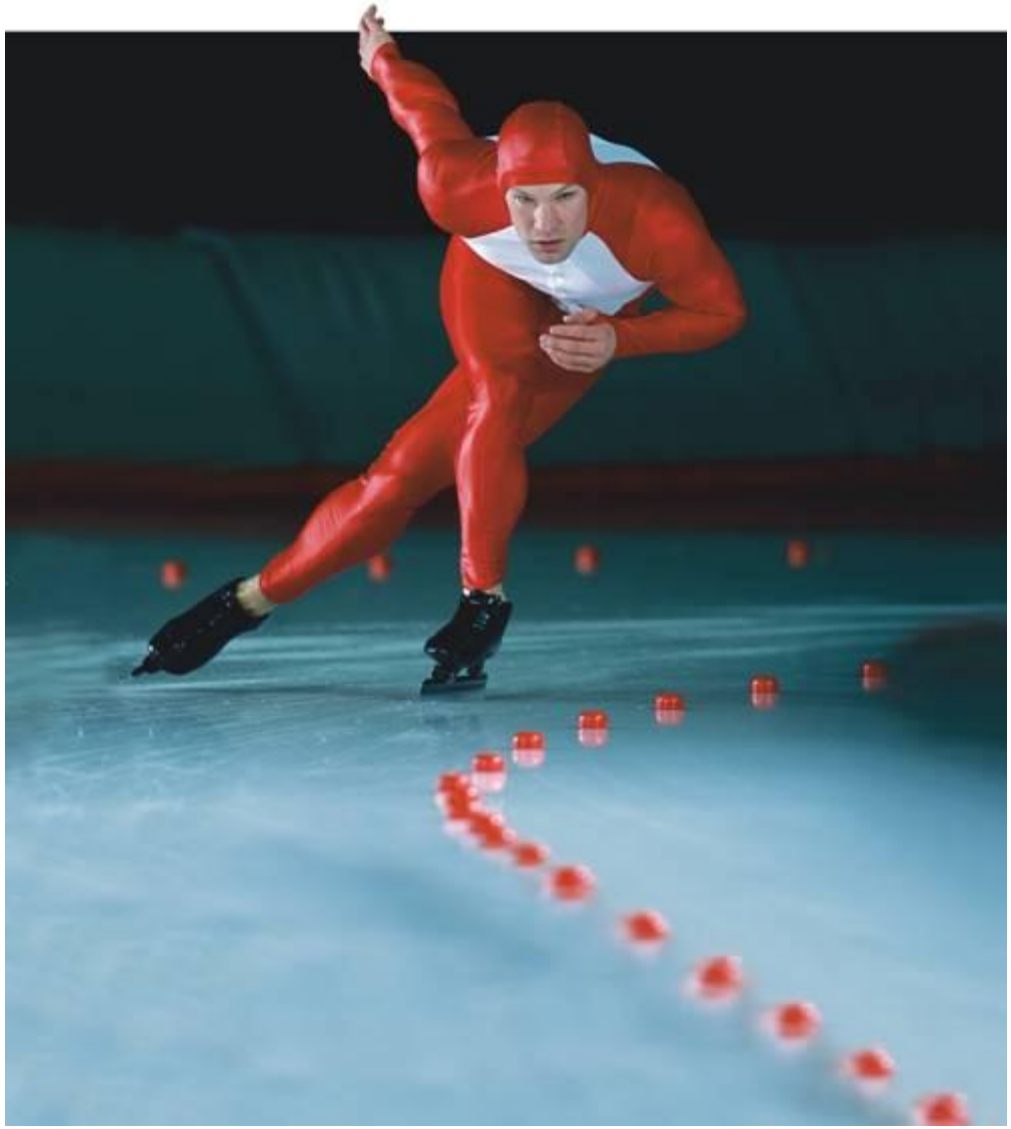
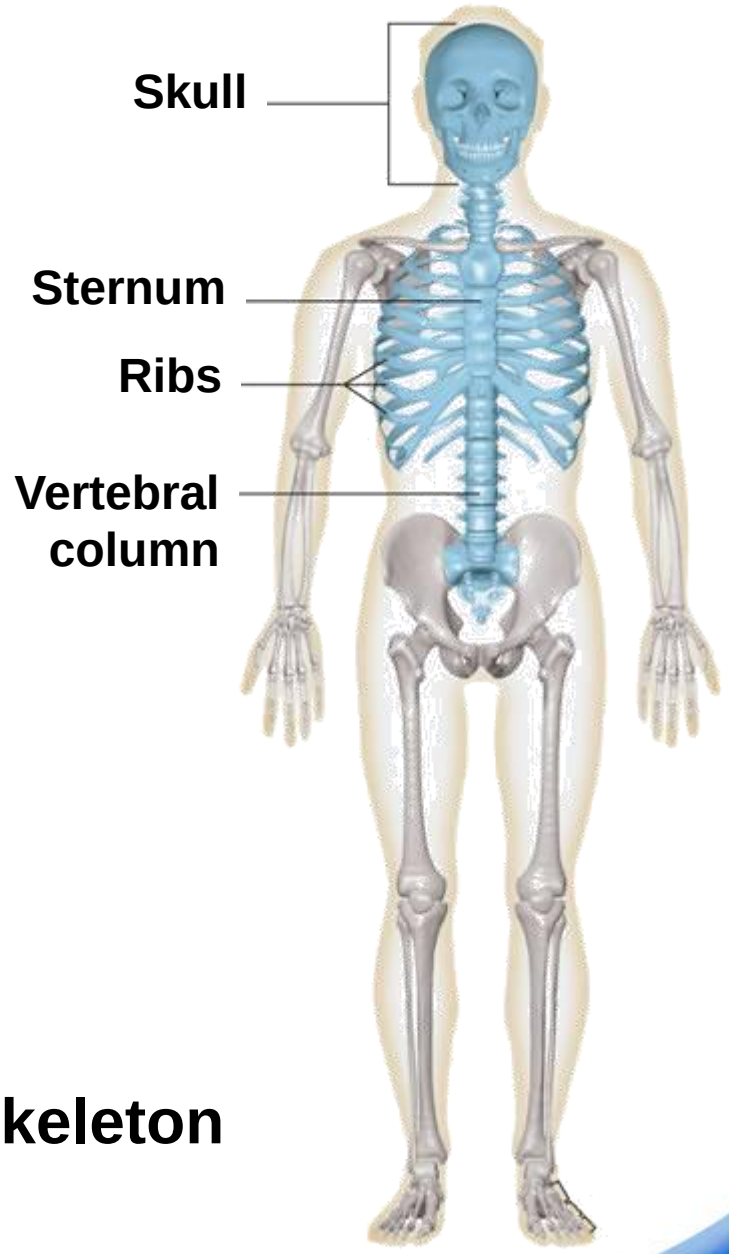
36–1 The Skeletal System



The skeleton:

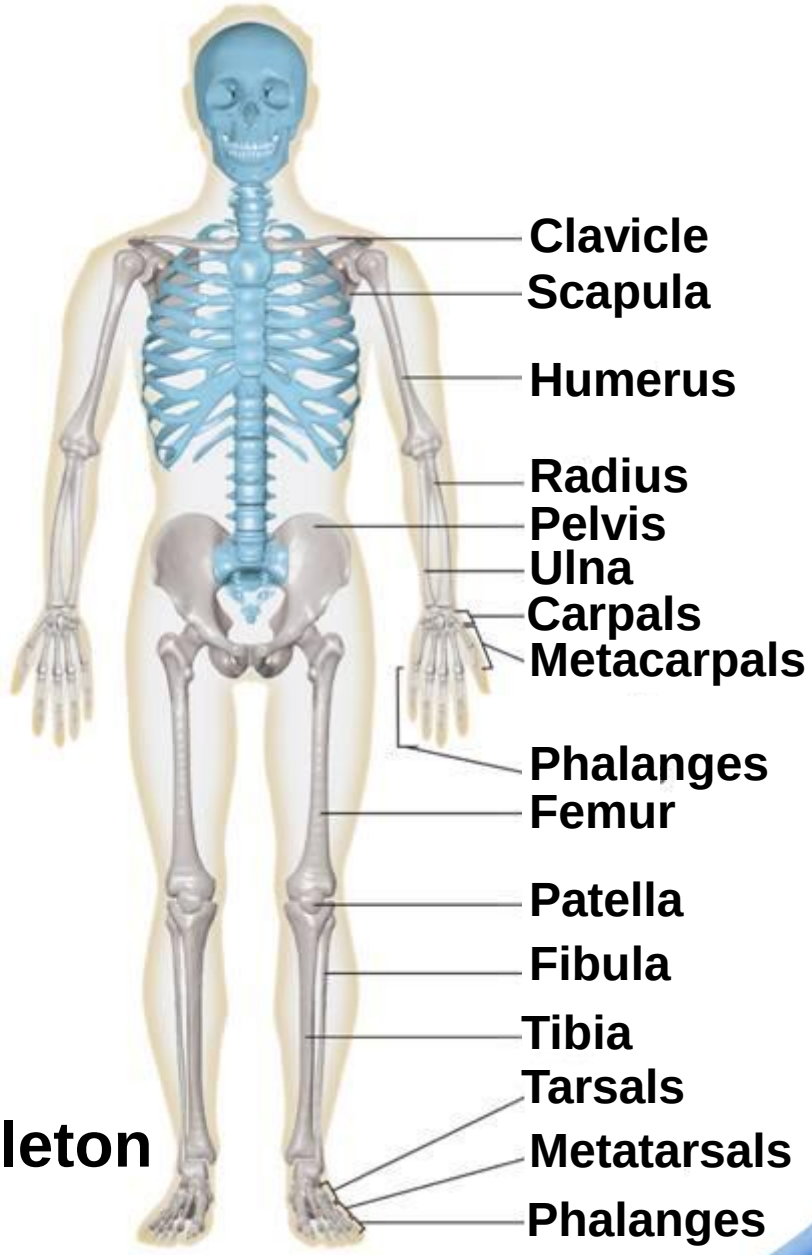
- supports the body.
- protects internal organs.
- provides for movement.
- stores mineral reserves.
- provides a site for blood cell formation.

The axial skeleton (blue) supports the central axis of the body.



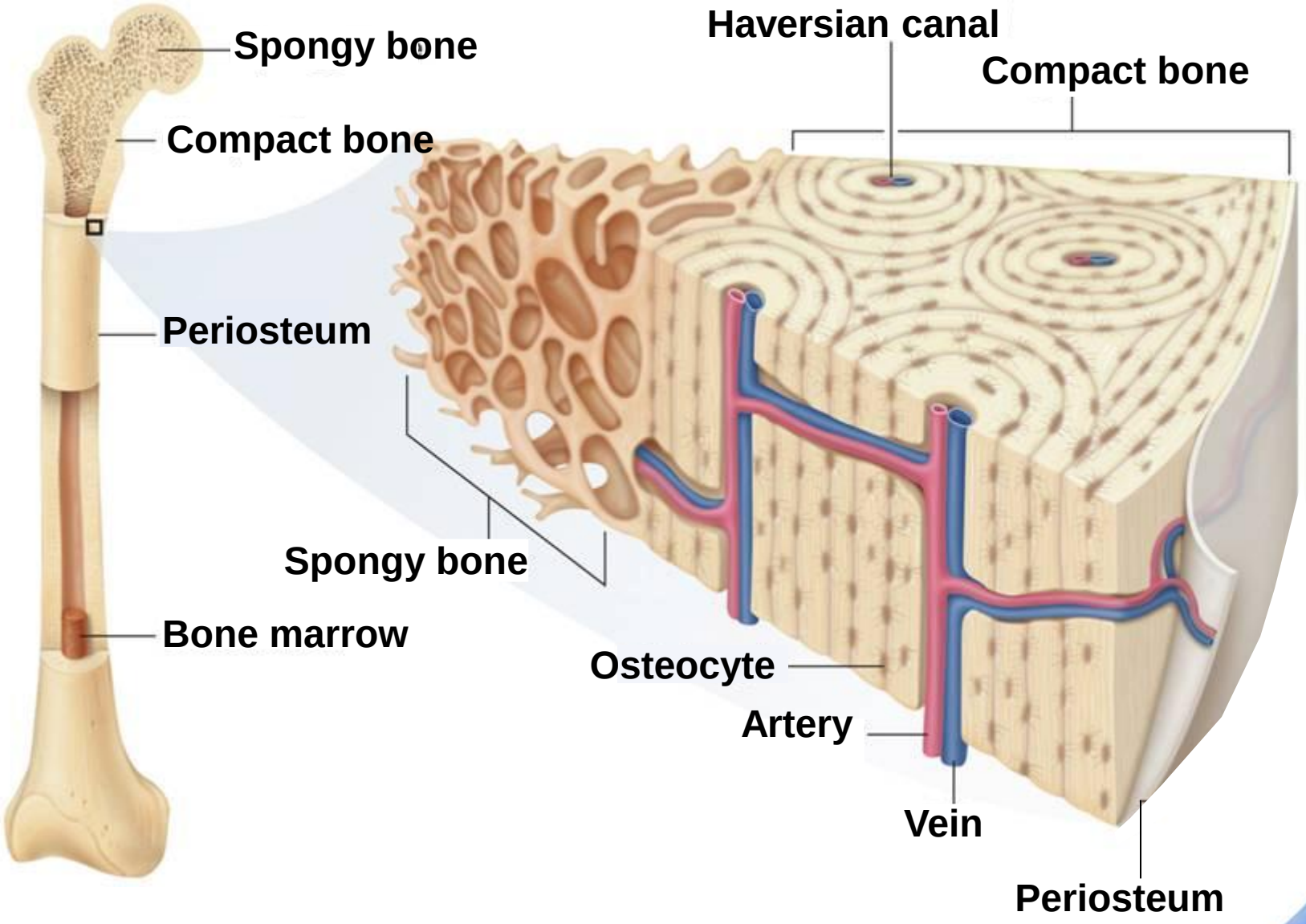
Axial Skeleton

The bones of the arms and legs, along with the bones of the pelvis and shoulder area form the appendicular skeleton (grey).



Appendicular Skeleton

Bones are a solid network of living cells and protein fibers that are surrounded by deposits of calcium salts.



Osteocytes, or mature bone cells, are embedded in the bone matrix.

Other bone cells—osteoclasts and osteoblasts—line the Haversian canals and the surfaces of compact and spongy bone.

- Osteoclasts break down bone.
- Osteoblasts produce bone.

Bone marrow is a soft tissue inside the cavities within bones.

There are two types of bone marrow:

- Yellow marrow is made up of fat cells.
- Red marrow produces red blood cells, some kinds of white blood cells, and platelets.

Development of Bones

The skeleton of an embryo is composed of cartilage.

Cartilage is a strong connective tissue that supports the body and is softer and more flexible than bone.

Cartilage is replaced by bone during the process of bone formation called **ossification**.

Bone tissue forms as osteoblasts secrete mineral deposits.

When the osteoblasts become surrounded by bone tissue, they mature into osteocytes.

Types of Joints

A place where one bone attaches to another bone is called a **joint**.

Joints permit bones to move without damaging each other.

Depending on its type of movement, a joint is classified as immovable, slightly movable, or freely movable.

Immovable Joints

Immovable joints, called fixed joints, allow no movement.

The bones are interlocked and held together by connective tissue, or they are fused together.

Places where bones in the skull meet are examples of immovable joints.

Slightly Movable Joints

Slightly movable joints permit a small amount of restricted movement.

Slightly movable joints are found in the joints between adjacent vertebrae.

Freely Movable Joints

Freely movable joints permit movement in one or more directions.

Four common freely movable joints are:

- ball-and-socket joints
- hinge joints
- pivot joints
- saddle joints

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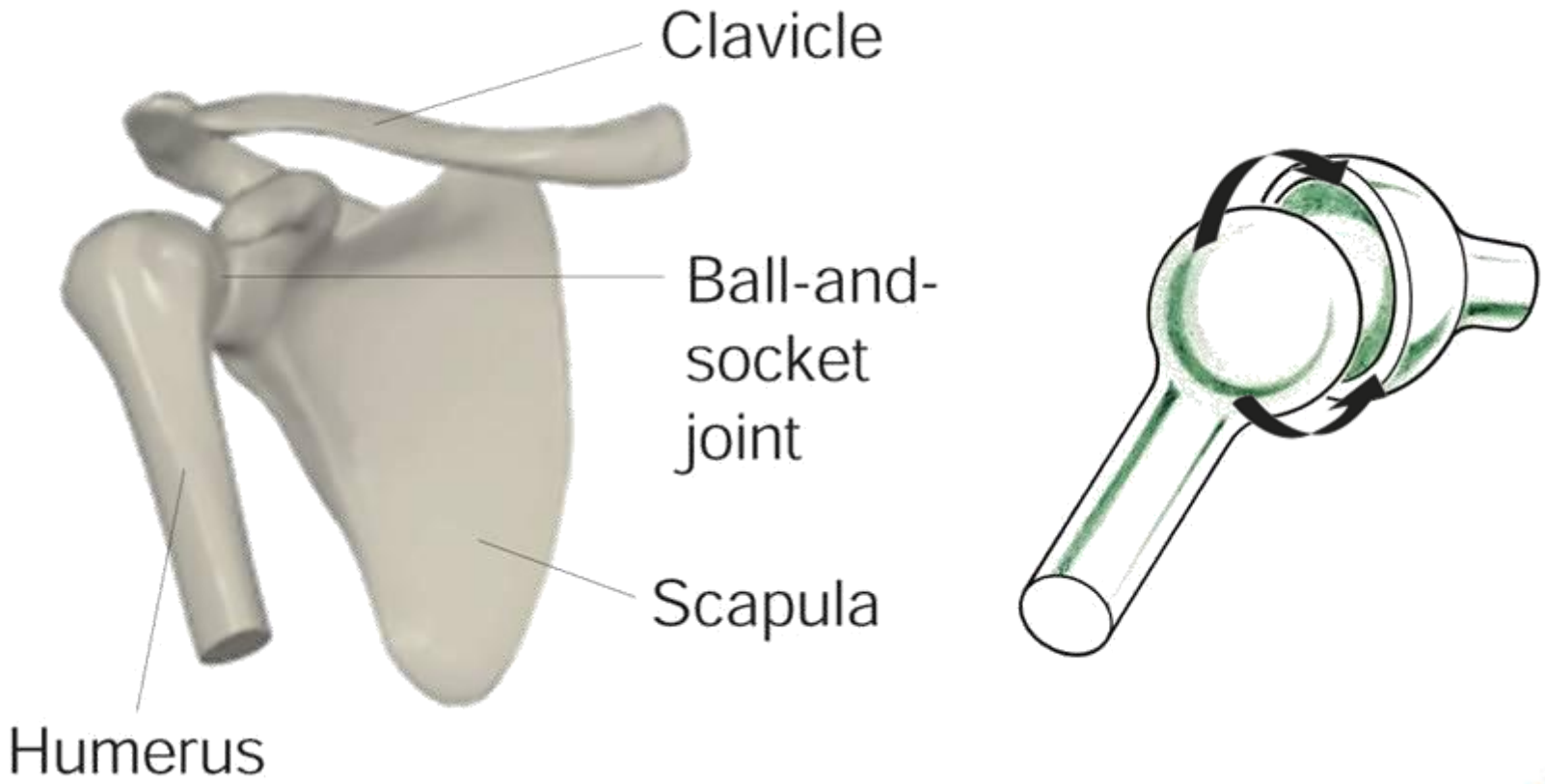
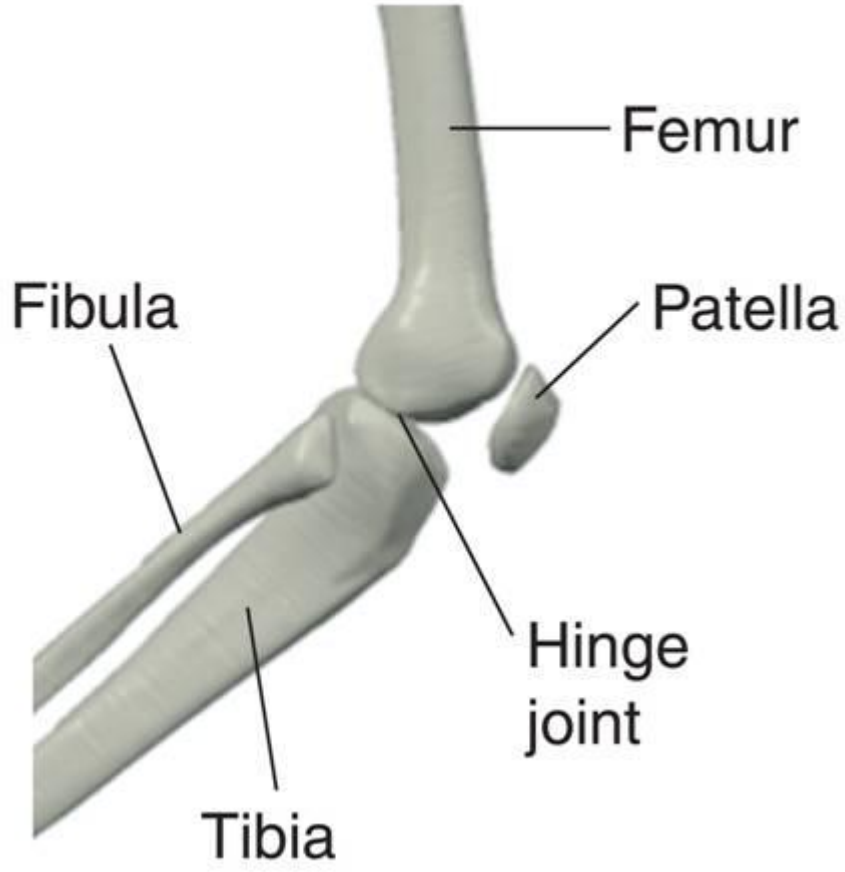
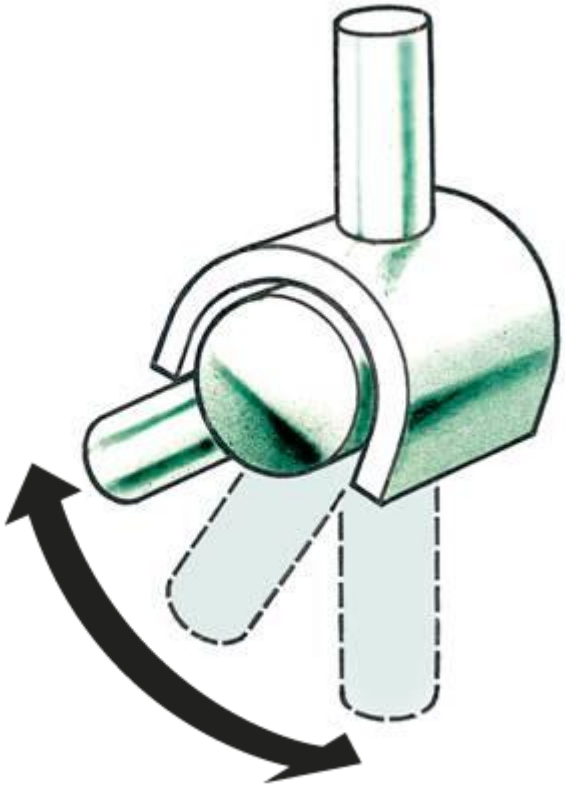
Ball-and-socket joints permit movement in many directions.

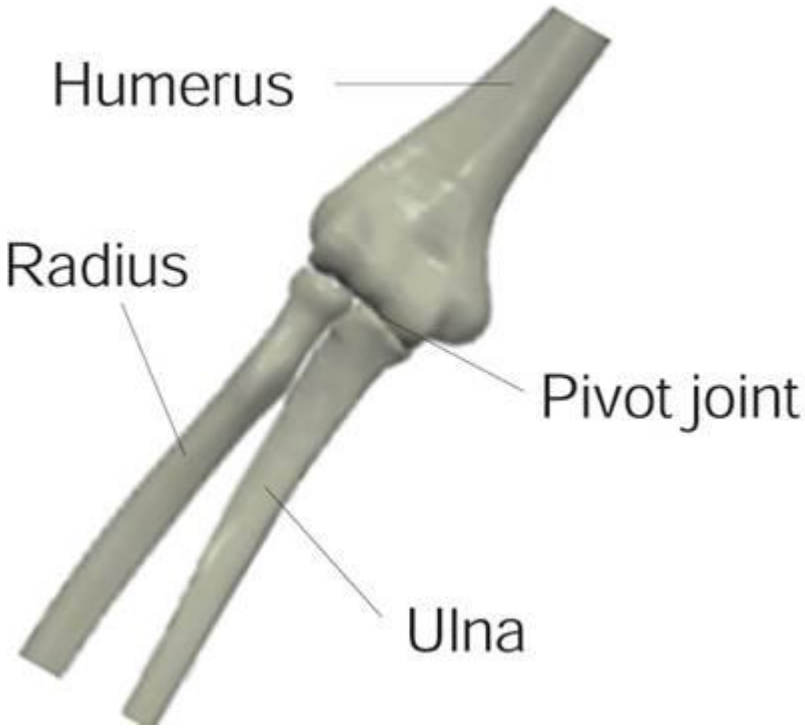


Hinge joints permit back-and-forth motion.

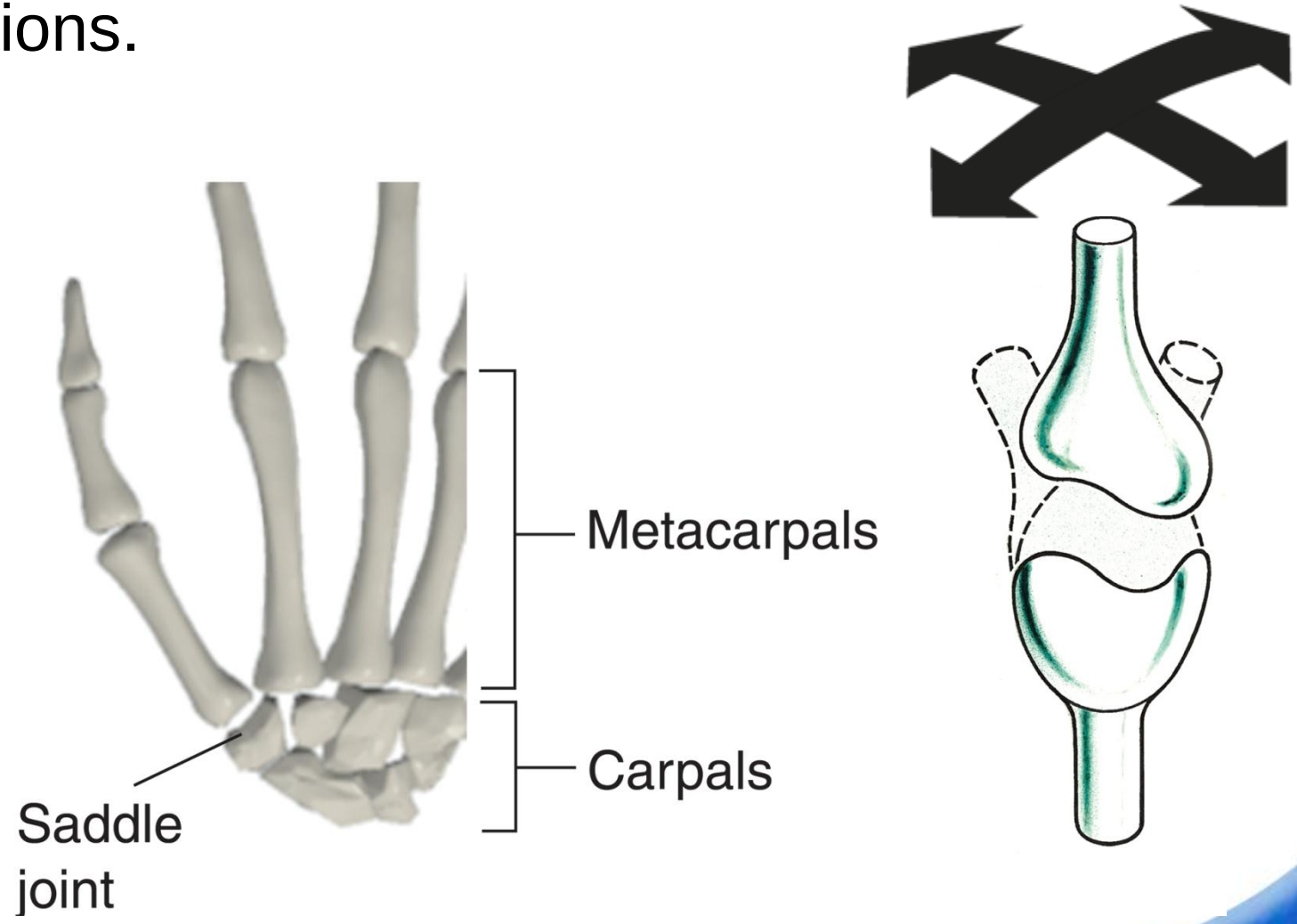




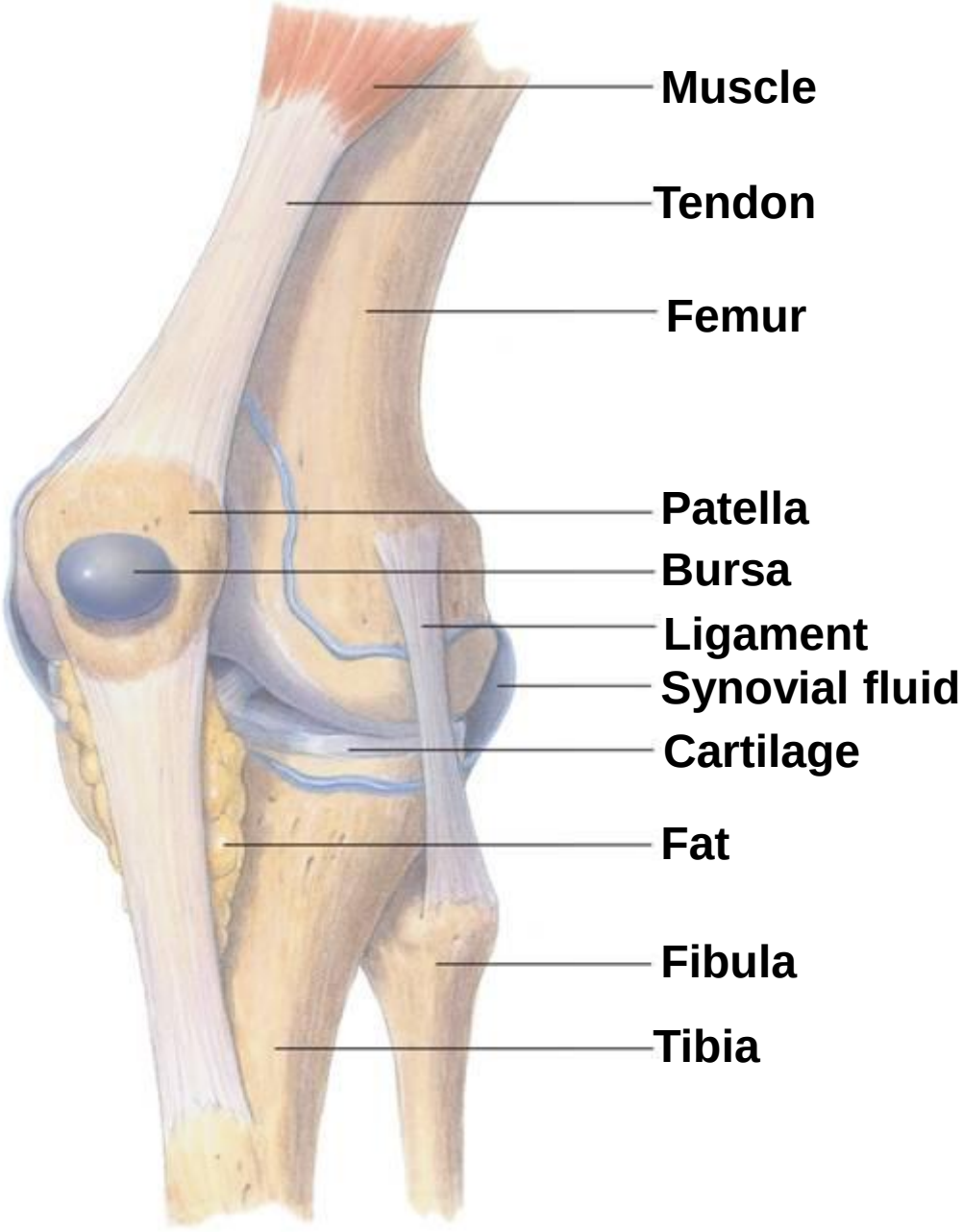
Pivot joints allow one bone to rotate around another.



Saddle joints permit one bone to slide in two directions.



Knee Joint



Connective tissue called **ligaments** hold bones together in joints and are attached to membranes that surround bones.

Synovial fluid forms a thin lubricating film over the surface of the joint.

Synovial fluid enables the bones to slide past each other more smoothly.

Skeletal System Disorders

Excessive strain on a joint may produce inflammation, in which excess fluid causes swelling, pain, heat, and redness.

- Inflammation of a bursa is called bursitis.
- Inflammation of the joint itself is called arthritis.

Another skeletal system disorder is osteoporosis. Osteoporosis is caused by a loss of calcium in the bone.

36–1 Section QUIZ

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36–1 Section QUIZ

1 Red blood cells, some kinds of white blood cells, and platelets are produced by

A a. red marrow.

b. cartilage.

c. yellow marrow.

d. osteocytes.

2 Mature bone cells are called

a. periosteum.

A b. osteocytes.

c. bone marrow.

d. Haversian canals.

3 In freely movable joints, what covers the surfaces where the two bones come together?

a. ligaments

A b. cartilage

c. bursae

d. tendons

4 During ossification, cartilage is replaced by

A a. bone.

b. ligament.

c. marrow.

d. tendon.

5 The shoulder joint is an example of a

A a. ball-and-socket joint.

b. hinge joint.

c. pivot joint.

d. saddle joint.

END OF SECTION