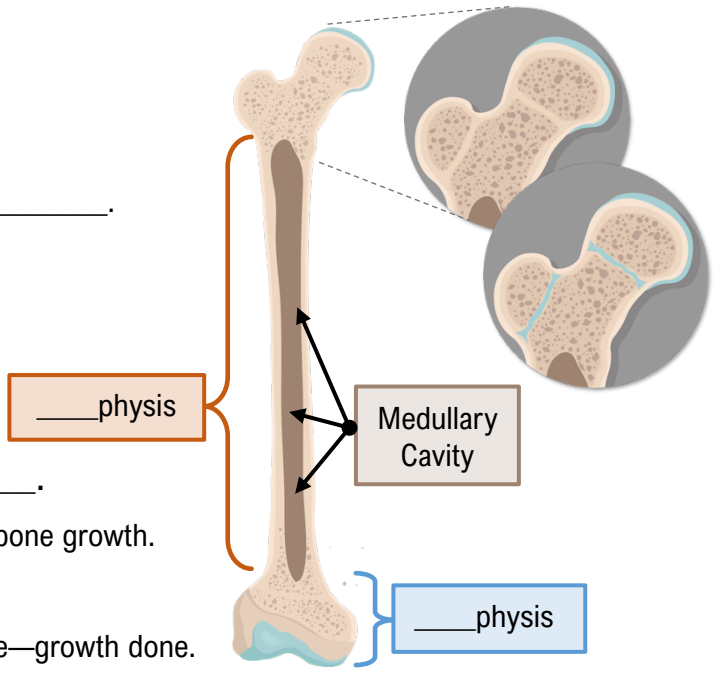
TOPIC: GROSS ANATOMY OF BONES: STRUCTURE OF A LONG BONE

Overview of Long Bones

- Long bones consist of two ends and a shaft.
  - **Epiphysis:** Wider end of a long bone.
    - **Articular Cartilage**: covers the epiphysis at the _____.
  - **Diaphysis:** tubular _____ of the bone.
    - **Medullary Cavity:** Space inside the diaphysis.
    - Contains _____ marrow.



- **Metaphysis:** area where epiphysis and diaphysis _____.
  - **Epiphyseal Plate**: line of hyaline cartilage that allows bone growth.
    - Site of bone growth until _____.
  - **Epiphyseal Line:** plate converts to _____ bone—growth done.

EXAMPLE: Forensic analyses can use bones to establish a rough age of a skeleton.

a) What specific structure in the metaphysis might a forensic scientist look at to determine age?

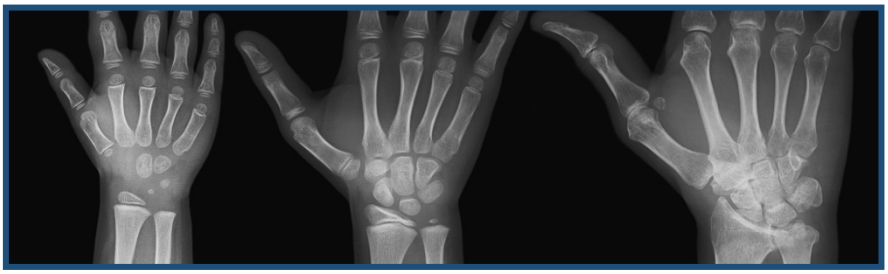
_____

b) What would you expect this structure to be comprised of at the following ages?

Child: _____

Adolescent: _____

Adult: _____



PRACTICE: During a skiing accident, Jean-Luc breaks the shaft of his humerus. What is the anatomically correct term for the portion of the bone that he broke?

a) Metaphysis

b) Epiphysis

c) Diaphysis

d) Articular Cartilage

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PRACTICE: Osgood-Schlatter disease is a painful condition that affects the proximal end of the tibia (a long bone) just distal to the knee. It primarily affects athletically active children between the ages of 10 and 14. The condition develops when the patellar tendon places strain on this area of the tibia as the area is not as stable as other regions of the bone in children this age. Why would this region not be as stable as other regions of the tibia?

a) The medullary cavity does not fully develop until adulthood, meaning the yellow marrow would not provide shock absorption.
b) The spongy bone of the epiphysis would not have fully calcified so the bone in that area would not be as hard.
c) Articular cartilage is not fully formed until adulthood meaning there would be more stress in the joint.
d) Children in this age are going through a growth spurt meaning there is a significant amount of cartilage in the epiphyseal plate.

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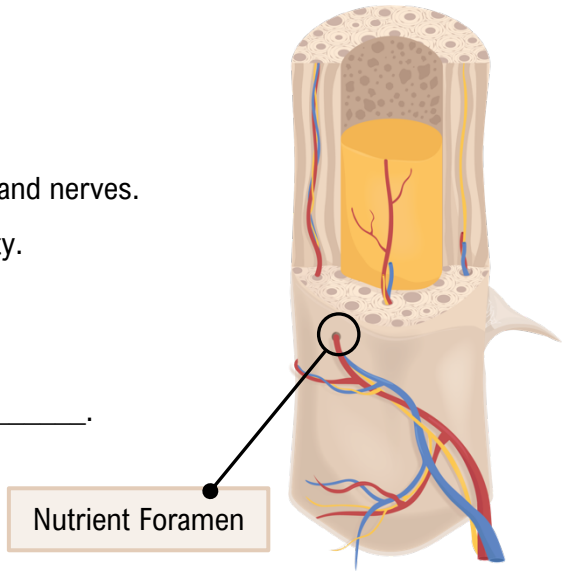
Nerves and Blood Supply

Recall: Bone contains blood vessels and nerves.

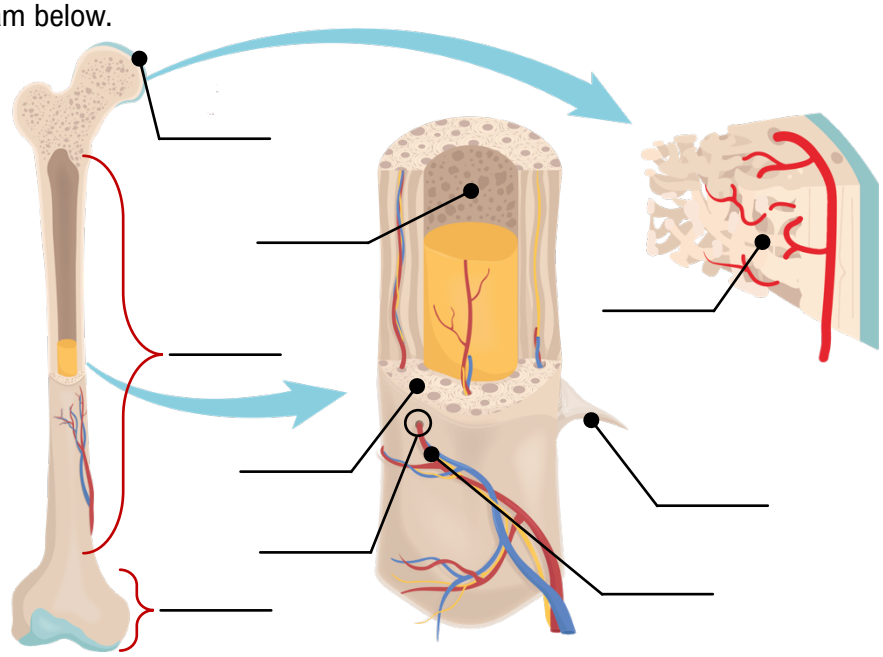
- **Nutrient Foramen**: small _____ in diaphysis for blood vessels and nerves.
  - *Nutrient Artery*: brings blood _____ the medullary cavity.
  - *Nutrient Vein*: carries blood _____ of the bone.
  - Nerves pass through the nutrient foramen into the bone.
- Several smaller *foramina* are located in the metaphysis and _____.



EXAMPLE: Label the diagram below.

Word Bank

a. Articular Cartilage
b. Compact Bone
c. Diaphysis
d. Epiphysis
e. Medullary Cavity
f. Nutrient Foramen
g. Nutrient Artery
h. Periosteum
i. Spongy Bone



PRACTICE: What problems would arise if a bone lacked a nutrient foramen?

a) Bones would lose their tensile strength.

b) The periosteum would not adhere to the bone properly.

c) The articular cartilage would not form.

d) Bones would lose blood supply and nerves.

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PRACTICE: Which bone structure is most closely associated with the perforating fibers?

a) Nutrient Foramen.
b) Periosteum.
c) Medullary Cavity.
d) Epiphyseal Plate.

PRACTICE: Achondroplasia is the most common form of dwarfism. A person with this condition will have short arms and legs but a normal sized head and trunk. Achondroplasia literally means “without cartilage formation”. Why would a disorder that affects cartilage formation lead to dwarfism?

a) Cartilage is more prevalent in the limbs as there are more articulating joints in the arms and legs.
b) Long bones grow in length at the epiphyseal plate, which is composed of cartilage until puberty.
c) Long bones are covered with articular cartilage at joints. A lack of cartilage at the joint would inhibit growth.
d) Without cartilage, the medullary cavity would not form properly shortening the diaphysis.

PRACTICE: Where would you be more likely to find red marrow and why?

a) The nutrient foramen, red marrow produces blood cells, and the nutrient foramen contains blood vessels.
b) The endosteum, red marrow produces blood cells, and the endosteum contains progenitor bone cells.
c) The epiphysis, red marrow is found in spongy bone, and spongy bone is found in the epiphysis.
d) The diaphysis, the medullary cavity of the diaphysis is filled with marrow.