

# HUMAN BODY

**Grade Level or Special Area:** Third Grade

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**Length of Unit:** Seven lessons (seven days, one day = 45 minutes) not including culminating activities

## I. ABSTRACT

Take a trip through the human body as we explore the skeletal and muscular systems. We will learn the jobs of the skeleton as we locate and name some of our 206 bones. Our study of bones will continue as we explore them inside and out. Our bones come together at joints, so we'll check those out, too. We also can't move a bone without a muscle, so we'll construct and explore these important parts. We'll discover how our bones and muscles work together as part of our amazing human body.

## II. OVERVIEW

### A. Concept Objectives

1. Student will recognize that the human body is made up of systems with structures and functions that are related and serve different functions in growth and survival. (*Colorado Model Content Standards for Science, Standard #3*)
2. Students understand the structures and functions of the skeletal and muscular system. (*Colorado Model Content Standards for Science, Standard #3*)
3. Students understand the processes of scientific investigation. (*Colorado Model Content Standards for Science, Standard #1*)

### B. Content from the *Core Knowledge Sequence*

1. Third Grade Science: The Human Body (p. 81)
  - a. The Muscular System
    - i. Muscles
      - a) Involuntary and voluntary muscles
  - b. The Skeletal System
    - i. Skeletal, bones, marrow
    - ii. Muscular-skeletal connections
      - a) Ligaments
      - b) Tendons, Achilles tendon
      - c) Cartilage
    - iii. Skull, cranium
    - iv. Spinal column, vertebrae
    - v. Joints
    - vi. Ribs, rib cage, sternum
    - vii. Scapula (shoulder blades), pelvis, tibia, fibula
    - viii. Broken bones, x-rays

### D. Skill Objectives

1. Students will identify the three functions of the skeleton as support, movement and protection.
2. Students will identify that there are 206 bones in your body.
3. Students will identify the longest bone as the femur.
4. Students will identify the smallest bone in the body as the stirrup, found in the inner ear.
5. Students will label 15 bones in the skeleton.
6. Students will label the parts of the bone.
7. Students will list ways to keep bones healthy.

8. Students will identify the three types of muscles in their bodies, as skeletal muscles (voluntary), smooth muscles (involuntary), and the cardiac muscle (heart).
9. Students will be able to give an example of a voluntary and involuntary muscle.
10. Students will understand that many of our muscles work in pairs.
11. Students will understand that muscles work by getting shorter (contracting).
12. Students will be able to point to their Achilles tendon.
13. Students will be able to differentiate between ligaments, tendons and cartilage.
14. Students will be able to identify the connection the ligaments, tendons and cartilage make in the muscular skeletal system.
15. Students will name two types of joints in their bodies, and give an example of each.

### III. BACKGROUND KNOWLEDGE

- A. For Teachers
  1. *Bones, Our Skeletal System*, by Seymour Simon
  2. *The Skeletal and Muscular System*, by C. Ballard
  3. *Muscles, Our Muscular System*, by Seymour Simon
- B. For Students
  1. The Human Body, Body Systems (1<sup>st</sup> Grade) *Core Knowledge Sequence* p. 38
  2. The Human Body, Cells (2<sup>nd</sup> Grade) *Core Knowledge Sequence* p. 60

### IV. RESOURCES

- A. *The Skeleton Inside You*, by Philip Balestrino (Lesson One)
- B. *A Book About Your Skeleton*, by Ruth Gross (Lesson Three)
- C. *You Can't Make A Move Without Your Muscles*, by Paul Showers (Lesson Four)
- D. *The Magic School Bus Flexes Its Muscles*, Video or DVD, by Scholastic (Lesson Five)

### V. LESSONS

#### Lesson One: Skeleton – Purpose (45 minutes)

- A. *Daily Objectives*
  1. Concept Objective(s)
    - a. Students understand the structures and functions of the skeletal and muscular system.
  2. Lesson Content
    - a. The Skeletal System
      - i. Skeletal, bones, marrow
  3. Skill Objective(s)
    - a. Students will identify the three functions of the skeleton as support, movement and protection.
- B. *Materials*
  1. *The Skeleton Inside You*, by Philip Balestrino
  2. A ball of clay or playdough for each student
  3. A toothpick for each student
  4. A small (8" x 8") sheet of waxed paper (optional)
  5. Plastic baggie for each child, for the clay (optional)
  6. K.W.L. chart
  7. Transparency of Appendix A
  8. Student copies of Appendix B
  9. Copy of Appendix C for the teacher

C. *Key Vocabulary*

1. Joint – where two bones fit together
2. Ligaments – hold bones together at the joint

D. *Procedures/Activities*

1. Before beginning this lesson you may want to prepare small baggies with a ball of clay or playdough in each (size of an adult fist), as well as a piece of waxed paper for each child to protect their desks while working with the clay.
2. Introduce the unit by telling the students that they are about to begin a journey about something they always have with them – their bodies, in particular two systems in their bodies. We will learn about the skeletal and muscular systems beginning with the skeletal system.
3. First let's find out what you already know about the skeletal system by filling out a K.W.L. chart.
4. At this time a review of the K.W.L. chart may be necessary. If students have had a lot of use with this type of chart you may skip this step. Explain to the students that the K stands for "Knowledge" that they already have on a subject. The W stands for "What" they want to learn, and the L is for concepts that they "Learn". The chart should be visited throughout the unit to answer questions they had at the beginning, as well as to list key concepts that they learned.
5. Call on students to tell you what they already know about the skeletal system, and write their comments under the K in the K.W.L. chart.
6. Next ask them to think about what they would like to learn about the skeleton and put their comments under the W in the K.W.L. chart.
7. Bring the students to the reading area, where they can see the chart paper.
8. Review the vocabulary words: joints and ligaments.
9. Tell the students that they will be listening to a book about their skeleton and that you want them to listen for the three main jobs that the skeleton has.
10. Read *The Skeleton Inside You*, by Philip Balestrino,
11. Pause on pages 6 (shape), 24 (protection), 26 (movement).
12. Finish the book and ask students what the main jobs of the skeleton are.
13. Have students go to their seats and helpers pass out a baggie with a ball of clay, a piece of wax paper, and a toothpick.
14. Have students make small dolls, then roll them into balls and make snakes, donuts or other figures.
15. Remind students that their body doesn't change shapes, like the playdough, because it has a skeleton in it to keep its shape.
16. Have students roll their clay into two hot dog shapes to represent the bone from their wrist to their elbow.
17. Students should insert a toothpick down the length of one, to represent the bone in their arm.
18. They should now observe the difference between the two shapes.
19. Call on students to relate what they observed.
20. Have students take the toothpick out of their clay, and ready their things for collection.
21. Have collectors collect baggies, wax paper, and toothpicks.
22. Make two columns on the board. Title one "Bones", and the other "Protects".
23. Write the words Skull, Vertebrae (bones that make up the backbone), and Ribs, in the left column and the words "spinal cord, brain, eyes, lungs, heart", in the second column.

24. Call on students to help you match the bone on the left to the organ it protects on the right. (Skull protects the brain and eyes, the vertebrae protect the spinal cord, and the ribs protect the heart and lungs.)
  25. Tell the students that you are going to teach them a game called “Add It On” that will demonstrate the third job of the skeleton – movement.
  26. Put the directions to the game (Appendix A) on the overhead. Read and explain.
  27. Divide students into groups of five.
  28. Play the game.
  29. Review the three functions of the skeleton.
  30. Pass out the worksheet “Parts of the Skeleton”.
  31. Read the directions. Students fill in sheet.
  32. Collect sheets. Correct using Appendix C and reteach if necessary.
- E. *Assessment/Evaluation*
1. Students will correctly fill out the worksheet, Parts of the Skeleton – Check (Appendix B).

**Lesson Two: Name Those Bones (60 minutes)**

- A. *Daily Objectives*
1. Concept Objective(s)
    - a. Students understand the structures and functions of the skeletal and muscular system.
  2. Lesson Content
    - a. The Skeletal System
      - i. Skeleton, bones, marrow
      - ii. Skull, cranium
      - iii. Spinal column, vertebrae
      - iv. Ribs, ribcage, sternum
      - v. Scapula (shoulder blades), tibia, pelvis, fibula
  3. Skill Objective(s)
    - a. Students will identify that there are 206 bones in your body.
    - b. Students will identify the longest bone as the femur.
    - c. Students will identify the smallest bone in the body as the stirrup, found in the inner ear.
    - d. Students will label 15 bones in the skeleton.
- B. *Materials*
1. Overhead of skeleton with bones labeled
  2. Copy of labeled skeleton for each child (Appendix M)
  3. Copy of worksheet (Appendix H)
  4. Copies of Appendix D (Word Search) for each student
  5. Large (size of child in class) sheet of butcher paper for half the class
  6. Copy of word cards for the skeleton for half the class (Appendix G)
  7. Concept or K.W. L. chart from Lesson One
- C. *Key Vocabulary*
1. Femur – hip bone, longest bone in body
  2. Stirrup – in the inner ear, smallest bone in body (size of grain of rice)
  3. Cranium – name for skull
  4. Vertebrae – small bones (24) stacked to form the spinal column
  5. Spinal column – another name for spine or backbone
- D. *Procedures/Activities*
1. Today we are going to learn about specific bones in our bodies.
  2. Read the book, *Bones, Our Skeletal System*, by S. Simon.

3. Call on students to add to the concepts chart or K.W.L. chart.
  4. Now we are going to learn a song about some of the parts of the body. It is sung to the tune of “Where is Thumbkin”. You might want to sing this song in order to review the rhythm.
  5. Put the overhead (Appendix K) of the song, “Where’s That Bone” up. Sing the song. Sing the song again with the class echoing each line.
  6. Sing the song and add the motions. Students join you singing with the motions.
  7. Pass out worksheet of the labeled skeleton (Appendix M).
  8. Put the overhead up with the skeleton without the names (Appendix H).
  9. Call on students to help you fill in the overhead.
  10. Explain that the class will be divided in half and that they will be completing two activities. One activity is tracing their partner and gluing down the names of the bones where they belong. The other group will be working on the skeleton word search. We will switch activities in 20 minutes.
  11. Group one will find a partner and get a scissors, glue, black crayon and one large sheet of butcher paper, and a copy of Body Cards (Appendix G). They will trace the outline of one partner and then together they will glue the correct cards to the outline.
  12. Group two will work on the Bones, Bones, Bones word search (Appendix D).
  13. Pass out Word Cards For the Skeleton (Appendix F) and large butcher paper to one group, and Bones, Bones, Bones Word Search (Appendix D) to the other group.
  14. Rotate around the groups, offering guidance when necessary.
  15. Switch groups after 20 minutes. When time is up, collect the word searches, and hang the human bodies in the hall or around the room.
  16. Put the overhead of the human body up and call on different students to point to one of their body parts as the class points to the same one and tells its name.
  17. Remind students to review the study guide of the bones of the human skeleton (Appendix M), and tell them that they will have to learn the bones of the human body. Be sure to tell them when the test will be, as well as mark it on their study sheet.
- E. *Assessment/Evaluation*
1. Students will have correctly identified 10 body parts on their butcher paper body outline.
  2. Students will correctly circle 50% or more of the words in the word search.
  3. Test on Human Body Skeleton (Appendix F) given after students have had adequate time to study.

### **Lesson Three: Composition of Bones (45 minutes)**

- A. *Daily Objectives*
1. Concept Objective(s)
    - a. Students understand the structures and functions of the skeletal and muscular system.
  2. Lesson Content
    - a. The Skeletal System
      - i. Skeletal, bones, marrow
      - ii. Broken bones, x-rays
  3. Skill Objective(s)
    - a. Students will label the parts of the bone.
    - b. Students will list ways to keep bones healthy.

B. *Materials*

1. One piece of plain 8 ½” by 11” white paper (copy or typing paper)
2. Two pieces of tape for each student
3. Chicken Bone Experiment (you will choose to do this as a class demonstration or with small (five to six) groups)
  - a. Whole Class
    - i. Two chicken bones
    - ii. One quart jar filled with vinegar
  - b. Small Groups
    - i. Two chicken bones per group
    - ii. One jar that the bone will fit into that is filled with vinegar
4. Optional: Bone from the meat department of a grocery store or butcher shop (ask the butcher to cut the bone crosswise and lengthwise, or obtain two bones one cut crosswise and the other cut lengthwise)
5. *A Book About Your Skeleton*, by Ruth Belov Gross
6. Copy a class set of Appendix I, “The Amazing Bone”
7. Copy a class set of Appendix J, Directions for “The Amazing Bone”
8. Chart paper

C. *Key Vocabulary*

1. Bone marrow – the spongy inside of the bone
2. Compact bone – strong hard material that makes up one of the outer layers of the bone
3. Spongy bone – mesh-like material that makes up the center of a bone
4. X-ray – a picture that looks through skin and muscle and shows only your bones
5. Calcium – the mineral that bones and teeth need to stay strong and healthy

D. *Procedures/Activities*

1. We are going to learn a lot about bones today. First let’s go to the center for a story that will tell us some information about bones.
2. Take students to the center (have chart paper on a stand here) and show them the book, *A Book About Your Skeleton*, by Ruth Belov Gross. Ask students what they already know about the skeleton and bones.
3. Tell them that you want to collect a sheet on Facts About Bones (put this as your title on your chart paper). You want them to raise their hands when they hear an interesting or important fact about bones while you’re reading.
4. Read the book, pausing to write down interesting or important facts about bones when students raise their hands. You may need to prompt and or model a few in order to get them started.
5. After you have finished reading the book, call on students to read the facts on the chart.
6. Students then return to their desks. Review with them that bones are made of a mineral called calcium. Calcium is found in many foods, particularly milk and foods made from milk. The calcium that’s in foods go to your bones and teeth to make them harder. It’s important to have enough calcium so later in life your bones stay strong and do not break as easily. Tell them that you are going to be performing an experiment that will help them understand the important role that calcium plays in keeping their bones hard.
7. Pass the chicken bones around and have students try to bend them (remind them that it is to see how hard the bone is and not to see if they can break the bone).
8. Put one bone in the vinegar and secure the lid.
9. Tell the class that every day you are going to check the bone that is in the vinegar, by removing it and trying to bend it. You will compare it to the bone

that is not in the vinegar. Every day after checking the bone in the jar you will replace it in the vinegar and secure the lid. You will do this for one week, noting your observations. At the end of the week the students will conclude that the vinegar removed the calcium from the bone, and made it weaker. Calcium makes your bones stronger and without it you could not stand or move your body. You can also discuss foods that are rich in calcium (dairy products).

10. After you have started the chicken bone experiment draw a model of a bone on the board. (If you have the bones from the grocery store or butcher shop use them here.) Tell the students that they are going to learn about the composition of bones, or what they look like inside.
11. Tell the class that living bones do not look like the bones they see in museum cases, or like the remains of dead animals they might see along a path. Living bones are alive with their own blood vessels and nerves. They are also one third water. If you took one of your larger bones and cut it down the middle, you would see several layers. Let's explore the inside of the bone now.
12. Pass out a sheet of plain paper to each student. First draw the outside of a bone (looks like a dog bone) on the blackboard. Then the inside of the bone, noting the "skin" of the bone, the compact bone and the bone marrow. On their paper they should draw arrows to these parts of the bone and write a few notes to go with them:
  - a. Outside layer "skin"-tough, contains nerve cells and blood vessels.
  - b. Compact bone-made up of thousands of tubes (similar to bundled drinking straws) to give the bone strength.
  - c. Spongy bone (like a sponge) filled with nerves and blood vessels.
  - d. Marrow-jelly filled space in the spongy bone where blood cells are produced (some carry nutrients through the body and others destroy harmful bacteria).

As students are copying this from the board, pass out two pieces of tape to each student.

13. Tell students that the long bone in their leg, which is also the longest bone in their bodies, called the femur is shaped much like the chicken leg bone. They are both shaped like a hollow cylinder. With the sheet that we drew the diagram of the bone on we are going to make a model of your femur to demonstrate how its shape makes it stronger.
14. Roll the paper into a tube, overlapping the top and bottom edges. Tape the edge at the top and at the bottom. Stand the tube on the paper and balance a book on it. It is strong enough to support the book.
15. Have students do the same.
16. Sometimes people have accidents and they break a bone. Ask if anyone has ever broken a bone. When you break a bone you go to the doctor and s/he takes an x-ray. An x-ray is a picture that can look through skin and muscle and shows only your bones. Bones are alive, so they heal all by themselves. However, the doctor will put a cast on, so the bones are held together and don't move. When a bone is broken the ends get soft and rubbery. Then, blood brings minerals, especially calcium over to the break. Slowly the minerals make the bone hard again. This process takes time. You might have a cast on for around two months.
17. Pass out copies of Appendices me and J, "The Amazing Bone".
18. Ask students if they think bones are dead or living tissue (living). How do they know this? (Bones grow, broken bones heal)
19. Construct "The Amazing Bone".

20. Students should pull the bones out very slowly to show the bone growing to its full size. Explain that bones can grow in diameter as well as at both ends. Most people finally stop growing when they are around 20 to 25 years old.
  21. Students should also notice the inside of the bone as displayed in their model.
  22. Discuss the different parts and functions of each part.
  23. Review the make-up of the bone, as well as the importance of eating healthy foods to keep our bones strong and healthy. There's another thing that you can do to protect your bones, and that is to wear protective wear for various sports as well as always wearing a seat belt. Discuss various sports, and the protective gear that is common with the sport. (Some include: helmets, shoulder pads, shin guards, knee and wrist guards...)
  24. Students receive a sheet of paper and will be writing three things they learned about bones today.
  25. Put the following heading and prompt on the board:  
BONES: I learned these three fascinating things about bones.
- E. *Assessment/Evaluation*
1. Students will write three things that they learned about bones (step 24 and 25).

#### **Lesson Four: Muscle Up (45 minutes)**

- A. *Daily Objectives*
1. Concept Objective(s)
    - a. Students understand the structures and functions of the skeletal and muscular system.
  2. Lesson Content
    - a. The Muscular System
      - i. Muscles
        - a) Involuntary and voluntary muscles
  3. Skill Objective(s)
    - a. Students will identify the three types of muscles in their bodies, as skeletal muscles (voluntary), smooth muscles (involuntary), and the cardiac muscle (heart).
    - b. Students will be able to give an example of a voluntary and involuntary muscle.
- B. *Materials*
1. *You Can't Make a Move Without Your Muscles*, by Paul Showers
  2. Copies of Appendix R for each student
- C. *Key Vocabulary*
1. Cardiac – of, or relating to the heart
  2. Involuntary muscles – also known as smooth muscles, work automatic, internal actions (ex. heartbeat, stomach churning)
  3. Voluntary muscles – also known as skeletal muscles, follow commands from your brain
- D. *Procedures/Activities*
1. Call students to a reading area, but make sure there is room for them to move as this is an interactive book.
  2. Read the book, *You Can't Make a Move Without Your Muscles*, by Paul Showers. This is an interactive book, so be sure to have the students do the activities as you read them.
  3. Ask students what concepts they learned about their muscles.
  4. Record the concepts on a concepts chart titled "Muscles".

5. Have students return to their seats. Draw three columns on the board titled, “Voluntary” (Skeletal), “Involuntary” (smooth) and “Cardiac”.
  6. Under the Voluntary column list any muscles that are attached to bones and help you move (examples: neck muscles, leg, arm, face, toe, back...)
  7. Under the involuntary column list the digestive tract, airways of the lungs, walls of veins and arteries, the bladder, uterus, eye pupils, and diaphragm. Go over the vocabulary of these terms at this time.
  8. Explain that the heart is the cardiac muscle.
  9. Students will fill out the worksheet to indicate their knowledge of the types of muscles.
- E. *Assessment/Evaluation*
1. Students will complete Appendix R.

**Lesson Five: Muscle Movement (45 minutes)**

- A. *Daily Objectives*
1. Concept Objective(s)
    - a. Student will recognize that the human body is made up of systems with structures and functions that are related and serve different functions in growth and survival.
  2. Lesson Content
    - a. The Skeletal System
      - i. Musculo-skeletal connections
        - a) Ligaments
        - b) Tendons, Achilles tendon
        - c) Cartilage
  3. Skill Objective(s)
    - a. Students will understand that many of our muscles work in pairs.
    - b. Students will understand that muscles work by getting shorter (contracting).
- B. *Materials*
1. Appendix Q and S for each child
  2. Box of brads enough for each child to have two
  3. Video or DVD *The Magic School Bus Flexes Its Muscles*, by Scholastic
  4. Concept chart on muscles
- C. *Key Vocabulary*
1. Contract – get shorter
  2. Biceps – upper arm
- D. *Procedures/Activities*
1. Show the video *The Magic School Bus Flexes Its Muscles*.
  2. Fill in some things that they learned about muscles on the concept chart on muscles.
  3. Explain that skeletal muscles work by contracting, or shortening, and then lengthening or relaxing. In other words, muscles pull together and then relax. They do not push.
  4. When you “make a muscle”, the biceps, which is the muscle in your upper arm, contracts and shortens and thickens into a bulge. Let’s all make a muscle using the bicep muscle. This bends the elbow and pulls the bones toward each other.
  5. When you relax the muscle, it lengthens and the arm unbends at the elbow. Direct students to unbend their elbow now.
  6. Ask students to get out their scissors, because they will be constructing a model of a muscle.

7. Demonstrate the construction of the model.
  8. Pass out the brads, and copies of Appendix Q and S.
  9. Students construct the muscle.
- E. *Assessment/Evaluation*
1. Correct construction of the muscle.

**Lesson Six: Connecting the Skeletal and Muscular System (60 minutes)**

A. *Daily Objectives*

1. Concept Objective(s)
  - a. Students understand the structures and functions of the skeletal and muscular system
  - b. Student will recognize that the human body is made up of systems with structures and functions that are related and serve different functions in growth and survival.
2. Lesson Content
  - a. The Skeletal System
    - i. Musculo-skeletal connections
      - a) Ligaments
      - b) Tendons, Achilles tendon
      - c) Cartilage
3. Skill Objective(s)
  - a. Students will be able to point to their Achilles Tendon.
  - b. Students will be able to differentiate between ligaments, tendons and cartilage.
  - c. Students will be able to identify the connections the ligaments, tendons, and cartilage make in the muscular skeletal system.

B. *Materials*

1. Several boxes of straws
2. Plastic wrap
3. Rulers
4. Four door hinges
5. One dozen pipe cleaners
6. Eight squares of foam
7. Sixteen rubber bands
8. Chicken bones, cooked and cleaned

C. *Key Vocabulary*

1. Tendons – narrow, ropelike ends of the muscle, that holds the muscle to the bone
2. Cartilage – a tough, smooth substance used to cover and cushion the ends of bones
3. Ligaments – connect one bone to another across a joint

D. *Procedures/Activities*

1. Call on students to recall or read a concept off the concept chart. Do this as a five minute review of things that they have learned about the muscular skeletal system.
2. Explain to students that cells sometimes group together into tissues in order to perform certain tasks. Muscles are made up of tissues. Muscle cells are long and thin, similar to a straw, pipe cleaner or telephone wire. Several cells are bundled together, and wrapped in a membrane (wrap five or six straws in a bundle). Have each team do the same, making three or four membranes. Now wrap several of these muscle bundles together to form muscle tissue, but leave

- some extra wrap at the end of the big bundle. This extra wrap acts as the tendons that attach the muscle to the bone.
3. Take the bundle and place it on a ruler and attach it with the end wrap.
  4. The ends of your bones are covered with cartilage, a tough smooth substance that cushions the ends of bones. Everyone should take two squares of foam and use masking tape to tape it to the ends of their rulers.
  5. Now we're going to attach the bones to the joint. Each group will work with another group to fasten the two ruler pieces to the hinges, and then use rubber bands to fasten the two bones (rulers) together across the joint (hinge).
  6. When your group has completed this, you need to get a piece of typing paper, and put your name and date on it.
  7. Put the following on the board: Muscle Bundles, hinge joint, muscle, tendon, ligament, cartilage.
  8. Students write the title "Muscle Bundles" on their paper, and draw a picture of a muscle bundle, while looking at their group's straw model.
  9. The students are then to draw arrows to the various parts of their model to indicate the location of the hinge joint, muscle, tendon, ligament and cartilage.
  10. They then explain the diagram to someone in their group.
- E. *Assessment/Evaluation*
1. Assessment of this lesson is based on getting 80% or higher on their diagram (drawing the correct items: hinge joint, muscle, tendon, ligament, cartilage), count for ten points each and identifying them on the diagram counts for ten points each.

### **Lesson Seven: Joints in the Body (45 minutes)**

- A. *Daily Objectives*
1. Concept Objective(s)
    - a. Students understand the structures and functions of the skeletal and muscular system
  2. Lesson Content
    - a. The Skeletal System
      - i. Joints
  3. Skill Objective(s)
    - a. Students will name two types of joints in their bodies, and give an example of each.
- B. *Materials*
1. Copy of Skeleton for each student (Appendix H)
- C. *Key Vocabulary*
1. Hinge joint – allows movement in only two directions
  2. Ball and socket joint – allow for a wide range of motion
  3. Gliding joint – allow only a little movement
  4. Pivot joint – allows a swivel movement
  5. Joint – where two bones meet
- D. *Procedures/Activities*
1. Today we are going to learn about joints. Joints are where bones meet. There are joints in the skull where the bones don't move, but we are going to learn about moveable joints.
  2. In order to demonstrate how important joints are to even simple movements, you are going to watch a friend try to walk without bending any joints.
    - a. Hinge joint – think of the hinge of a door, it opens and closes the door, these are the simplest joints and allow bones to bend and straighten.

Let's bend and straighten our knees. Bend and straighten, bend and straighten. Bend and straighten. Now our elbows, bend and straighten, bend and... Let's explore those hinge joints in our fingers, bend and straighten...

- b. Ball and Socket joints – How many of you have played with a joy stick on a computer? These joints allow for movement in many directions. Let's swivel those hips in a lot of directions. Now move your arm at the shoulder in one direction, then another, and around it goes. These are ball and socket joints.
  - c. Gliding joints – Have you ever seen a hand shower? You can take it down from it's tall hook, and it has a flexible hose on it. This is similar to a gliding joint where it has little movement in one direction. Try to bend the vertebrae in your spine just a little at a time.
  - d. Pivot joints – allow a joint to swivel or move side to side. Turn your head one way, and then reverse. Now turn your wrist, and see how it pivots around your ulna.
3. These are some of the main types of joints in your body, so let's review and move it baby!
- a. Hinge joint – bend and straighten those elbows, now the knees, and bend those fingers too.
  - b. Ball and socket , ball and socket, swing those hips, swing those hips. Ball and socket, ball and socket, round the arm at the shoulder, round the arm at the shoulder.
  - c. Gliding joints like moving your spine like a snake or caterpillar, here we glide, here we glide.
4. Now we're going to identify a hinge joint, a ball and socket joint and a gliding joint on the skeleton. Pass out Appendix H. Have students get out a red, blue and green crayon. Have them circle a hinge joint in red, a ball and socket joint in blue and a gliding joint in green.
- E. *Assessment/Evaluation*
1. Correct identification of the three joints in number four above.
  2. Questions regarding hinge and ball and socket joints on the final test.

## **VI. CULMINATING ACTIVITY**

- A. Human Body Final Test (Appendix N)

## **VII. HANDOUTS/WORKSHEETS**

- A. Appendix A: Add It On Game  
B. Appendix B: Parts of the Skeleton Check  
C. Appendix C: Parts of the Skeleton Check, Answer Key  
D. Appendix D: Bones, Bones, Bones Word Search  
E. Appendix E: Bones, Bones, Bones Answer Key  
F. Appendix F: Skeleton Fill in the Blank  
G. Appendix G: Word Cards for the Skeleton  
H. Appendix H: Skeleton with Blanks  
I. Appendix I: The Amazing Bone  
J. Appendix J: The Amazing Bone-Directions  
K. Appendix K: Where's That Bone Song  
L. Appendix L: Human Body Test Review  
M. Appendix M: Skeleton Review  
N. Appendix N: Human Body Test

- O. Appendix O: Answers for Human Body Test
- P. Appendix P: Study Guide for the Human Body Bones Test
- Q. Appendix Q: Directions for Flex That Muscle
- R. Appendix R: Muscles
- S. Appendix S: Flex That Muscle

### VIII. BIBLIOGRAPHY

- A. Balestrino, P. *The Skeleton Inside You*. New York: HarperCollins, 1989. 0-06-445087-2
- B. Brunn, R., M.D. and Brunn, B., M.D. *The Human Body*. New York, NY: Random House, 1982. 0-394-84424-6
- C. Gross, R., *A Book About Your Skeleton*. New York: Scholastic, 1994. 0-590-48312-9
- D. *All About People*. New York: Scholastic, 1995. 0-590-47525-8
- E. Parker, S. *How the Body Works*. Pleasantville, New York: The Reader's Digest Association, Inc., 1994. 0-895-77575-1
- F. Ballard, C. *The Skeleton and Muscular System*. Austin, Texas, Steck-Vaughn Company, 1998. 0-8172-4805-6
- G. Peacock, G., and Hudson, T., *The Super Science Book of Our Bodies*, New York, Thomson Learning, 1993. 1-56847-023-1
- H. Silver, D., and Wynne, P. *Easy Make and Learn Projects Human Body*. New York: Scholastic Professional Books, 1999. 0-439-04087-6
- I. Showers, P., *You Can't Make a Move Without Your Muscles*. New York, Thomas Y. Crowell, 1982. 0-690-04184-5
- J. Simon, S. *Bones Our Skeletal System*, New York, Morrow Junior Books, 1998. 0-688-14644-9
- K. Simon, S. *Muscles, Our Muscular System*, New York, Morrow Junior Books, 1998. 0-688-14643-0
- L. Walker, R. *First Human Body Encyclopedia*. New York: Kingfisher, 1999. 0-7534-5177-8
- M. Weise, J., *Head To Toe Science*. New York, John Wiley and Sons, Inc.2000. 0-471-33203-8

Appendix A  
**Game – “Add It On”**

**ADD IT ON**

**DIRECTIONS:** This game is similar to Memory, where a new movement is demonstrated then added to the previous action or action.

1. Students should form circles of four to six students. (You may have to step outside or modify movements to fit your classroom.)
2. One student makes a motion with a body part (i.e. a large circle with his/her right arm).
3. Students one by one imitate the first movement.
4. The second student demonstrates a new movement (ex. nodding head).
5. Students following this student do the first movement and then add the second movement (ex. large circle with right arm then nodding head). Students do this one by one all the way around the circle.
6. The third student adds another movement with another body part (ex. swivel hips).
7. Students in turn do the sequence of the three movements.
8. This continues until everyone has had a chance to add a movement.
9. When done, people in the group can suggest doing the sequence using a variation below.

**VARIATIONS**

- |                |                    |
|----------------|--------------------|
| * Hyper Speed  | * Slow Motion      |
| * As a Dance   | * Mirror a Partner |
| * Crouched Low | * On Tip Toes      |

**Appendix B**  
**Parts of the Skeleton Check**

Name \_\_\_\_\_

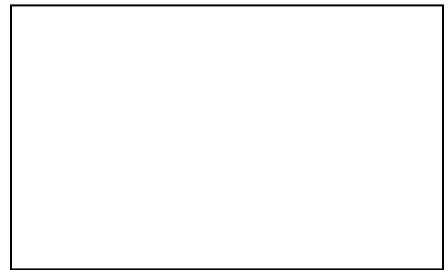
Date \_\_\_\_\_

Directions: List the main jobs of the skeleton on the blanks. Draw a picture explaining the job in the box.

1. \_\_\_\_\_



2. \_\_\_\_\_



3. \_\_\_\_\_



**Appendix C**  
**Parts of the Skeleton Check – Answer Key**

Directions: List the main jobs of the skeleton on the blanks. (Order may vary) Draw a picture explaining the job in the box.

- |               |   |
|---------------|---|
| 1. Shape      | Picture should show a skeleton or person.   |
| 2. Protection | Picture shows either: skull protecting the brain, eyes,<br>or the ribs protecting the heart and/or lungs,<br>or the vertebrae protecting the spinal cord. |
| 3. Movement   | Picture displays a person or skeleton in motion.  |

**Appendix D**  
**BONES, BONES, BONES**

G U G V X G N J R Z R C Z U J C T D B J S T S M W  
G G U R C M F E Y V Y Z Q L G W I U T B F O C N B  
Q H M T E F U E H Y V T O S B Q B E F Z A W A Z K  
A L L E T A P N M T B P I C Y F I Q R W V C P N S  
I P M A D J X U R U X Y M Z P D A L B T X X U T W  
E L F J J F I L J E R T F K T S D H F B I R L H R  
J J C U K L O P U V T X G D H D T Z T W P W A G G  
C N C R J L J C J P Q S H E N X O Q P R M D K R L  
R S H L H G S I N F A C I H P R S B D G T W C I T  
H T U M B T D R D Z I T U C N Q G S Y Y V R V B I  
W N O I M C S L U T P M R T D Q B I J H O S T Y H  
T I G Q C E K H Z H E A U S P Y X F D N U U Q B X  
K J O Q S Z N S W R V J H F P Q W N Y Z Y E O W K  
T K Y Q X H I M U M P O U U F H V D B R O S F R H  
R B W N N C L S F N E G A R C S I C T M S U P N E  
Y T L P G F A J X P D D J L E I P Q T W X S V D A  
Z J Q K J U X A H W P C O D K V A S Y L T C E P W  
E Z O C G M Z A J F M M R N B L B K V E Q B U Y Z  
X G N S J J L G U Q E C M A C E J T C U X L X W F  
T A O A B U K V G H D P K U N P U M M N N Y Z E E  
I K O F B U J X S Y J U U U S I I W S A Q U W P O  
Q I O I A U P N X V R C A E T C U A V G I H E S P  
Q X F Q U N H R E A U D E B S Q F M M F D U S T B  
Z T I Z Y L F A Q E C M D V S L J B R V T L V O J  
P U U M D P H A L A N G E S R A D I U S W T E I P

CRANIUM  
FEMUR  
FIBULA  
HUMERUS  
PATELLA  
PELVIS  
PHALANGES

RADIUS  
RIB  
SCAPULA  
STERNUM  
TIBIA  
ULNA

*Created by [Puzzlemaker](http://Puzzlemaker) at [DiscoverySchool.com](http://DiscoverySchool.com)*

Appendix E  
**BONES, BONES, BONES**

G U G V X G N J R Z R C Z U J C T D B J S T S M W  
 G G U R C M F E Y V Y Z Q L G W I U T B F O C N B  
 Q H M T E F U E H Y V T O S B Q B E F Z A W A Z K  
 A L L E T A P N M T B P I C Y F I Q R W V C P N S  
 I P M A D J X U R U X Y M Z P D A L B T X X U T W  
 E L F J J F I L J E R T F K T S D H F B I R L H R  
 J J C U K L O P U V T X G D H D T Z T W P W A G G  
 C N C R J L J C J P Q S H E N X O Q P R M D K R L  
 R S H L H G S I N F A C I H P R S B D G T W C I T  
 H T U M B T D R D Z I T U C N Q G S Y Y V R V B I  
 W N O I M C S L U T P M R T D Q B I J H O S T Y H  
 T I G Q C E K H Z H E A U S P Y X F D N U U Q B X  
 K J O Q S Z N S W R V J H F P Q W N Y Z Y E O W K  
 T K Y Q X H I M U M P O U U F H V D B R O S F R H  
 R B W N N C L S F N E G A R C S I C T M S U P N E  
 Y T L P G F A J X P D D J L E I P Q T W X S V D A  
 Z J Q K J U X A H W P C O D K V A S Y L T C E P W  
 E Z O C G M Z A J F M M R N B L B K V E Q B U Y Z  
 X G N S J J L G U Q E C M A C E J T C U X L X W F  
 T A O A B U K V G H D P K U N P U M M N N Y Z E E  
 I K O F B U J X S Y J U U U S I I W S A Q U W P O  
 Q I O I A U P N X V R C A E T C U A V G I H E S P  
 Q X F Q U N H R E A U D E B S Q F M M F D U S T B  
 Z T I Z Y L F A Q E C M D V S L J B R V T L V O J  
 P U U M D P H A L A N G E S R A D I U S W T E I P

CRANIUM  
 FEMUR  
 FIBULA  
 HUMERUS  
 PATELLA  
 PELVIS  
 PHALANGES

RADIUS  
 RIB  
 SCAPULA  
 STERNUM  
 TIBIA  
 ULNA

Created by [Puzzlemaker](http://Puzzlemaker) at [DiscoverySchool.com](http://DiscoverySchool.com)

Appendix F  
**Skeleton - Fill in the Blank**

Name \_\_\_\_\_

Date \_\_\_\_\_

**Directions:**

Fill in the blank with a word from the word bank.

**The Skeleton**

1. There are 206 b\_\_\_\_\_ in you body.
2. The central core of the skeleton is formed by the skull, b\_\_\_\_\_ and ribs.
3. The bones in your head are called your s\_\_\_\_\_.
4. Twenty-four vertebrae stacked on top of each other form the s\_\_\_\_\_column. It is also called the spine or b\_\_\_\_\_.
5. R\_\_\_\_\_are connected to the center of your chest to a bone called the sternum or breastbone. You have 12 ribs on each side that form the ribcage.
6. The long bones of the a\_\_\_\_\_join the core of bones at the shoulders.
7. The l\_\_\_\_\_bones join the core of bones at the hips.

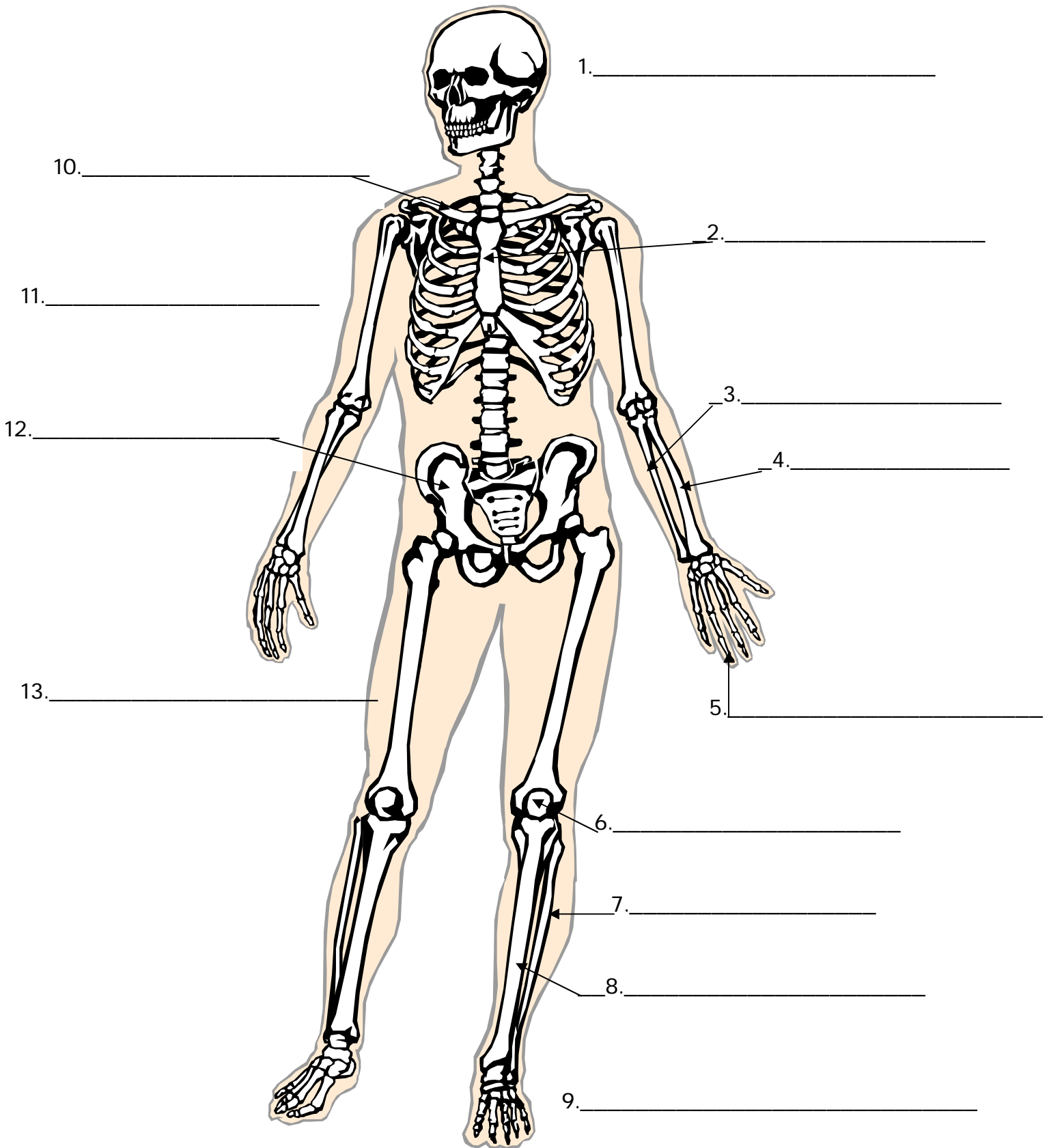
**WORD BANK**

leg skull Ribs backbone spinal arm bones

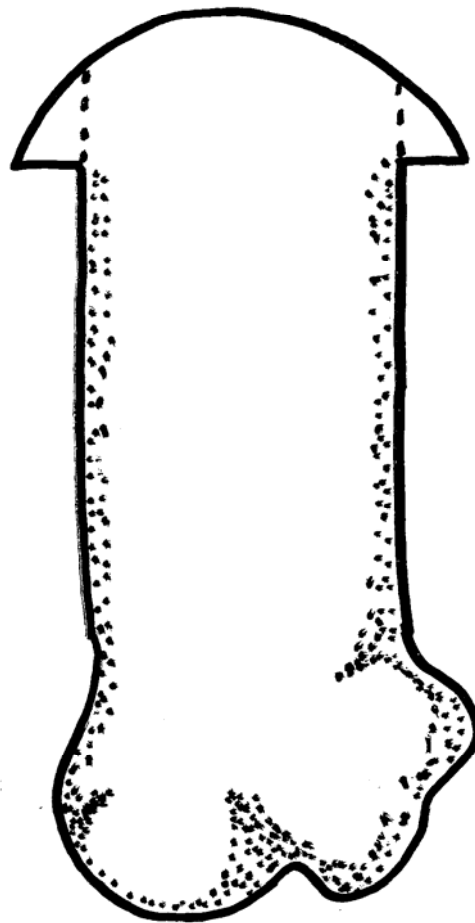
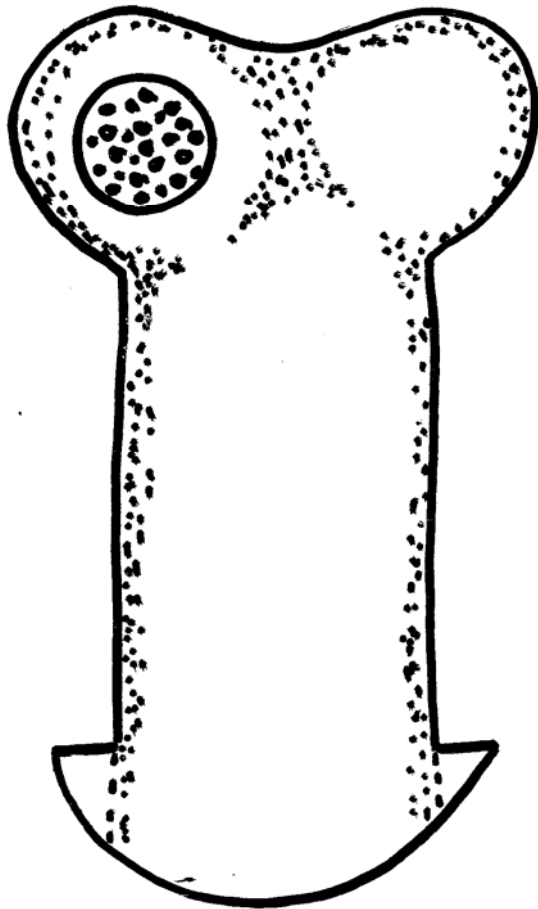
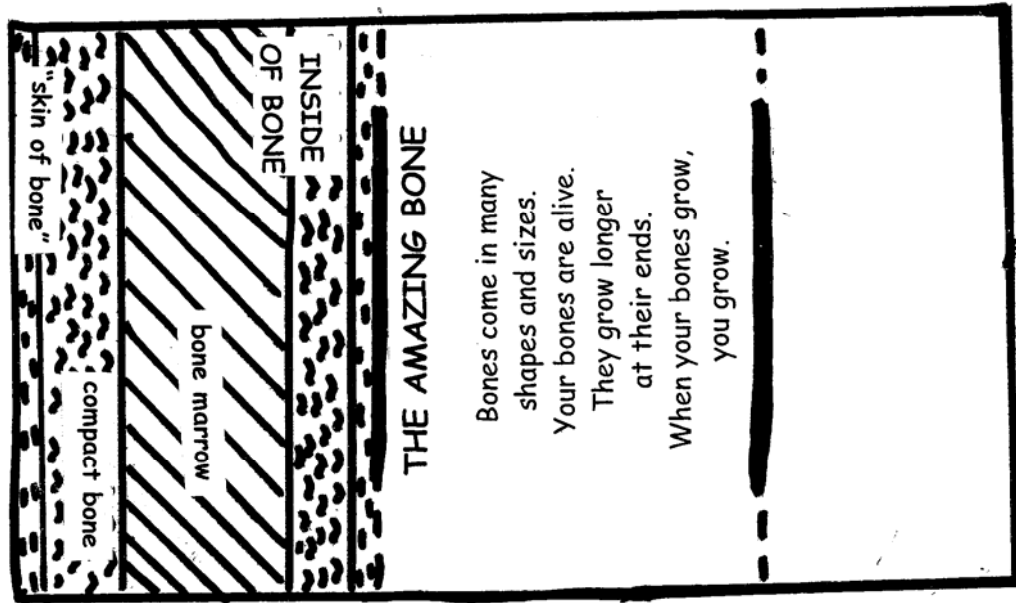
Appendix G  
**Word Cards for the Skeleton**

CRANIUM (SKULL)	RADIUS
STERNUM	THIGHBONE (FEMUR)
RADIUS	KNEECAP (PATELLA)
ULNA	FIBULA
HUMERUS	TIBIA

Appendix H  
Skeleton with Blanks



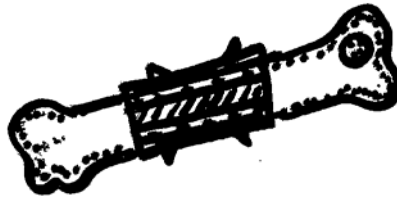
Appendix I  
**The Amazing Bone**



(adapted from *Easy to Make and Learn Projects: Human Body*-Scholastic Professional Books by Donald M. Solver and Patricia J. Wynne)

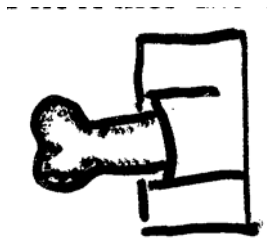
## Appendix J

# The Amazing Bone

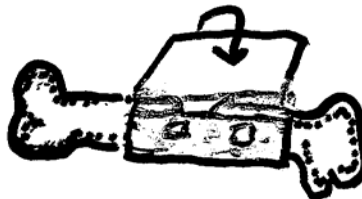


### Directions:

1. Photocopy Appendix I. Color the page if desired.
2. Cut out all three pieces along the outside solid black lines.
3. Cut open the two slits (dark black lines) on the rectangular piece.
4. Fold the rectangular piece along the dotted lines that continue out from the slits.
5. Turn over the rectangular sheet, so the writing is not showing. Turn over one of the bone pieces and fit it into the slits as shown. Then repeat with the other bone piece.



6. Fold the flaps of the rectangle so that “The Amazing Bone” paragraph and the picture show. Tape the top flap down as shown.



7. Fold down the small triangular parts of the bone pieces that extend out of the slits. Turn the model over and push the two bone pieces together. Pull the two bone pieces out, and watch the amazing bone grow!



(adapted from *Easy to Make and Learn Projects: Human Body*-Scholastic Professional Books by Donald M. Solver and Patricia J. Wynne)

## SONG

### “WHERE’S THAT BONE?”

(SUNG TO THE TUNE “WHERE IS THUMBKIN?”)

Where’s the Cranium?

Where’s the Cranium?

It’s right here (point to the head).

It’s right here (point to the head).

It’s also called the head.

It’s also called the head.

Cra-ni-um, Cra-ni-um

Where’s the Spinal column?

Where’s the spinal column?

It’s right here (point to the backbone.)

It’s right here (point to the backbone.)

Made of many vertebrae,

Made of many vertebrae,

Protects the spinal cord,

Protects the spinal cord.

Where’s the Scap-u-la?

Where’s the Scap-u-la?

It’s right here (Point to the shoulder blade).

It’s right here (Point to the shoulder blade).

Holds the Humerus, radius and ulna.

Holds the Humerus, radius and ulna.

Scapula, Shoulder blade

Where’s the Sternum?

Where’s the Sternum?

It’s right here (point to center of ribcage).

It’s right here (point to center of ribcage).

Holds the ribs to form the ribcage.

**Appendix K, page 2**

Protects the heart and vital organs.

Ster-num, Ster-num

Where's the pelvis?

Where's the pelvis?

It's right here (point to belly area).

It's right here (point to belly area).

Connects the leg to the body,

Femur, tibia, fibula

Pelvis holds the leg.

Pelvis holds the leg.

## Appendix L

### Human Body Review for Test on \_\_\_\_\_

#### Bones:

1. Be able to label 15 bones of the human body (word bank will be provided, spelling will count). See the labeled skeleton attached to this review.
2. There are 206 bones in an adult human skeleton. Babies are born with 300. Bones fuse together as you get older.
3. The three jobs of the skeleton are support, movement and protection.
4. The skull protects the brain and some sensory organs, the ribs or ribcage protect the heart and other internal organs, the backbone protects the spinal cord.
5. The largest, longest bone in your body is the femur, or upper leg bone.
6. The smallest bones in the body are found in the inner ear (hammer, anvil, stirrup).
7. Bone marrow is found in the center of your larger bones. This is where red blood cells are produced.
8. Explain what would happen if you didn't have bones.
9. Explain how you can take care of your bones.
10. If your doctor thought you might have a broken bone, (s)he would probably take an x-ray to find out. Broken bones heal by themselves. A cast holds broken bones together so they don't move and heal straight.
11. Know where your cranium, vertebrae, ribs, sternum, scapula, pelvis, tibia, fibula and femur are.

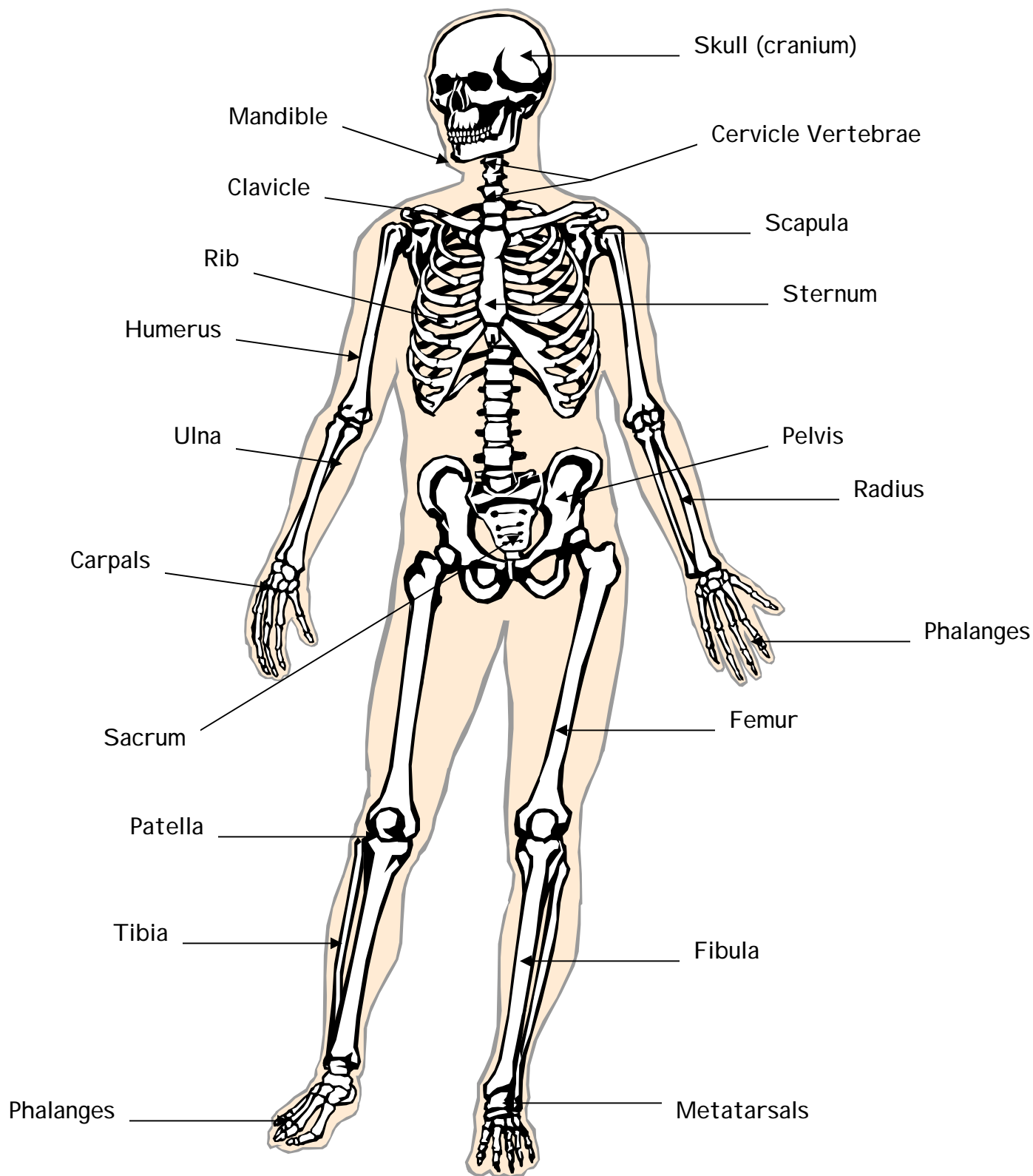
#### Muscles:

12. The largest muscle in your body is the gluteus maximus.
13. Students are able to name the three types of muscles as voluntary, involuntary and cardiac. They will be able to explain these and give an example of each.
14. Your muscles have two jobs, to extend and contract. Be able to explain what each of these mean.

#### Skeletal – Muscular Connections

15. Ligaments – tissue that connects bone to bone
16. Tendons – tissue that joins muscle to bone
17. Cartilage – tough, white connective tissue that forms part of the skeleton and vertebrates; cartilage is more flexible than bone, and not as hard; cartilage can be found in the earlobe and tip of the nose
18. Joints are two bones meet, and allow movement.
19. Three types of joints are ball and socket, hinge and sliding. Be able to give an example of two of these joints.
20. Achilles tendon is the strongest tendon in your body and is located in your ankle.

Appendix M  
**Study Guide – Human Skeleton**



# Human Body Test

Name \_\_\_\_\_

Date \_\_\_\_\_

1. What would happen if you didn't have bones?

---

---

2. Name the three jobs of the skeleton.

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_

3. There are \_\_\_\_\_ bones in an adult human skeleton, but babies are born with only \_\_\_\_\_. Bones \_\_\_\_\_ together as you get older.

4. Why do we call the skull, rib cage, and backbone protective parts of your skeleton? What do they protect?

---

---

---

---

---

5. What is special about the femur bone? \_\_\_\_\_

6. Where are the smallest bones in your body found? \_\_\_\_\_

7. How can you take care of your bones? (circle all that are true)

- |                        |                      |
|------------------------|----------------------|
| a. get enough calcium  | d. use tobacco       |
| b. crack your knuckles | e. fall down a lot   |
| c. wear a bike helmet  | f. eat healthy foods |

8. Another name for the cranium is

femur                      backbone                      head                      leg

9. The femur is found in the

leg                      hand                      ankle                      arm

10. The tibia is part of the

shoulder                      arm                      ribs                      inner ear

## Appendix N, page 2

### True or False

11. \_\_\_\_\_ Red blood cells are produced in the bone marrow found in the center of large bones.
12. \_\_\_\_\_ Your doctor would take an x-ray if he or she thought you broke a bone?
13. \_\_\_\_\_ Your ear contains NO cartilage.
14. \_\_\_\_\_ Elderly people have very strong bones.
15. \_\_\_\_\_ Broken bones can heal.
16. \_\_\_\_\_ Cartilage is as hard as bone.
17. Why do we need joints?

---

---

18. Give an example of a hinge joint. \_\_\_\_\_
19. Give an example of a ball and socket joint. \_\_\_\_\_

### Muscles

20. Name the three types of muscles:
  1. \_\_\_\_\_
  2. \_\_\_\_\_
  3. \_\_\_\_\_

21. What does a voluntary muscle do?

---

---

---

22. Give an example of where a voluntary muscle is located and what it helps you do.

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---

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23. The cardiac muscle is your \_\_\_\_\_.

24. The two jobs of the muscles are to \_\_\_\_\_ and \_\_\_\_\_.

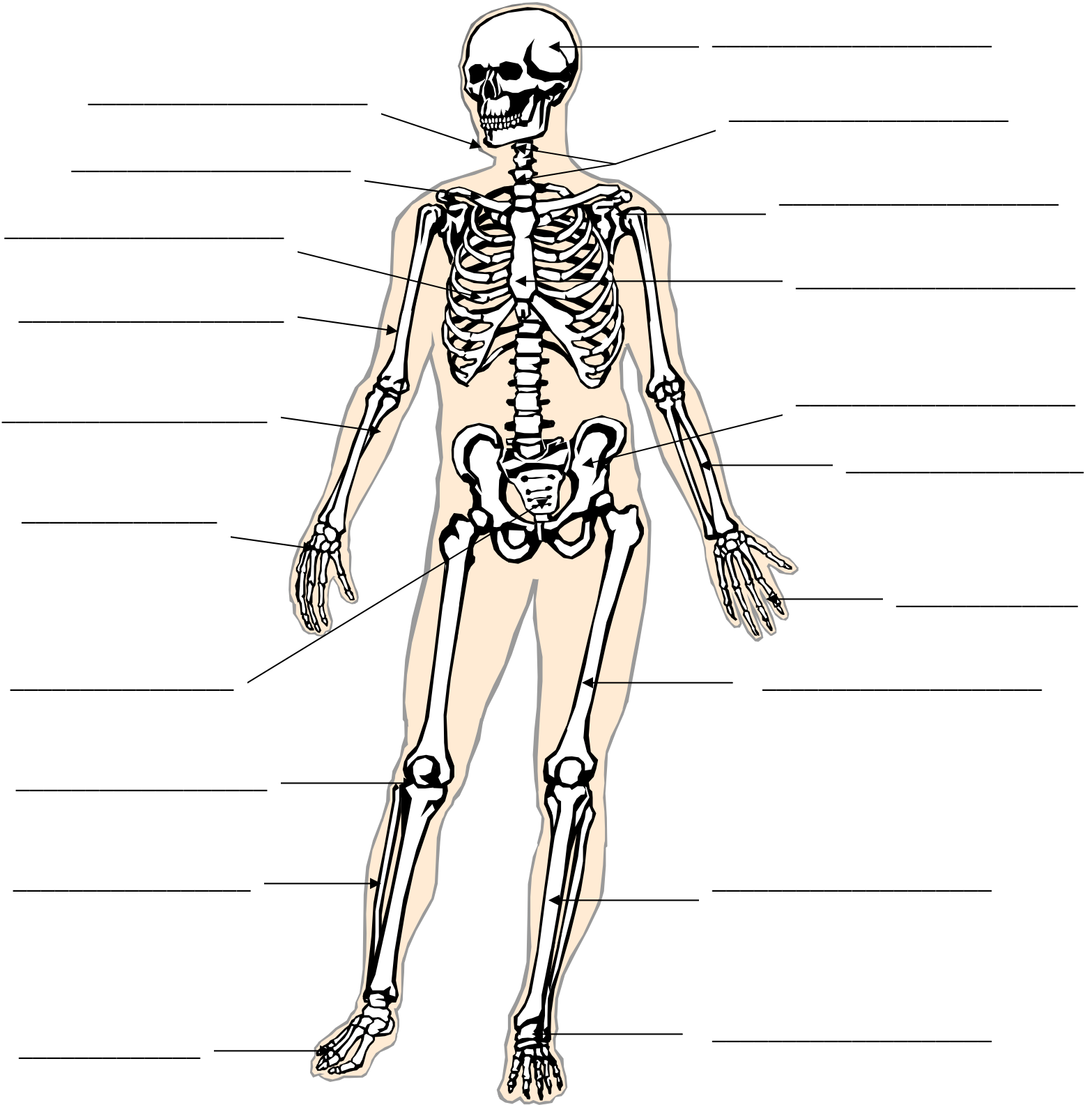
**Appendix N, page 3**

True and False

25. \_\_\_\_\_ You can't move your bones without your muscles.
26. \_\_\_\_\_ When a muscle contracts it becomes shorter and bunches together.
27. \_\_\_\_\_ You can not make your muscles stronger.
28. \_\_\_\_\_ Your heart beats because you tell it to.
29. \_\_\_\_\_ The strongest muscle in your body is in your arm.
30. Tendons are tissues that join your muscles to your \_\_\_\_\_.
31. The Achilles tendon is the strongest tendon and is located at your \_\_\_\_\_.
32. In order to keep your bones and muscles strong you must exercise. List three activities or types of exercise you can do to keep your bone/muscle team strong.
  1. \_\_\_\_\_
  2. \_\_\_\_\_
  3. \_\_\_\_\_

# Test-Bone Names

Label each bone using the Word Bank on the next page.



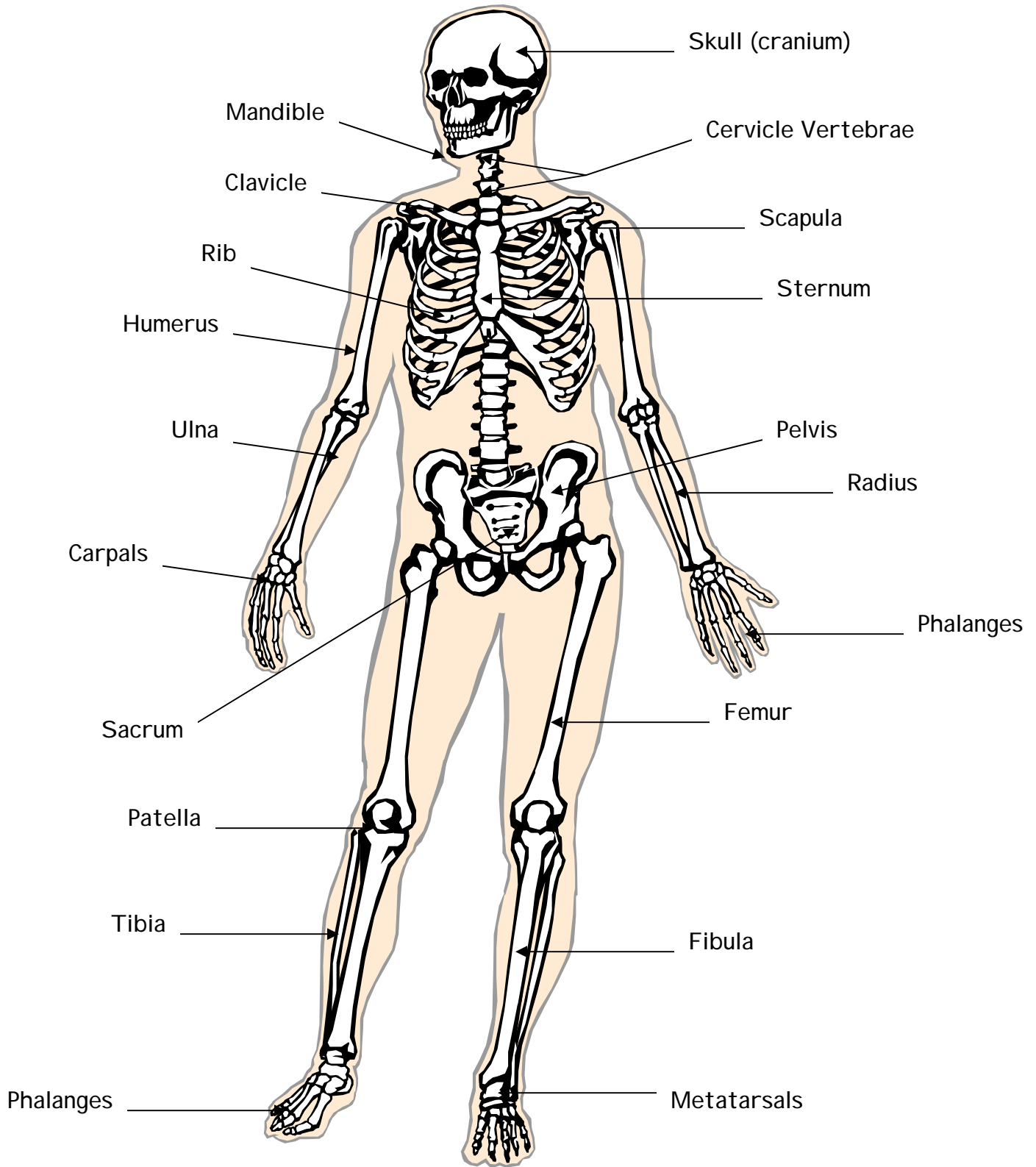
## Word Bank for Bone Names Test

Patella	Fibula	Pelvis
Sacrum	Rib	Skull
Scapula	Phalanges	Metatarsals
Tibia	Mandible	Clavicle
Radius	Humerus	Ulna
Femur	Sternum	Carpals
Cervicle Vertebrae	Phalanges	

## Answers for Human Body Test

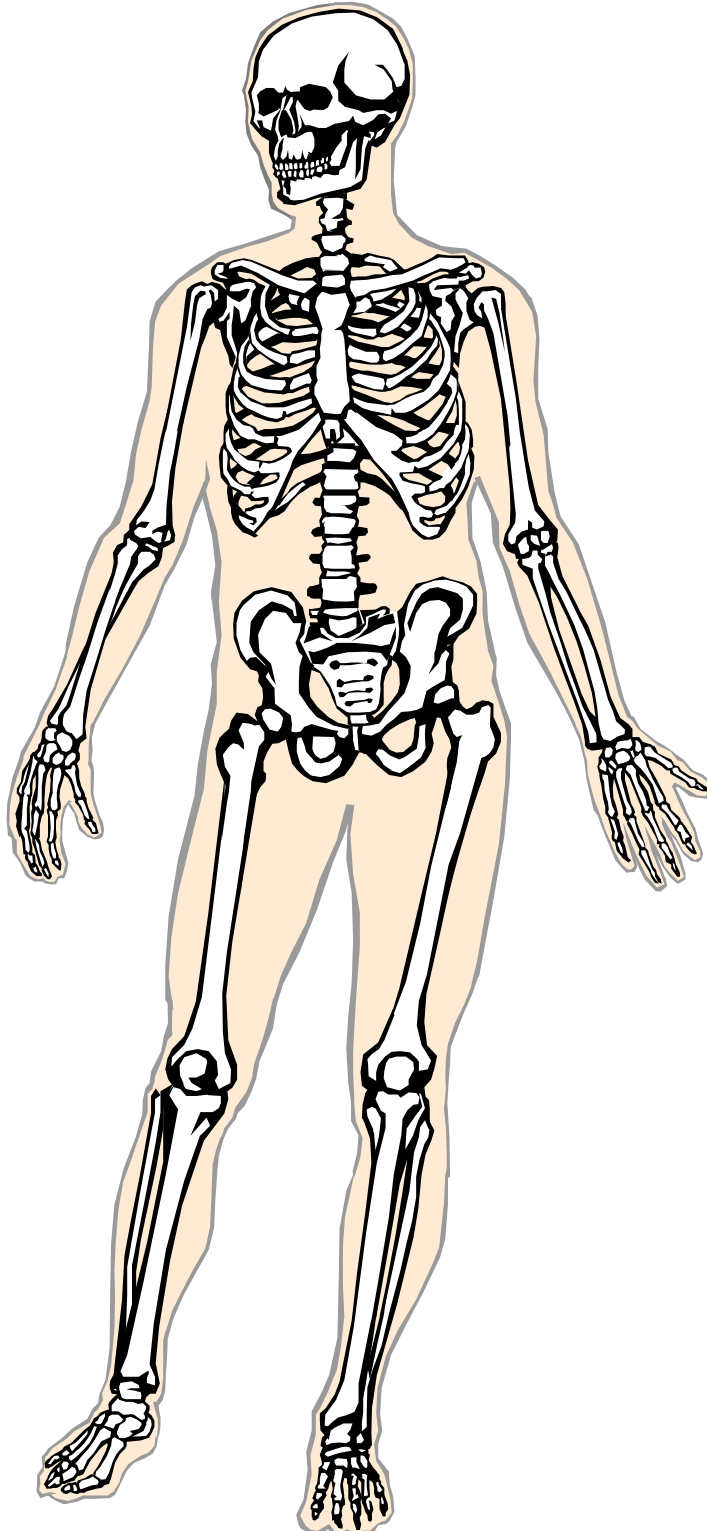
1. Possible answers could include: you'd be a lump
2. support, movement, protection
3. 206; 300; fuse (grow)
4. They act as shields or protection around vital organs. The skull protects the brain, the rib cage protects the heart and lungs, and the backbone protects the spinal cord.
5. it is the longest bone
6. inner ear
7. a. get enough calcium, c. wear a bike helmet, f. eat healthy foods
8. head
9. leg
10. arm
11. True
12. True
13. False
14. False
15. True
16. False
17. They allow bones to move.
18. leg, arm, finger
19. shoulder, hip
20. voluntary, involuntary, cardiac
21. moves bones in your body, under your control, skeletal muscle
22. ex. a leg kicking a ball
23. heart
24. extend; contract
25. True
26. True
27. False
28. False
29. False
30. bones
31. ankle
32. Answers will vary.

Appendix O, page 2



Appendix P  
**Study Guide For The Human Body**  
**Bones Test**

Be able to identify 15 bones on the Human Body. A word bank will be provided. Spelling will count. Test will be given \_\_\_\_\_.



## Appendix Q

# **FLEX YOUR MUSCLE**

DIRECTIONS (to be done with the “Flex Your Muscle” sheet)

1. Color the page.
2. Cut out the three pieces along the solid black lines.
3. Cut out the slit along the solid black line of the upper arm piece. Use the tip of your brad to punch holes where you see the dark black dots.
4. Set the two arm pieces at right angles to each other with the lower arm on top. Put one brad through the lower arm’s hole and the upper arm’s hole.
5. Set the muscle piece behind the arm pieces. Match up the hole to the other hole of the lower arm and feed the brad through. Fold the brad’s ends back.
6. Slide the end of the muscle labeled PULL through the slit so it can be pulled from the front of the model.

## DID YOU KNOW?

Many of our muscles work in pairs. When one muscle contracts the other one relaxes. Put one hand, palm up, under your desk. Push upwards. Feel the front and back of your upper arm, with your other hand. Did the muscle in front or back get hard? The hard muscle in front is your biceps. When it bunches up, the muscle in the back of the arm (the triceps) relaxes. Now press on the desktop with their palms and feel their muscles again. Did you notice that the triceps got hard (contracted) and the biceps relaxed?

## Appendix R Muscles

Directions: Put the correct activity under the correct heading.

### **VOLUNTARY MUSCLES (Skeletal)**

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_

### **INVOLUNTARY MUSCLES (Smooth)**

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_

kick a ball

pupil of the eye gets larger

smile

blood flows through body

thread a needle

digestion of food

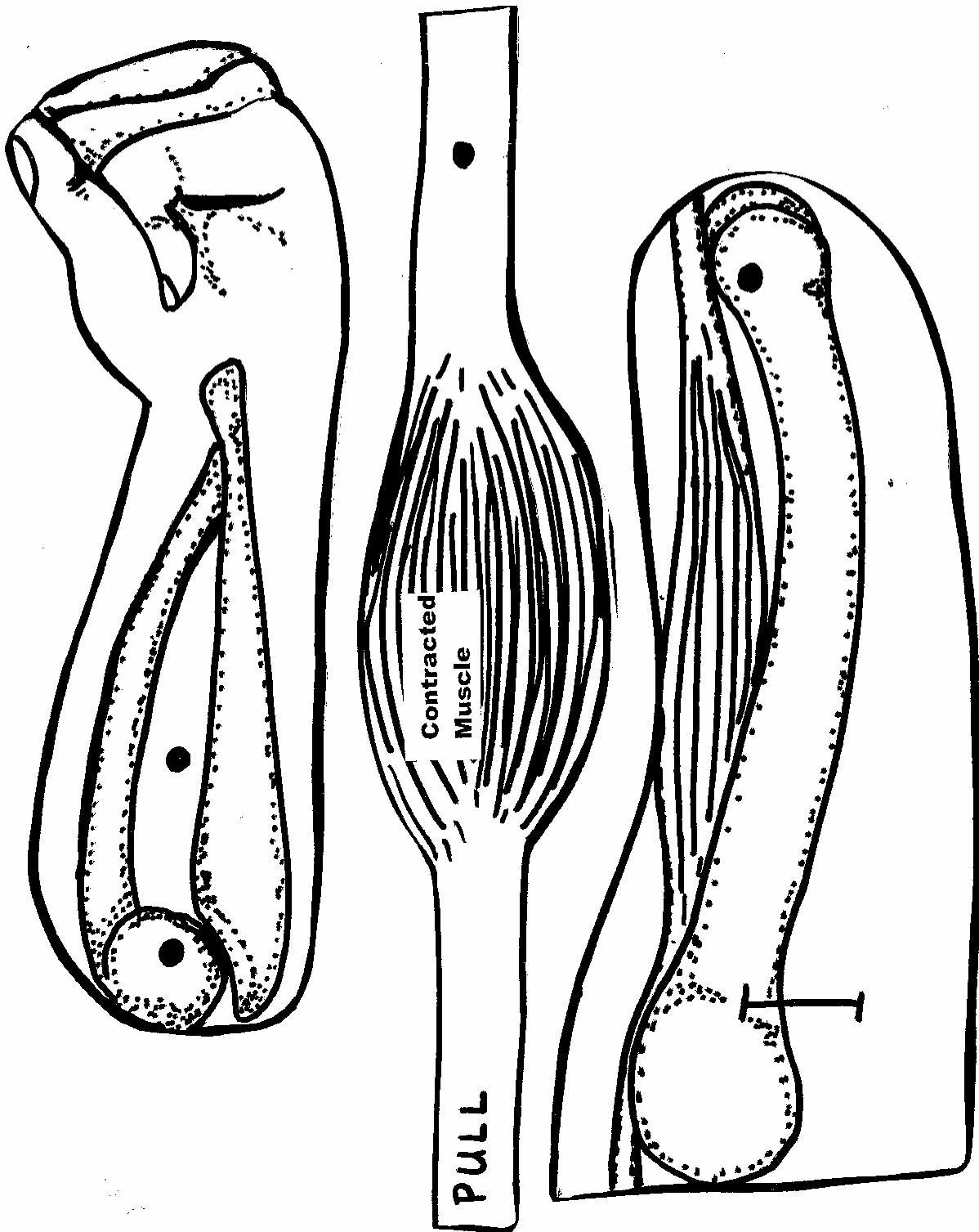
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### Answers

Voluntary (skeletal)-kick a ball, smile, thread a needle

Involuntary (smooth)-blood flows through body, digestion of food, pupil of the eye gets larger.

Appendix S  
**Flex That Muscle**



(adapted from *Easy to Make and Learn Projects: Human Body*-Scholastic Professional Books by Donald M. Solver and Patricia J. Wynne)