

# DR. DIAGNOSIS LESSON PLAN

## LEARNING OBJECTIVES

The student will be able to:

- Identify a cast and its purpose
- Identify medical pins and their purpose
- Create a bone scaffold from salt dough
- Create a diagnosis for each station
- Create a broken bone and accompanying story

## TIME

1-3 hours

## GRADE LEVEL

6-9th grade

## TOPICS COVERED

- Human Anatomy
- Human Skeleton
- Bones



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**SEPA**

SCIENCE EDUCATION  
PARTNERSHIP AWARD



 **DUQUESNE  
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## OVERVIEW

Prior to this lesson, students will need to view the Scientastic episode, “Sticks and Stones,” which covers topics including bone health, bone physiology, bone repair, and regenerative medicine. Having viewed an introduction to modern and regenerative medicine dealing with broken bones, students get to explore various broken bone vignettes in this station learning activity. The students will travel, in pre-assigned pairs or small groups, to 6 stations. Each station will provide the students with a short story about a person who broke a bone, their x-ray, a model of the broken bone, and a set of materials to “repair” the break. Students will record their repair diagnoses in their medical journal and discuss their findings with their classmates. As an extension, students can create their own medical station.

## STANDARDS

### NATIONAL

- **TEACHING STANDARD A: Teachers of science plan an inquiry-based science program for their students.**
- **TEACHING STANDARD E: Teachers of science develop communities of science learners that reflect the intellectual rigor of scientific inquiry and the attitudes and social values conducive to science learning.**

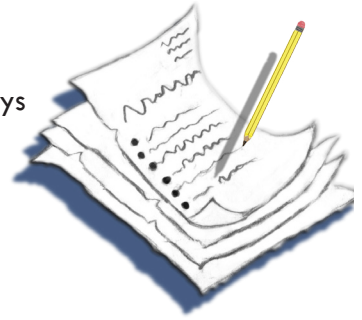
### PENNSYLVANIA STATE

- **3.8.4.A. Know that people select, create and use science and technology and that they are limited by social and physical restraints.**
  - » Identify how physical technology (e.g., construction, manufacturing, transportation), informational technology and biotechnology are used to meet human needs.
  - » Apply the technological design process to solve a simple problem.
- **3.8.4.B. Know how human ingenuity and technological resources satisfy specific human needs and improve the quality of life.**
  - » Identify and distinguish between human needs and improving the quality of life.
  - » Identify and distinguish between natural and human-made resources, natural and human-made resources.

# MATERIALS, RESOURCES, PREPARATION

## PROVIDED MATERIALS

- Scientastic Journal
- 6 Broken Bone Vignettes and accompanying X-rays
- 6 Model Broken Bone Templates
- Extension Activity Worksheet
- Station Instructions
- Exit Slip

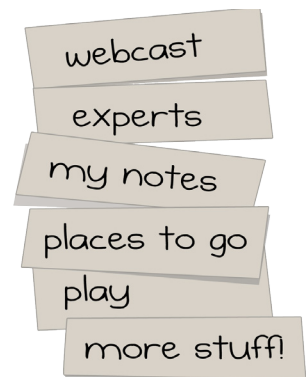


## ADDITIONAL MATERIALS

- Scientastic: Sticks and Stones DVD
- Home-made salt dough or Playdough
- Set of “medical pins”
- Casts
- Construction Paper
- Scissors

## EXTRA RESOURCES

Visit the web site [www.scientasticshow.com](http://www.scientasticshow.com) to find more information and activities about the bone. Click the tab “the show“ to find it! The web site includes background information on the bone, including common injuries and regenerative medicine research, a series of videos of experts discussing the same topics, and many suggestions for field trips, games and other sites to visit.



## SET-UP

1. **Prior to the students entering the classroom**, set up six workshop stations around the classroom. Each station should have one vignette with its corresponding x-ray. Each station should also have a model broken bone or broken bone template, a cast, metal pins, and salt dough. If necessary, cover the stations to avoid distractions until you are ready for this section of the lesson plan.
  - **You can either create 3D broken bone models out of the salt dough to provide to your class or use the provided 2D broken bone templates.**
  - **Note: Salt-dough can be dangerous if ingested, be sure to remind your students not to eat any of the salt dough at the broken bone stations.\*\***
2. Show the Scientastic episode “**Sticks and Stones**” prior to starting the lesson.



## PROCEDURES

### ANTICIPATORY SET

1. Display the following warm-up activity on the board as students enter the classroom:

***“Think about the way the doctors and experts helped with Habiba’s broken arm and other broken bones in the Sticks and Stones episode. Take five minutes to brainstorm in your Scientastic Journal about the science/medicine used to help heal broken bones. Be sure to include not only written descriptions of what you remember, but also any relevant diagrams, drawings, and graphic organizers that help you brainstorm!”***

2. After the students have been giving ample time to brainstorm, call on volunteers to share their brainstorming with their fellow students. Students can share their work on a document camera, submit thoughts through a personal responder device such as Turning Point, or contribute their thoughts and drawings on the classroom board (SmartBoard, etc). Valid talking points would include (but are not limited to): casts, metal pins, scaffolds, stem cells, nutrients, and good health practices. If the students have difficulty recalling the content, you can ask guided questions such as,

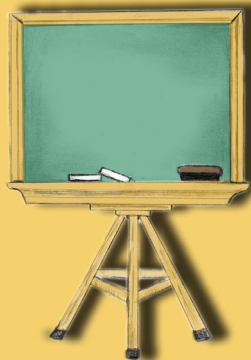
***“What suggestions did Habiba’s doctor make to aid in her recovery?”***

***“Do you remember what the rapping researcher guy told us about?”***

### ACTIVITY

3. After the students have reviewed traditional and regenerative medicine methods for treating a broken bone, place the students into their assigned pairs (Keep students strengths and skills in mind when choosing pairs). Designate roles to each group member. For the pairs, one student may be assigned to be the Medical Examiner who would read aloud the station vignette, record the diagnosis, and explain the science behind their decision. The other student could then be the Bone-Setter who would “repair” the model broken bone and, if possible, take a picture of their repair or simply sketch and explain the fix in their Scientastic Journal. Have the students accomplish the following tasks at each station (If necessary, place these instructions on the board or somewhere else visible for the students to follow while rotating stations):

1. Read the provided story and examine the provided x-ray.
2. With your partner, decide the appropriate course of treatment for the character in the story.
3. Display your diagnosed course of treatment on the model broken bone using either the cast, the pins, or the salt dough to form a scaffold, or any combination of the above.
4. Record your diagnosis in your Scientastic journal and either a sketch or picture of your broken bone treatment.





4. Throughout the activity, circle the classroom to informally assess student understanding and help anyone who is struggling. Be sure to remind students to record their observations, type of break, and treatments in their journal.
5. After each pair has visited each station, call the class together to discuss their findings. If possible, allow the students to show either pictures of their treatments or drawings/diagrams of their work. Also ask that at least one group, explains why they chose their course of treatment for each station. Allow the students to check each other's work as they progress.

## CLOSURE

6. For the last five minutes of class, have the students complete an exit slip. The students can either journal on this topic for homework, or simply fill out a half-sheet of paper which they could turn in before exiting the classroom. The exit slip will ask the following question:

***“We have learned that a bone scaffold and stem cells can be inserted in a bad break to help it heal faster. Can you think of a different medical problem that this method could help treat or cure?”***

## EXTENSIONS/ASSESSMENTS

Have the students create their own broken bone station. Each group would produce a short description of how the bone broke and draw a picture of the break or make a model of the break out of construction paper or salt dough. Students could then either choose a course of treatment for their own station or challenge their fellow students to treat the broken bone that they created.

## ADAPTATIONS

### FOR LOWER LEVEL STUDENTS

- Use only 3-4 broken bone stations
- Provided guided questions at each station to help the students determine the correct course of treatment
- Provide the students with 2D construction paper bones and additional paper for cutting out scaffolds as opposed to 3D bone models and salt dough

### FOR HIGHER LEVEL STUDENTS

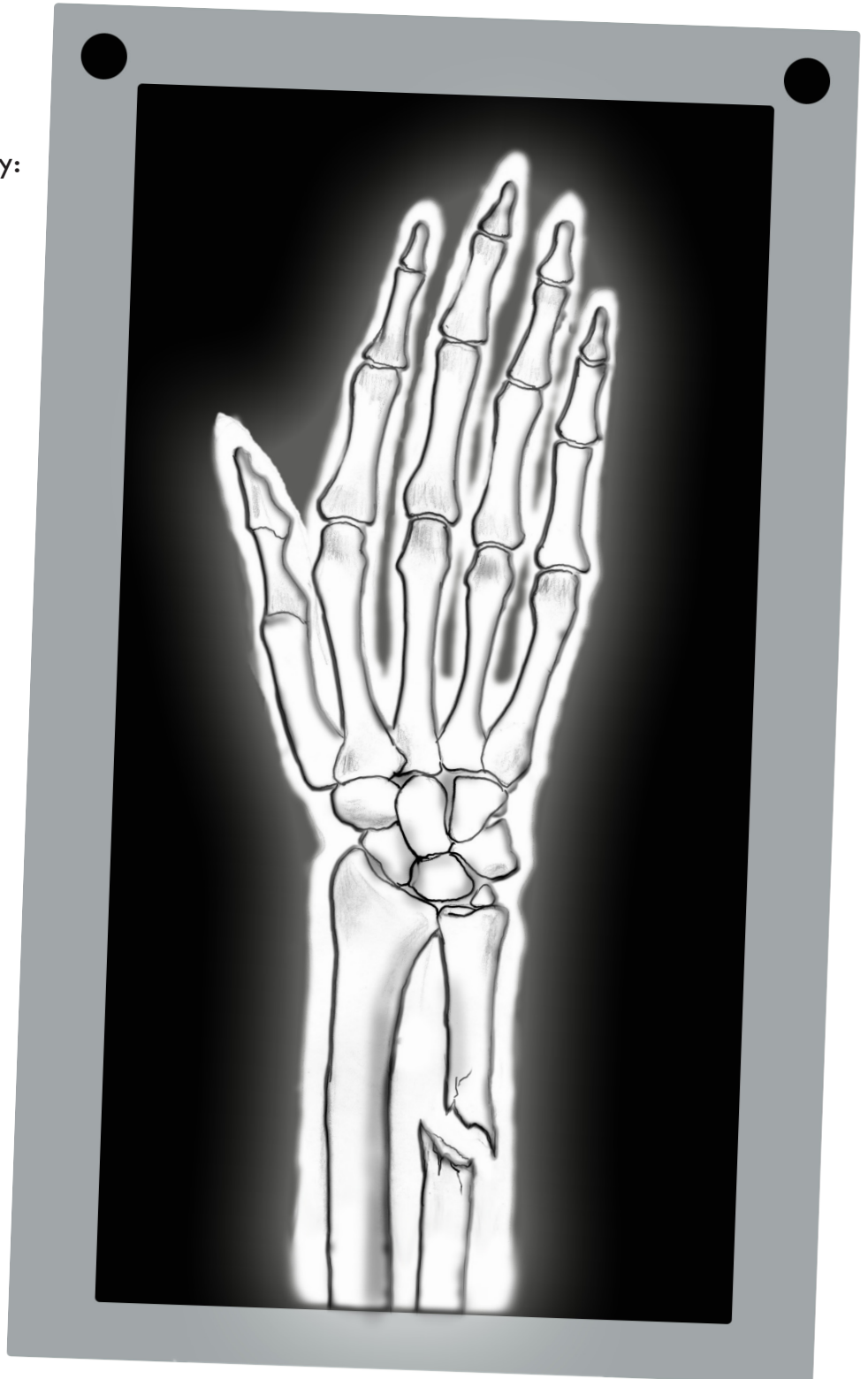
- Add additional stations and accompanying broken bone vignettes/x-rays
- Have the students research another area of medicine which has been improved by regenerative medicine and present their findings
- Have the students research different types of breaks including hairline fractures, complete fractures, greenstick fractures, comminuted fractures, bowing fractures, and open fractures, to help further diagnose each character in the vignettes.

# SALLY'S BROKEN WRIST

The other day Sally was riding her new bicycle around her neighborhood. She was riding down a small hill a bit too fast when she hit a patch of loose gravel. She flew off of her bike and landed on top of her wrist. She heard a loud, "Snap!" and was immediately in horrible pain. Thankfully, a kind neighbor saw the fall and immediately called 911 and Sally's parents. Once in the emergency room, the x-ray technician took the following x-ray:

**So, Dr. Diagnosis, this looks like a pretty bad break.**

**How should we proceed?**

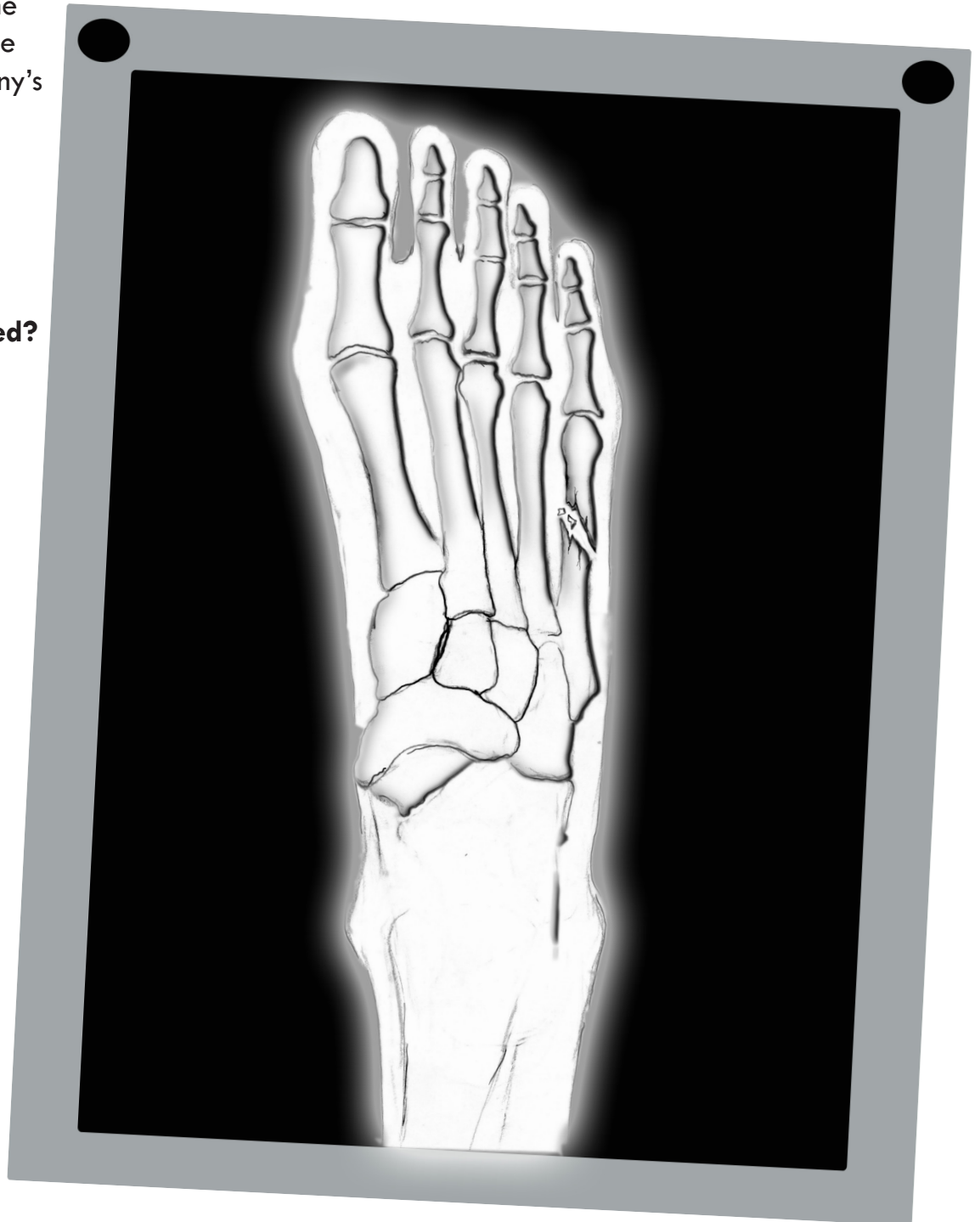


# JOHNNY'S BROKEN FOOT

Johnny was super excited about making the middle school football team! He ran into his first practice ready to learn everything there was to know about the sport. While running a practice play, Johnny was stepped on by a larger player and felt a terrible crack. Terribly upset, Johnny laid in the field until the coach came over. "I think my foot is broken!" Johnny said. The ambulance came quickly, and confirmed Johnny's assumption. The ambulance quickly took Johnny to the emergency room and the X-ray technician took the following X-ray of Johnny's foot:

**So, Dr. Diagnosis, this looks like a pretty bad break.**

**How should we proceed?**



# ROSE'S BROKEN HIP

The other day, Rose, a friendly elderly woman in your neighborhood, was chasing her dog that had gotten loose. Even though it was a bit icy out, Rose chased after the dog onto her sidewalk. Unfortunately, she slipped and fell on a patch of ice and felt a horrible pain. Another neighbor saw Rose fall and immediately called 911. When Rose reached the hospital, the X-ray technician took the following X-ray.



**So, Dr. Diagnosis, this looks like a pretty bad break. How should we proceed?**



# CARLOS'S BROKEN FEMUR

Carlos loves adventure. The other day, he was racing around the woods on his dirt bike with a few of his friends. While speeding through the trail, Carlos hit a pile of leaves and fell off the bike and into a large oak tree. His friends immediately called his parents and 911. At the hospital, the staff immediately knew that Carlos had a very bad break. They took the following X-ray of his leg.

**So, Dr. Diagnosis, this looks like a pretty bad break. How should we proceed?**



# ERIN'S BROKEN FINGER

Erin and her little brother Kevin were riding in the car with their mother to the grocery store. When they arrived at the store, the siblings got out of the car to go shop with their mom. Kevin, excited by the prospect of ice cream, accidentally shut the door on his sister's hand. "Ouch!" she screamed. "I think you broke my finger!" Everyone got back in the car and drove to the hospital. The X-ray technician took the following X-ray of Erin's finger, and sure enough, it was broken.

**So, Dr. Diagnosis, this looks like a pretty bad break. How should we proceed?**

