Built to Move

How joint structure balances mobility and stability

HS-AP3-5 "Compare and contrast the major types of joints and construct an argument how these structural components influence functional mobility and stability."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline one structural feature of each major joint type, then circle the movement or stability that each feature helps explain.

A Goalkeeper's Joints

1. At a soccer match, a goalkeeper tracks a high shot, bends her knees, and dives. Those actions depend on joints, places where bones meet. Not every joint is built for the same motion. In a fibrous joint, dense connective tissue binds bones closely together. The sutures between skull bones are fibrous joints: their tight connections permit little or no movement and make a rigid case around the brain. Stability here matters more than range of motion. A skull that shifted freely when the keeper landed would offer less reliable protection during impact.

2. Between many vertebrae of the spine, cartilaginous joints contain pads called intervertebral discs. Each disc joins neighboring bones and compresses slightly under load, helping absorb shock when the goalkeeper lands. A single pair of vertebrae moves only a little; small movements across many pairs let her bend and turn. These joints are less rigid than skull sutures but do not have the wide range of many synovial joints. Their discs resist compression while allowing limited motion, so the back can shift without behaving like a loose stack of bones.

3. The knee and shoulder are synovial joints. Their bone ends have smooth cartilage, and a capsule holds lubricating fluid that reduces friction as they move. Ligaments connect bones and help limit excessive movement. At the knee, surfaces and supporting ligaments mainly guide bending and straightening, as when the goalkeeper crouches; this hinge-like pattern helps resist sideways motion. At the shoulder, a rounded head fits into a shallow socket, allowing the arm to move in many directions to reach for the ball. That freedom comes with less bony stability than at a deeper, more constrained joint, so surrounding muscles must help stabilize the shoulder.

2 ANSWER WITH EVIDENCE

Use the passage

1. Compare skull sutures with the joints between vertebrae. How does each structure affect movement?

2. Compare the knee and shoulder. How do their structures affect the directions they can move?

3. Both skull sutures and knee joints provide stability. Compare the structures that help each do so, and explain why they allow different amounts of movement.

4. When the goalkeeper lands and bends her knees, how do the joints in her spine and knees help in different ways? Use one structural detail for each.

3 YOUR TURN

Your own words

A climber keeps one foot planted while reaching around a corner for a grip. In 4 to 5 sentences, argue how the knee and shoulder joints help with these different actions, compare their mobility and stability using at least two structural details, and predict what would change if the shoulder worked like a knee hinge.

Built to Move

PART 1 · READ AND MARK

Underline one structural feature of each major joint type, then circle the movement or stability that each feature helps explain. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	Compare skull sutures with the joints between vertebrae. How does each structure affect movement?	**Dense connective tissue holds skull bones tightly, allowing little or no movement. Discs between vertebrae allow small movements that add up across the spine.**
2	Compare the knee and shoulder. How do their structures affect the directions they can move?	**The knee's surfaces and ligaments mainly guide bending and straightening. The shoulder's rounded head and shallow socket allow movement in many directions.**
3	Both skull sutures and knee joints provide stability. Compare the structures that help each do so, and explain why they allow different amounts of movement.	**Dense connective tissue holds skull bones nearly still. Knee ligaments help limit excessive movement, but the synovial joint still bends and straightens.**
4	When the goalkeeper lands and bends her knees, how do the joints in her spine and knees help in different ways? Use one structural detail for each.	**Intervertebral discs compress to help absorb shock. Knee surfaces and ligaments guide bending while helping resist sideways motion.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

The shoulder's rounded head and shallow socket let the climber reach around the corner. Her planted knee can bend, while its supporting ligaments help limit sideways movement. The shoulder has more freedom to move, but it has less bony stability and needs muscles to help steady it. If her shoulder worked like a knee hinge, her arm would move in fewer directions and might not reach the grip.

Accept answers that connect the named joint structures to a defensible mobility or stability claim. For the open task, look for a comparison of both joints and a reasonable prediction about hinge-like shoulder movement.