Bones in Motion

Use structure and function to explain movement and injury.

HAP.4 "Students will investigate the structures and functions of the skeletal system including the cause and effect of diseases and disorders. Use models to compare the structure and function of the skeletal system..."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline two axial bones and two appendicular bones in the passage. Circle the joint types, then number two places where a structure affects movement or protection.

A Leap and a Landing

1. At a dance rehearsal, Maya lands from a leap and turns to face her partner. Her skeleton does more than hold her upright. The axial skeleton includes the skull, ribs, and vertebral column, which support the body's central axis and protect organs. The appendicular skeleton includes the humerus in the upper arm, the femur in the thigh, and the shoulder and pelvic girdles. These parts connect the limbs to the central axis. Maya's vertebrae help support her trunk, while her femur helps carry her weight. Their different positions make protection and movement possible at the same time.

2. Connections between bones also shape what Maya can do. Immovable sutures join the skull bones and help form a protective case around the brain. At her hip, the rounded head of the femur fits into a cup-shaped socket in the pelvis. This ball-and-socket joint lets her thigh swing forward, backward, and sideways and rotate. At her knee, a hinge joint mainly bends and straightens the leg. Smooth cartilage reduces friction where bones meet in these movable joints. Ligaments connect bones and help stabilize the joints as she lands, but a hard landing can still injure them.

3. Bone is living tissue, not a solid block of stone. Cells continually remove old bone and build new bone, allowing bones to respond to stress and repair small damage. In osteoporosis, bone is lost faster than it is replaced, so bones become less dense and more likely to fracture in a fall. A hip fracture could make Maya unable to put weight on her leg even if the joint could normally rotate. Blood calcium levels also affect this system. When blood calcium falls, parathyroid hormone helps raise it partly by promoting calcium release from bone. Bone lost repeatedly without enough replacement can weaken the skeleton.

2 ANSWER WITH EVIDENCE

Use the passage

1. Classify Maya's vertebrae and femur as axial or appendicular. How does each help her during the dance?

2. How do the structure and function of skull sutures differ from those of the hip joint?

3. Which joint lets Maya rotate her thigh? Why would her knee not allow the same movement?

4. Trace how osteoporosis could change the result of Maya's landing.

3 YOUR TURN

Your own words

Write four sentences describing a model made from common objects that compares skull sutures with the hip joint. Name what represents each connection, explain how each shows its movement, and identify one important limit of your model.

ANSWER KEY

Bones in Motion

PART 1 · READ AND MARK

Underline two axial bones and two appendicular bones in the passage. Circle the joint types, then number two places where a structure affects movement or protection. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	Classify Maya's vertebrae and femur as axial or appendicular. How does each help her during the dance?	**The vertebrae are axial and support her trunk. The femur is appendicular and helps carry her weight as she moves.**
2	How do the structure and function of skull sutures differ from those of the hip joint?	**Skull sutures are immovable connections that help protect the brain. The hip is a ball-and-socket joint that lets the thigh swing in several directions and rotate.**
3	Which joint lets Maya rotate her thigh? Why would her knee not allow the same movement?	**The hip's ball-and-socket joint lets her rotate her thigh. The knee is a hinge joint that mainly bends and straightens.**
4	Trace how osteoporosis could change the result of Maya's landing.	**In osteoporosis, bone is lost faster than it is replaced. The less dense bone is more likely to fracture in a fall, and a hip fracture could prevent Maya from putting weight on her leg.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

I would glue two cardboard pieces edge to edge to model skull sutures. The pieces would stay still, like the connected bones that protect the brain. I would set a small ball inside a cup to model the hip joint because the ball could turn and tilt in several directions. My cup would not show the ligaments that help stabilize a real hip.

Accept other accurate examples of axial and appendicular structures. For the model, look for two distinct connections, a correct comparison of their movement, and a realistic limitation.