Bones in Motion

Read, mark, and model how the skeleton works with other body systems.

HAP.3 "Develop and use a model to illustrate how the structures of the skeletal system contribute to its function. a. Obtain, evaluate, and communicate information describing the growth and development of the skeletal system. b..."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline two bone structures and what each does, circle one change that happens as bones develop, and number the steps that help restore low blood calcium. Use your marks to build explanations from the text.

A Jump, a Landing, and Living Bone

1. When a basketball player lands from a jump, the knee must support weight and still bend. The femur meets the tibia at the knee, while smooth cartilage covers their ends and reduces friction. Ligaments connect bone to bone and limit excessive motion. A thigh muscle pulls through tendons and the kneecap to move the tibia, which acts as a lever at the knee. Hard outer bone tissue resists bending, while a lighter, spongy network inside spreads forces. These structures work together, not as separate parts, to make controlled movement possible.

2. The same player's skeleton is still developing. Near the ends of many long bones, growth plates contain cartilage that is gradually replaced by bone, allowing bones to lengthen. Once the plates close in late adolescence or early adulthood, those bones stop growing longer. Bone still changes afterward: cells called osteoblasts build new bone tissue, and osteoclasts remove old tissue. This remodeling can repair damage and respond to repeated forces. Blood vessels inside bone deliver oxygen and nutrients to living cells. A model of skeletal growth must therefore include both changing bone tissue and support from the circulatory system.

3. During a long practice, muscles contract to move bones, while nerves coordinate the timing of those contractions. Bone also stores calcium, a mineral needed for muscle contraction and nerve signaling. If blood calcium falls, the parathyroid glands release a hormone that increases calcium release from bone and helps the kidneys conserve calcium. If blood calcium rises, hormone release decreases, so less calcium is drawn from bone. The digestive system supplies calcium from food, and the circulatory system carries it to tissues. This feedback helps keep blood calcium within a useful range, though prolonged low calcium intake can weaken bones.

2 ANSWER WITH EVIDENCE

Use the passage

1. In a model of the landing, what roles should the tibia and cartilage have at the knee?

2. How should a model of a long bone change as its growth plate closes? What process continues afterward?

3. Trace how the skeletal, endocrine, and urinary systems respond when blood calcium falls.

4. Explain how blood vessels and bone cells work together during remodeling.

3 YOUR TURN

Your own words

A student fractures a forearm bone and wears a cast. Write a six-sentence verbal model explaining how the cast affects movement, how bone and blood support repair, and how the endocrine and urinary systems help keep blood calcium stable.

Bones in Motion

PART 1 · READ AND MARK

Underline two bone structures and what each does, circle one change that happens as bones develop, and number the steps that help restore low blood calcium. Use your marks to build explanations from the text. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	In a model of the landing, what roles should the tibia and cartilage have at the knee?	**The tibia acts as a lever when the knee moves. Cartilage covers the bone ends and reduces friction.**
2	How should a model of a long bone change as its growth plate closes? What process continues afterward?	**The growth plate's cartilage is replaced by bone, and the long bone stops lengthening. Osteoblasts and osteoclasts continue to remodel its tissue.**
3	Trace how the skeletal, endocrine, and urinary systems respond when blood calcium falls.	**The parathyroid glands release a hormone that increases calcium release from bone and helps the kidneys conserve calcium.**
4	Explain how blood vessels and bone cells work together during remodeling.	**Blood vessels supply oxygen and nutrients to living bone cells. Osteoblasts build tissue, while osteoclasts remove old tissue.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

The cast limits motion at the fracture so the broken ends stay aligned as they heal. Muscles still pull on the arm, but the cast reduces movement where the bone broke. Blood vessels bring oxygen and nutrients to living bone cells. Osteoblasts build new bone tissue at the damaged area while remodeling reshapes it. If blood calcium falls, the parathyroid glands release a hormone that increases calcium release from bone. That hormone also helps the kidneys conserve calcium, helping maintain a stable blood calcium level.

Accept accurate models that connect each named structure or system to its function. For Part 3, accept other clear six-sentence explanations that distinguish fracture repair from blood-calcium regulation.