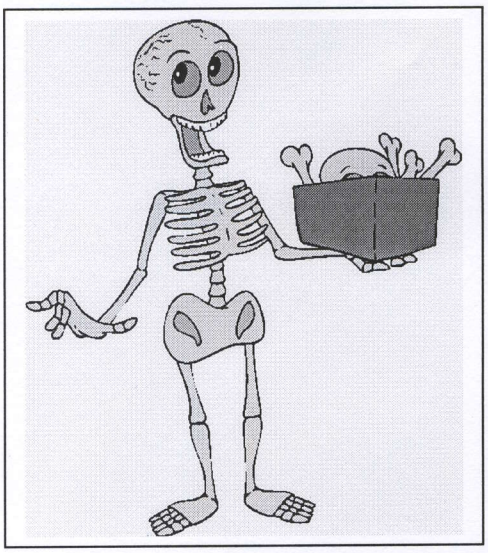
Grade 6



The Skeletal System

Science & Technology

Name_____

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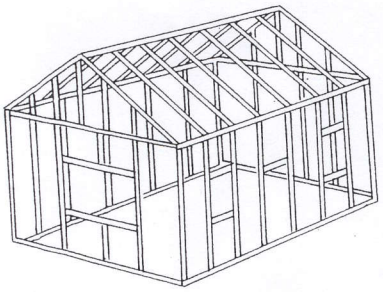
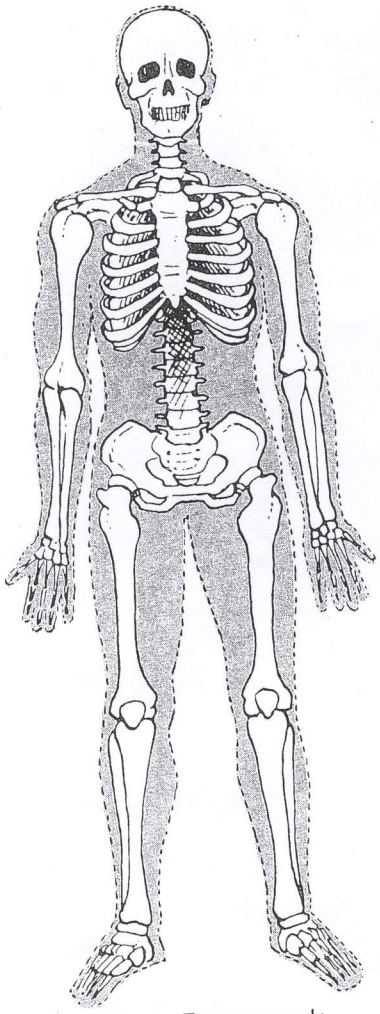
The Skeletal System

The Skeleton



House Framework



Body Framework

The framework of a house holds all the parts of the house in place. It gives the house its shape. You have a framework of bones called a **skeleton.** Your skeleton supports your body. It gives shape to your body. Without a skeleton you would not be able to stand up.

Your skeleton is made up of 206 bones of different shapes and sizes. There are tiny bones in your fingers, and long bones in your arms and legs. All the bones are part of your **skeletal system.** The bones of the skeletal system work together with muscles to produce movement. People can walk, run, wave their arms, and jump. All these motions and others are possible because muscles move the bones of the skeleton.

The bones of the skeleton also protect the soft parts of your body. Your heart and lungs are protected by a cage of rib bones. Your brain is covered by a bony skull. You will learn more about these bones as you read the rest of the unit.

Bones help the body in another way. The bones of the skeleton store minerals that the body needs. These minerals help keep the bones and teeth strong. Bones also make cells for the blood.

A. Answer True or False.

1. The skeleton gives your body shape. _____
2. A skeleton helps support your body. _____

3. The bones of the skeleton store important minerals. _____
4. Bones can move without muscles. _____
5. The skeleton protects soft body parts. _____

B. Complete the sentences. Use the words below.

bones	muscles	support
framework	protects	

1. The skeleton is like the _____ of a house.
2. The skeleton is made up of 206 _____.
3. Bones and _____ produce movement.
4. The skeleton _____ the soft parts of the body.
5. The body gets shape and _____ from the skeleton.

C. Use each word to write a sentence about the skeletal system.

1. skeleton _____

_____

2. bones _____

_____

D. Answer the questions.

1. What are two things your skeleton does for your body? _____

_____

_____

2. What parts of your body work together to help you move? _____

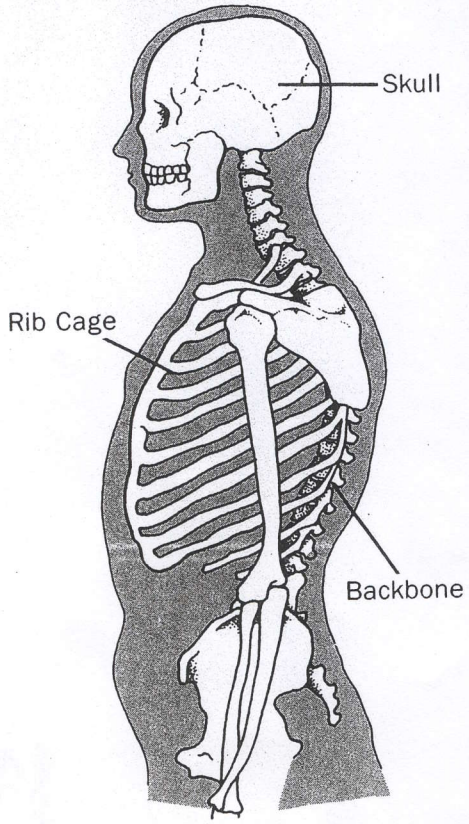
_____

3. What parts of your body are protected by the skeleton? _____

_____

The Skeletal System

The Parts of the Skeleton



Bend forward and run your fingers down the middle of your back. Do you feel a line of bones? Each of the small bones you feel is called a **vertebra.** Many vertebrae are stacked on top of each other. This column of 26 vertebrae forms the **backbone.**

Each vertebra has a hole in the middle. The **spinal cord** goes through these holes. It is part of your nervous system. The spinal cord connects your brain with other parts of your body. An injury to the spinal cord could prevent parts of the body from moving. The important job of the backbone is to protect the spinal cord. (You will read more about the spinal cord and the nervous system later in this book.)

Attached to the backbone are 12 pairs of bones. These bones, or ribs, curve around the body. They form a kind of cage. The **rib cage** protects the heart and lungs. Ten of the bone pairs are attached to the breastbone at the front of the cage.

Another group of bones protects your eyes and brain. These bones form the **skull.** It may feel like one, large, round bone. But the skull is really made up of many bones. The bones of your face are also part of the skull.

A. Answer True or False.

1. The skull is shaped like a cage. _____
2. The backbone is made up of many vertebrae. _____

3. The brain is protected by the backbone. _____
4. The skull protects the brain. _____
5. The ribs protect the spinal cord. _____
6. The ribs are part of the skeletal system. _____

B. Write the letter for the correct answer.

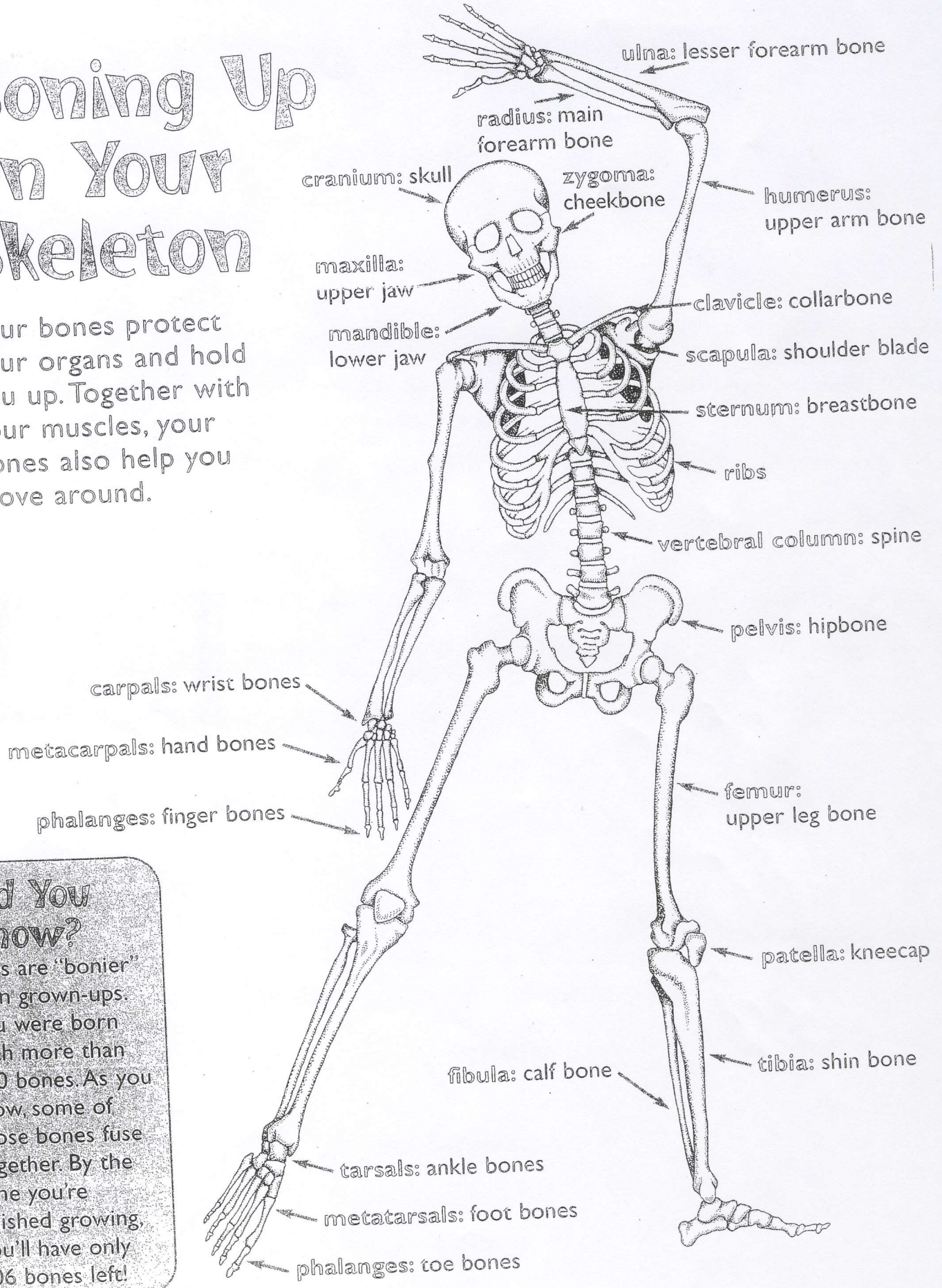
1. A vertebra is part of the _____.
   (a) skull (b) backbone (c) rib cage
2. The ribs are attached to the _____.
   (a) skull (b) brain (c) backbone
3. A group of bones that protects the brain is the _____.
   (a) skull (b) backbone (c) rib cage
4. The backbone is made up of many _____.
   (a) cords (b) ribs (c) vertebrae
5. The part of the skeleton that protects the spinal cord is the _____.
   (a) rib cage (b) skull (c) backbone
6. The _____ is the part of the skeleton that protects the heart.
   (a) skull (b) rib cage (c) backbone

C. Answer the questions.

1. What is the important job of the rib cage? _____
   _____
2. What are the bones of the backbone called? _____
3. Name the important job of the skull. _____
   _____
4. What could happen if your spinal cord were injured? _____
   _____
5. What is the important job of the backbone? _____
   _____

Boning Up on Your Skeleton

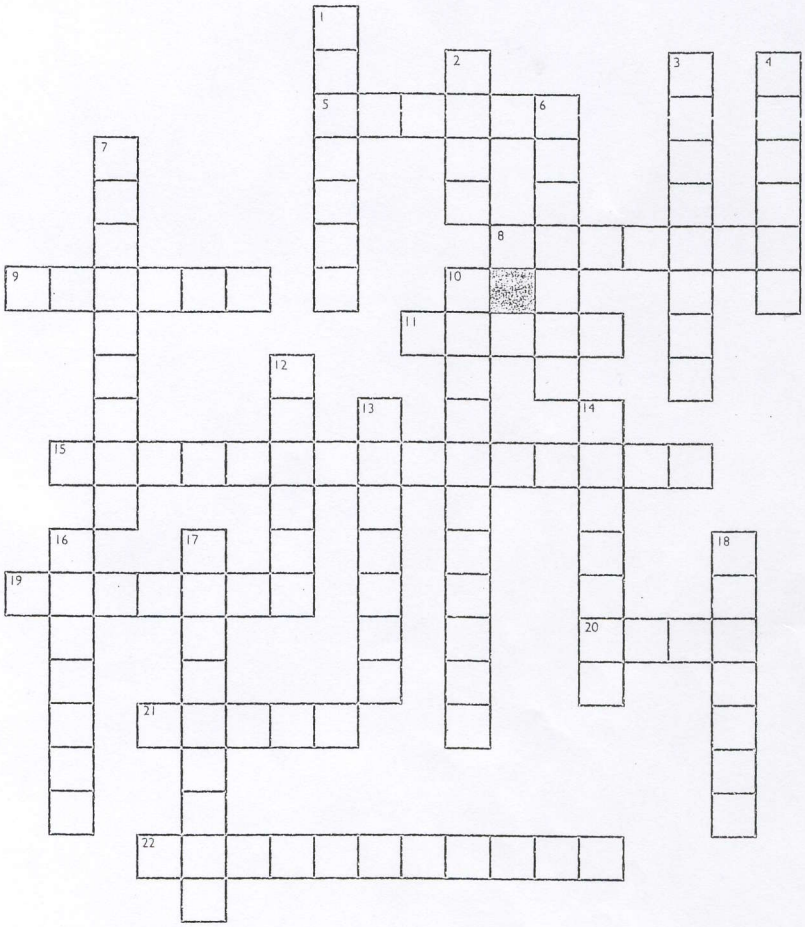
Your bones protect your organs and hold you up. Together with your muscles, your bones also help you move around.



Did You Know?

Kids are "bonier" than grown-ups. You were born with more than 300 bones. As you grow, some of those bones fuse together. By the time you're finished growing, you'll have only 206 bones left!

Boning Up on Your Skeleton



Across

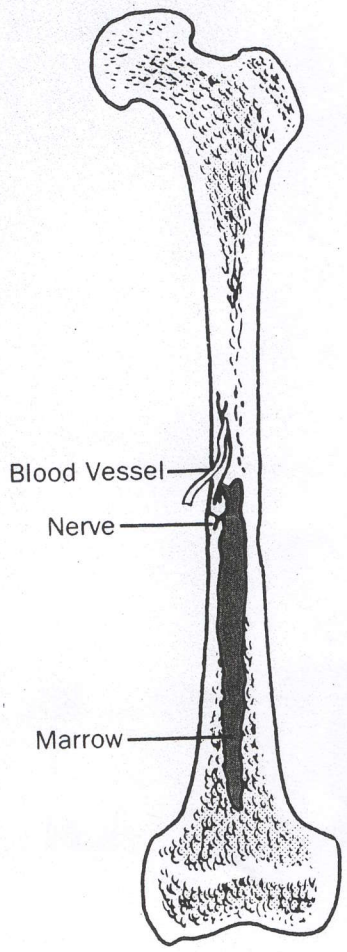
5. The bone between the inside of your elbow and your wrist is your _____.
8. This bone protects your brain.
9. Your upper leg bone is attached to your torso at your _____.
11. The bone between your hip and knee is your _____.
15. Sit up straight. You just used your spine, or _____.
19. Your upper teeth are rooted in your _____.
20. Your lesser forearm bone is called your _____.
21. This bone runs parallel to 12 Down.
22. Your foot bones are called _____.

Down

1. The bones between your metatarsals and your tibia are called _____.
2. Your _____ protect your heart and lungs.
3. To open your mouth, you need to move your _____.
4. Some muscles that help you grin are attached to each cheekbone, or _____.
6. Your upper ribs connect in front to a bone called the _____.
7. Your toes and fingers are all called _____.
10. The bones in the palm of your hand are called _____.
12. Your calf bone is called your _____.
13. The round, flat bone that protects the joint between your upper and lower leg bones is called your _____.
14. The _____ connects your shoulder to your forearm.
16. Your wrist bones are called _____.
17. Both your _____ stretch from shoulder to shoulder in front.
18. A shoulder blade is called a _____.

The Skeletal System

Bones



Inside a Bone

Bones are the hardest and the strongest parts of your body. You might think that bones don't grow or change. But like all the other parts of your body, bones are made of cells. When bone cells divide, bones grow longer. How can you tell that your bones have grown?

Bones can grow. They can also repair themselves. The outside of a bone is hard, but the inside is soft. Inside a bone are blood vessels and nerves. If a bone breaks, the bone repairs itself from the inside out. The blood vessels carry food into the bone. The food helps to build new bone.

Bone also contains a soft material called **marrow.** Red blood cells for the body are made in the marrow.

Not all parts of your body are shaped or supported by bone. Gently move the tip of your nose from side to side. Bend the tip of an ear forward. These parts of your body contain **cartilage.** Cartilage is part of your skeleton but it is softer than bone. It can bend without breaking. Cartilage supports your nose and ears. It is found between the vertebrae. The vertebrae are the bones of the backbone. Cartilage is also found where some bones come together. In all these places the cartilage acts as a cushion.

When you were born, almost all of your skeleton was made of soft, flexible cartilage. Within months, bones began to form from the cartilage. What parts of your skeleton never changed to bone?

A. Answer True or False.

1. Cartilage is harder than bone. _____
2. You have the same amount of cartilage in your body all your life. _____
3. Bones can repair themselves. _____
4. Red blood cells are made in marrow. _____
5. Bones always stay the same size. _____
6. Some cartilage changes to bone. _____

B. Complete the sentences. Use the words below.

blood vessels	cartilage	marrow
bones	cells	red blood cells

1. Bones can grow because they are made of _____.
2. The soft material inside a bone is _____.
3. When a bone breaks, _____ carry food into the bone.
4. Your nose and ears are supported by _____.
5. The bone marrow makes _____.
6. The hardest parts of your body are your _____.

C. Answer the questions.

1. What part of your skeleton can bend without breaking? _____
2. What do blood vessels do in the bones? _____
3. Where do new red blood cells come from? _____
4. What is a baby's skeleton made of? _____
5. What shapes and supports your arms and legs? _____

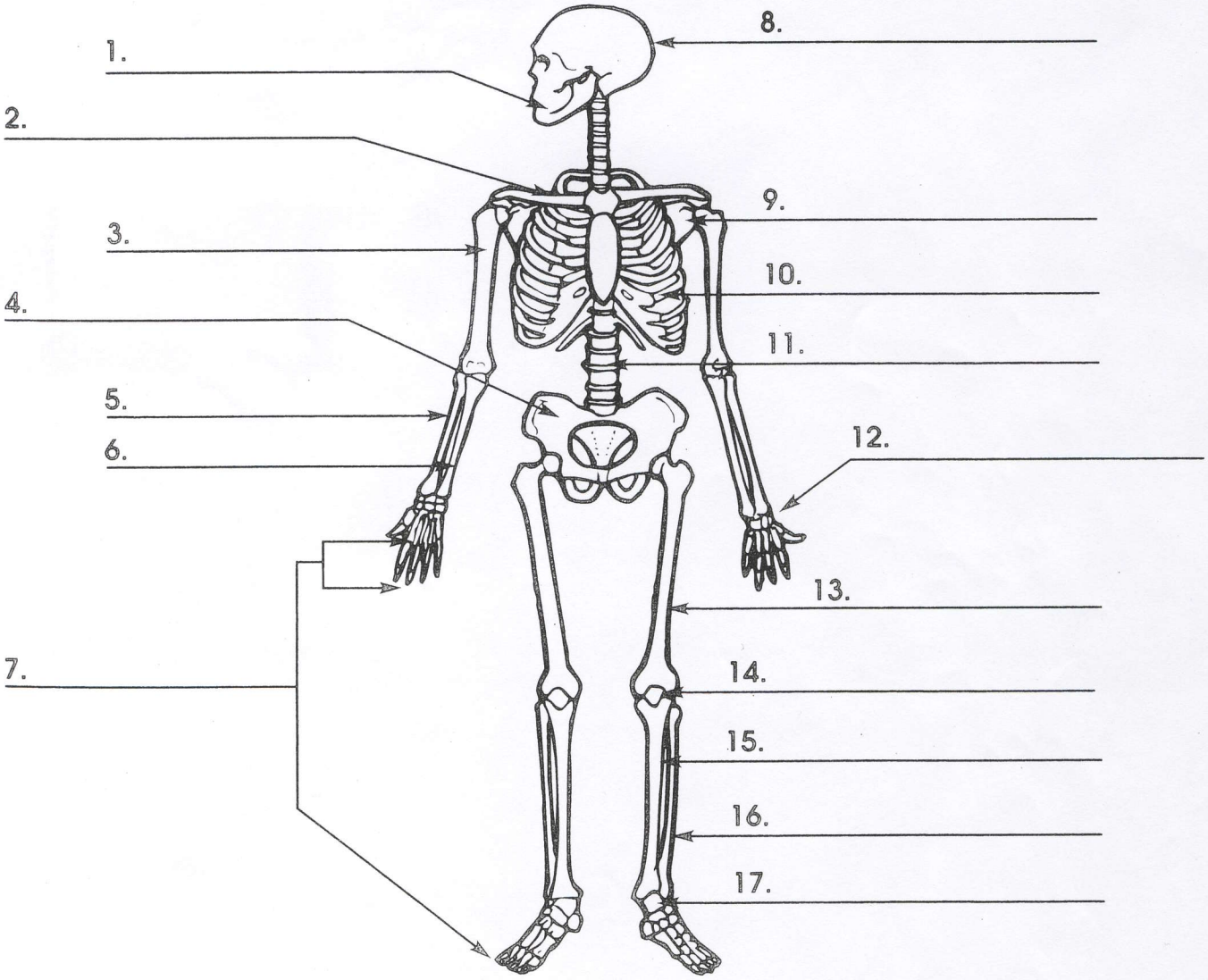
The Framework of the Body

Label the major bones of the body in the diagram of the skeletal system.

Word Bank

Scientific Name (Common Name)

cranium (skull)
carpals (wrist bones)
pelvis (hipbone)
tarsals (ankle bones)
tibia (shinbone)
phalanges (fingers and toes)
clavicle (collarbone)
patella (kneecap)
scapula (shoulder blade)
fibula (lower leg bone)
rib cage (ribs)
radius (lower arm bone)
vertebrae (backbone)
femur (thighbone)
ulna (lower arm bone)
mandible (jawbone)
humerus (upper arm bone)



Bone Up on This!

Calcium in Bones

Calcium is a very hard mineral that helps make bones and teeth strong. Calcium comes from the foods we eat. To have healthy bones and teeth, it is important to eat foods such as milk, yogurt, cheese, and leafy, green vegetables.

Question:

What is the purpose of calcium in bones?

Materials Needed:

- 2 cleaned chicken leg bones
- white vinegar
- 2 jars with lids

Procedure:

A. Put a cleaned chicken leg bone in a jar filled with vinegar and put the lid on the jar. (Vinegar will dissolve the calcium from the bone.)

B. Put the other bone into an empty jar and put the lid on the jar.

C. Wait at least one week and then remove the bones from the jars. Compare them by trying to bend each bone.

Results:

How is the bone that still has calcium different from the bone that lost its calcium when it was soaked in the vinegar?

_____

Conclusions:

Why is it important to have calcium in our bones? What does calcium do for our bones?

_____

_____

_____

Describe some problems that people could have if they do not get enough calcium in their diets.

_____

_____

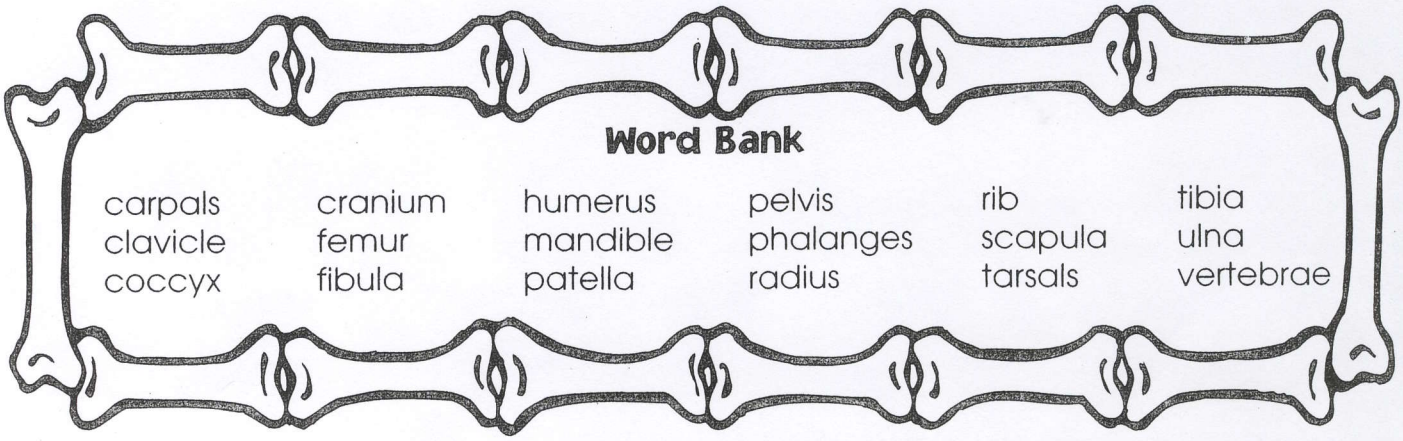
_____

_____

_____

No Bones about It!

Circle the words from the Word Bank in the puzzle. The words can be found horizontally, vertically, and diagonally.



Word Bank

carpals	cranium	humerus	pelvis	rib	tibia
clavicle	femur	mandible	phalanges	scapula	ulna
coccyx	fibula	patella	radius	tarsals	vertebrae

o	c	c	x	y	c	a	r	p	o	f	r	a	d	i
f	s	e	g	n	a	l	a	h	p	i	e	b	t	y
i	d	s	e	v	x	y	z	b	a	b	v	m	h	s
t	i	b	r	s	e	e	i	f	l	u	e	a	u	z
a	p	a	m	b	c	r	c	i	l	l	r	n	m	r
r	d	e	u	f	g	a	t	b	e	a	t	d	e	a
s	h	i	l	l	g	k	p	e	l	x	e	i	r	d
a	l	m	n	v	n	o	p	u	b	i	b	b	u	i
l	x	x	a	t	i	a	r	s	l	r	r	l	s	u
s	a	y	r	v	w	s	s	c	x	a	a	e	t	s
d	b	z	c	a	r	p	a	l	s	f	t	e	a	r
e	c	e	l	c	i	v	a	l	c	e	y	c	r	i
a	i	b	i	t	o	u	l	l	h	m	x	b	s	d
m	a	n	b	i	l	c	e	p	a	t	e	l	l	a

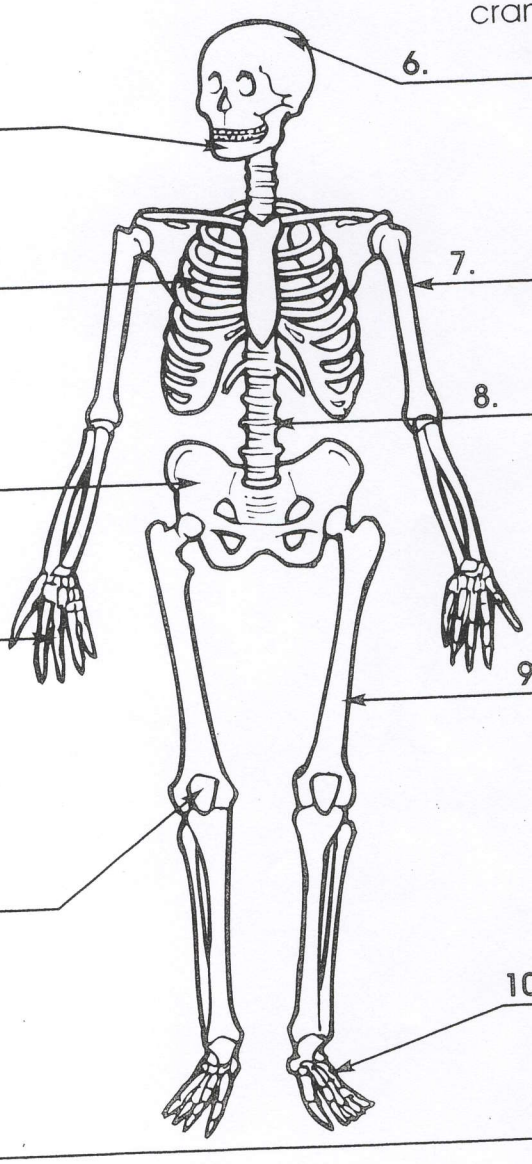
Mr. Matchmaker

Most bones have a scientific name and a common name.

Write the words from the Word Bank in the spaces to match the common name of each bone to its scientific name.

Word Bank
Common Name

arm bone	thighbone	kneecap	skull	foot bones
finger bones	hipbone	backbone	ribs	jawbone



mandible
1. _____

rib cage
2. _____

pelvis
3. _____

phalanges
4. _____

patella
5. _____

cranium
6. _____

humerus
7. _____

vertebrae
8. _____

femur
9. _____

metatarsals
10. _____

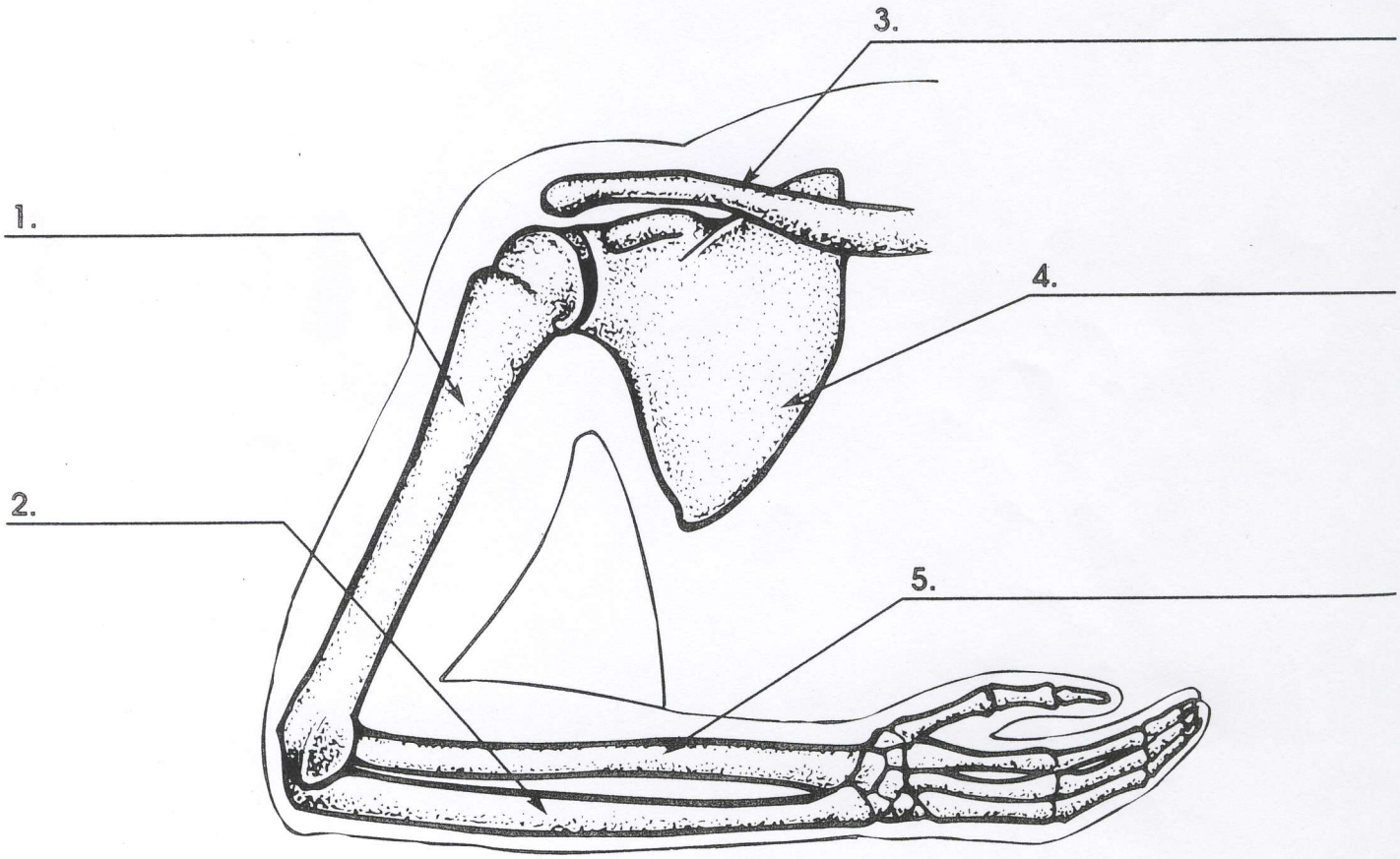
Shoulder and Arm Bones

Use the words from the Word Bank to label the diagram of the shoulder and arm.

Word Bank

Scientific Name (Common Name)

scapula (shoulder blade)
clavicle (collarbone)
humerus (upper arm bone)
ulna (lower arm bone)
radius (lower arm bone)



A Spine-Tingling Experience

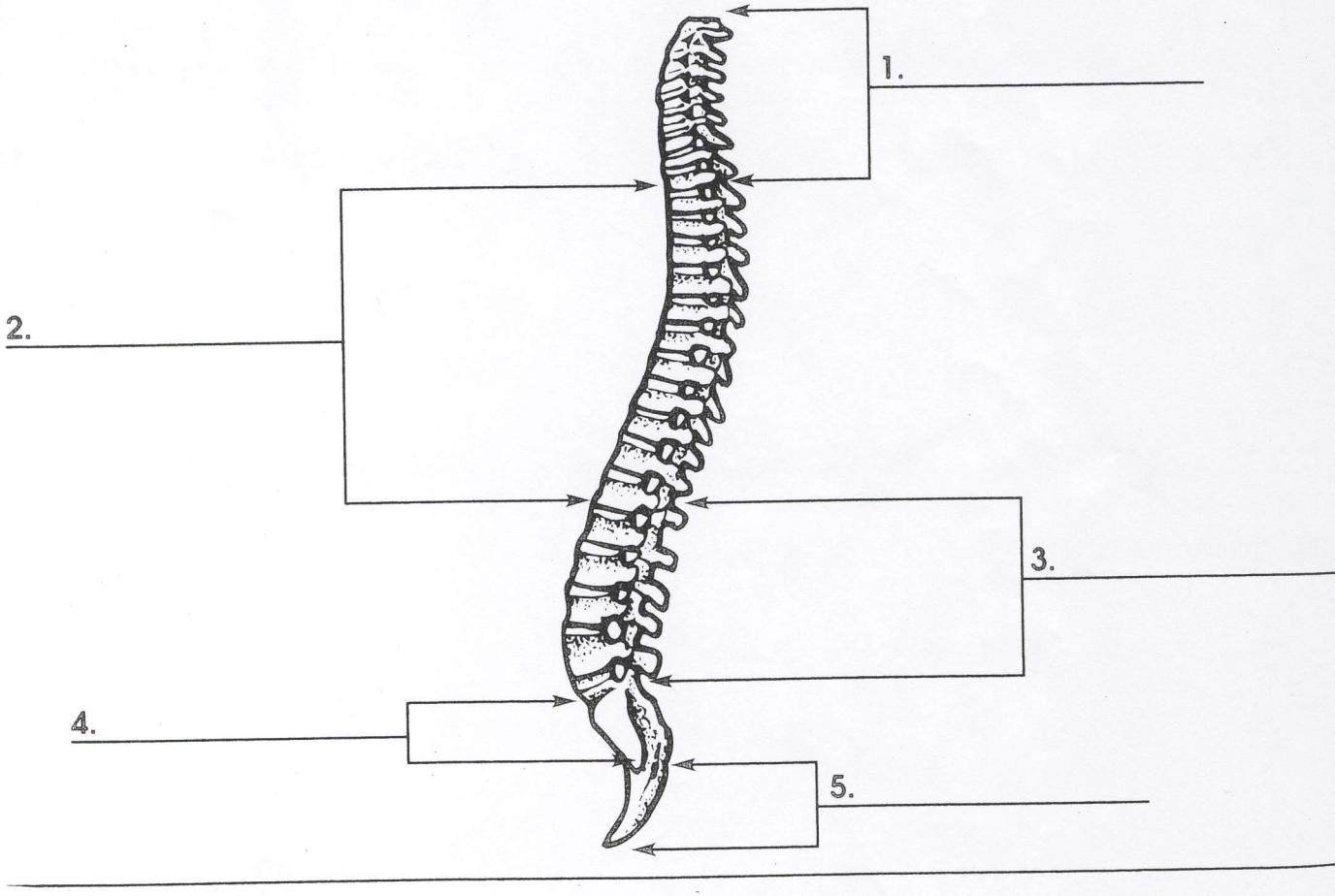
The spinal column, or backbone, provides the main upright support for the body. It is made up of 27 small ring-like bones in a series, called vertebrae. The vertebrae enclose and protect the spinal cord, which is made of delicate nerve tissue. There are discs of cartilage between each of the vertebrae that act as cushions, or shock absorbers, in the spinal column. The vertebrae are not all exactly alike, even though they look similar. Some vertebrae are attached to the ribs, and some in the pelvic region are joined together.

Label each region of the vertebral column in the diagram of a backbone.

Word Bank

Scientific Name (Common Name)

cervical (neck)
coccygeal (tailbone)
thoracic (chest)
lumbar (lower back)
sacral (pelvic girdle)



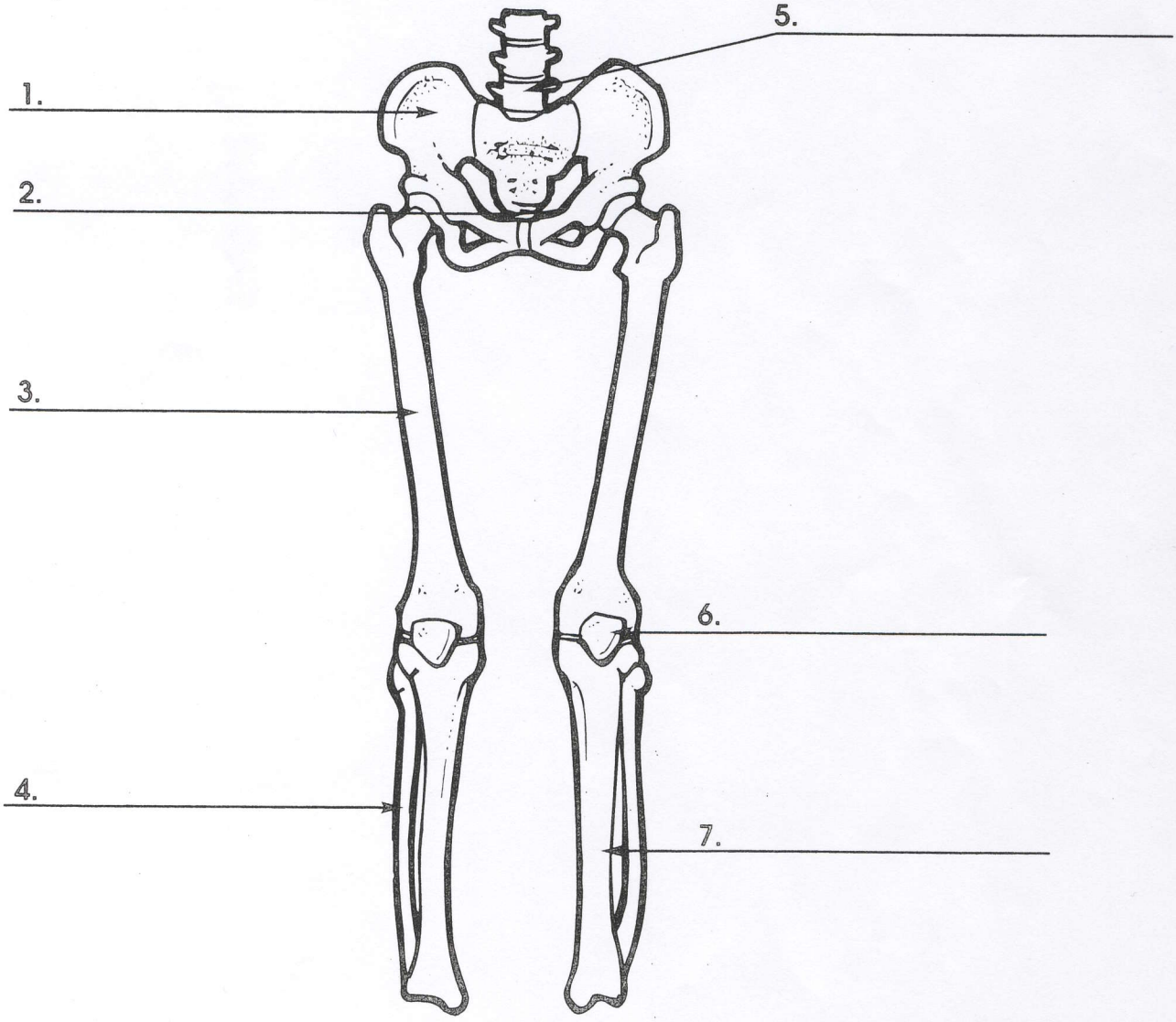
Hip and Leg Bones

Use the words from the Word Bank to label the diagram of the hip and legs.

Word Bank

Scientific Name (Common Name)

femur (thighbone)
fibula (lower leg bone)
lumbar vertebra (lower back vertebra)
patella (kneecap)
tibia (shinbone)
pelvis (hipbone)
coccyx (tailbone)



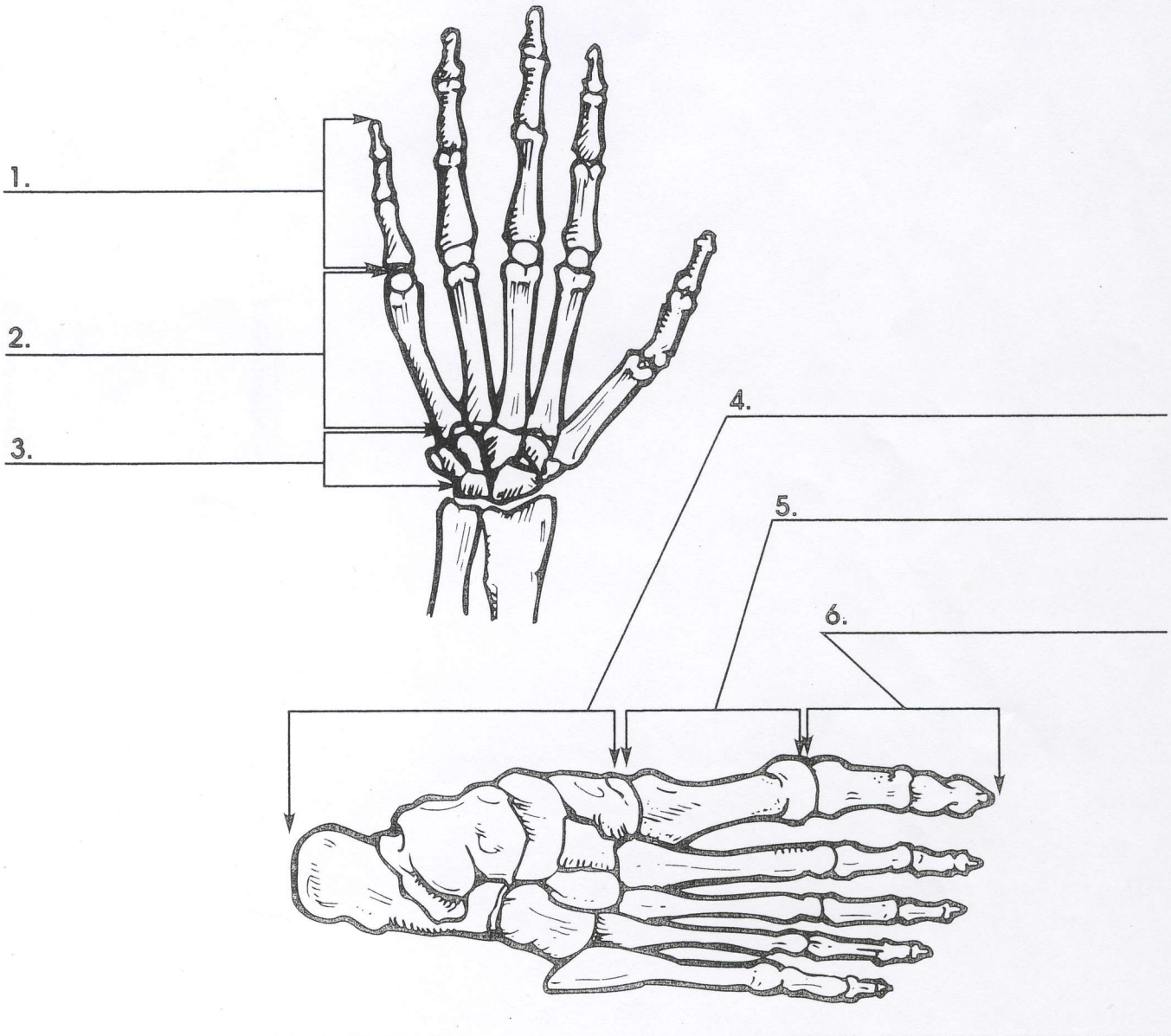
Hands and Feet

Use the words from the Word Bank to label the bones of the hand and foot.

Word Bank

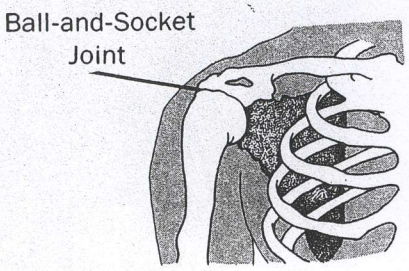
Scientific Name (Common Name)

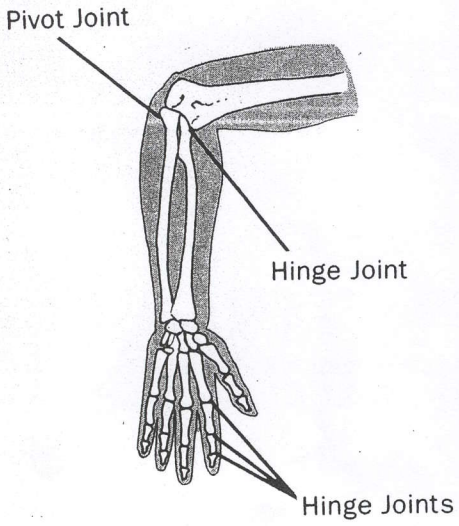
phalanges (finger bones)	carpal (wrist)	phalanges (toe bones)
metatarsals (foot bones)	tarsal (ankle)	metacarpal (palm)

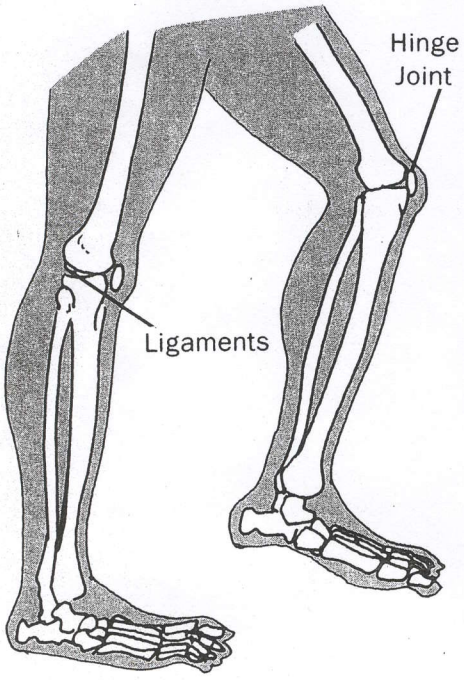


The Skeletal System

Joints







You would not be able to move your body without **joints.** A joint is a place where two bones come together. At every joint, bones are held together by strong threadlike tissues called **ligaments.** Together, joints and ligaments let bones move.

There are three different kinds of moveable joints in the body. **Hinge joints** work like the hinge of a door. They can bend back and forth in only one direction. You have hinge joints in your elbows and knees. You also have hinge joints in your fingers and toes. These joints let you move all the many small bones in your hands and feet.

Your head is connected to your backbone by a **pivot joint.** A pivot joint can move around and back. This joint lets you twist your head around and look over your shoulder. You can also bend your head back or forward.

Remember that your elbow has a hinge joint. But it also has a pivot joint. This joint lets your arm twist so you can do things like turn a doorknob.

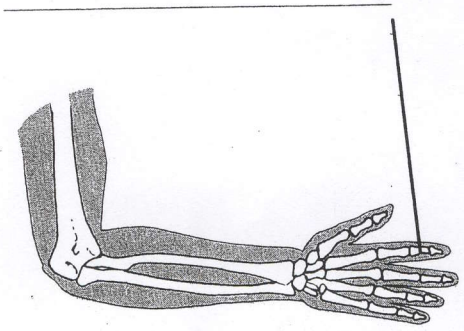
The joint that allows the most movement is a **ball-and-socket joint.** It can move in all directions. In a ball-and-socket joint, the end of one bone is shaped like a ball. It fits into a curved space at the end of the other bone. Your shoulders and hips have this kind of joint. A ball-and-socket joint can move in a complete circle. This lets you make the movements to throw a baseball or swim.

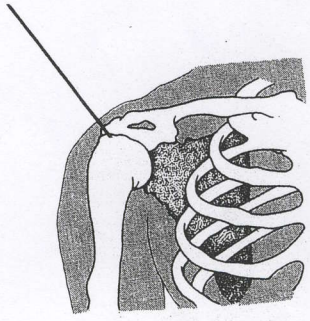
A. Write the letter for the correct answer.

1. Bones come together at _____.
   (a) ligaments (b) joints (c) elbows
2. Hinge joints bend _____.
   (a) in one direction (b) in many directions (c) all around
3. Your fingers have _____.
   (a) hinge joints (b) ball-and-socket joints (c) no joints
4. Bones are held together by _____.
   (a) blood vessels (b) nerves (c) ligaments

B. Label the joints in the diagram.

_____ _____





C. Use each word to write a sentence about how your body moves.

1. hinge joint _____

   _____

2. ball-and-socket joint _____

   _____

D. Answer the questions.

1. What tissues hold bones together? _____
2. How do hinge joints work? _____

   _____

3. What kind of joint can move in a complete circle? _____

   _____

A Joint Effort

A joint is where two or more bones are joined together. There are many different kinds of joints in the body.

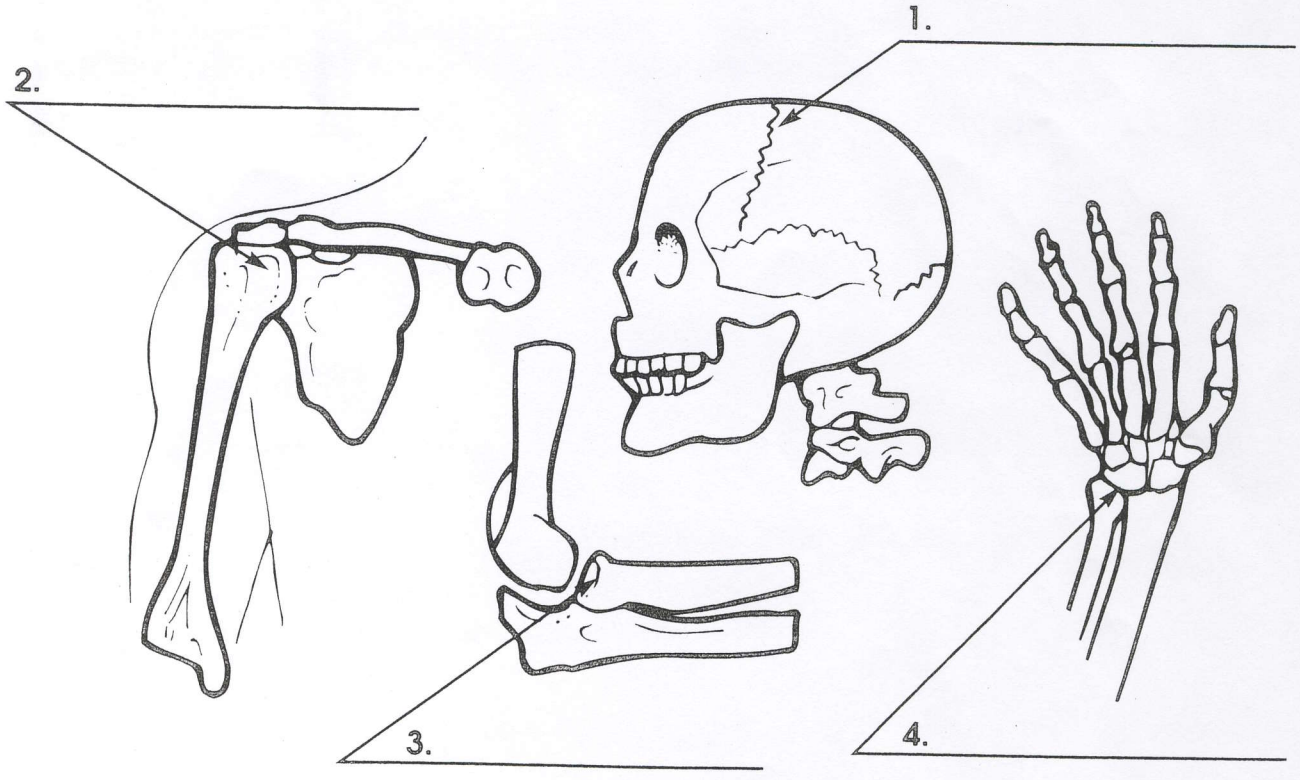
Write the name of each type of joint in the spaces below.

A. Fixed joints, as found in the skull, do not move.

B. Partially moveable joints, as found between the vertebrae of the back, allow some movement of bones.

C. Moveable joints allow full movement of bones.

1. Ball-and-socket joints, which are found in the shoulder, allow the bones to swing in almost any direction.
2. Hinge joints, such as the joints in the elbow and knee, allow movement in one direction.
3. Pivot joints, which are found in the neck, form when one bone rests and rotates from a certain point.
4. Gliding joints, such as the wrist, are formed when two bones that can move separately meet.



Let's Join In

Classify the following joints by writing the letter naming the type of joint in the blank before each joint. For moveable joints, write the letter and the correct number.

A. Fixed joints allow no movement of bones.

B. Partially moveable joints allow some movement of bones.

C. Moveable joints allow full movement of bones.

1. Ball-and-socket joints allow movement in any direction.
2. Hinge joints allow movement in only one direction.
3. Pivot joints allow rotating movement from side to side.
4. Gliding joints allow sliding movement back and forth.

_____ 1. knee

_____ 2. elbow

_____ 3. vertebrae

_____ 4. skull

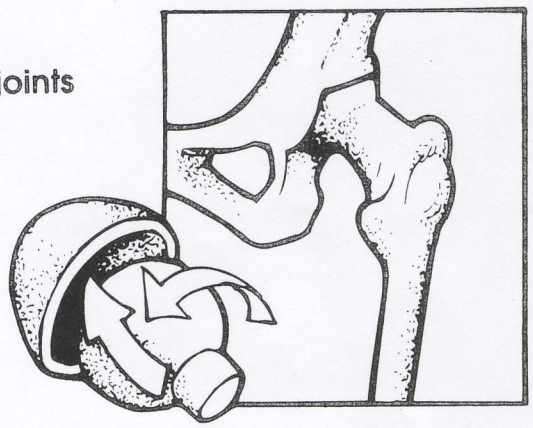
_____ 5. wrist

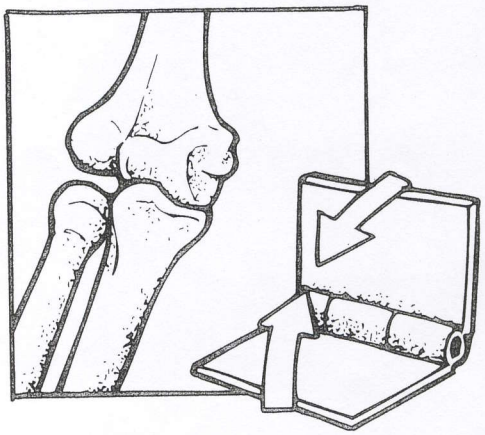
_____ 6. neck

_____ 7. shoulder

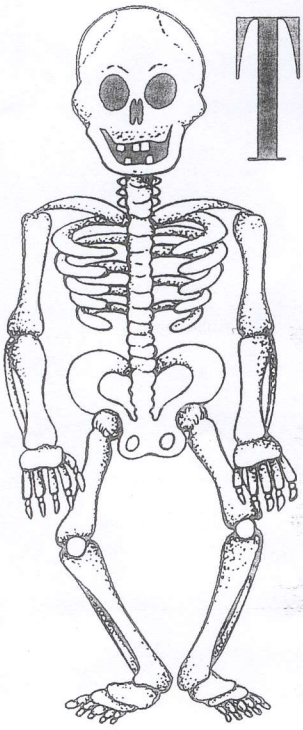
_____ 8. hip

ball-and-socket joints

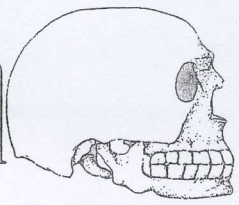




hinge joints



The Skeletal System



Activity One

"Bone" - y Terminology

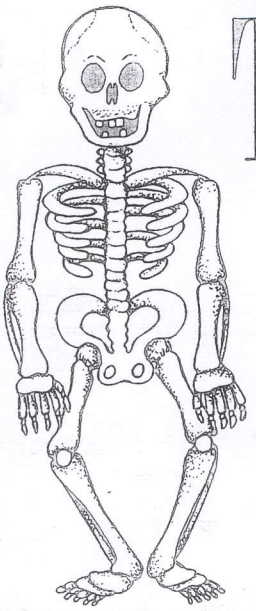
How knowledgeable are you about "bone" - y terminology?

In the sentences that follow, see if you can fill in the blanks using the words located in the box at the bottom of the page.

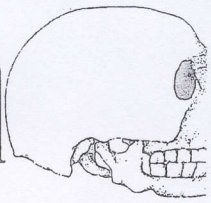
Use resource books or a dictionary, where necessary.

1. Strong bands that help to keep our bones in their proper place are called _____.
2. A _____ is the place where two bones come together and fit against one another.
3. A soft yellow or red substance found in the central cavities of the bones is called the _____.
4. The _____ is the only bone in the skull that moves.
5. If a bone breaks, the condition is known as a _____.
6. A small triangular bone at the end of the spine is known as the _____.
7. _____ are the tough connective tissues that fasten muscles to the bones.

jawbone, marrow, ligaments, coccyx, tendons, joint, fracture



The Skeletal System



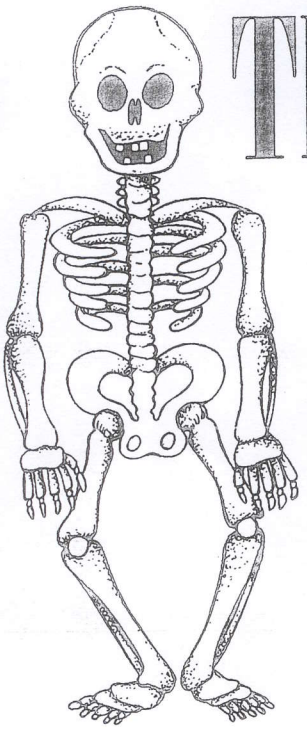
Activity Two

"Boning Up" on Information

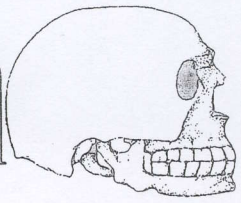
Do some research and decide which of the three answers is the best one. All questions have to do with the skeleton - you body's framework.

Underline the correct answer.

1. How many red blood cells does bone manufacture every day?
   a) five hundred b) ten thousand c) one billion
2. How many bones are there in your body?
   a) 206 b) 300 c) 150
3. What is the main mineral found in bone?
   a) magnesium b) calcium c) potassium
4. Where are half of the body's bones located?
   a) in your arms and legs b) in your hands and feet
   c) in your brain and spinal cord
5. What is the human skull made of?
   a) one bone b) two bones joined together c) 29 different bones
6. What is the shock absorber in your body?
   a) the knee b) the elbow c) the spine
7. Which bone is the strongest and heaviest of all the bones in your body?
   a) femur b) tibia c) fibula
8. Which bone is your "funny bone"?
   a) elbow b) humerus c) radius
9. Which bones form a kind of cage?
   a) ribs b) pelvis c) spine
10. What is the soft tissue called that fills the hollow or central part of most bones?
    a) cartilage b) marrow c) vitamins



The Skeletal System



Activity Three

Mr. Skelly-Ton

Part A:

Below are the names of several bones in our body.

Match the bones with the appropriate body parts.

Then show where each bone is on "Mr. Skelly-Ton".

Consult an encyclopedia or other resource books and do some reading on the skeletal system prior to doing this activity.

Bones

a) femur _____

b) cranium _____

c) tibia _____

d) ulna _____

e) sternum _____

f) tarsals _____

g) patella _____

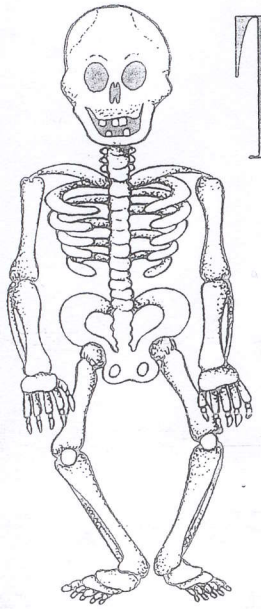
h) phalanx _____

i) clavicle _____

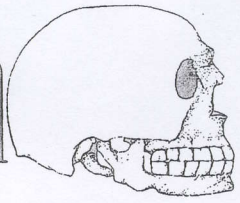
j) mandible _____

Body Locations

1. ankle
2. knee
3. thigh
4. forearm
5. fingers
6. shoulder
7. jaw
8. brain
9. shin
10. chest



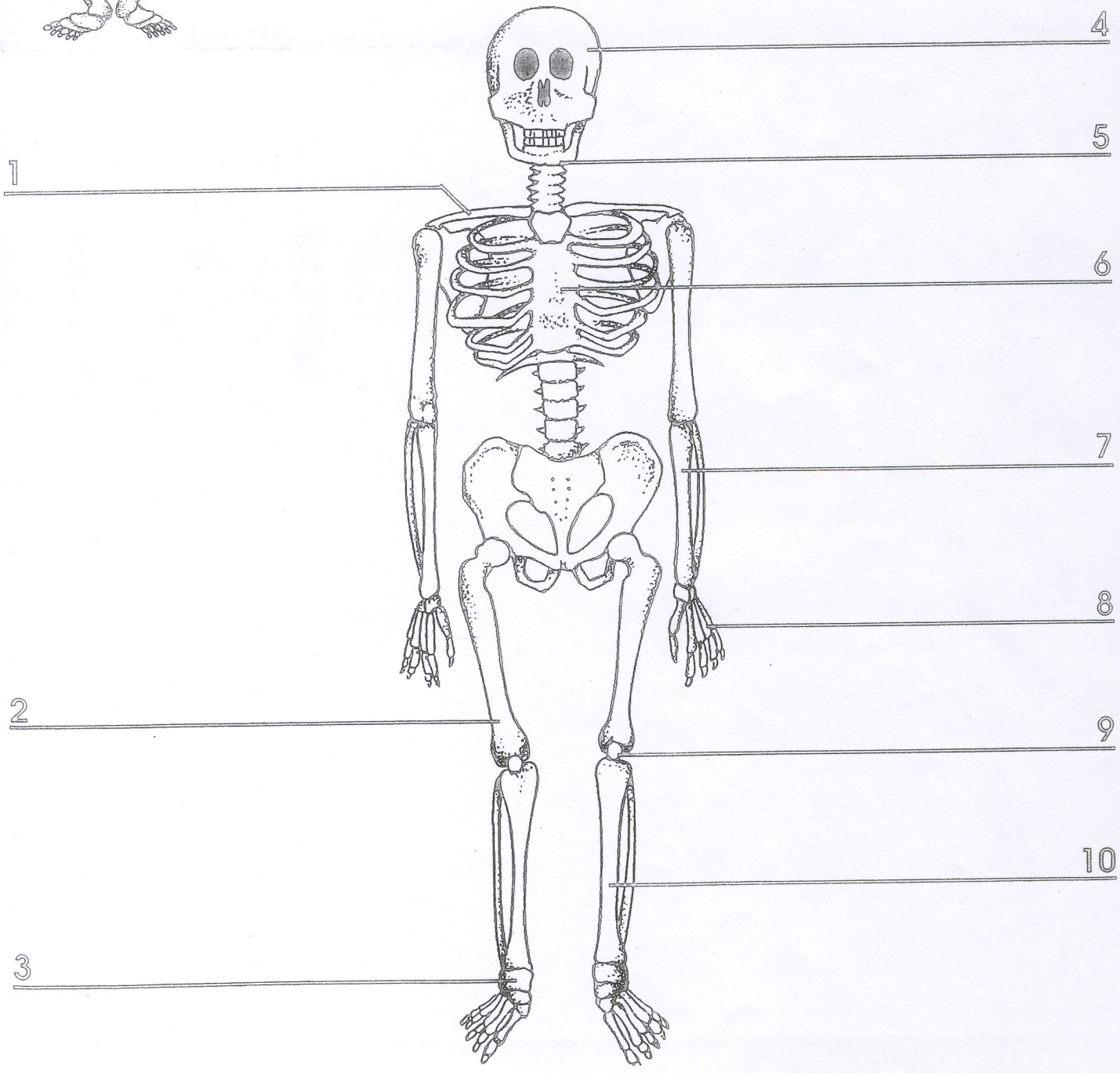
The Skeletal System

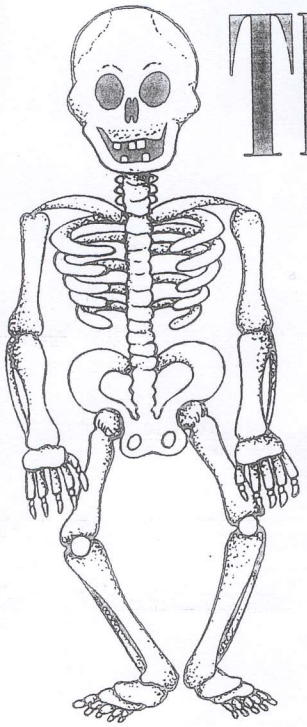


Activity Three

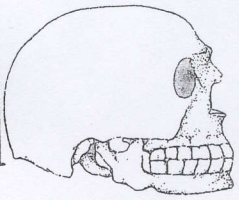
Mr. Skelly-ton

Part B: Label the parts of your skeleton.





The Skeletal System



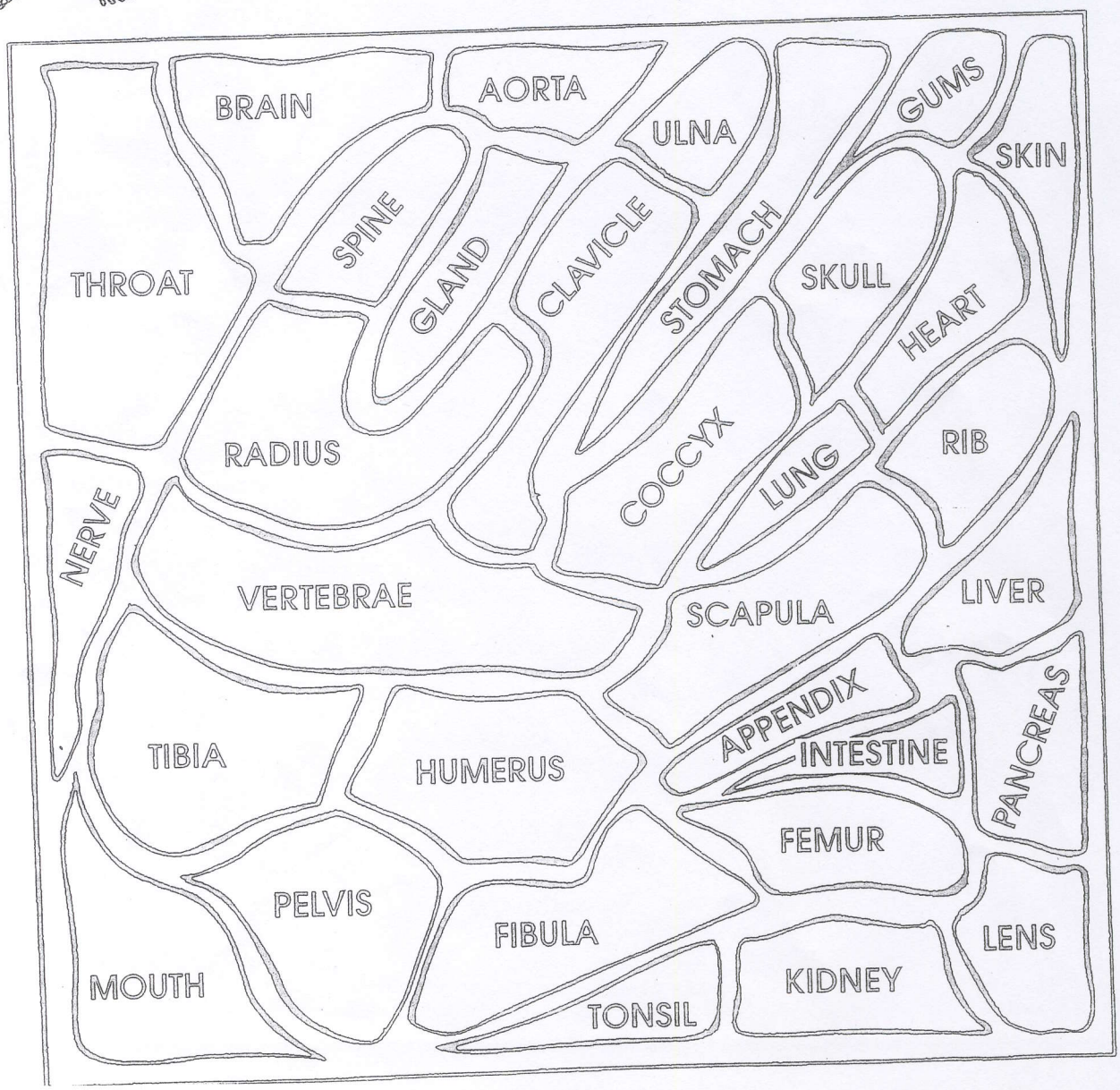
Activity Four

Skeleton Mystery

Using a pencil, shade in all the parts of the body that are the names of bones.

When you do, a hidden part of your body will appear.

Use a dictionary to help you.



How the Skeletal System Works

To find out what you already know about the skeletal system, write a word or words from the Word Bank to complete each definition.

Word Bank

flat	long	short	bones	skeletal system
joints	fixed	gliding	calcium	calcification
hinge	pivot	marrow	ligaments	ball-and-socket
irregular	cartilage	fracture	moveable	partially moveable

_____ 1. The ____ has several functions. It supports the body, permits movement, protects internal organs, stores minerals, and produces blood cells.

_____ 2. The human skeleton of an adult is made up of a total of 206 ____ , which give the basic shape to the body and make up a framework to which muscles are attached. At birth, humans have over 300 bones, but some of them fuse together.

_____ 3. Besides bones, the skeleton also contains connective tissue called ____ , which is flexible and tough. This type of rubbery tissue is present in the tip of the nose, the outer ear, and wherever two bones meet.

_____ 4. The places in the skeleton where two or more bones meet are called _____ , and these can be grouped into three basic types.

_____ 5. One type of joint that allows no movement at all is called a _____ joint. Examples of this type of joint are found in the hip and in the skull.

_____ 6. Another type of joint that allows a small amount of movement is called a ____ joint. The spinal column contains this type of joint.

_____ 7. A _____ joint, like those found in the knees and shoulders, allows full movement of bones.

_____ 8. The bones in a joint are cushioned by cartilage, which keeps them from rubbing together. They are held together by strong bands of connective tissue called _____ .

_____ 9. _____ bones are the chunky, wide bones of the feet and wrists.

_____ 10. Another type of moveable joint is called a _____ joint. It allows movement in only one direction, like on a door. Knees, elbows, and the first and second bends in fingers are examples of these types of joints.

_____ 11. A _____ joint, a moveable joint that allows movement in many directions, is formed where the rounded end of one bone fits into the socket of another bone. The hips and the shoulders contain this type of joint.

_____ 12. The last type of moveable joint is called a _____ joint because it allows rotating movement from side to side, like in the first and second neck vertebrae. In this type of joint, one bone twists within the cup or ring of another.

_____ 13. Bones include about 30% living tissue, including bone cells, blood, blood vessels, nerves, and fat. The center of a bone has a space, or cavity, containing a soft tissue called ____ in which new blood cells are produced.

_____ 14. Bones are covered by a tough outer membrane. Underneath this membrane is a layer of bone cells surrounded by deposits of minerals, which make the bone hard and strong. _____ is a mineral that comes from milk and milk products and is important in building strong bones.

_____ 15. Before birth, the skeleton is made mostly of cartilage. During the early years of life, the bones begin to harden as they become coated with layers of minerals. This process is called _____ .

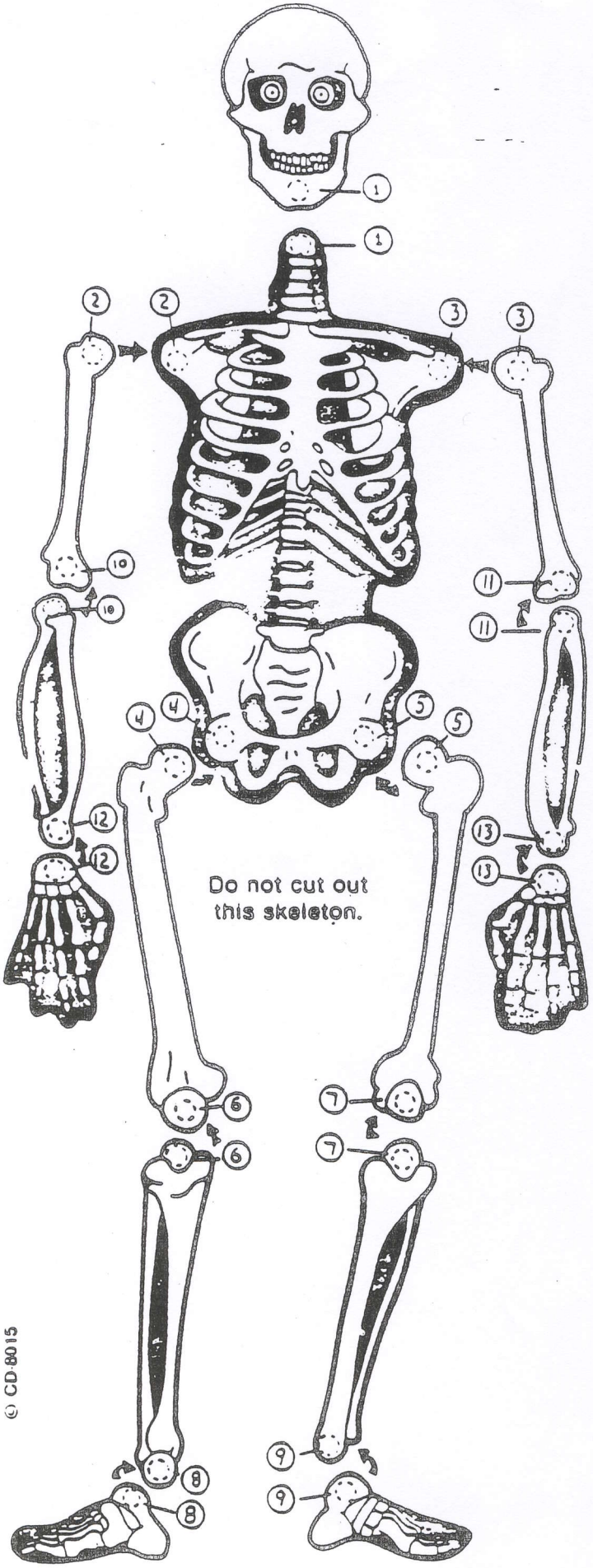
_____ 16. There are four basic shapes of bones. Some are _____ bones, like in our legs and arms.

_____ 17. Some bones have a _____ shape. These include plate-like bones such as the ribs and shoulder blades.

_____ 18. There are several types of moveable joints in the body. One type is called a _____ joint because it allows smooth, sliding movements. Examples of this type of moveable joint are the wrist and ankle.

_____ 19. Some bones, such as the vertebrae, have very odd shapes and do not fit into any other category. These are called _____ -shaped bones.

_____ 20. A break in a bone is called a _____ .



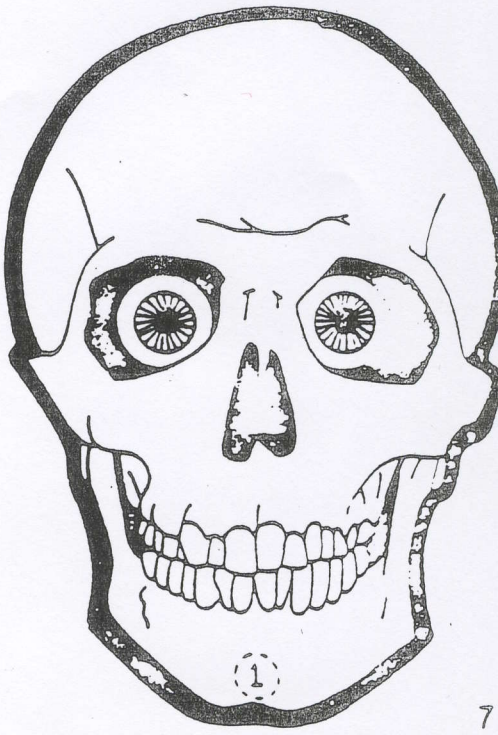
Boning Up for Fun

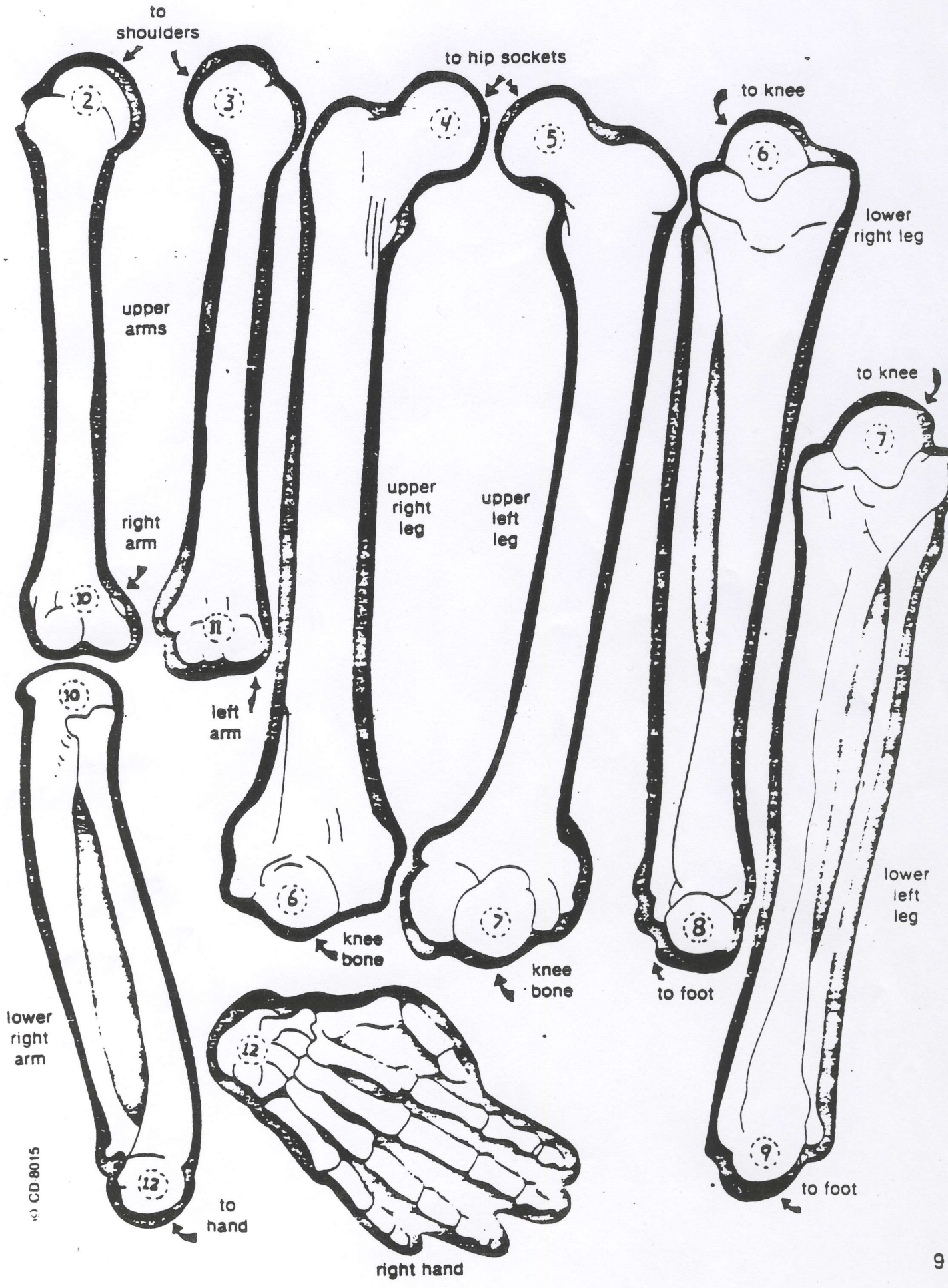
Use these directions to construct the skeleton pictured on the following pages. Use the diagram at the left to help you.

1. Cut out all skeleton parts on pages 7-9 except for complete skeleton at the left.
2. Use tape, glue or metal fasteners to connect matching numbers at dotted line circles. (Use pen or pencil to punch holes in the dotted circles before inserting fasteners.)

Suggestions for Use:

1. Hang your skeleton on the front door or your bedroom door.
2. Attach a string to the head and hang your skeleton from the ceiling.




to shoulders
to hip sockets
to knee
upper arms
lower right leg
to knee
right arm
upper right leg
upper left leg
left arm
lower left leg
knee bone
knee bone
to foot
lower right arm
to foot
to hand
right hand
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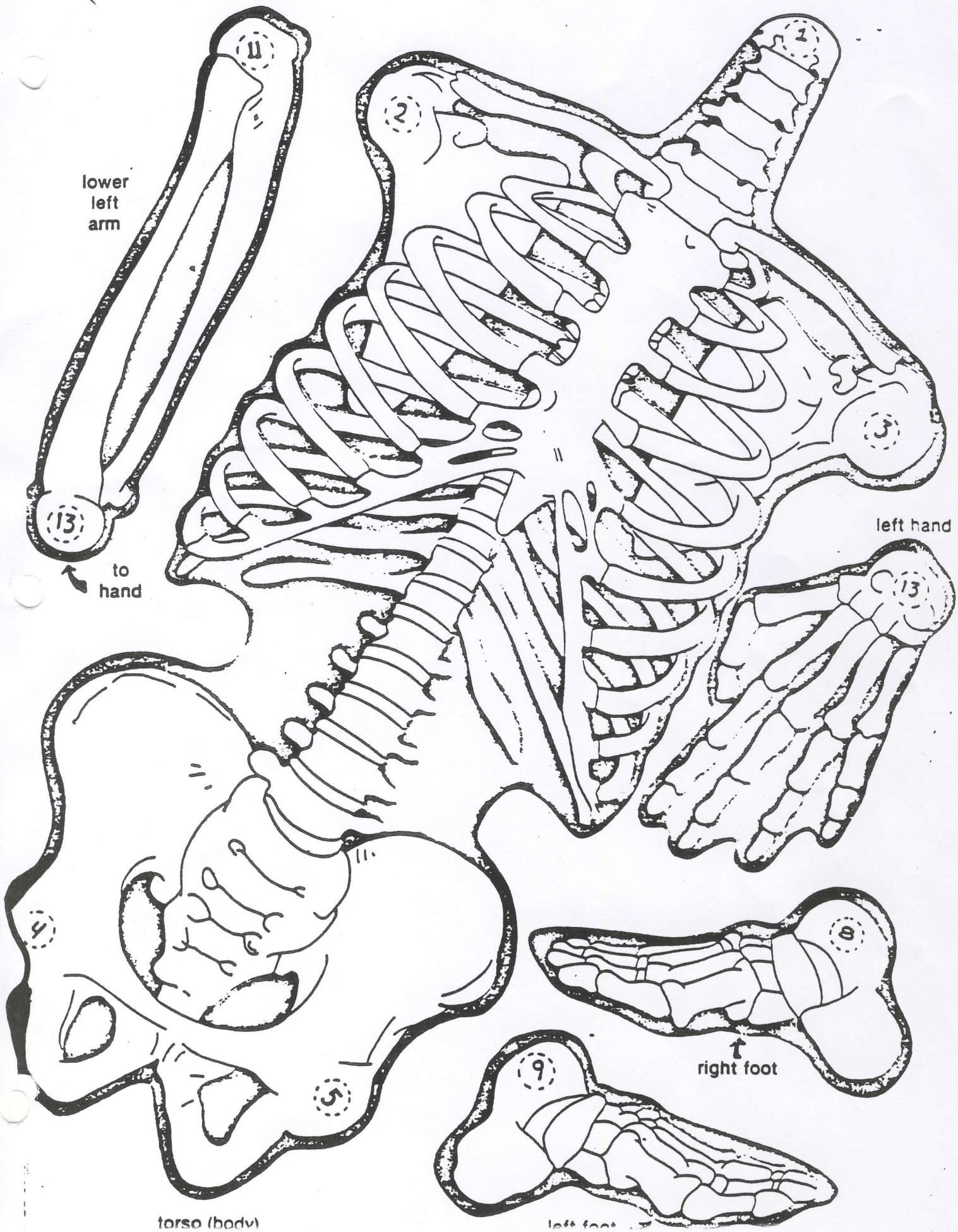
lower
left
arm
to
hand
left hand
right foot
torso (body)