1 ounce
Milk, Lactose Reduced	1 cup

* % DV = % of Daily Value used on food labels. The Daily Value for calcium is 1,000 milligrams (mg). 5% DV or less of a nutrient is low; 20% DV or more is high. Label values are rounded. Visit the [KidsHealth](#) and [FDA](#) Web sites to read more about food labels. ** Using 2 slices of white bread, 1 1/2 ounces cheese, nonstick cooking spray. **Sources:** American Dietetic Association's *Complete Food and Nutrition Guide*, by Roberta Larson Duyff, Chronimed Publishing, 1996; *Bowes and Church's Food Values of Portions Commonly Used*, revised by Jean A.T. Pennington, Lippincott-Raven Publishers, 1998; USDA Nutrient Database for Standard Reference (Release 14, 2001); Imagine Foods Rice Dream and Pacific Foods. **Sources:** United States Department of Health and Human Services, *Dietary Guidelines for Americans*, 2005, Appendix B - Food Sources of Selected Nutrients: Appendix B-4: Non-Dairy Food Sources of Calcium. **Sources:** *Bone Health and Osteoporosis, A Report of the Surgeon General*, 2004, Chapter 7: Lifestyle Approaches to Promote Bone Health, Table 7-2: Selected Food Sources of Calcium, pg 161. **Note:** % Daily Value numbers are often rounded. That means the %DV numbers may not be the exact value. Rounded numbers are easier to work with. Numbers that end in 1 through 4 are generally rounded to the next lower number that ends in 0. For example 74 rounded to the nearest ten would be 70. Numbers that end in a digit of 5 or more are generally rounded up to the next even ten. For instance the number 88 rounded to the nearest ten would be 90.

[Department of Health and Human Services' Office on Women's Health*](#)
[Centers for Disease Control and Prevention](#)
[National Osteoporosis Foundation*](#)



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