Fracture Clinic Lab: Teacher Guide

mrsajdak.com/fractures · Anatomy & Physiology, Hole's Essentials of Human Anatomy & Physiology 3e, Section 7.4 Bone Development, Growth, and Repair (pp. 234–237) and the article Bone Fractures (pp. 266–267, listed by the district under Section 7.12) · one period, about 35 to 40 minutes · © Ryan Sajdak, CC BY-NC-SA 4.0

What students do

The virtual version of the Break It hands-on lab. Students put six forces on a model bone, read five real X-rays, then follow one break through a year of repair and use a clinical rule of thumb for healing time.

Tab	Students	Learn It teaches	Sheet
Do Now	Four real X-rays of one arm over a year. What does a bone have that a pencil does not?		A, B
1. Break it	Run six tests. Record pieces, angle and whether it stays joined. After the Learn It, name the six breaks.	transverse, oblique, spiral, comminuted, impacted, greenstick; simple and compound	1–9
2. Read the X-ray	Follow the dark line on five real X-rays. After the Learn It, give three cases two labels.	how an X-ray shows a break; compression, depressed	10–13
3. Follow the repair	Step through seven times in one year. Record how firmly it holds. After the Learn It, use the Perkins table.	hematoma, soft callus, bony callus, remodeling; why blood matters	14–20

Questions before each READ FIRST line are data only. Each Learn It opens only when the student has the data.

Standards

HS-LS1-1, HS-LS1-2. HS-LS1-2: "Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms." The repair stages show bone tissue working with the blood system. **SEP 2** Developing and using models (Q16). **SEP 3** Planning and carrying out investigations (Q1). **SEP 4** Analyzing and interpreting data (Q10). **SEP 5** Using mathematics and computational thinking (Q15, 18, 19). **SEP 6** Constructing explanations (Q13, 20). **CCC 2** Cause and effect (Q5, 8). **CCC 4** Systems and system models (Q20). **CCC 6** Structure and function (Q7, 9).

Opening: pick a phenomenon

Option	What it is	Notes
A. Video: How a Bone Heals	Clip 1: "How Does a Bone Heal?", AskaBiologist, 0:00 to 0:30. Clip 2: "Bone healing in 2 mins!", Dr Matt & Dr Mike, 0:00 to 0:30. Watch for: what a bone does that a pencil cannot.	Both embed (oEmbed checked). Neither was watched: **preview first**, and stop before the stages are explained.
B. Activity: Bend or Twist	3 minutes. Snap one stick of chalk by bending, one by twisting. Compare the broken ends.	Chalk, tray, safety glasses. Warn about the snap.
C. Photo: One Arm, One Year	Four X-rays of one bone: the break, 1 month, 2 months, 1 year.	No skin, no blood. The gentlest option.

The district section, and additions

BPS A&P Unit 2, Section 7.4, Bone Development, Growth, and Repair (pp. 234–237); listed Writing Connection: Bone Timeline (TG p. 156), which the teacher's manual says can use the figure of the steps in repair of a fracture. The article Diagnosing Disease and Disorders: Bone Fractures (pp. 266–267) is listed under Section 7.12. The fracture chart is the teacher's manual's discussion question. **Additions beyond the district list:** this lab, the force tests and Perkins' rule.

Limits to say out loud

The break shapes, angles and piece counts are a model. The firmness numbers are round numbers, not a measurement. Perkins' rule is a rough guide for adults, and it is not advice for anyone's own injury.

Sources

Hole's Essentials of Human Anatomy & Physiology 3e teacher's manual, Section 7.4 and the Bone Fractures answers. Betts and others, Anatomy and Physiology 2e, OpenStax (2022), Section 6.5 Fractures: Bone Repair, for the stages and types, written here in my own words. Perkins' times: UK Ministry of Defence, Synopsis of Causation: Fractures, Long Bones, Upper Limb (2008). X-rays are credited on the lab page. The student edition is not on disk, so its stage wording was not checked. The answer key is a separate file, kept off the public site.