

Body Websites

<http://www.eskeletons.org/> Skeleton Comparison

http://infozone.imcpl.org/kids_skel.htm Bone

http://www.kidshealth.org/kid/body/bones_SW.html Big Story on Bones

<http://yucky.kids.discovery.com/noflash/body/pg000124.html> Skeletal System

<http://www.innerbody.com/htm/body.html> Interactive Inner Body

<http://library.thinkquest.org/4131/> The Amazing Backbone

<http://www.medtropolis.com/VBody.asp> The Virtual Body

http://vilenski.org/science/humanbody/hb_intro.html Tour the Human Body

<http://www.bio.psu.edu/faculty/strauss/anatomy/skel/skeletal.htm> Real Pictures

<http://www.kidport.com/RefLib/Science/HumanBody/BodyBones.htm>

<http://sv.berkeley.edu/showcase/pages/bones.html> Mr. Bones

<http://sorrel.humboldt.edu/~bioman/bones/bones.html> Exploring the Human Body

<http://www.cln.org/themes/skeletal.html> Skeletal Theme Page

http://sciconn.mcb.arizona.edu/skeleton_lesson.html The Leg Bone Is Connected To:

http://trackstar.hprtec.org/themes/sik-4/index_siK4.html The Human Skeleton

The Bones Inside Us

Check out the following web sites to find out some great facts about bones and answer the following questions.

First Destination: www.kidshealth.org/kid/body/bones_SW_p8.html

1. The human skeleton has 206 bones. Which is the longest? _____
2. What is the hardest bone in our body? _____

Second Destination: www.howstuffworks.com/hearing4.htm

3. The smallest bones are those in our ears. What are their names? There are three, and each has a plain and a fancy name.

	Plain Name	Fancy Name
1.	_____	_____
2.	_____	_____
3.	_____	_____

Third Destination: www.kidshealth.org/kid/body/bones_SW.html

4. What makes up the inside portion of our bones? _____
5. What is its purpose? _____

Fourth Destination: www.kidshealth.org/kid/body/bones_SW.html

6. Joints are what hold our bones together. There are two types: movable and immovable. A hinge joint is a type of movable joint found in _____, _____, and _____.
7. Why do you think they are called hinge joints?

Fifth Destination: http://www.calacademy.org/exhibits/skulls/structure_and_function.html

8. Another word for the skull is the cranium. What is the most important job of the skull? _____

Sixth Destination: http://www.bigchalk.com/cgi-bin/WebObjects/WOPortal.woa/wa/HWCDA/file?fileid=233472&flt=Middle_School&pathTitles=/History_of_Dentistry/General/George_Washington's_teeth&version=2&tg=Resource

9. What were George Washington's teeth made from? (Hint: Not wood!)? _____

Bones! Bones! Bones! Exploring the Skeletal System

Grade Level: Third

Presented by: Amy Jacobs, Hawthorne Elementary, San Antonio, TX

Length of Unit: Seven lessons

I. Abstract

During this ten to twelve day science unit students will be introduced to systems of the human body and will examine in more detail the skeletal system. They will learn the number of bones in the human skeleton, the location of those bones, and will become familiar with ligaments, tendons, cartilage, joints, and fractures. They will also explore orthopedics as a future profession. The unit accommodates a variety of learners-- visual, auditory, and kinesthetic-- and has both literature and math connections. The specificity of the topic paired with a variety of culminating activities allows the unit to mesh well with the *Core Knowledge Sequence*.

II. Overview

A. Concept objectives:

1. to discover how the different body systems are interrelated
2. to learn what the skeletal system is comprised of
3. to comprehend that the skeletal system is vital to the function of the human body
4. to understand the importance of taking care of the skeletal system and the whole body
5. to encourage a future in medical professions

B. Content from *Core Knowledge Sequence*:

1. Second Grade
 - a. taking care of your body
 - (1) vitamins and minerals
2. Third Grade
 - a. the skeletal system
 - (1) skeleton, bones, marrow
 - (2) musculo-skeletal connections
 - (a) ligaments
 - (b) tendons, Achilles tendon
 - (c) cartilage
 - (3) skull, cranium
 - (4) ribs, rib cage, sternum
 - (5) scapula, pelvis, tibia, fibula
 - (6) broken bones, X-rays

C. Skills Taught:

1. group work
2. information
3. summarization
4. research
5. graphing
6. interpreting data
7. forming hypothesis
8. categorizing
9. "How to. . ." writing

III. Background Knowledge

- A. For teachers:
 - 1. *Core Knowledge Sequence*. Charlottesville: Core Knowledge Foundation 1995.
 - 2. Cumbaa, Stephen. *The Bones and Skeleton Book*. New York: Workman Publishing, 1991.
 - 3. Dillner, L. and Abrahams, J., consultants. *The Human Body*. Wilton, CT: Victoria Points Pub., 1993.
 - 4. Hirsch, E.D. (ed.) *What Your Third Grader Needs to Know*. New York: Doubleday Publishing, 1991.
 - 5. *The Human Body. Whole Language Theme Unit Workbook, Grades 4-6*. Instructional Fair Inc., Grand Rapids, MI.
- B. For students:
 - 1. Kindergarten: The Human Body
 - a. Taking care of your body-- exercise, cleanliness, healthy food
 - 2. First Grade: The Human Body
 - a. Body Systems-- an introduction
 - 3. Second Grade: The Human Body
 - a. Taking care of your body-- vitamins and minerals
 - 4. Third Grade: The Human Body
 - a. The muscular system unit

IV. RESOURCES

- A. Books:
 - 1. *The Human Body. Whole Language Theme Unit Workbook, Grades 4-6*. Instructional Fair Inc., Grand Rapids, MI.
 - 2. Moore, Jo Ellen. *My Skeleton and Muscles*. Monterey: Evan-Moor Corp., 1987.
 - 3. *Core Knowledge Sequence*. Charlottesville: Core Knowledge Foundation, 1995.
 - 4. Hirsch, E.D. (ed.) *What Your Third Grader Needs to Know*. New York: Doubleday Publishing, 1991.
- B. Videos
 - 1. *The Magic School Bus: Inside Ralphie*. 30 minutes, color, NR, 1995.
- C. Other
 - 1. Various X-rays (found at doctor's offices or hospitals)
 - 2. "Parts of Bone" overhead
 - 3. Various posters of the different body systems

V. LESSONS

Lesson One: Let's Learn Systems!

- A. Objectives:
 - 1. Lesson content: systems of the body
 - 2. Concept objective: Students will understand what a system is and different parts of the body work together as one system.
 - 3. Skill objective: Students will discriminate between some of the body's systems by researching and presenting new information to a group. They will practice the skill of formulating hypotheses. They will correlate systems and functions.
- B. Materials:
 - 1. poster that displays the body's systems
 - 2. cards for matching game

3. butcher or chart paper and marker
- C. Key Vocabulary:
 1. circulatory system
 2. respiratory system
 3. digestive/urinary system
 4. muscular system
 5. skeletal system
 6. nervous system
 7. immune system
- D. Procedures:
 1. Introduce “Amazing Fact” #1: There are over ten systems in the human body that all work together so we can function successfully.
 2. One “Amazing Fact” will be introduced each day of the unit.
 3. Discuss definition of “system.”
 4. Group students into threes. Assign each a system.
 5. Have each group brainstorm and use poster to hypothesize what they think the function of their system is and the parts of the body that comprise the system.
 6. Introduce some of the systems of the body and their functions to the large group by having each small group present their hypothesis and brainstorm results.
 7. Write each system and function on chart paper as a classroom reference.
 8. As a class, discuss how the systems work together.
 9. Introduce the skeletal system as the next class topic.
 10. View *The Magic School Bus, Inside Ralphie*.
- E. Evaluation/Assessment:
 1. Systems/Functions Game
 - a. divide students into groups of three
 - b. pass out set of cards to each group
 - c. students practice coordinating system and function
- F. Standardized Test/State Test Connection:
 1. Reading
 - a. students will perceive relationships
 - b. students will determine the meaning of words
 - c. students will formulate hypotheses, make predictions

Lesson Two: What is a Bone?

- A. Objectives:
 1. Lesson content: parts of a bone
 2. Concept objective: Students will understand that bones have a unique structure and function. Bones are living things and need nourishment.
 3. Skill objective: Students will form hypotheses and conduct a science experiment.
- B. Materials:
 1. “Let’s Look at Chicken Bones” experiment sheet (see Appendix A)
 2. chicken bones from meat department of grocery store
 3. vinegar
 4. water
 5. “Parts of Bone” overhead
 6. “Parts of Bone” worksheet (see Appendix B)
- C. Key Vocabulary:
 1. periosteum

2. spongy bone
 3. compact bone
 4. marrow
 5. calcium
- D. Procedures:
1. Introduce Amazing Fact #2: The human thighbone is stronger than reinforced concrete.
 2. Introduce parts and functions of bone using overhead.
 3. Demonstrate parts of bones using “Chicken Bones” experiment sheet.
 4. Place bones in jar of three-fourths vinegar and one-fourth water.
 5. Discuss what will happen to these bones after a week or so-- vinegar will absorb calcium making them bendable.
 6. Discuss calcium and its importance to bones.
- E. Evaluation/Assessment:
1. “Parts of Bone” labeling worksheet
- F. Standardized Test/State Test Connection:
1. Reading
 - a. students will read information from graphs / visuals
 2. Math
 - a. students will use graphic sources of information

Lesson Three: Count Your Bones: The Skeleton

- A. Objectives:
1. Lesson content: number of bones in the human body
 2. Concept objective: Students will understand how bones fit together and how many bones there are in the human body.
 3. Skill objective: Students will count and estimate the number and location of their bones.
- B. Materials:
1. “Count Your Bones” worksheet (see Appendix C)
 2. “The Dancing Skeleton” cutouts from *My Skeleton and Muscles* (Moore and Evans), pages 4-6.
 3. actual human skeleton, if available
 4. brad fasteners
- C. Key Vocabulary:N/A
- D. Procedures:
1. Introduce Amazing Fact #3: In your lifetime you will “lose” over 600 bones (through growing and fusing).
 2. Introduce “skeleton” and the number of bones found in the human body.
 3. Have students pair up and complete worksheet, “Count Your Bones” by feeling their bones and estimating.
 4. Go over questions together as a large group.
- E. Evaluation/Assessment:
1. Students will cut out skeletal parts from “Dancing Skeleton” worksheet and use brads to put together correctly.
 2. Hang these from ceiling.
- F. Standardized Test/State Test Connection:
1. Math
 - a. students will predict outcomes

- b. students will form hypotheses
- c. students will estimate

Lesson Four: Let's Name Our Bones!

A. Objectives:

- 1. Lesson content: names of the bones in the human body
- 2. Concept objective: Students will understand the names of bones and their connectedness.
- 3. Skill objective: Students will verbalize and illustrate bones, locations and connectedness.

B. Materials:

- 1. "Mr. Bones!" reference sheet (see Appendix D)
- 2. "Mr. Bones!" worksheet (see Appendix E)
- 3. actual human skeleton, if available
- 4. butcher paper
- 5. markers
- 6. kid-size skeletal systems, cut out

C. Key Vocabulary:

- | | |
|--------------------|------------------|
| 1. skull / cranium | 12. tibia |
| 2. jaw bone | 13. fibula |
| 3. vertebrae | 14. ankle bones |
| 4. scapula | 15. foot bones |
| 5. clavicle | 16. toe bones |
| 6. sternum | 17. humerus |
| 7. ribs / rib cage | 18. radius |
| 8. floating ribs | 19. ulna |
| 9. pelvis | 20. wrist bone |
| 10. femur | 21. hand bones |
| 11. knee cap | 22. finger bones |

D. Procedures:

- 1. Introduce Amazing Fact #4: Over half the bones in the human body are in the hands and feet.
- 2. Pass out "Mr. Bones!" reference sheet.
- 3. Choose one student to wear (tape onto clothes) the kid-size skeletal system.
- 4. Point out each bone of the skeletal system on sheet and on the student.
- 5. Songs/Activities: can be done throughout the unit to engage auditory and kinesthetic learners:
 - a. "Connected to . . ." song and actions
 - b. "If you're happy and you know it touch your skull (etc.) . . ."
 - c. "Simon Says" with bones of the body
- 6. Pair students up and have them trace each other's bodies on large sheets of butcher paper.
- 7. Give each a kid-size skeletal system to glue on their outlines.
- 8. Label the parts and hang on walls.

E. Evaluation/Assessment:

- 1. Quiz students with "Mr. Bones!" worksheet.

F. Standardized Test/State Test Connection:

- 1. Math
 - a. students will sort information

- b. students will draw conclusions
- c. students will assign labels

Lesson Five: Muscles and Bones

A. Objectives:

- 1. Lesson content: the muscular / skeletal system connections
- 2. Concept objective: Students will explore the definitions of skeletal system and muscular systems and how these systems work together.
- 3. Skill objective: Students will use resource materials, summarize information, synthesize information, and share with a large group.

B. Materials:

- 1. butcher paper and markers
- 2. “Research” worksheet (see Appendix F)
- 3. various resource books
- 4. Achilles tendon legend
- 5. chicken bone with meat (muscle), tendons, cartilage

C. Key Vocabulary:

- 1. tendon
- 2. Achilles tendon
- 3. ligament
- 4. cartilage

D. Procedures:

- 1. Introduce Amazing Fact #5: Without the Achilles tendon, a person could not run, would have difficulty walking and couldn’t stand on his or her toes.
- 2. Tell (using a kid’s version) or re-tell (with a teacher-made big book, for example) the mythological story of Achilles, the great Greek warrior and hero of Homer’s *The Iliad*. [In order to protect him from danger, Achilles mother, Thetis, dipped him in the River Styx, which contained waters on invulnerability. However, the water did not touch the heel by which Thetis held him. He became a great warrior of the Trojan War but was shot by his brother, Paris. The god Apollo guided the arrow to Achilles’ unprotected heel. Achilles died of the wound. The Achilles tendon (or heel) is named after this Greek legend].
- 3. Introduce and define tendon, ligament and cartilage as additional parts of the skeletal system.
- 4. Recall chicken bone experiment. Bring in other bones with meat (muscle) attached. Can you find the tendons? Cartilage?
- 5. Divide students into three groups, assign each one of the above.
- 6. Give each group resources or have them go to the library and complete “Research” worksheet.

E. Evaluation/Assessment

- 1. Students share their mini-report with the class and display summary statement in classroom

F. Extension

- 1. Students write their own legend explaining another part of the human body and how it got its name.

G. Standardized Test/State Test Connection:

- 1. Reading
 - a. students will identify information in a variety of written texts
 - b. students will summarize a variety of written texts
 - c. students will use resource materials
 - d. students will synthesize material

Lesson Six: Meeting Places!

A.

1. Lesson content: joints of the human body
2. Concept objective: Students will discover the different types of joints and where many of them are in the human body. They will understand what joints do and how important they are to the body's movement.
3. Skill objective: Students will predict outcomes and recall facts and details.

B. Materials:

1. "Meeting Places" worksheet from *The Human Body* (Instructional Fair), page 10.
2. "Joints" worksheet (see Appendix G)
3. "Mr. Bones!" Reference sheet (from lesson four)
4. full size skeletal drawings (from lesson four)
5. markers

C. Key Vocabulary:

1. joint
2. fixed joint
3. moveable joint
4. ball and socket joint
5. pivot joint
6. hinge joint
7. saddle joint
8. sliding joint

D. Procedures:

1. Introduce Amazing Fact #6: The only jointless bone in your body is the hyoid bone in your throat.
2. Introduce joints-- purpose, types, function.
3. Pair students up.
4. Students will use "Mr. Bones" Reference sheet and their bodies to find examples of each joint. Record on "Meeting Places" worksheet.
5. In large group go over examples found.
6. Have students stand up and "move" each joint as it is called.
7. Have students label the various joints on their full-size skeletal drawings (done in lesson 4).

E. Evaluation/Assessment:

1. Quiz students on joints of the body using "Joints" worksheet.

F. Standardized Test/State Test Connection:

1. Reading
 - a. students will recall facts and details
 - b. students will predict outcomes
2. Math
 - a. students will use and read charts and diagrams

Lesson 7: Bone Trauma and Treatment

A. Objectives:

1. Lesson content: bone injury, treatment and professions
2. Concept objective: Students will recognize a variety of bone injuries, learn the scope of treatment for those injuries and explore career options in orthopedics.
3. Skill objective: Students will identify and recognize fractures from both visual and written scenarios and will read X-rays.

- B. Materials:
 1. "Fracture Scenarios" handout (see Appendix H)
 2. "Determine the Fracture" worksheet (see Appendix H)
 3. bar graph / math worksheet (see Appendix I)
 4. butcher paper
 5. markers
 6. sample x-rays from doctor's office or hospital
- C. Key Vocabulary:

1. partial fracture	5. impacted fracture
2. compound fracture	6. comminuted fracture
3. simple fracture	7. x-ray
4. complete fracture	8. orthopedic surgeon
- D. Procedures:
 1. Introduce Amazing Fact #7: Your bones grow as you grow. The average female grows until she is around 16 years old. The average male stops growing when he reaches age 18.
 2. Ask students to share some experiences with bone trauma-- broken bones, sprains, and fractures.
 3. Hand out "Fracture Scenarios," go over each situation. Discuss types of fractures. Record on chart.
 4. Talk about bone trauma treatment: X-rays, slings, casts.
 5. Show real X-rays. Hold up against light to read and try to determine the fracture.
 6. Introduce "orthopedics" and careers in the field.
- E. Evaluation/Assessment:
 1. Students will match the "Fracture Scenarios" (already discussed in class) to the "Determine the Fracture" worksheet.
 2. Students will write about an experience with bone trauma or their future in the medical profession.
- F. Extension
 1. Complete bar graph activity sheet on broken bones and types of fractures as a math connection.
- G. Standardized Test/State Test Connection:
 1. Reading
 - a. students will compare and contrast
 - b. students will identify and eliminate
 - c. students will match
 2. Math
 - a. students will predict outcomes and interpret data from graphs
 - b. students will solve problems using bar graphs

VI. Culminating Activities

- A. Field Trip: Students will have the opportunity to visit a hospital and: meet with orthopedic specialists, see a real human skeleton, see a variety of X-rays and the screens used to view them, see other hospital equipment, observe a cast being set, discuss career options in orthopedics and other fields.
- B. Guest Speaker: If a field trip is not possible, have a doctor come to the school to discuss his/her occupation, education, daily routines, etc.

- C. Classroom casts: By dipping strips of newspaper in a simple mixture of school glue and water, the teacher can “cast” each child’s wrist. This is a good follow-up to lesson seven. An autograph party after the casts have dried would also be appropriate.
- D. Essay: Student should write an essay over one of many topic choices: what they thought of the field trip or guest speaker, their experience with skeletal system trauma, what they learned from the unit, why medical careers are so important, etc.
- E. Test: Students will complete the “Skeletal System Unit Test” (see Appendix J).
- F. Unit Evaluation: Students will complete “How’d You Like the Unit” sheet (see Appendix K) as a guide for teachers and future unit planning.

VII. Handout/Worksheets

- A. “The Dancing Skeleton” cutouts from *My Skeleton and Muscles* (Moore and Evans), pages 4-6.
- B. “Meeting Places” worksheet from *The Human Body* (Instructional Fair), page 10.
- C. see appendices

VIII. Bibliography

- A. *Core Knowledge Sequence*. Charlottesville: Core Knowledge Foundation, 1995
- B. Cumbaa, Stephen. *The Bones and Skeleton Book*. New York: Workman Publishing, 1991.
- C. Dillner, L. and Abrahams, J., consultants. *The Human Body*. Wilton, CT: Victoria Points Pub., 1993.
- D. Hirsch, E.D. (ed.) *What Your Third Grader Needs to Know*. New York: Doubleday Publishing, 1991.
- E. *The Human Body. Whole Language Theme Unit Workbook*, Grades 4-6. Instructional Fair Inc., Grand Rapids, MI. ISBN 0-88012-830-5
- F. *The Magic School Bus: Inside Ralphie*. 30 minutes, color, NR, 1995.
- G. Moore, Jo Ellen. *My Skeleton and Muscles*. Monterey: Evan-Moor Corp., 1987. ISBN 1-55799-101-4
- H. Strachan, Ian. *The Iliad*. New York: Kingfisher, 1997. ISBN 0-7534-5107-7.
- I. *The World Book Encyclopedia*. Volume “A.” Chicago: Childcraft International, 1990.

A MATHEMATICAL SCAVENGER HUNT THROUGH THE HUMAN BODY

Situation/Problem:

You and a partner will take part in a math scavenger hunt. As with all scavenger hunts, some items are easy to find, while others require some looking. For this hunt you must find parts of the human body that correspond to the numbers 1 through 15. For example, we each have one head, and that corresponds to 1. Sounds easy? What can you come up with for 13? While you must try to find corresponding body parts up through 15, you may wish to do more research and find examples that correspond to higher numbers. Simply extend your list and add numbers and body parts as you find them. You will also need to know the function of the body parts or organs you list.

Possible Strategies:

1. Use 3×5 note cards to list body parts for specific numbers. Use only one card per number.
2. Consult reference books for information about the human body. Skim the information for numbers.

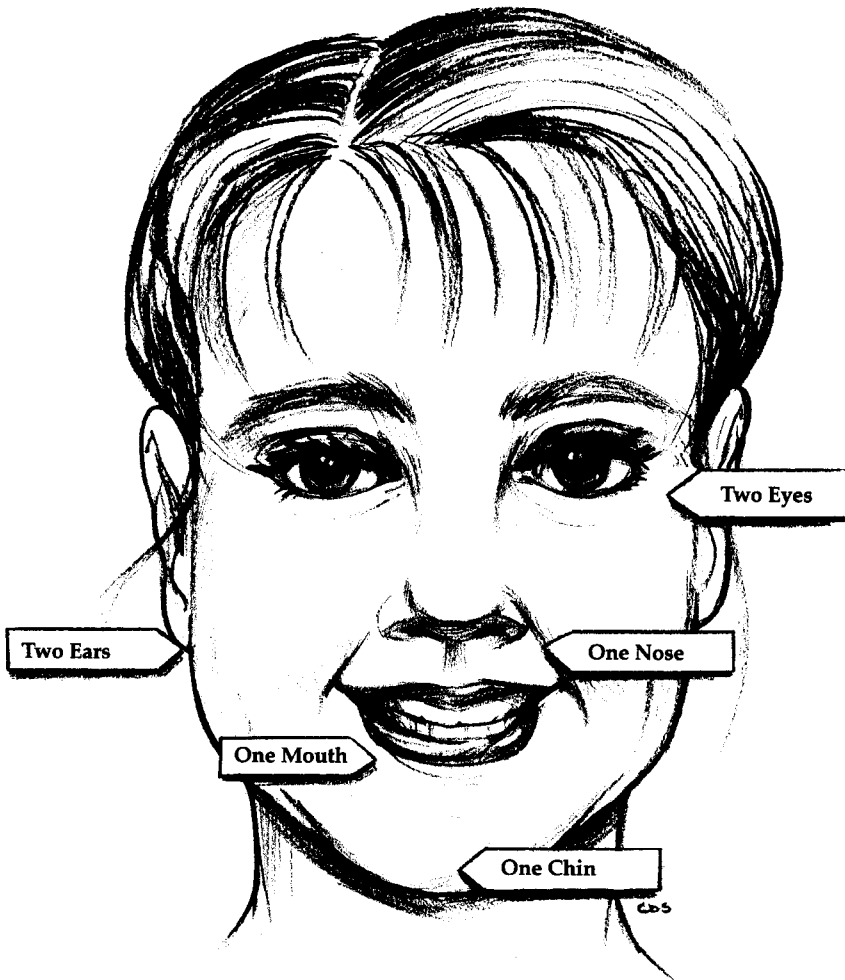
Special Considerations:

- There are many answers for some numbers. Humans have one head, one nose, one heart, one gallbladder, one liver. . . . We (usually) have two hands, two feet, two eyes. . . .
- For some numbers it will be easier to find corresponding body parts than others. You may look for groups of muscles or bones that work together.
- Write the function of the body part or organ on your note card.
- Because answers vary, include the source where you found specific information. Write the author's last name, the title of the book, the publication date, and the page number. Put this information on the note card for the number.

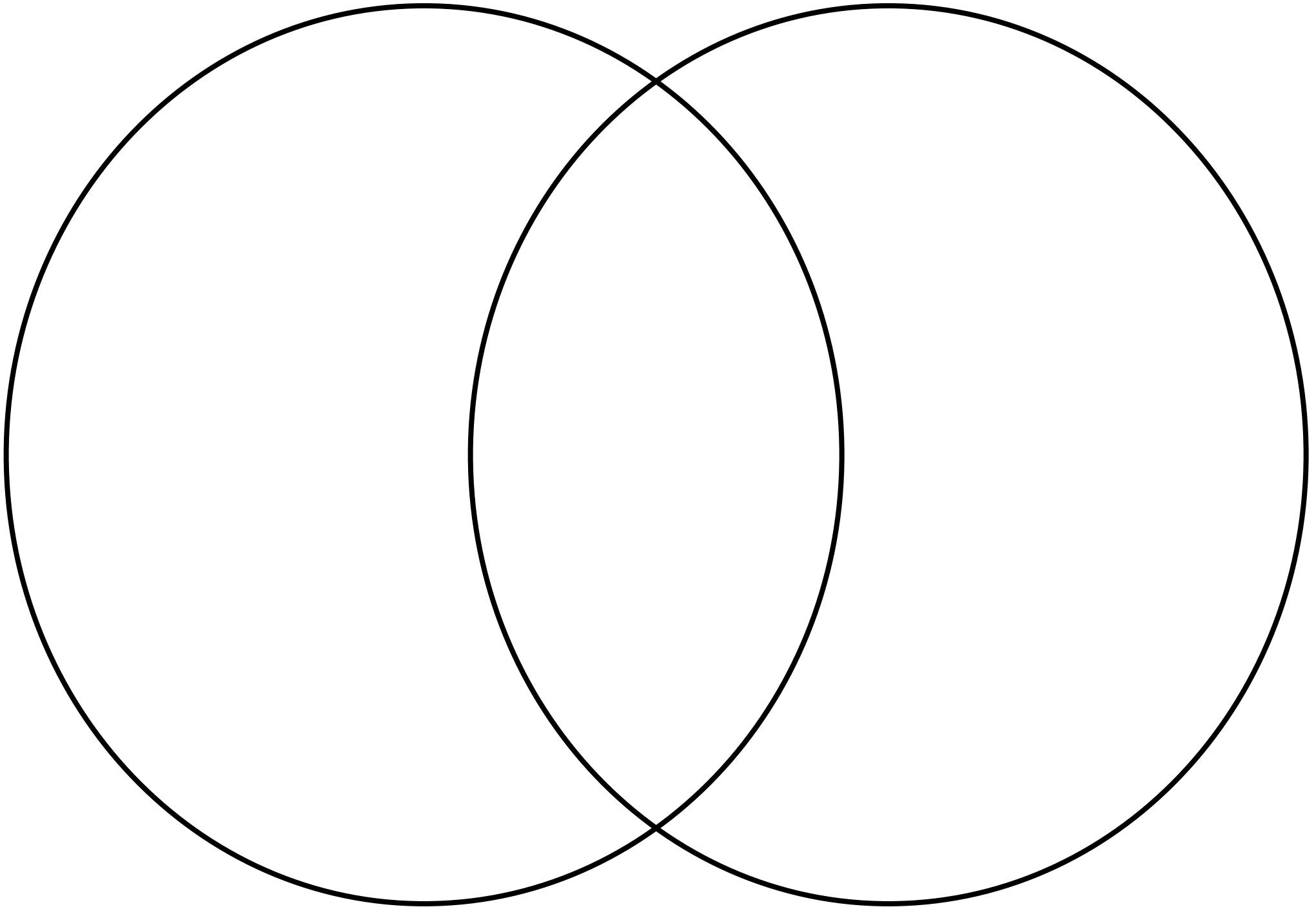
- If you can't find body parts for all the numbers 1 to 15, skip the ones you can't find and try to find others. For example, there are 206 bones in the average person's skeleton. There are about 700 million alveoli in the lungs. (For such large numbers, approximations are acceptable.) List as many additional numbers and body parts or organs as you can.

To Be Submitted:

Your completed note cards



BONES VENN DIAGRAM



Show Me If You Can added 9-1-01 Original Author Unknown

Sung to: "In and Out The Window"

Where is your finger?
Where is your finger?
Where is your finger?
Show me if you can.

Good, now where's your nose?
Now, where is your nose?
Now, where is your nose?
Show me if you can. (Use other body parts.)

Me added 9-1-01 Original Author Unknown

My hands upon my head I place,
(Do actions as described, then bring hands
down slowly & place them in lap.)
On my shoulders, on my face,
On my knees, & at my side,

Then behind me they will hide.
Then I raise them up so high
'Till they almost reach the sky.
Swiftly count them-1,2, 3,
And see how quietly they can be.

Touch added 9-1-01 Original Author Unknown

I'll touch my hair, my lips, my eyes (Suit actions to words.)
I'll sit up straight & then I'll rise.
I'll touch my ears, my nose, my chin,
Then quietly sit down again.

Here Are my Ears added 9-1-01 Original Author Unknown

Here are my ears. (Suit actions to words.)
Here is my nose.
Here are my fingers.
Here are my toes.
Here are my eyes,
Both open wide.
Here is my mouth
With white teeth inside.

Here is my tongue
That helps me speak.
Here is my chin,
And here are my cheeks.
Here are my hands
That help me play.
Here are my feet For walking today.

My Wiggles added 9-1-01 Original Author Unknown

I wiggle my fingers, (Suit actions to words.)
I wiggle my toes.
I wiggle my shoulders.

I wiggle my nose.
Now the wiggles are out of me,
And I'm just as still as can be.

Ten Little Fingers added 9-1-01 Original Author Unknown

(Hold up ten fingers. Suit actions to words.)
I have ten little fingers,
And they all belong to me.
I can make them do things,
Would you like to see?
I can shut them up tight,
Or open them wide.

I can put them together,
Or make them all hide.
I can make them jump high,
I can make them jump low.
I can fold them up quietly,
And hold them just so.

Everybody Knows added 9-1-01 Original Author Unknown

Everybody knows I love my toes
Everybody knows I love my toes
I love my nails, my knees
My neck and my nose
But everybody knows I love my toes!
Everybody knows I love my eyes
Everybody knows I love my thighs
I love my legs, my lips
My neck and my nose
But everybody knows I love my toes!

Everybody knows I love my feet
Everybody knows I love my seat
I love my skin, my chin
My knees and my nose
But everybody knows I love my toes!
Everybody knows I love my toes
Everybody knows I love my toes
I love my nails, my knees
My neck and my nose
But everybody knows I love my toes!

Head And Shoulders added 9-1-01 Original Author Unknown

Head and shoulders, knees and toes,
Knees and toes, knees and toes,
Head and shoulders, knees and toes,
Eyes, ears, mouth and nose.
Ankles, elbows, feet and seat, feet and seat,
Ankles, elbows, feet and seat, feet and seat,
And hair and hips and chin and cheeks,
Ankles, elbows, feet and seat, feet and seat.

Me added 9-1-01 Original Author Unknown

Here are my fingers and here is my nose.
Here are my ears, and here are my toes.
Here are my eyes that open wide.
Here is my mouth with my white teeth inside.
Here is my pink tongue that helps me speak.
Here are my shoulders and here is my cheek.
Here are my hands that help me play.
Here are my feet that go walking each day.

Parts that Bend added 9-1-01 Original Author Unknown
Sung to: "B-I-N-G-O"

My arms have parts that bend and move
Every time I use them.
Shoulder, elbow, wrist and hand.
Shoulder, elbow, wrist and hand.
Shoulder, elbow, wrist and hand.
And this is how I move them!
My legs have parts that bend and move
Every time I use them.
Knee, ankle, heel and foot
Knee, ankle, heel and foot
Knee, ankle, heel and foot
And this is how I move them!

My trunk has parts that bend and move
Every time I use them.
Neck, back, waist and hips
Neck, back, waist and hips
Neck, back, waist and hips
And this is how I move them!
I'm made of parts that bend and move
Every time I use them.
Shoulder, elbow, wrist and hand..
Knee, ankle, heel and foot.
Neck, back, waist and hips
And this is how I move them!

Scrub A Dub-Dub Song added 9-1-01 Original Author Unknown

Sung to: "The Mulberry Bush"

This is the way we scrub our hands,
(Pretend to wash hands.)
Scrub our hands, scrub our hands.
This is the way we scrub our hands,
So early in the morning.
This is the way we scrub our faces,
(Pretend to wash face.)
Scrub our faces, scrub our faces.
This is the way we scrub our faces,
So early in the morning.

This is the way we scrub our elbows,
(Pretend to wash elbows.)
Scrub our elbows, scrub our elbows.
This is the way we scrub our elbows,
So early in the morning.
This is the way we scrub our stomachs,
(Pretend to wash stomachs.)
Scrub our stomachs, scrub our stomachs.
This is the way we scrub our stomachs,
So early in the morning.

Continue with additional verses ~ other body parts.

Hands On Shoulders added 9-1-01 Original Author Unknown

Hands on shoulders, hands on knees,
Hands behind you if you please.
Touch your shoulders, now your nose,
Now your chin and now your toes.

Hands up high in the air,
Down at your sides and touch your hair.
Hands up high as before,
Now clap your hands--one, two, three, four.

Head, Shoulders, Knees, Toes added 9-1-01 Original Author Unknown

Head, shoulders, knees, and toes,
Knees and toes.
Head, shoulders, knees and toes,
Knees and toes,
And eyes and ears,
And mouth and nose.
Head, shoulders, knees, and toes,
Knees and toes.

Fingers added 9-1-01 Original Author Unknown

Fingers, fingers, everywhere (Suit action to words.)
Fingers blinking in the air.
Fingers making little holes.

Fingers tying little bows.
Fingers learning to button & snap.
Fingers on hands that like to clap.

Eye Winker added 9-1-01 Original Author Unknown

Eye Winker, (Point to eyes.)
Tom Tinker, (Point to ears.)
Nose Smeller, (Point to nose.)
Mouth Eater, (Point to mouth.)

Chin Chopper, (Tap chin.)
Chin Chopper, Chin Chopper,
Chin Chopper, Chin.

Head to Toe added 9-1-01 Original Author Unknown

Wiggle fast; then wiggle slow.
Let's learn about the body-from head to toe!

My Body added 9-1-01 Original Author Unknown
Sung to: "Where is Thumbkin"

This is my body.
This is my body.
It's the only one I've got.
It's the only one I've got.

I'm going to take good care of it.
I'm going to take good care of it.
Yes I am. Yes I am.

It's Me Again! added 9-1-01 Original Author Unknown

Here are my ears
Here are my ears.
Here is my nose.
Here are my fingers.
Here are my toes.
Here are my eyes,
Both open wide.
Here is my mouth
With white teeth inside.

Here is my tongue
That helps me speak.
Here is my chin,
And here are my cheeks.
Here are my hands
That help my play.
Here are my feet
For walking today.

Touch Your Nose added 9-1-01 Original Author Unknown

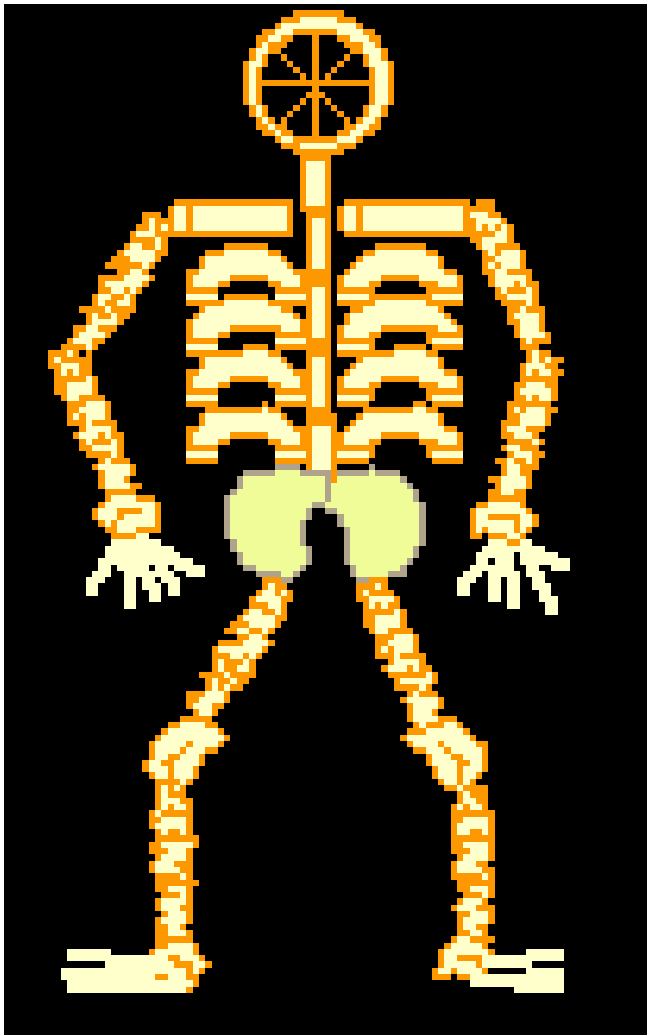
Touch your nose,
Touch your chin;
That's the way this game begins.
Touch you eyes,
Touch your knees;
Now pretend you're going to sneeze.

Touch your hair,
Touch one ear;
Touch your two red lips right here,
Touch your elbows
Where they bend;
That's the way this touch game ends.

B-O-N-E-S added 8-26-02 Original Author Unknown

Submitted by: Jane F.
Sung to: "B-I-N-G-O"

Once there was a skeleton,
And Bones was his name, oh!
B-O-N-E-S, B-O-N-E-S, B-O-N-E-S,
And Bones was his name, oh!
Once there was a skeleton,
And Bones was his name, oh!
B-O-N-E-(clap), B-O-N-E-(clap), B-O-N-E-(clap),
And Bones was his name, oh!
(Continue to repeat the verse--each time dropping one more letter from and adding a clap to B-O-N-E-S--
until the entire name is clapped.)





Bone Composition

Objective: to explain that bones are hard on the outside and have a soft spongy center

Student Information: Your bones hold you up. They give your body its shape. Bones are very strong and hard on the outside in order to support your body. On the inside, bones have a spongy layer around the marrow to make them lighter and movement.

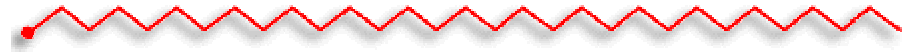
Materials:

- one cardboard tube per student
- small rocks
- kitchen sponges
- masking tape

Procedures: Students will work in pairs, filling one tube with rocks and the other with sponges, taping the ends of the tubes. Students will make comparisons of the two "bones" in terms of strength and mass.

Assessment: Journal Entry

- Which materials made the "bones" lightweight and strong?
- Why is it important for bones to be lightweight and strong?
- Which material would be best?
- How is this material like bone marrow?



Major Bones of the Body

Objective: to identify and locate the major bones of the human body

Student Information: When you are born, you have about 300 bones. As you grow, some of these bones grow or fuse together. When you are an adult you will have 206 bones.

Materials:

- reflective tape
- black trash bags
- dark long-sleeved shirts and dark pants for each child

Procedures: 1. Students will review and label main bones on skeleton handout. Bones identified include skull (cranium), jaw, clavicle, sternum, rib cage, rib, spine, humerus, radius, ulna, pelvis, carpals, metacarpals, phalanges, femur, patella, fibula, tibia

Assessment: 1. Completed skeleton costume/model.

2. Journal Entry

Name three bones found in the human body and tell the location of each bone.



Jazzy Joints

Objective: to identify and name the joints that connect bones

Materials:

- floppy rag doll
- example of a hinge joint
- a universal joint
- a ball-and-socket joint

Procedures:

1. Bring a floppy rag doll to class and explain that without bones, humans would look like this. Explain that without joints--points where two or more rigid bones are joined together by muscles and tendons--humans could not bend, swivel, curl, pivot, and point.

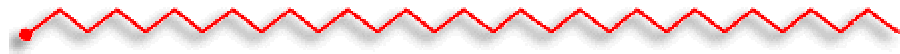
2. Show children the joint examples. Let them handle the joints to become familiar with the range of motion of each one. Begin with the hinge joint and ask the children to describe the motion. Have the students give examples of hinge joints that they have seen on machines and around their houses. Repeat the discussion using the universal and ball-and-socket joints.

3. Have students move some of the major bones in their own bodies, such as the tibia (shinbone), the patella (kneecap), the femur (thighbone), and the mandible (jawbone). While touching each bone, have them move that part of the body so they can locate the nearest joint to the part they are touching. Have the students describe how they are able to move the joint (up and down, around in a circle, side to side and up and down, and so on), and in doing so, to identify which type of joint they believe they have discovered. Except for the ankle and wrist joints (which are gliding joints, complex combinations of the ball-and-socket and hinge

joints), any joints the students locate can be categorized as either a hinge joint, a universal joint, or a ball-and-socket joint.

- Assessment:**
1. Journal Entry
In cooperative groups, list the joints evident in the body and label each as a hinge joint, a universal joint, or a ball-and-socket joint.
 2. Visual Chart
Create a class chart that classifies joints.

Source: "Jazzy Joints" (Integrated Theme Units - Scholastic, Inc., 1993)



Living Bones

- Objectives:**
- to identify what happens when a bone breaks and to discuss the healing process
 - to determine proper use of safety equipment

Student Information: A bone may not look like alive, but it is made of living cells. Some of these cells are the hard outer coating of the bone. Inside, the bone cells are soft like a sponge. You can break a bone. The bone hurts and will swell near the break. The skin often bruises. A doctor will line up the broken bone so it can heal straight. It is the cells that strengthen and heal the break.

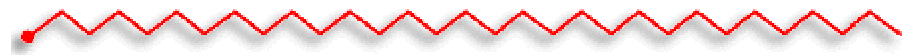
Materials: diagram of a bone (showing the inside of the bone), x-rays showing broken bones, safety equipment (bicycle helmet, knee pads, elbow pads, football shoulder pads, etc.)

Procedures: Ask if anyone in the class has ever had a broken bone. Discuss how the accidents happened, their experiences at the hospital, time in a cast, how the

incident changed what they could do. Show the x-rays. Discuss which bone might be shown in the x-ray and the trauma to the bone. Show the safety equipment and discuss which bone(s) it protects.

Assessment: Safety Posters (In cooperative groups, have the students show children engaged in activities and wearing the proper safety equipment. Include a safety rule or comment on each poster.) Journal Entry (Creative Writing - Write the story of a person who breaks his or her leg. Tell how the accident happens and how this event changes this person's daily life.)

Sources: Frank Schaffer Publications, FS-3150
Human Body/Integrated Theme Units, Scholastic, Inc. 1993



Skeletal System

Objective: to measure various objects using non-standard units of the human body

Student Information: Long before there were rulers, people could measure things:

- A **cubit** is the length from the elbow to the fingertips.
- A **span** is the measure of your outspread fingers.
- A **fathom** measures your outstretched arms.
- A **pace** is a walking step.

Procedures:

1. Use your own **cubit** to find some measures in the classroom. Work with a partner.
 - Find something in the classroom that is the same size as your **cubit**. What is it?
 - Guess how many **cubits** long the teacher's desk is. Now use your body to find how many cubits long it really is.
 - Guess how many **cubits** wide the chalkboard is.

is. Measure to find how many **cubits** wide it really is.

2. On a piece of paper, draw a line to show the size of your **span**.

3. How many friends standing side by side fit in your **fathom**?

4. How many **paces** is it from the classroom door to your seat?

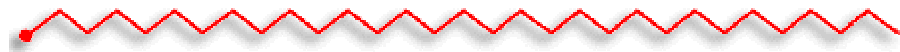
Assessment:

Journal Entry

- Work with a partner.
- How tall are you in **cubits**?
- Suppose a weaver sells five **fathoms** of cloth for three dollars. In this class, whose **fathom** would you want to measure with? Why?

Source:

Integrated Theme Units, Scholastic, Inc., 1993



Measuring Your Skeleton

Objective:

to relate the topics of measurement and the skeletal system to their lives by using measuring tapes to find the lengths of different body parts

Materials:

- measuring tapes (1 per 2 students)
- recording sheets

Procedures:

1. Review the recording sheet with the whole group, clarifying what it means to measure your arm (include the hand or not?), leg, etc.
2. Review the similarities and difference between measuring with a ruler and measuring with a

tape.

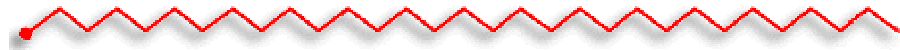
3. Demonstrate measuring a body part on a partner and answer any questions.

4. The students then measure each other and record the lengths on their sheets.

Assessment: As a whole group, ask students questions that lead them to compare the measurements of their different body parts. Encourage use of words like "long", "longer", and "longest".

Journal Entry

After all have had a chance to contribute, ask students to write three true statements that compare the lengths of either their own body parts or those of their classmates.



Pretzel Skeletons

Preparation: Parent volunteers are helpful for this activity. This activity should come after students are familiar with the human skeleton and the names of some of its parts. Divide students into groups (6-8 in each)

Materials:

- ingredients for the recipe (follows) for each group
- baking pans
- measuring cups and spoons
- oven
- water source

Recipe:

- 1 Package dry yeast, dissolved in cold water
- 4 cups flour
- 1 teaspoon sugar
- 1 teaspoon salt

water

Mix yeast mixture and 3 cups of flour. Slowly add about 1 more cup of flour until the mixture can be kneaded. Take turns kneading it on a floured counter top or table. Sculpt like clay into a skeleton. Bake at 350 degrees for about 20 minutes. Makes one skeleton.

- Procedures:**
1. Explain to the children that they will be using their measuring skills to make pretzel dough. Review the type of measuring involved in cooking. Be sure to include the idea of leveling off measuring cups and spoons!
 2. Remind the children of the proper way to work in a group-- they will need to divide up the work and give everyone a job. (Assign jobs if necessary.)
 3. Read through the ingredients and directions as whole group and answer any questions. Tell the children that they will be responsible for naming at least five of the bones in their skeleton when it is completed.
 4. Students make dough with their group (adults helping when necessary) and form the parts of the skeleton, combining parts to make the final project. While the skeletons cook, everyone cleans up!

- Assessment:** When students are finished, they point out and name at least five of the bones that they represented.
Review the parts together and then eat!



Remember to add the bones to one leg of your paper bodies!



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[Henry County Public
Schools](#)

This integrated instructional unit was designed by teachers of the:

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396 Tomlinson Street
McDonough, Georgia 30253
USA
Telephone: 770/957-6601

Questions/Comments 

Updated 4/19/98



Think back to last Halloween for a minute. Wherever you looked, there were vampires, ghosts, or bony skeletons grinning back at you. Vampires and ghosts don't really exist, but skeletons sure do! Every single person has a skeleton made up of many bones. These bones give your body structure, let you move in many ways, protect your internal organs, and more. It's time to look at all your bones - the adult human body has 206 of them!

What Are Bones Made Of?

If you've ever seen a real skeleton or fossil in a museum, you might think that all bones are dead. Although bones in museums are dry, hard, or crumbly, the bones in your body are different. The bones that make up your skeleton are all very much alive, growing and changing all the time like other parts of your body.

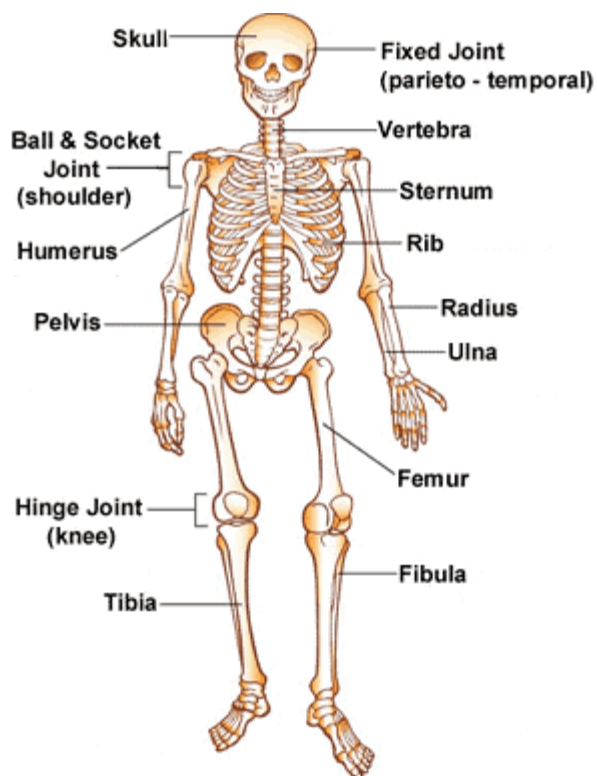
Almost every bone in your body is made of the same materials:

- The outermost layer is made up of **compact** bone. This part is smooth and very hard. It's the part you see when you look at a skeleton.
- Within the compact bone are many layers of **cancellous** (say: **can-seh-lus**) bone, which looks a bit like a sponge. Cancellous bone is not quite as hard as compact bone, but it is still very strong.
- In many bones, the cancellous bone protects the innermost part of the bone, the **bone marrow** (say: **mar-oh**). Bone marrow is sort of like a thick jelly, and its job is to make blood cells.

How Bones Grow

When you were a baby, you had tiny hands, tiny feet, and tiny everything! Slowly, as you grew older, everything became a bit bigger, including your bones.

A baby's body has about 300 "soft" bones at birth. These eventually fuse (grow together) to



form the 206 bones that adults have. Some of a baby's bones are made of a special material called **cartilage** (say: **car-til-ij**). This cartilage is soft and flexible. During childhood, as you are growing, the cartilage grows and slowly hardens into bone, with help from [calcium](#).

By the time you are 25, the cartilage will have finished hardening into bone. After this happens, there can be no more growth - the bones are as big as they will ever be. All of these bones make up a skeleton that is both very strong and very light.

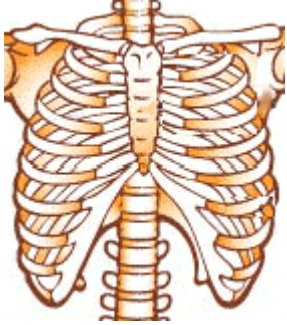
Your Spine

Your spine is one part of the skeleton that's easy to check out: reach around to the center of your back and you'll feel its bumps under your fingers.

The spine lets you twist and bend, and it holds your body upright. It also 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 isn't made of one or even two bones: it's made of 26 bones in all! These bones are called [vertebrae](#) (say: **vor-tuh-bray**), and each one is shaped like a ring.

There are five types of vertebrae in the spine, and each does a different kind of job:

- The first seven vertebrae at the top are called the **cervical** (say: **sir-vih-kul**) vertebrae. These bones are in the back of your neck, just below your brain, and they support your head and neck. Your head is pretty heavy, so it's lucky to have help from the cervical vertebrae!
- Below the cervical vertebrae are the **thoracic** (say: **thuh-rah-sick**) vertebrae, and there are 12 in all. These guys anchor your ribs in place.
- Below the thoracic vertebrae are five **lumbar** (say: **lum-bar**) vertebrae.
- Beneath the lumbar vertebrae is the **sacrum** (say: **say-krum**), which is made up of five vertebrae that are joined together.
- Finally, all the way at the bottom of the spine is the **coccyx** (say: **cok-sicks**), which is made of four fused vertebrae. The bottom sections of the spine are important when it comes to bearing weight and giving you a good center of gravity. So when you pick up a heavy [backpack](#), the lumbar vertebrae, sacrum, and coccyx give you the power. When you dance, skip, and even



walk, these parts help keep you balanced.

In between each vertebra (the name for just one vertebrae) are small **disks** made of cartilage. These disks keep the vertebrae from rubbing against one another, and they also act as your spine's natural shock absorbers. When you jump in the air, or twist while slamming a dunk, the disks give your vertebrae the cushioning they need.

Your Ribs

Your [heart](#), [lungs](#), and liver are all very important, and luckily you've got ribs to keep them safe. Ribs act like a cage of bones around your chest. It's easy to feel this cage by running your fingers along the sides and front of your body, a few inches below your heart. If you breathe in deeply, you can easily feel your ribs right in the front of your body, too. Some thin kids can even see a few of their ribs right through their skin.

Your ribs come in pairs, and the left and right sides of each pair are exactly the same. Most people have 12 pairs of ribs, but some people are born with one or more extra ribs, and some people might have one pair less.

All 12 pairs of ribs attach in the back to the spine, where they are held in place by the thoracic vertebrae. The first seven pairs of ribs attach in the front to the **sternum** (say: **stur-num**), a strong bone in the center of your chest that holds those ribs in place. The remaining sets of ribs don't attach to the sternum directly. The next two or three pairs are held on with cartilage to the ribs above them.

The very last two sets of ribs are called **floating** ribs because they aren't connected to the sternum or the ribs above them. But don't worry, these ribs can't ever float away. Like the rest of the ribs, they are securely attached to the spine in the back.

Your Skull

Your skull protects the most important part of all, the brain. You can feel your skull by pushing on your head, especially in the back a few inches above your neck. The skull is actually made up of different bones. Some of these bones protect your [brain](#), whereas others make up the structure of your face. If you touch beneath your eyes, you can feel the ridge of the bone that forms the hole where your [eye](#) sits.

And although you can't see it, the smallest bone in your whole body is in your head, too.



The stirrup bone behind your eardrum is only .1 to .13 inches (2.6 to 3.3 millimeters) long! Want to know something else? Your lower jawbone is the only bone in your head you can move. It opens and closes to let you talk and chew food.

Your skull is pretty cool, but it's changed since you were a baby. All babies are born with spaces between the bones in their skulls. This allows the bones to move, close up, and even overlap as the baby goes through the birth canal. As the baby grows, the space between the bones slowly closes up and disappears, and special joints called **sutures** (say: **soo-churs**) connect the bones.

Your Hands

As you sit and type at the keyboard, while you swing on a swing, even when you pick up your lunch, you're using the bones in your fingers, hand, wrist, and arm.

Each arm is attached to a shoulder blade or **scapula** (say: **sca-pyuh-luh**), a large triangular bone on the upper back corner of each side of the rib cage. The arm is made up of three bones: the **humerus** (say: **hyoo-muh-rus**), which is above your elbow, and the **radius** (say: **ray-dee-us**) and **ulna** (say: **ul-nuh**), which are below the elbow.

Each of these bones is wider at the ends and skinnier in the middle, to help give it strength where it meets another bone. At the end of the radius and ulna are eight smaller bones that make up your wrist. Although these bones are small, they can really move! Twist your wrist around or wave and you'll see how the wrist can move.

The center part of your hand is made up of five separate bones. Each finger on your hand has three bones, except for your thumb, which has two. So between your wrists, hands, and all your fingers, you've got a grand total of 54 bones - all ready to help you grasp things, write your name, pick up the phone, or throw a softball!

Your Legs

Sure, arm, wrist, hand, and finger bones are great for picking up the phone, but how are you supposed to run to answer it? Well, with the bones of the legs and feet! Your legs are attached to a circular group of bones called your **pelvis**. The pelvis is a bowl-shaped structure that supports the spinal column. It is made up of the two large hip bones in front and behind are the sacrum and the coccyx. The pelvis acts as a tough ring of protection



around parts of the [digestive system](#), the urinary system, and parts of the reproductive system.

Your leg bones are very large and strong to help support the weight of your body. The bone that goes from your pelvis to your knee is called the **femur** (say: **fee**-mur), and it's the longest bone in your body. At the knee, there's a triangular-shaped bone called the patella, or kneecap, that protects the knee joint. Below the knee are two other leg bones: the **tibia** (say: **tih**-bee-uh) and

the **fibula** (say: **fi**-byuh-luh). Just like the three bones in the arm, the three bones in the leg are wider at the ends than in the middle to give them strength.

The ankle is a bit different from the wrist; it has three larger bones and four smaller ones. But the main part of the foot is similar to the hand, with five bones. Each toe has three tiny bones, except for your big toe, which has just two. This brings the bone total in both feet and ankles to 52!

Most people don't use their toes and feet for grabbing stuff or writing, but they do use them for two very important things: standing and walking. Without all the bones of the foot working together, it would be impossible to balance properly. The bones in the feet are arranged so the foot is almost flat and a bit wide, to help you stay upright. So the next time you're walking, be sure to look down and thank those toes!

Your Joints

The place where two bones meet is called a **joint**. There are moving joints that move and fixed ones that don't.

Fixed joints are fixed in place and don't move at all. Your skull has some of these joints (called sutures, remember?), which close up the bones of the skull in a young person's head. One of these joints is called the **parieto-temporal** (say: par-**eye**-ih-toh **tem**-puh-rul) joint - it's the large one that runs around the sides and back of the skull.

Moving joints are the ones that let you ride your bike, eat cereal, and play a video game - the ones that allow you to twist, bend, and move different parts of your body. Some moving joints, like the ones in your spine, move only a little. Other joints move a lot. One of the main types of moving joints is called a **hinge** joint. Your elbows and knees each have hinge joints, which let you bend and then straighten your 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. You can find these joints at your shoulders and hips. They are made up of the round end of one bone fitting into a small cup-like area of another bone. Ball and socket joints allow for lots of movement in every direction. Make sure you've got lots of room, and try swinging your arms all over the place.

Have you ever seen someone put oil on a hinge to make it work easier or stop squeaking? Well, your joints come with their own special fluid called **synovial fluid** (say: **si-no-vee-ul**) that helps them move freely. Bones are held together at the joints by **ligaments** (say: **lih-guh-mints**), which are like very strong rubber bands.

Taking Care of Bones

Your bones help you out every day so make sure you take care of them. Here are some tips:

- Protect those skull bones (and your brain inside!) by wearing a helmet for [bike riding](#) and other sports.
- When you use a skateboard, in-line skates, or a scooter, be sure to add wrist supports and elbow and knee pads. Your bones in these places will thank you if you have a fall!
- If you play a sport like football, soccer, or ice hockey, always wear all the right equipment.
- **Never** play on a trampoline. Many kids end up with broken bones from jumping on them. Broken bones can eventually heal, but it takes a long time and isn't much fun while you wait.
- Strengthen your skeleton by drinking milk and eating other dairy products (like low-fat cheese, frozen yogurt, and ice cream). They all contain calcium, which helps bones harden and become strong.

Be kind to your bones, and they will treat you right!

Updated and reviewed by: [Elana Pearl Ben-Joseph, MD](#)

Date reviewed: August 2003

Originally reviewed by: [Steven Dowshen, MD](#)



Note: All information on KidsHealth is for educational purposes only. For specific medical advice, diagnoses, and treatment, consult your doctor.

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BODY BASICS

Name: _____ Date: _____

BONES AND JOINTS

BACKGROUND

We are going to build a model of an arm to see how joints and muscles work. Like all models, it will be like the real thing in some ways and very different in others. Spend some time investigating your own arm. How is it made? In what ways can it move?

MATERIALS NEEDED

3 skill sticks

1 Styrofoam ball

1 bottle cap

masking tape

MAKE THE MODEL

1. Mark the three skill sticks as shown in Figure 1. Note that some of the markings are made on the underside of the stick. Break the stick where shown. Note that E stands for "elbow" and H for "hand".

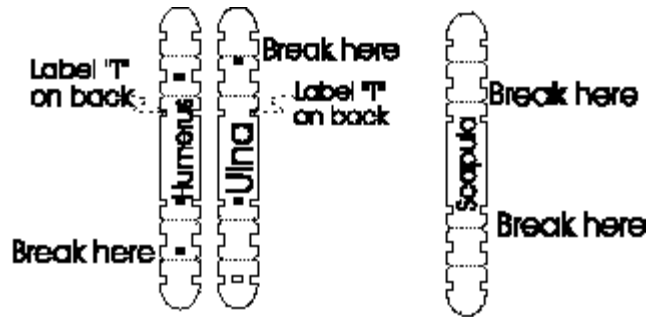


Figure 1

2. Assemble the shoulder joint as shown in Figure 2.

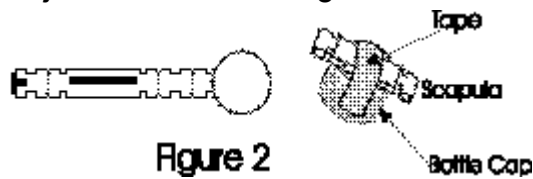


Figure 2

3. Now assemble the elbow as shown in Figure 3. Be sure to leave space between the humerus and the ulna about the thickness of a skill stick.

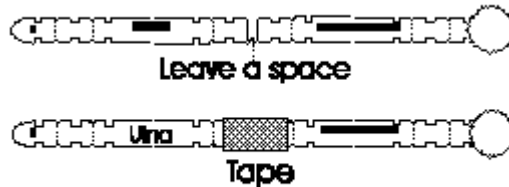


Figure 3

QUESTIONS

1. What bone is missing from this model?

—

2. What type of motion does this missing bone allow?

—

3. Describe each joint:

JOINT	TYPE	TYPE OF MOTION
-------	------	----------------

Shoulder		
Elbow		

4. Knowing that we still have to attach muscles, what do you think "T", "D" and "B" might stand for?

—

—

—



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TITLE OF LESSON PLAN: Give Me a Break!

LENGTH OF LESSON: Two class periods

GRADE LEVEL: 3-4

SUBJECT AREA: Human Body

CREDIT: Diane Hoffman, second grade teacher, teacher trainer, and education consultant.

OBJECTIVES:

Students will understand the following:

1. The importance of a survey questionnaire.
2. The basics of data collection and graphing.
3. The concept of relationships between data.

MATERIALS:

For this lesson, you will need:

Paper pencils markers or dot stickers large construction paper or bulletin board paper

PROCEDURE:

1. To begin the lesson, ask your students if any of them have ever broken a bone. Lead a short discussion on broken bones and the treatments that students received. Then ask your students the following question: Do you think it takes a large bone longer to heal than it takes a short bone to heal? Accept student responses as guesses for this question. Then tell students that they are going to try to answer that question by gathering information from their schoolmates.
2. Next, ask your students to work as a class to generate a list of questions for a survey on broken bones and healing time. (Questions might include: Name and age? Have you ever broken a bone? Which bone did you break? Did you have a cast? How long was the cast on? How long did it take your bone to heal? Did you require any physical therapy or special exercises afterwards?)
3. When the class has decided on questions, take your students to other classes to conduct the survey. (You will obviously need to get permission from other teachers to visit their classes beforehand.) Try to visit as many classes as possible, because the more data you have, the more information you can organize.
4. When the survey is complete, have your students plot their data on a large graph. The vertical axis should be labeled “Length of Healing Time” and divided into weeks. The horizontal axis should be labeled with the different bones that appeared in the survey. Using markers or dot stickers, have your students plot points for the healing times for each broken bone; there should be several points for each kind of broken bone, and some of the points may overlap. The collection of points above each bone should give a clear sense of the approximate average healing time.
5. Lead a discussion about the graph. Ask the class to note whether there seems to be a relationship between the size of the bone and the length of healing time. You can also ask students to consider why (or why not) a relationship exists.

ADAPTATIONS:

For younger students, you might want to utilize a simpler graphing project. The survey could only collect data about which students had ever broken a bone and which bones they broke. You could then have the class create a bar graph for the various bones, indicating how often each had been broken for class members. The graph would then indicate which bones seemed to be the most and least likely to break.

Students in higher grades should be able to develop their own survey questions regarding broken bones: Do girls break more bones than boys break? Do adults break more bones than children break? Are more large bones than small bones broken? Do older students break more bones than do younger students? Are certain places—playgrounds, the home, the school—more likely to lead to broken bones than others? Students can also develop individual graphs depicting the information they have gathered. When they are finished, they can share their graphs with the rest of the school.

DISCUSSION QUESTIONS:

1. Discuss how the x-ray machine has changed the treatment of broken bones. What problems could have happened before we had x-rays?
2. Healthy bones are always growing. Our bodies repair them when they age. Discuss how diet, exercise, and age affect the health of our bones.
3. Suppose that a tiny camera could replace a person's eye. How could having a camera for an eye help you? What problems would you have?
4. Noise pollution (excessive noise) is a problem for today's hearing health. What sources of noise pollution can affect our hearing? How can we protect our ears from noise damage?

EVALUATION:

You can use a five-point rubric to evaluate student work:

Five points: survey questionnaire designed; survey completed with 15 responses; graph designed correctly; data entered correctly on the graph; student participates in discussion.

Three points: survey questionnaire partially complete; survey completed with 10 responses; graph designed correctly, but with minimal labeling; some participation in discussion.

One point: survey questionnaire incomplete; survey completed with five responses; graph partially designed, not labeled; student does not participate in discussion.

EXTENSION:

Safety First!

Have your students make a list of ways that people could improve the safety of their work, play, and school environments and reduce the risk of broken bones. Make sure they touch on safety equipment, health factors that influence bone strength, and behavior. You might also invite your school nurse to talk to your class about preventing broken bones.

Look Out!

To help your students understand how human vision compares to camera vision, take the class outside and have each student walk around a proscribed area while looking through a cardboard tube. Then have them repeat the same path using their regular vision. When they are finished, lead a discussion about how the two forms of vision were different.

SUGGESTED READINGS:

How the Body Works Steve Parker. Dorling Kindersley Limited, 1994.

This book invites youngsters and teachers to discover our amazing human body with hands-on fun. It is chock-full with experiments that teach everything from why our bones are so strong to how nature and technology help us exceed our limits. The clear, colorful photographs make the experiments easy to understand.

Human Body Mary J. Wright. Time-Life Education, Inc., 1999.

This vibrant, in-depth book pulls you into to the story of how our bodies work and mend. With timelines, diagrams, sidebars, and humorous graphics, you can't help but turn the page! It also contains interesting "how and why" trivia as well as a glossary and an index.

WEB LINKS:

Children and Crime Prevention <http://www.ncpc.org/child.htm>

This site, which is sponsored by the National Crime Prevention Council, includes games and projects for students on safety, many of which can be downloaded for student use.

No Bones About it—Drink Milk for Calcium <http://www.drink-milk.com>

This site was created for students age 9 to 14 to encourage good nutrition for strong bones and good health. Find fascinating facts, games, and information for parents and teachers!

Seeing, Hearing and Smelling the World <http://www.hhmi.org/senses>

The Howard Hughes Medical Institute has created this site for science and health information on how the senses work.

VOCABULARY:

bionics

A science concerned with the application of data about the functioning of biological systems to the solution of

engineering problems.

Context:

Bionics is about trying to use technology to match or even improve the abilities of the human body.

collagen

An insoluble fibrous protein that occurs in the bones of vertebrates.

Context:

The arches in a bone are built out of a mixture of strong minerals like calcium and phosphate and a flexible protein called collagen.

decipher

To interpret the meaning of.

Context:

As nerve cells are stimulated, the brain will decipher the image.

intricate

Having many complexly interrelating parts or elements.

Context:

Inside Lisa's bone, the intricate arches have been snapped to pieces.

massive

Impressively large.

Context:

Lisa's body is faced with a massive repair job.

microchip

A tiny complex of electronic components and their connections that is produced on a small slice of material.

Context:

This microchip contains 100 electrodes, which can register as 100 dots of light.

transformation

Change from one state to another.

Context:

The transformation from blood to bone is under way as Lisa's bone begins to mend.

vibrate

To swing or move to and fro.

Context:

Sounds travel in waves that make the air vibrate.

ACADEMIC STANDARDS:

Grade Level: 3-5 **Subject Area:** health

Standard:

Knows environmental and external factors that affect individual and community health.

Benchmarks:

Knows how the physical environment can impact personal health (e.g., the effects of exposure to pollutants).

Grade Level: 3-5 **Subject Area:** health

Standard:

Knows essential concepts and practices concerning injury prevention and safety.

Benchmarks:

Knows safety rules and practices to be used in home, school, and community settings (e.g., using a seat belt or helmet, protecting ears from exposure to excessive noise, wearing appropriate clothing and protective equipment for sports, using sunscreen or a hat in bright sunlight).

Grade Level: K-2, 3-5

Subject Area: mathematics

Standard:

Understands and applies basic and advanced concepts of statistics and data analysis.

Benchmarks:

Understands that observations about objects or events can be organized and displayed in simple graphs.

Organizes and displays data in simple bar graphs, pie charts, and line graphs.

Reads and interprets simple bar graphs, pie charts, and line graphs.

Grade Level: 3-5

Subject Area: technology

Standard:

Understands the relationships among science, technology, society, and the individual.

Benchmarks:

Knows areas in which technology has improved human lives (e.g., transportation, communication, nutrition, sanitation, health care, entertainment).

Grade Level: 6-8

Subject Area: science

Standard:

Knows the general structure and functions of cells in organisms.

Benchmarks:

Knows that multicellular organisms have a variety of specialized cells, tissues, organs, and organ systems that perform specialized functions (e.g., digestion, respiration, reproduction, circulation, excretion, movement, control and coordination, protection from disease).

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Bones! Bones! Bones! Exploring the Skeletal System

Grade Level: Third

Presented by: Amy Jacobs, Hawthorne Elementary, San Antonio, TX

Length of Unit: Seven lessons

I. Abstract

During this ten to twelve day science unit students will be introduced to systems of the human body and will examine in more detail the skeletal system. They will learn the number of bones in the human skeleton, the location of those bones, and will become familiar with ligaments, tendons, cartilage, joints, and fractures. They will also explore orthopedics as a future profession. The unit accommodates a variety of learners-- visual, auditory, and kinesthetic-- and has both literature and math connections. The specificity of the topic paired with a variety of culminating activities allows the unit to mesh well with the *Core Knowledge Sequence*.

II. Overview

A. Concept objectives:

1. to discover how the different body systems are interrelated
2. to learn what the skeletal system is comprised of
3. to comprehend that the skeletal system is vital to the function of the human body
4. to understand the importance of taking care of the skeletal system and the whole body
5. to encourage a future in medical professions

B. Content from *Core Knowledge Sequence*:

1. Second Grade
 - a. taking care of your body
 - (1) vitamins and minerals
2. Third Grade
 - a. the skeletal system
 - (1) skeleton, bones, marrow
 - (2) musculo-skeletal connections
 - (a) ligaments
 - (b) tendons, Achilles tendon
 - (c) cartilage
 - (3) skull, cranium
 - (4) ribs, rib cage, sternum
 - (5) scapula, pelvis, tibia, fibula
 - (6) broken bones, X-rays

C. Skills Taught:

1. group work
2. information
3. summarization
4. research
5. graphing
6. interpreting data
7. forming hypothesis
8. categorizing
9. "How to. . ." writing

III. Background Knowledge

A. For teachers:

1. *Core Knowledge Sequence*. Charlottesville: Core Knowledge Foundation 1995.
2. Cumbaa, Stephen. *The Bones and Skeleton Book*. New York: Workman Publishing, 1991.
3. Dillner, L. and Abrahams, J., consultants. *The Human Body*. Wilton, CT: Victoria Points Pub., 1993.
4. Hirsch, E.D. (ed.) *What Your Third Grader Needs to Know*. New York: Doubleday Publishing, 1991.
5. *The Human Body. Whole Language Theme Unit Workbook, Grades 4-6*. Instructional Fair Inc., Grand Rapids, MI.

B. For students:

1. Kindergarten: The Human Body
 - a. Taking care of your body-- exercise, cleanliness, healthy food
2. First Grade: The Human Body
 - a. Body Systems-- an introduction
3. Second Grade: The Human Body
 - a. Taking care of your body-- vitamins and minerals
4. Third Grade: The Human Body
 - a. The muscular system unit

IV. RESOURCES

A. Books:

1. *The Human Body. Whole Language Theme Unit Workbook, Grades 4-6*. Instructional Fair Inc., Grand Rapids, MI.
2. Moore, Jo Ellen. *My Skeleton and Muscles*. Monterey: Evan-Moor Corp., 1987.
3. *Core Knowledge Sequence*. Charlottesville: Core Knowledge Foundation, 1995.
4. Hirsch, E.D. (ed.) *What Your Third Grader Needs to Know*. New York: Doubleday Publishing, 1991.

B. Videos

1. *The Magic School Bus: Inside Ralphie*. 30 minutes, color, NR, 1995.

C. Other

1. Various X-rays (found at doctor's offices or hospitals)
2. "Parts of Bone" overhead
3. Various posters of the different body systems

V. LESSONS

Lesson One: Let's Learn Systems!

A. Objectives:

1. Lesson content: systems of the body
2. Concept objective: Students will understand what a system is and different parts of the body work together as one system.
3. Skill objective: Students will discriminate between some of the body's systems by researching and presenting new information to a group. They will practice the skill of formulating hypotheses. They will correlate systems and functions.

B. Materials:

1. poster that displays the body's systems
2. cards for matching game

3. butcher or chart paper and marker
- C. Key Vocabulary:
 1. circulatory system
 2. respiratory system
 3. digestive/urinary system
 4. muscular system
 5. skeletal system
 6. nervous system
 7. immune system
- D. Procedures:
 1. Introduce “Amazing Fact” #1: There are over ten systems in the human body that all work together so we can function successfully.
 2. One “Amazing Fact” will be introduced each day of the unit.
 3. Discuss definition of “system.”
 4. Group students into threes. Assign each a system.
 5. Have each group brainstorm and use poster to hypothesize what they think the function of their system is and the parts of the body that comprise the system.
 6. Introduce some of the systems of the body and their functions to the large group by having each small group present their hypothesis and brainstorm results.
 7. Write each system and function on chart paper as a classroom reference.
 8. As a class, discuss how the systems work together.
 9. Introduce the skeletal system as the next class topic.
 10. View *The Magic School Bus, Inside Ralphie*.
- E. Evaluation/Assessment:
 1. Systems/Functions Game
 - a. divide students into groups of three
 - b. pass out set of cards to each group
 - c. students practice coordinating system and function
- F. Standardized Test/State Test Connection:
 1. Reading
 - a. students will perceive relationships
 - b. students will determine the meaning of words
 - c. students will formulate hypotheses, make predictions

Lesson Two: What is a Bone?

- A. Objectives:
 1. Lesson content: parts of a bone
 2. Concept objective: Students will understand that bones have a unique structure and function. Bones are living things and need nourishment.
 3. Skill objective: Students will form hypotheses and conduct a science experiment.
- B. Materials:
 1. “Let’s Look at Chicken Bones” experiment sheet (see Appendix A)
 2. chicken bones from meat department of grocery store
 3. vinegar
 4. water
 5. “Parts of Bone” overhead
 6. “Parts of Bone” worksheet (see Appendix B)
- C. Key Vocabulary:
 1. periosteum

2. spongy bone
 3. compact bone
 4. marrow
 5. calcium
- D. Procedures:
1. Introduce Amazing Fact #2: The human thighbone is stronger than reinforced concrete.
 2. Introduce parts and functions of bone using overhead.
 3. Demonstrate parts of bones using “Chicken Bones” experiment sheet.
 4. Place bones in jar of three-fourths vinegar and one-fourth water.
 5. Discuss what will happen to these bones after a week or so-- vinegar will absorb calcium making them bendable.
 6. Discuss calcium and its importance to bones.
- E. Evaluation/Assessment:
1. “Parts of Bone” labeling worksheet
- F. Standardized Test/State Test Connection:
1. Reading
 - a. students will read information from graphs / visuals
 2. Math
 - a. students will use graphic sources of information

Lesson Three: Count Your Bones: The Skeleton

- A. Objectives:
1. Lesson content: number of bones in the human body
 2. Concept objective: Students will understand how bones fit together and how many bones there are in the human body.
 3. Skill objective: Students will count and estimate the number and location of their bones.
- B. Materials:
1. “Count Your Bones” worksheet (see Appendix C)
 2. “The Dancing Skeleton” cutouts from *My Skeleton and Muscles* (Moore and Evans), pages 4-6.
 3. actual human skeleton, if available
 4. brad fasteners
- C. Key Vocabulary: N/A
- D. Procedures:
1. Introduce Amazing Fact #3: In your lifetime you will “lose” over 600 bones (through growing and fusing).
 2. Introduce “skeleton” and the number of bones found in the human body.
 3. Have students pair up and complete worksheet, “Count Your Bones” by feeling their bones and estimating.
 4. Go over questions together as a large group.
- E. Evaluation/Assessment:
1. Students will cut out skeletal parts from “Dancing Skeleton” worksheet and use brads to put together correctly.
 2. Hang these from ceiling.
- F. Standardized Test/State Test Connection:
1. Math
 - a. students will predict outcomes

- b. students will form hypotheses
- c. students will estimate

Lesson Four: Let's Name Our Bones!

A. Objectives:

- 1. Lesson content: names of the bones in the human body
- 2. Concept objective: Students will understand the names of bones and their connectedness.
- 3. Skill objective: Students will verbalize and illustrate bones, locations and connectedness.

B. Materials:

- 1. "Mr. Bones!" reference sheet (see Appendix D)
- 2. "Mr. Bones!" worksheet (see Appendix E)
- 3. actual human skeleton, if available
- 4. butcher paper
- 5. markers
- 6. kid-size skeletal systems, cut out

C. Key Vocabulary:

- | | |
|--------------------|------------------|
| 1. skull / cranium | 12. tibia |
| 2. jaw bone | 13. fibula |
| 3. vertebrae | 14. ankle bones |
| 4. scapula | 15. foot bones |
| 5. clavicle | 16. toe bones |
| 6. sternum | 17. humerus |
| 7. ribs / rib cage | 18. radius |
| 8. floating ribs | 19. ulna |
| 9. pelvis | 20. wrist bone |
| 10. femur | 21. hand bones |
| 11. knee cap | 22. finger bones |

D. Procedures:

- 1. Introduce Amazing Fact #4: Over half the bones in the human body are in the hands and feet.
- 2. Pass out "Mr. Bones!" reference sheet.
- 3. Choose one student to wear (tape onto clothes) the kid-size skeletal system.
- 4. Point out each bone of the skeletal system on sheet and on the student.
- 5. Songs/Activities: can be done throughout the unit to engage auditory and kinesthetic learners:
 - a. "Connected to . . ." song and actions
 - b. "If you're happy and you know it touch your skull (etc.) . . ."
 - c. "Simon Says" with bones of the body
- 6. Pair students up and have them trace each other's bodies on large sheets of butcher paper.
- 7. Give each a kid-size skeletal system to glue on their outlines.
- 8. Label the parts and hang on walls.

E. Evaluation/Assessment:

- 1. Quiz students with "Mr. Bones!" worksheet.

F. Standardized Test/State Test Connection:

- 1. Math
 - a. students will sort information

- b. students will draw conclusions
- c. students will assign labels

Lesson Five: Muscles and Bones

A. Objectives:

- 1. Lesson content: the muscular / skeletal system connections
- 2. Concept objective: Students will explore the definitions of skeletal system and muscular systems and how these systems work together.
- 3. Skill objective: Students will use resource materials, summarize information, synthesize information, and share with a large group.

B. Materials:

- 1. butcher paper and markers
- 2. “Research” worksheet (see Appendix F)
- 3. various resource books
- 4. Achilles tendon legend
- 5. chicken bone with meat (muscle), tendons, cartilage

C. Key Vocabulary:

- 1. tendon
- 2. Achilles tendon
- 3. ligament
- 4. cartilage

D. Procedures:

- 1. Introduce Amazing Fact #5: Without the Achilles tendon, a person could not run, would have difficulty walking and couldn’t stand on his or her toes.
- 2. Tell (using a kid’s version) or re-tell (with a teacher-made big book, for example) the mythological story of Achilles, the great Greek warrior and hero of Homer’s *The Iliad*. [In order to protect him from danger, Achilles mother, Thetis, dipped him in the River Styx, which contained waters on invulnerability. However, the water did not touch the heel by which Thetis held him. He became a great warrior of the Trojan War but was shot by his brother, Paris. The god Apollo guided the arrow to Achilles’ unprotected heel. Achilles died of the wound. The Achilles tendon (or heel) is named after this Greek legend].
- 3. Introduce and define tendon, ligament and cartilage as additional parts of the skeletal system.
- 4. Recall chicken bone experiment. Bring in other bones with meat (muscle) attached. Can you find the tendons? Cartilage?
- 5. Divide students into three groups, assign each one of the above.
- 6. Give each group resources or have them go to the library and complete “Research” worksheet.

E. Evaluation/Assessment

- 1. Students share their mini-report with the class and display summary statement in classroom

F. Extension

- 1. Students write their own legend explaining another part of the human body and how it got its name.

G. Standardized Test/State Test Connection:

- 1. Reading
 - a. students will identify information in a variety of written texts
 - b. students will summarize a variety of written texts
 - c. students will use resource materials
 - d. students will synthesize material

Lesson Six: Meeting Places!

A.

1. Lesson content: joints of the human body
2. Concept objective: Students will discover the different types of joints and where many of them are in the human body. They will understand what joints do and how important they are to the body's movement.
3. Skill objective: Students will predict outcomes and recall facts and details.

B. Materials:

1. "Meeting Places" worksheet from *The Human Body* (Instructional Fair), page 10.
2. "Joints" worksheet (see Appendix G)
3. "Mr. Bones!" Reference sheet (from lesson four)
4. full size skeletal drawings (from lesson four)
5. markers

C. Key Vocabulary:

1. joint
2. fixed joint
3. moveable joint
4. ball and socket joint
5. pivot joint
6. hinge joint
7. saddle joint
8. sliding joint

D. Procedures:

1. Introduce Amazing Fact #6: The only jointless bone in your body is the hyoid bone in your throat.
2. Introduce joints-- purpose, types, function.
3. Pair students up.
4. Students will use "Mr. Bones" Reference sheet and their bodies to find examples of each joint. Record on "Meeting Places" worksheet.
5. In large group go over examples found.
6. Have students stand up and "move" each joint as it is called.
7. Have students label the various joints on their full-size skeletal drawings (done in lesson 4).

E. Evaluation/Assessment:

1. Quiz students on joints of the body using "Joints" worksheet.

F. Standardized Test/State Test Connection:

1. Reading
 - a. students will recall facts and details
 - b. students will predict outcomes
2. Math
 - a. students will use and read charts and diagrams

Lesson 7: Bone Trauma and Treatment

A. Objectives:

1. Lesson content: bone injury, treatment and professions
2. Concept objective: Students will recognize a variety of bone injuries, learn the scope of treatment for those injuries and explore career options in orthopedics.
3. Skill objective: Students will identify and recognize fractures from both visual and written scenarios and will read X-rays.

- B. Materials:
 1. "Fracture Scenarios" handout (see Appendix H)
 2. "Determine the Fracture" worksheet (see Appendix H)
 3. bar graph / math worksheet (see Appendix I)
 4. butcher paper
 5. markers
 6. sample x-rays from doctor's office or hospital
- C. Key Vocabulary:

1. partial fracture	5. impacted fracture
2. compound fracture	6. comminuted fracture
3. simple fracture	7. x-ray
4. complete fracture	8. orthopedic surgeon
- D. Procedures:
 1. Introduce Amazing Fact #7: Your bones grow as you grow. The average female grows until she is around 16 years old. The average male stops growing when he reaches age 18.
 2. Ask students to share some experiences with bone trauma-- broken bones, sprains, and fractures.
 3. Hand out "Fracture Scenarios," go over each situation. Discuss types of fractures. Record on chart.
 4. Talk about bone trauma treatment: X-rays, slings, casts.
 5. Show real X-rays. Hold up against light to read and try to determine the fracture.
 6. Introduce "orthopedics" and careers in the field.
- E. Evaluation/Assessment:
 1. Students will match the "Fracture Scenarios" (already discussed in class) to the "Determine the Fracture" worksheet.
 2. Students will write about an experience with bone trauma or their future in the medical profession.
- F. Extension
 1. Complete bar graph activity sheet on broken bones and types of fractures as a math connection.
- G. Standardized Test/State Test Connection:
 1. Reading
 - a. students will compare and contrast
 - b. students will identify and eliminate
 - c. students will match
 2. Math
 - a. students will predict outcomes and interpret data from graphs
 - b. students will solve problems using bar graphs

VI. Culminating Activities

- A. Field Trip: Students will have the opportunity to visit a hospital and: meet with orthopedic specialists, see a real human skeleton, see a variety of X-rays and the screens used to view them, see other hospital equipment, observe a cast being set, discuss career options in orthopedics and other fields.
- B. Guest Speaker: If a field trip is not possible, have a doctor come to the school to discuss his/her occupation, education, daily routines, etc.

- C. Classroom casts: By dipping strips of newspaper in a simple mixture of school glue and water, the teacher can “cast” each child’s wrist. This is a good follow-up to lesson seven. An autograph party after the casts have dried would also be appropriate.
- D. Essay: Student should write an essay over one of many topic choices: what they thought of the field trip or guest speaker, their experience with skeletal system trauma, what they learned from the unit, why medical careers are so important, etc.
- E. Test: Students will complete the “Skeletal System Unit Test” (see Appendix J).
- F. Unit Evaluation: Students will complete “How’d You Like the Unit” sheet (see Appendix K) as a guide for teachers and future unit planning.

VII. Handout/Worksheets

- A. “The Dancing Skeleton” cutouts from *My Skeleton and Muscles* (Moore and Evans), pages 4-6.
- B. “Meeting Places” worksheet from *The Human Body* (Instructional Fair), page 10.
- C. see appendices

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- E. *The Human Body. Whole Language Theme Unit Workbook*, Grades 4-6. Instructional Fair Inc., Grand Rapids, MI. ISBN 0-88012-830-5
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