This folio contains a variety of resources that help teachers assess student progress in reaching Grade Level Expectations (GLEs) as outlined in the Essential Academic Learning Requirements (EALRs) for science. These materials have been designed for Washington State teachers using the 2000 edition of FOSS. Look in the Assessment Overview, available at www.smerc.org, for more on how to use these classroom-based assessments.

Scoring guides for each of the assessments begin on page 4, using a +/✓/– rubric.

+ going beyond expectations
✓ meeting expectations
– below expectations

The summative assessment scores more complex items with a 0-4 rubric.

4 going beyond expectations
3 meeting expectations
2 close to expectations
1 below expectations
0 off task, or no response
**PART 1**

**COUNTING BONES**

- How does your body move when jumping rope?
- How many bones are in the human skeleton?
- What are the functions of the bones in the skeleton?

Time: two 50-minute sessions

Students start by observing the human body in motion. They discuss what moves during rope jumping and focus attention on the bones in their bodies. Students count the number of bones in the skeleton, first without visual aids, then using photographs and posters to help make a more accurate count.

**PART 2**

**MR. BONES PUZZLE**

- How do the bones in a skeleton go together?

Time: 45–50 minutes

Students assemble a model of a human skeleton. First they assemble it from memory; then they compare and discuss their models. Finally they compare a picture of an accurate model to their own work.

**PART 3**

**OWL PELLETS**

- In what ways are the skeletons of a rodent and a human similar?

Time: two 40–50-minute sessions

Students examine owl pellets, remove the rodent bones from them, and compare and contrast their structures to those of human bones. Then they reconstruct the skeleton.
### Modified Student Sheet

#### Response Sheet — Investigation 1

**Structure of Physical Earth/Space and Living Systems.**

Analyze how the parts of a system go together and how these parts depend on each other. (GLE 1.2.1)

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#### Examples of questions students might generate for inquiry projects

- Explain how each part of your skeleton moves when you are eating, riding a bike, and so forth.
NOTE: Informal notes are used to assess students in Part 1 of this investigation.

INVESTIGATION 1: BONES
PART 2: MR. BONES PUZZLE

Use modified student sheet no. 6 called Response Sheet—Investigation 1.

Answers:
- The large vertebrae need to be removed from the neck and placed between the ribs and pelvis.
- The skeleton’s right arm should have two bones in the lower arm rather than in the upper arm.
- The rib cage is upside-down.
- The femur on the skeleton’s left leg is upside-down.

<table>
<thead>
<tr>
<th>Score</th>
<th>If the student...</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>identifies and explains each of the changes listed above.</td>
</tr>
<tr>
<td>3</td>
<td>identifies three of the four changes listed above; explains at least one of the changes.</td>
</tr>
<tr>
<td>2</td>
<td>identifies two of the four changes listed above.</td>
</tr>
<tr>
<td>1</td>
<td>identifies one of the four changes listed above.</td>
</tr>
<tr>
<td>0</td>
<td>does not complete the task, or gives information that has nothing to do with what was asked.</td>
</tr>
</tbody>
</table>

GOING FURTHER

If students are unable to identify how to change the response sheet, they may need to spend more time assembling skeletons like Mr. Bones. Copy the duplication masters for Mr. Bones and have students cut out and tape the bones together. It is helpful to discuss the shape of the bones, and how those shapes are important to the bones’ functions. There is also a home/school connection sheet in which students put together a three-dimensional skeleton called Bonita.
Laura completed putting Mr. Bones together. She would like you to check her work to see if she made any mistakes.

If you find any bones in the wrong place, circle the bones or groups of bones. Then write a note below explaining to Laura how she should correct each of her mistakes.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
INVESTIGATION 1: BONES
PART 3: OWL PELLETS

Use student sheet no. 7 called Owl-Pellets Observation.

<table>
<thead>
<tr>
<th>Score</th>
<th>If the student...</th>
</tr>
</thead>
<tbody>
<tr>
<td>+</td>
<td>draws a bone from the pellet that is similar to and different from a human bone (i.e., limbs, ribs, spine, pelvis) and gives the bone's name.</td>
</tr>
<tr>
<td>✓</td>
<td>draws a bone from the pellet that is similar to a human bone (i.e., limbs, ribs, spine, pelvis) and gives the bone's name.</td>
</tr>
<tr>
<td>–</td>
<td>can’t accurately compare a human bone to those found in the owl pellet.</td>
</tr>
</tbody>
</table>

GOING FURTHER

Work with small groups of students who need help comparing bones in the owl pellets to the human skeleton. They should be able to identify bones whose shape would most likely be from the legs, vertebrae (backbones), ribs, and skull.
**OWL-PELLETS OBSERVATION**

**PART 1: THE OWL PELLET**

Describe the size, shape, color, and texture of the owl pellet.

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Draw the owl pellet here.

**PART 2: INSIDE THE OWL PELLET**

Describe what the owl pellet is made of and what you found inside.

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

**PART 3: THE BONES IN THE OWL PELLET**

Find a bone that is **similar to** a human bone. Draw it.
Bone name ___________________________

Find a bone that is **different from** a human bone. Draw it.
Bone name ___________________________

What animal skeleton did you find in your pellet? _______________________________
What bones helped you decide it was that animal? _______________________________
INVESTIGATION 2: JOINTS

PART 1
LOOKING AT THUMB JOINTS
• How important are thumbs for doing everyday activities?
• What tasks are difficult to do without thumbs?
Time: 50–60 minutes

Students investigate joints and discover the advantages of an articulated skeleton. In this part they modify their hands to simulate having no thumbs and try to accomplish a number of routine tasks.

PART 2
DOING JOINT TASKS
• How important are joints in the fingers and hands for doing everyday tasks?
Time: 50–60 minutes

Students continue their investigation of joints by taping up their fingers in other ways to immobilize certain fingers or their thumbs.

PART 3
NAMING JOINTS
• Are all the joints in the human skeleton the same?
• What are the three main types of joints that allow movement?
Time: 30–40 minutes

Students look closely at joints in their bodies and categorize them by similarity of operation. Joints in the human body are compared to mechanical devices such as hinges and ball-and-socket connectors.

PART 4
COMPARING BONES
• How are leg bones from different animals similar? How are they different?
Time: 40–50 minutes

Students examine a small collection of plastic bones and discuss function as related to structure. They determine which bones go together to form a complete leg and identify the kinds of joints involved.
• The place where two bones come together is called a joint.

• *Articulated* means jointed or joined in sections.

• An opposable thumb is positioned opposite the other fingers.

- Articulated hands with opposable thumbs are essential for performing intricate tasks.

- The human skeleton has three basic types of joints: hinge, ball-and-socket, and gliding joints.

- Hinge, ball-and-socket, and gliding joints allow the body to move in many different ways.

- Human, rodent, and chicken leg bones have general similarities and specific differences.

**Examples of questions students might generate for inquiry projects**

- Are the leg bones of the human skeleton more like chicken leg bones or rodent leg bones?

- How would you write, eat, count coins, and do other actions if you had no fingers (tape hands into clenched fists)?
INVESTIGATION 2: JOINTS
PART 1: LOOKING AT THUMB JOINTS

STUDENT SHEETS AND TEACHER OBSERVATION

Use teacher observation along with the modified student sheet no. 9 called Thumb Joints. Distribute student sheet no. 9a called Without Thumb Joints when students have completed their investigations. It will help students reflect on their experiences and form conclusions about the usefulness of the opposable thumb and how systems are affected when one part is missing. Collect both student sheets.

<table>
<thead>
<tr>
<th>Teacher Observation and Modified Student Sheet—Thumb Joints</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Intellectual Honesty.</strong> Understand that all scientific observations are reported accurately and honestly even when the observations contradict expectations. (GLE 2.2.1)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Score</th>
<th>If the student...</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓</td>
<td>completes the table with actual results (based on your observations).</td>
</tr>
<tr>
<td>-</td>
<td>does not fully complete the table or records results based on expectations not actual results.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>New Student Sheet—Without Thumb Joints</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Structure of Physical Earth/Space and Living Systems.</strong> Analyze how the parts of a system go together and how these parts depend on each other. (GLE 1.2.1)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Score</th>
<th>If the student...</th>
</tr>
</thead>
<tbody>
<tr>
<td>+</td>
<td>gives detailed evidence to demonstrate the difficulties of doing the various tasks with the thumb disabled and states a conclusion based on these experiences. Also gives several advantages of having an opposable thumb.</td>
</tr>
<tr>
<td>✓</td>
<td>describes experiences to demonstrate the difficulties of doing the various tasks with the thumb disabled and states a conclusion based on these experiences. Also gives at least one example of an advantage of having an opposable thumb.</td>
</tr>
<tr>
<td>-</td>
<td>is not able to relate the conclusions based on their experience and/or give an example of an advantage of having an opposable thumb.</td>
</tr>
</tbody>
</table>
THUMB JOINTS

Color or shade the picture carefully.

ACTION

<table>
<thead>
<tr>
<th>ACTION</th>
<th>Easier than with thumb</th>
<th>About the same as with thumb</th>
<th>Harder than with thumb</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tape your own fingers.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tape your partner’s fingers.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hold a pencil.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shade the picture.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trace a maze.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Work a zipper.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Work a button.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tie a shoe.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turn pages in a book.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

ADDITIONAL TASKS

- Color or shade the picture carefully.
- Trace the maze from start to finish.
1. Describe your experiences when your thumb could not move. Did it make a difference in how difficult the tasks were to complete?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

2. What are the advantages of an opposable thumb?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
INVESTIGATION 2: JOINTS
PART 2: DOING JOINT TASKS

Use teacher observation to assess students’ ability to identify joints and the value of the opposable thumb.

<table>
<thead>
<tr>
<th>Teacher Observation—Joints in fingers and thumb</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human Body. Understand the organization and function of human body structures and organs and how these structures and organs interconnect. (GLE 1.2.8)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Score</th>
<th>If the student...</th>
</tr>
</thead>
<tbody>
<tr>
<td>+</td>
<td>can point out several joints in the fingers and thumb; knows that hands without thumbs could not do as many things.</td>
</tr>
<tr>
<td>✓</td>
<td>can point out several joints in the fingers and thumb, but does not consider the thumb important.</td>
</tr>
<tr>
<td>–</td>
<td>cannot point out joints in the fingers and thumb.</td>
</tr>
</tbody>
</table>

**NOTE:** At this point students should be able to point out that joints are where bones come together and that they allow movement between the bones. They should also have some sense that the opposable thumb is a remarkable structure that allows people to do a lot more with their hands than most other animals can.
INVESTIGATION 2: JOINTS
PART 3: NAMING JOINTS

Use modified student sheet no. 12 called Response Sheet—Investigation 2 to assess students’ understanding of the organization and orientation of bones in the arm and shoulder and how the different types of joints allow for certain types of movement of these bones. Before students begin answering the response sheet, demonstrate the lasso-throwing motion and have students try it as well. You may also want to have students isolate each joint and think about the way it moves.

WHAT TO LOOK FOR

• The elbow is a hinge joint and can only move back and forth.
• The shoulder and wrist are also involved in the rope-throwing motion.
• The shoulder is a ball-and-socket joint, which allows for motion in all directions.
• The wrist joint is actually a series of gliding joints between the many tiny bones that make up the wrist. Each gliding joint allows for movement in two directions rather than rotation but taken together they simulate rotation. This may lead students to think the wrist is a ball-and-socket joint. Address any confusion when you review the Response Sheet.

Response Sheet—Investigation 2

<table>
<thead>
<tr>
<th>Structure of Physical Earth/Space and Living Systems.</th>
<th>Analyze how the parts of a system go together and how these parts depend on each other. (GLE 1.2.1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human Body.</td>
<td>Understand the organization and function of human body structures and organs and how these structure and organs interconnect. (GLE 1.2.8)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Score</th>
<th>If the student...</th>
</tr>
</thead>
<tbody>
<tr>
<td>+</td>
<td>is able to give detailed information involving elbow, shoulder, and wrist as described in What to Look For to explain how the joints are acting in this scenario.</td>
</tr>
<tr>
<td>✔</td>
<td>is able to give some accurate information as described in What To Look For to explain how the joints are acting in this scenario.</td>
</tr>
<tr>
<td>-</td>
<td>does not understand any of the joints’ role in Carl’s action.</td>
</tr>
</tbody>
</table>
After school when Carl was practicing his rope throwing for the junior rodeo, he swung his lasso up over his head and thought that his elbow was moving like a ball-and-socket joint.

Try this motion yourself. You may find it helpful to place your hand on your wrist, elbow, and shoulder (one at a time) as you try the motion.

Describe how the elbow and other joints are involved in this action to help Carl understand that the elbow is not a ball-and-socket joint.
INVESTIGATION 2: JOINTS  
PART 4: COMPARING BONES

Use teacher observation to check students’ understanding of how leg systems can be modeled by the plastic rodent and chicken bones.

<table>
<thead>
<tr>
<th>Teacher Observation—Modeling Leg Bones</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Modeling</strong></td>
</tr>
<tr>
<td><strong>Score</strong></td>
</tr>
<tr>
<td>+</td>
</tr>
<tr>
<td>✓</td>
</tr>
<tr>
<td>–</td>
</tr>
</tbody>
</table>
INVESTIGATION 3: MUSCLES

PART 1

MAKING A LEG MODEL
- How do muscles move bones?
- How do muscles attach to bones to make leg movements possible?

Time: 40–50 minutes

Students begin their inquiry into muscles by looking and feeling for their muscles when the muscles are working, particularly the ones used during rope jumping. Students work in pairs to build a model leg and foot with muscles and tendons that emulate the actions of a leg and foot during jumping.

PART 2

MAKING A THUMB MODEL
- How do muscles, tendons, and ligaments attach to bones to make a thumb move?
- Where are some of the muscles that move the hand and thumb?

Time: 50–60 minutes

Students build a second model to emulate the movement of the thumb, with tendons and ligaments that make the thumb operate properly.

PART 3

MAKING AN ARM MODEL
- How does the biceps muscle move the arm?

Time: 40–50 minutes

Students build an arm model with a biceps muscle that flexes the arm when it contracts.
• Muscles contract when they work.
• Muscles attach across joints to move bones.
• Muscles attach to bones with tissue called tendon.

**Teacher Observation and Interview**
Making your body move

**Human Body.** Understand the organization and function of human body structures and organs and how these structures and organs interconnect. (GLE 1.2.8)

• Some muscles that move the fingers and thumb are in the arm. These muscles have long tendons that stretch down to the thumb.
• Ligaments attach bone to bone. Some ligaments serve as guides through which tendons run.

**Modified Student Sheet**
*Response Sheet — Muscles*

**Explaining.** Understand how to construct a reasonable explanation using evidence. (GLE 2.1.3)

• Muscles contract when they work.

**Modified Student Sheet**
*Muscle Action*

**Teacher Observation**
Understands use of of a model

**Structure of Organization of Living Systems.**
Understand that organisms can be single cell or many cells that form parts with different functions. (GLE 1.2.6)

**Modeling.** Understand how to use simple models to represent objects, events, systems, and processes. (GLE 2.1.4)

**Examples of questions students might generate for inquiry projects**
• What other models could you make that show how skeletal systems work with muscles? Could you model a cat? Dog? Bird?
INVESTIGATION 3: MUSCLES
PART 1: MAKING A LEG MODEL

Interview the student groups to assess their understanding of how the muscles work with the bones to create movement.

Sample probing questions if students are having trouble explaining (from section #20 of Wrapping up).

What do muscles do when they work?

What happens when muscles contract?

How do the muscles attach to the bones to make movement possible?

<table>
<thead>
<tr>
<th>Interview—Making your body move</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human Body. Understand the organization and function of human body structures and organs and how these structures and organs interconnect. (GLE 1.2.8)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Score</th>
<th>If the student...</th>
</tr>
</thead>
<tbody>
<tr>
<td>+</td>
<td>demonstrates how the muscles contract when they work, which causes the bones to move because they are connected to the bones by tissue called tendon.</td>
</tr>
<tr>
<td>✓</td>
<td>demonstrates that muscles contract and pull on the bone but does not identify the tissue (tendon) that connects to the bone.</td>
</tr>
<tr>
<td>–</td>
<td>is not able to explain how the muscles work with the bones to create movement.</td>
</tr>
</tbody>
</table>
NOTE: Informal notes are used to assess students in Part 1 of this investigation.

# INVESTIGATION 3: MUSCLES

## PART 2: MAKING A THUMB MODEL

Use modified student sheet no. 17 called *Response Sheet—Investigation 3*.

### Response Sheet—Investigation 3

**Explaining.** Understand how to construct a reasonable explanation using evidence. (GLE 2.1.3)

<table>
<thead>
<tr>
<th>Score</th>
<th>If the student...</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>disagrees and identifies the mistakes as “muscles are found only in the arms and legs” and “the main job that muscles do is make us strong”; corrects the journal entry by writing that muscles are in all parts of the body, not just arms and legs, that muscles are always there, and that their strength depends on how they are used or exercised. Also mentions two additional muscle facts.</td>
</tr>
<tr>
<td>3</td>
<td>identifies both mistakes described above but cannot tell exactly how they are wrong; mentions two additional facts.</td>
</tr>
<tr>
<td>2</td>
<td>identifies one mistake; may or may not be able to tell how it is wrong; mentions one additional fact.</td>
</tr>
<tr>
<td>1</td>
<td>makes an attempt, but cannot describe anything wrong in the journal entry; may or may not mention additional facts.</td>
</tr>
<tr>
<td>0</td>
<td>does not complete the task, or gives information that has nothing to do with what was asked.</td>
</tr>
</tbody>
</table>

### GOING FURTHER

Common misconceptions among students are that muscles are found only in arms and legs, and that only strong people have muscles. Be sure to discuss this response sheet with students, especially those who appear to endorse similar misconceptions.
After completing the investigations on muscles, Lisa wrote in her journal.

**Everything I Know About Muscles**

Muscles are found only in the arms and legs. The main job that muscles do is make us strong.

Do you agree or disagree with Lisa’s two statements? Explain your answer.

What else would you write about muscles in your journal?
INVESTIGATION 3: MUSCLES

PART 3: MAKING AN ARM MODEL

Use modified student sheet no. 18 called Muscle Action.

**Student Sheet—Muscle Action**

**Structure of Organization of Living Systems.** Understand that organisms can be single cell or many cells that form parts with different functions. (GLE 1.2.6)

<table>
<thead>
<tr>
<th>Score</th>
<th>If the student...</th>
</tr>
</thead>
<tbody>
<tr>
<td>+</td>
<td>describes how the muscle on the model arm works; shows a clear understanding of how the biceps and triceps work together to flex and extend the main part of the arm. Identifies picture on far right as correct.</td>
</tr>
<tr>
<td>✓</td>
<td>gives some description of how the muscle on the model works; may not have a clear understanding of how the biceps and triceps work together. May describe biceps as getting “harder” for contracting and triceps as getting “softer” or “longer” for relaxing.</td>
</tr>
<tr>
<td>–</td>
<td>does not complete the sheet or has major misconceptions.</td>
</tr>
</tbody>
</table>

**Teacher Observation—Modeling**

**Modeling** Understand how to use simple models to represent objects, events, systems, and processes. (GLE 2.1.4)

<table>
<thead>
<tr>
<th>Score</th>
<th>If the student...</th>
</tr>
</thead>
<tbody>
<tr>
<td>+</td>
<td>can build a reasonable model of the arm; can explain how models are used to study complex systems; notes differences between models and the real thing.</td>
</tr>
<tr>
<td>✓</td>
<td>can build a reasonable model of an arm; can explain how models are used to study complex systems; is unclear about how models in science are different from just small versions of something.</td>
</tr>
<tr>
<td>–</td>
<td>has trouble making the model; does not understand how models are used in science.</td>
</tr>
</tbody>
</table>

**GOING FURTHER**

Students should have the basics about muscles at this point. If they don’t, plan to spend some time with small groups to continue working
MUSCLE ACTION

1. Put your left hand on the biceps muscle (top) of your right arm. Put your right hand under the front of your desk and lift up slowly.

   How does your biceps feel?

   Are your biceps contracting or are they relaxing?

   How does the triceps muscle (bottom of the arm) feel?

   Are your triceps contracting or are they relaxing?

2. Look at your model of an arm with a biceps muscle. Describe what each part of the model represents.

   Dowels             Rubber tube
   Paper clips        Rubber band

   What happens to the dowels when you shorten the rubber band by bringing its ends together?

   How is this like what happens to your arm when you flex your muscles?

   Which muscle is the rubber band most like, the biceps or the triceps?

3. One of these pictures correctly shows the muscles when a person flexes an arm. Draw a circle around the correct picture.
INVESTIGATION 4: COORDINATION

PART 1

STIMULUS/RESPONSE

• Does it take the same amount of time for hands and feet to respond to a visual stimulus?

Time: 50–60 minutes

Students use a falling-cup device to investigate the time that elapses between a visual stimulus and a response. They attempt to move their hand out of the way of a falling cup once they see it start to fall. They then compare foot-response time to hand-response time.

PART 2

RESPONSE AND PRACTICE

• Does practice make a difference in response time?

Time: 30–40 minutes

Students investigate how practice affects response time. They repeat the Part 1 investigations after several sessions of practice.

PART 3

TIMING YOUR RESPONSES

• How long does it take to respond to a visual stimulus?

Time: 40–50 minutes

Students quantify response time in 100ths of a second. They catch a falling strip of paper on which are written numbers that correspond to the time elapsed between drop and catch.

PART 4

CHOOSING YOUR OWN INVESTIGATION

• Students ask their own questions and plan investigations or research to answer them.

Time: 4–6 sessions

Students select a topic from their study of bones, joints, muscles, and stimulus/response to investigate in greater depth. The results of their project are shared with the rest of the class in a formal presentation.
### CONCEPTS AND PRINCIPLES

- Coordination is when parts work together to complete a task.
- A stimulus is something that triggers (starts) a response. A stimulus is often information received through the senses.
- A response is a reaction of a living thing to a stimulus.
- Response time is the length of time it takes for a person to respond to a stimulus.
- Practice increases muscle strength and reinforces neural pathways.
- Coordinated humans generally respond to visual stimuli in less than a quarter of a second.
- Apply concepts learned in previous investigations.

### ASSESSMENT OPPORTUNITIES

- New Student Sheet
  - Foot Response
- Teacher Observation and Student Sheet
  - Stimulus/Response
- Planning and Conducting Safe Investigations. Understand how to plan and conduct simple investigations following all safety rules. (GLE 2.1.2)
- Explaining. Understand how to construct a reasonable explanation using evidence. (GLE 2.1.3)
- Intellectual Honesty. Understand that all scientific observations are reported accurately and honestly even when the observations contradict expectations. (GLE 2.2.1)
- Modified Student Sheet
  - Response Sheet — Coordination
- Structure of Physical Earth/Space and Living Systems. Analyze how the parts of a system go together and how these parts depend on each other. (GLE 1.2.1)
- Interview
  - Timing responses
- Motion of Objects. Understand the relative position and motion of objects. (GLE 1.1.2)
- Performance Assessment
  - Inquiry or Design Project
    - Investigating Systems: GLEs 2.1.1—2.1.5
    - or Designing Solutions: GLEs 3.1.1—3.1.3
INVESTIGATION 4: COORDINATION

PART 1: STIMULUS/RESPONSE

Use teacher observation, new student sheet no. 18a called Foot Response, and student sheet no. 19 called Stimulus/Response.

Do this assessment after completing Part 1 as written in the FOSS teacher guide.

### Planning and Conducting Safe Investigations

Understand how to plan and conduct simple investigations following all safety rules. (GLE 2.1.2)

<table>
<thead>
<tr>
<th>Score</th>
<th>If the student...</th>
</tr>
</thead>
<tbody>
<tr>
<td>+</td>
<td>makes a prediction and gives a reason for that prediction. Generates a logical plan for a simple investigation including a list of materials, a controlled variable, a manipulated variable, and a measured variable, and plans multiple trials.</td>
</tr>
<tr>
<td>✓</td>
<td>makes a prediction and gives a reason for that prediction. Generates a logical plan for a simple investigation, including some but not all of the following: a list of materials, a controlled variable, a manipulated variable, a measured variable.</td>
</tr>
<tr>
<td>−</td>
<td>does not complete the task or leaves out critical and numerous components to the plan.</td>
</tr>
</tbody>
</table>
### Student Sheet—Foot Response, item 4

**Explaining.** Understand how to construct a reasonable explanation using evidence. (GLE 2.1.3)

<table>
<thead>
<tr>
<th>Score</th>
<th>If the student...</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>makes a logical conclusion; explains it with respect to the data; suggests additional conclusions that may be based on the data or suggests further investigations based on what has been discovered so far.</td>
</tr>
<tr>
<td>3</td>
<td>makes a logical conclusion related to the data; references data as the evidence for the conclusion.</td>
</tr>
<tr>
<td>2</td>
<td>makes a logical conclusion that relates to the data; does not reference the data in the written response.</td>
</tr>
<tr>
<td>1</td>
<td>makes a conclusion that partially relates to the data but also contains information that does not relate to the data.</td>
</tr>
<tr>
<td>0</td>
<td>does not complete the task, or gives information that has nothing to do with what was asked.</td>
</tr>
</tbody>
</table>

### Teacher Observation and Student Sheet—Stimulus/Response

**Intellectual Honesty.** Understand that all scientific observations are reported accurately and honestly even when the observations contradict expectations. (GLE 2.2.1)

<table>
<thead>
<tr>
<th>Score</th>
<th>If the student...</th>
</tr>
</thead>
<tbody>
<tr>
<td>+</td>
<td>records all data accurately regardless of predictions made or desire for a certain conclusion.</td>
</tr>
<tr>
<td>✔</td>
<td>records most data accurately.</td>
</tr>
<tr>
<td>−</td>
<td>cannot record data accurately; selects data to confirm prediction or to “win.”</td>
</tr>
</tbody>
</table>
1. Do you think your foot-response time (the time that passes between the stimulus and moving your foot) would be faster or slower than your hand-response time? Why do you think so?

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

2. Design and conduct an investigation to find out. What steps will you follow to answer the question: Is foot-response time or hand-response time faster? (Don’t forget to think about release height.)

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

3. Carry out your investigation. Record your data on the student sheet called Stimulus/Response.

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

4. What is your conclusion about foot-response time compared to hand-reponsne time, based on the data you have collected? How does this compare with your prediction?

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________
### STIMULUS/RESPONSE

<table>
<thead>
<tr>
<th>Height of Drop</th>
<th>Stimulus</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Vision</td>
<td>Right hand</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HIT</th>
<th>MISS</th>
</tr>
</thead>
</table>

### Height of Drop

<table>
<thead>
<tr>
<th>Height of Drop</th>
<th>Stimulus</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HIT</th>
<th>MISS</th>
</tr>
</thead>
</table>

### Height of Drop

<table>
<thead>
<tr>
<th>Height of Drop</th>
<th>Stimulus</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HIT</th>
<th>MISS</th>
</tr>
</thead>
</table>

FOSS Human Body Module
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Investigation 4: Coordination
No. 19—Student Sheet
WA Edition
INVESTIGATION 4: 
COORDINATION
PART 2: RESPONSE AND PRACTICE

Use modified student sheet no. 20 called Response Sheet — Investigation 4.

<table>
<thead>
<tr>
<th>Score</th>
<th>If the student...</th>
</tr>
</thead>
<tbody>
<tr>
<td>+</td>
<td>suggests Martin use a hand brake and adds that the hand is closer than the foot to the brain and thus can respond more quickly and gives evidence to support that choice.</td>
</tr>
<tr>
<td>✓</td>
<td>suggests Martin use a hand brake and gives evidence to support that choice.</td>
</tr>
<tr>
<td>–</td>
<td>suggests foot brake or gives no supporting information.</td>
</tr>
</tbody>
</table>

GOING FURTHER
If students struggle a bit with identifying stimuli and responses, have them write stories that show stimulus-response actions. Start with a class story that everyone works on, then have students write their own stories.
Martin wants to know if bike brakes work faster if they are hand brakes or foot brakes. Hand brakes are on the handlebars of the bike and work by squeezing them with your hands. Foot brakes work by pushing the bike pedals backwards with your feet. Which type of brakes (hand or foot) do you think Martin should use on his bike?

Use what you know about response time to explain your choice to Martin.
INVESTIGATION 4: COORDINATION

PART 3: RESPONSE AND PRACTICE

Use interview and/or last question from student sheet Timing Response.

Interview questions:
What’s the position when your student started? finished?
How is your reaction time different between two hands?
Ask questions to find out if students can relate the ending position of the reaction time to how long it takes them to respond.

<table>
<thead>
<tr>
<th>Interview—Timing responses</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Motion of Objects.</strong> Understand the relative position and motion of objects. (GLE 1.1.2)</td>
</tr>
<tr>
<td><strong>Score</strong></td>
</tr>
<tr>
<td>+</td>
</tr>
<tr>
<td>✓</td>
</tr>
<tr>
<td>–</td>
</tr>
</tbody>
</table>
INVESTIGATION 4: COORDINATION

PART 4: CHOOSING YOUR OWN INVESTIGATION

INQUIRY OR DESIGN PROJECT

The inquiry or design project replaces “Choosing Your Own Investigation.” It can be completed at any point in the module with any lesson that lends itself to students’ independently carrying out an investigation, starting from their own question, to drawing a conclusion. See examples of inquiry questions at the bottom of each At a Glance page.

Use materials available from the FOSS kit and add materials as needed or possible. Use the inquiry project sheets, which are also in the Assessment Overview with more detailed information.

NOTE: Students should complete an entire inquiry project at least once in each module to build understanding of the inquiry and design process by the fifth and sixth grades.

INQUIRY OR DESIGN PROJECT SCORING GUIDES

Use the Student Project Scoring Rubric to grade projects. Score one point for each attribute in the list. By the end of fifth grade, students should be able to score between 10 and 13 points for planning an investigation to meet standards on the WASL.
INQUIRY PROJECT

Plan an investigation to answer a question.

Your plan should include all these parts.

- A question that can be investigated
- A prediction of the outcome of the investigation
- Materials needed to do the investigation
- A procedure that includes
  - logical steps to do the investigation
  - variables kept the same (controlled)
  - one variable changed (manipulated)
  - any variables being measured and recorded
  - how often measurements are taken and recorded

Question

________________________________________________________________________

Prediction

________________________________________________________________________

Materials

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
INQUIRY PROJECT (continued)

You may use the space below for a labeled diagram to support your procedure.

Procedure

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
WRITING A CONCLUSION

Data Collected

After completing your investigation, write a conclusion that explains whether your prediction was correct. Your conclusion should include these parts.

- Supporting data from your data table
- An explanation of how this data supports your conclusion

Supporting Data

__________________________________________

Explanation

__________________________________________

__________________________________________

__________________________________________

__________________________________________

__________________________________________

__________________________________________
### STUDENT INQUIRY PROJECT SCORING RUBRIC

#### Questioning. Understand how to ask a question about objects, organisms, and events in the environment. (GLE 2.1.1)

<table>
<thead>
<tr>
<th>Investigation Attribute</th>
<th>If the student . . .</th>
<th>Value Point</th>
</tr>
</thead>
<tbody>
<tr>
<td>Question</td>
<td>Asks a question that can be investigated.</td>
<td>1</td>
</tr>
</tbody>
</table>

#### Planning and Conducting Safe Investigations. Understand how to plan and conduct simple investigations following all safety rules. (GLE 2.1.2)

<table>
<thead>
<tr>
<th>Investigation Attributes</th>
<th>If the student . . .</th>
<th>Value Point</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prediction</td>
<td>Relates the prediction to the investigative question and includes both the changed variable and the measured variable.</td>
<td>1</td>
</tr>
<tr>
<td>Materials</td>
<td>Lists the materials for the procedure.</td>
<td>1</td>
</tr>
<tr>
<td>Logical steps</td>
<td>Writes the steps of the investigation in a logical order. Includes enough detail so that someone could repeat the procedure.</td>
<td>1</td>
</tr>
<tr>
<td>Variables kept the same (controlled)</td>
<td>Identifies at least one variable that stays the same.</td>
<td>1</td>
</tr>
<tr>
<td>One changed variable (manipulated)</td>
<td>Identify the correct variable that changes.</td>
<td>1</td>
</tr>
<tr>
<td>One measured variable</td>
<td>Identifies the variable to be measured and the units to be used.</td>
<td>1</td>
</tr>
<tr>
<td>Repeated trials</td>
<td>Plan for more than one trial.</td>
<td>1</td>
</tr>
<tr>
<td>Record measurements</td>
<td>States how you will record data.</td>
<td>1</td>
</tr>
<tr>
<td>Conducts investigation</td>
<td>Follows the procedure as planned unless problems arise, then adjusts the procedure.</td>
<td>1</td>
</tr>
<tr>
<td>Data collection</td>
<td>Collects and records data.</td>
<td>1</td>
</tr>
</tbody>
</table>

#### Explaining. Understand how to construct a reasonable explanation using evidence. (GLE 2.1.3)

<table>
<thead>
<tr>
<th>Investigation Attributes</th>
<th>If the student . . .</th>
<th>Value Point</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cites data</td>
<td>Reports lowest supporting data.</td>
<td>1</td>
</tr>
<tr>
<td>Cites data</td>
<td>Reports highest supporting data.</td>
<td>1</td>
</tr>
<tr>
<td>Explanation</td>
<td>Uses data to form a reasonable explanation.</td>
<td>1</td>
</tr>
</tbody>
</table>
END-OF-MODULE ASSESSMENT

This assessment is used as an evaluative tool after all the investigations have been completed. It checks student content knowledge, skills in conducting investigations, and explanation building. Items are in three formats: performance tasks, multiple-choice/short-answer items (which give students practice for standardized tests), and narrative items that require students to write short explanations.

MATERIALS FOR EACH BONES STATION

- 2 Paper plates *
- 1 Leg bone from a chicken *
- 1 Vertebrae (backbone section) from a chicken *
- Assessment sheet no. 7 called Performance Assessment — Bones

NOTE: If you cannot get real chicken bones (leg bones and vertebrae), use one of the plastic chicken-leg bones from the kit and substitute the plastic rat-pelvis bone for the chicken vertebrae.

* Supplied by the teacher

Use the duplication master to make copies.
GETTING READY

1. SCHEDULE THE ASSESSMENT

You may need to give the assessment in two sessions: one for the performance items, and one for the multiple-choice/short-answer and narrative items. Read through Steps 2 and 3 below before deciding how you will proceed.

2. ADMINISTER THE PERFORMANCE ITEMS

The performance assessment is in two parts: one assesses understanding of bone structure, and the other, the importance of having an articulated (jointed) skeleton.

Individual Assessment. If you want students to work individually, you can assess up to eight students at a time. Set up eight identical stations for bones. Students will need 5 to 10 minutes to complete each task and to fill in the assessment sheet at the station. Send shifts of students to the stations until all have had a chance to complete the task. Students waiting to take their turn at the performance task can be completing the multiple-choice/short-answer and narrative items, or working on some other quiet activity.

Collaborative-Group Assessment. If you don’t have time for each student to complete the performance task, have students work in groups. After the group completes the task, each student fills in his or her assessment sheet individually. The completed assessment sheets should reflect each student’s learning.

3. ADMINISTER THE MULTIPLE-CHOICE/SHORT-ANSWER AND NARRATIVE ITEMS

Assessment items in content areas such as science often require a fairly high level of reading. If you feel that students will have a difficult time reading the items on their own, you can read each item and its possible answers (when appropriate) aloud. Have students mark their answers and move on to the next item, working together through the assessment, item by item.

4. COPY ASSESSMENT SHEETS

Make copies of the assessment masters provided after this folio. Each student needs one set of sheets nos. 7–17. Make a copy of assessment chart no. 5 to record scores.
5. **PREPARE THE REAL CHICKEN BONES**
   - Plan a tasty chicken dinner and save the bones.
   - Boil the bones until the remaining meat begins to fall off (about 1 hour).
   - Clean all the meat off the bones and wash them with detergent.
   - Soak the bones overnight in a weak bleach solution.
   - Rinse and dry the bones.

6. **SET UP THE PERFORMANCE STATIONS**
   Set up stations for the human body performance task as suggested below.

**Bones Station**
- Put the two paper plates on the table and label them A and B.
- Put the chicken leg bone on plate A and the vertebrae on plate B.
### END-OF-MODULE ASSESSMENT

#### SCORING GUIDES

**PERFORMANCE ASSESSMENT ITEMS**

<table>
<thead>
<tr>
<th>Score</th>
<th>If the student...</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>correctly identifies the part of the animal from which both bones came; gives valid reasons for both bones such as A is a long straight bone and can support a lot of weight or resembles the leg bones studied in the module, and B is a small bone, many of them stack one on top of the other, and it resembles the pictures of the backbones studied in the module.</td>
</tr>
<tr>
<td>3</td>
<td>makes a minor mistake in identification such as saying the leg bone is an arm bone; gives good reasons for identifying the bones.</td>
</tr>
<tr>
<td>2</td>
<td>correctly identifies one bone with a valid reason, but misidentifies the other bone without a good reason.</td>
</tr>
<tr>
<td>1</td>
<td>attempts all parts of the task, but gives incorrect answers.</td>
</tr>
<tr>
<td>0</td>
<td>does not complete the item, or gives information that has nothing to do with what was asked.</td>
</tr>
</tbody>
</table>

**NOTE:** If you substitute the plastic rat-pelvis bone for the chicken vertebrae, students should describe that the bone has places for leg bones to join and resembles the bones studied in the module.
MULTIPLE-CHOICE/SHORT-ANSWER ITEMS

Score **1 point** for each correct answer.

1. B  
2. B  
3. A  
4. D  
5. C  
6. A  
7. A  
8. C  
9. B  
10. C  
11. D  
12. C  
13. D  
14. C

Short-Answer Item 15

Score **1 point** for each box if joint names are placed correctly. (3 points possible.)

(NOTE: fingers and toes can be both hinge and gliding joints.)

- **Hinge joints:** knee, finger, toe, elbow.
- **Ball-and-socket-joints:** shoulder, hip.
- **Gliding:** finger, neck, toe, wrist, ankle, backbone.

Short-Answer Item 16

Score **1 point** for each correct answer.

a. Hinge.

b. Knee, fingers, toes (two of these).

c. Ball-and-socket or gliding.

d. A ball-and-socket can pivot in many directions; or the bones glide past each other in gliding joints.

e. Ball-and-socket can be found in hips and shoulders; gliding can be found in neck, backbone, wrists, and ankles.

Short-Answer Item 17

Score **1 point** for each correct answer.

a. A picture showing two parallel bones.

b. A picture showing one bone crossed over the other.
Short-Answer Item 18

Score 1 point for (a) if all animals are reasonably identified from a feature logically described.

A. Crocodile, alligator, or lizard
B. Frog
C. Rabbit, hamster, rodent
D. Kangaroo
E. Bat
F. Lion or cat
G. Chimp or monkey

Score 1 point for (b) if all pelvises are correctly identified.

Score 1 point for (c) if all scapulae are correctly identified.

Score 1 point for (d) if students answer that A has two bones, and B has only one in the lower arm.

Score 1 point for (e) if students write that the hand bones are longer.

Score 1 point for (f) if students write, “So it can fly,” or similar answer.

Short-Answer Item 19

Score 1 point for each correct answer.

a. Skeleton G.

b. Similar rib cage, lower arms and legs have two bones, and backbone. (Accept all reasonable answers.)

c. Pelvis is shaped differently, arms are much longer, doesn’t stand upright. (Accept all reasonable answers.)

Short-Answer Item 20

Score 1 point for each correct answer.

a. Ribs

b. Your brain

Short-Answer Item 21

Score 1 point if the student writes two of the following reasons: protection, support, movement.

Short-Answer Item 22

Score 1 point if the student writes that Aisha is probably left-handed because she had fewer hits when using her left hand than when using her right.
### NARRATIVE ITEMS

**ITEM 23 The function of hands and feet**

<table>
<thead>
<tr>
<th>Score</th>
<th>If the student...</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>(a) writes that the bone structure in the hands and feet is similar: wrists and ankles are both gliding joints that connect hands and feet to the rest of the body, and the fingers and toes are hinge joints; identifies differences in size and shape of bones and that fingers are much longer than toes, and feet are broad and long to support weight; points out that the hand has an opposable thumb, while all the toes function similarly; (b) explains that the longer fingers and opposable thumb allow the hand to catch things much more easily and securely than the feet; says that people have to stand on feet and don’t get much practice catching things with their feet.</td>
</tr>
<tr>
<td>3</td>
<td>(a) describes one similarity and one difference between hands and feet; (b) mentions something about structure making it easier to catch something with the hands and that feet don’t get much practice catching.</td>
</tr>
<tr>
<td>2</td>
<td>(a) describes one similarity or difference; (b) mentions the opposable thumb as helpful to catching and that feet don’t get much practice catching.</td>
</tr>
<tr>
<td>1</td>
<td>(a) describes one similarity or difference; (b) does not give a reason why people catch with their hands and not with their feet.</td>
</tr>
<tr>
<td>0</td>
<td>does not complete the item, or gives information that has nothing to do with what was asked.</td>
</tr>
</tbody>
</table>
**ITEM 24  Comparing joints**

<table>
<thead>
<tr>
<th>Score</th>
<th>If the student...</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>(a) states that a ball-and-socket joint allows more movement because the joint can pivot in any direction and that the hinge joint allows only movement back and forth; (b) names an action such as kicking or throwing a ball, swinging a bat, or eating; describes each joint, including how it works.</td>
</tr>
<tr>
<td>3</td>
<td>(a) answers as above; (b) has minor errors in explaining the action.</td>
</tr>
<tr>
<td>2</td>
<td>(a) answers as above; (b) has major errors in explaining the action.</td>
</tr>
<tr>
<td>1</td>
<td>states that the hinge joint allows more movements or leaves most of the question unanswered.</td>
</tr>
<tr>
<td>0</td>
<td>does not complete the item, or gives information that has nothing to do with what was asked.</td>
</tr>
</tbody>
</table>

**ITEM 25  How bones move**

<table>
<thead>
<tr>
<th>Score</th>
<th>If the student...</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>explains that (1) bones provide the structure, but muscles actually move the bones; (2) muscles are attached to bones by tendons; and (3) when a muscle contracts, it moves the bones it is attached to; gives a reasonable and well-described example, possibly based on the models built in class, but not necessarily.</td>
</tr>
<tr>
<td>3</td>
<td>includes two of the three points described above about how muscles move bones; gives an example, but does not go into detail.</td>
</tr>
<tr>
<td>2</td>
<td>includes two of the three points described above about how muscles move bones; gives brief example that may have errors.</td>
</tr>
<tr>
<td>1</td>
<td>includes only one point described above about how muscles move bones; gives no example.</td>
</tr>
<tr>
<td>0</td>
<td>does not complete the item, or gives information that has nothing to do with what was asked.</td>
</tr>
</tbody>
</table>
### 3-5 Grade Level Expectations (GLE) Assessment Opportunities

#### SYSTEMS

<table>
<thead>
<tr>
<th>Motion of Objects. Understand the relative position and motion of objects. (GLE 1.1.2)</th>
<th>Inv. 4, Pt. 3</th>
<th>Inv. 1, Pt. 2</th>
<th>Inv. 2, Pt. 1, 3</th>
<th>Inv. 4, Pt. 2</th>
<th>PA - Bones 1-16 18-20 24</th>
<th>Covered in several other modules.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structure of Physical Earth/Space and Living Systems. Analyze how the parts of a system go together and how these parts depend on each other. (GLE 1.2.1)</td>
<td>Inv. 3, Pt. 3</td>
<td>Inv. 1, Pt. 3</td>
<td>Inv. 2, Pt. 2-3</td>
<td>Inv. 3, Pt. 1</td>
<td>PA—Bones 1–25 All</td>
<td>Covered in several other modules.</td>
</tr>
<tr>
<td>Structure of Organization of Living Systems. Understand that organisms can be single cell or many cells that form parts with different functions. (GLE 1.2.6)</td>
<td>Inv. 4, Pt. 1</td>
<td>Inv. 3, Pt. 2</td>
<td>Inv. 4, Pt. 1</td>
<td>Inv. 3, Pt. 3</td>
<td>PA—Bones 21-25</td>
<td>Assessed throughout grades in inquiry projects.</td>
</tr>
<tr>
<td>Human Body. Understand the organization and function of human body structures and organs and how these structures and organs interconnect. (GLE 1.2.8)</td>
<td>Inv. 4, Pt. 1</td>
<td>Inv. 2, Pt. 4</td>
<td>Inv. 3, Pt. 3</td>
<td>Inv. 2, Pt. 1</td>
<td>Inv. 4, Pt. 1</td>
<td>Important to cover in this module.</td>
</tr>
</tbody>
</table>

#### INQUIRY

<table>
<thead>
<tr>
<th>Planning and Conducting Safe Investigations. Understand how to plan and conduct simple investigations following all safety rules. (GLE 2.1.2)</th>
<th>Inv. 4, Pt. 1</th>
<th>Inv. 3, Pt. 2</th>
<th>Inv. 4, Pt. 1</th>
<th>PA—Bones</th>
<th>Covered in several other modules.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Explaining. Understand how to construct a reasonable explanation using evidence. (GLE 2.1.3)</td>
<td>Inv. 4, Pt. 1</td>
<td>Inv. 3, Pt. 3</td>
<td>Inv. 2, Pt. 4</td>
<td>Inv. 3, Pt. 1</td>
<td>PA—Bones 21-25</td>
</tr>
<tr>
<td>Modeling Understand how to use simple models to represent objects, events, systems, and processes. (GLE 2.1.4)</td>
<td>Inv. 2, Pt. 1</td>
<td>Inv. 4, Pt. 1</td>
<td>Inv. 2, Pt. 4</td>
<td>Inv. 3, Pt. 3</td>
<td>All</td>
</tr>
<tr>
<td>Intellectual Honesty. Understand that all scientific observations are reported accurately and honestly even when the observations contradict expectations. (GLE 2.2.1)</td>
<td>Inv. 2, Pt. 1</td>
<td>Inv. 4, Pt. 1</td>
<td>Inv. 2, Pt. 1</td>
<td>Inv. 4, Pt. 1</td>
<td>All</td>
</tr>
</tbody>
</table>

#### INQUIRY OR DESIGN PROJECT

| Investigating Systems: GLEs 2.1.1—2.1.5 or Designing Solutions: GLEs 3.1.1—3.1.3 | Projects | Projects | Projects | Projects | Projects | Important to do one project per module. |

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