HEALTH & LIFE SCIENCES
ACTIVITY BUNDLE

For Grades 3-5

Four hands-on STEM activities that introduce K-2 learners to health science careers through investigation, movement, and nutrition.

STEM NEXT
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STEM Next Health & Life Sciences Activity Bundle (Grades 3-5)

Welcome to the STEM Next Health Science Activity Bundle! This bundle is one of three bundles now available from the Health & Life Sciences Center of Excellence, powered by the Institute for a STEM Ready America.

Use the four activities below to inspire youth grades 3-5 with hands-on science. Through these activities, youth develop foundational STEM skills by engaging in hands-on investigations of health science concepts (medical imaging, nursing, and nutrition), while building career awareness by exploring how professionals use science, technology, engineering, and math.

Interested in more resources like this from STEM Next? Check out our Tools in our online Resource Library.

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Lesson 1: X-Ray Exploration

In this lesson, youth will be able to:

- Understand how X-rays work on a basic level by seeing inside objects.
- Practice observation, prediction, and explanation skills.

Time needed: 60 minutes

Preparation

Materials	• X-ray slide presentation (or X-ray cards) • X-ray handout • Brown paper lunch bags • Small everyday objects that youth would be familiar with (crayon, marker, block, water bottle, etc.) • Flashlight or light source
Setup	• Print copy of X-ray handout for each youth. • Label paper bags with numbers. • Place one small object in each bag and seal with a staple or tape. • Print copy of X-ray cards for each group of youth. (optional)

Facilitation

Overview:

In this activity, youth will investigate X-ray technology through hands-on exploration. Youth explore how X-rays allow people to see inside objects without opening them, and how this technology is used in fields such as medicine and security.

Engage:

1. Ask youth: *How do doctors see inside your body without opening it? Who has ever had an X-ray? Could you describe what happened? Where did you go for the X-ray? Why did you need an X-ray?* Explain that X-rays help medical professionals see inside the body. They help to identify injuries without a surgical procedure.

2. Show the examples of X-rays (Slides 3–8). Ask the group if they can identify the animal in the X-ray.

3. Show an X-ray of the human body (Slide 9). Ask youth to point to the different body parts on the X-ray, such as a thigh, arm, finger, shoulder, ankle, toe, etc).

4. Show X-rays of specific body parts and have youth identify them (Slides 10–14).

Investigate:

1. Explain to the group that we don't have an X-ray machine in the room, but we can pretend that we do. Show one of the lunch bags. Ask youth how they would go about determining what is inside the bag without opening it. Demonstrate the ideas youth share. Be sure to demonstrate shining a light through the bag, similar to an X-ray. Have youth make guesses as to what is in the bag.

2. Place the other bags around the room. Direct youth to move from bag to bag to identify the object. Encourage youth to record hypotheses and observations on the X-ray handout. Allow youth about 10 minutes per bag to explore and identify the object inside.

3. Bring the group back together and have youth share their observations and hypotheses about the contents of each bag. After each bag has been discussed, open the bag to reveal the object. Have youth record the name of the object on their handout.

Wrap-up:

Ask: *How is the bag similar to the human body? In our activity, what acted like an X-ray? Which objects were the most difficult to identify? Why? Did the light pass through all objects? Are X-rays safe? Do you know any other uses for X-rays?*

Implementation

Alternative facilitation:

- Make copies of the X-ray cards. During the Engage activity, allow youth to work in pairs to identify the animals and body parts.

Career Connection:

- Share the career profile for radiology technologists.
- Radiology technologist: Provide youth with a different body part that has a broken bone. Using black construction paper and chalk to simulate an X-ray, have youth draw a picture of the broken bone as the X-ray might show.
- Airport security: Using black paper and chalk, instruct youth to draw a picture of what airport security might see inside their backpack as it goes through the security X-ray machine. Have the others in the group guess the contents of the backpack based on the drawing.

Lesson 2: You Got the Beat

In this lesson, youth will be able to:

- Perform numerous physical activities that build balance, strength, and flexibility.
- Follow and provide clear instructions to complete a task.

Time needed: 60 minutes

Preparation

Materials	• You Got the Beat Handout (one per group) • 1" cube or ball of modeling clay (any color) • 1 round toothpick • Stopwatch or timer • You Got the Beat Graph (one per youth) • Pencil • Crayons, markers, or colored pencils
Setup	• Make copies of the You Got the Beat Handout and You Got the Beat Graph. • Locate pulse locations on your own body. • Assemble the pulse tool: Roll clay into a 1” ball and place a toothpick into the ball so the toothpick stands upright. Assemble one tool per group.
Presentation	Slides

Facilitation

Overview:

In this activity, youth will explore the relationship between physical activity and heart rate by locating and measuring their pulse before and after movement. Through guided investigation and discussion, youth will develop foundational understanding of how the heart functions and connect the activity to the nursing career.

Engage:

1. Ask youth: *Have you ever wondered what your heart is doing while you sit, move, or play?* Right now, your heart is beating inside your chest. It is pushing blood through your body. Even though you can’t see your heart

beating, you can feel it in places like your wrist or neck (Slide 2). That feeling is called your pulse.

2. Demonstrate how to find a pulse on the left side of your neck (Slide 3). Have youth find their pulse and count for one minute. Tell youth when to start and stop counting. Have youth share their pulse rates.

3. Demonstrate how to find your pulse on your wrist (Slide 3). Again, have youth find their pulse and count for one minute. Tell youth when to start and stop counting. Have youth share their pulse rates.

4. Divide youth into groups of three and give each group a pulse tool (clay with toothpick). Have one group member sit in a chair and place their wrist, palm side up, on a table or desk. Another group member should place the clay on the wrist, and move the clay around until the toothpick starts to vibrate back and forth (Slide 3). Once again, have youth find their pulse and count for one minute. Tell youth when to start and stop counting. Have youth share their pulse rates.

Investigate:

1. Ask youth: *How does your heart work? Allow youth to share their knowledge.* Explain: Your heart is a strong muscle that works like a pump. It squeezes to push blood through tiny tubes called blood vessels. Your blood carries oxygen and nutrients to all parts of your body so you can move, think, and grow. Then your blood travels back to your heart to get more oxygen, and the cycle starts again! The lub-dub sound you hear when you listen to your heart is the sound of the valves in your heart opening and closing. The "lub" sound is when the two upper chambers, or atriums, are pumping the blood into the ventricles, and the "dub" sound is when the ventricles are pumping the blood to either the lungs or the body (Slide 4).

2. Explain that within their small groups, one person will be the recorder, one person will be the timer, and the third person will be the pulse measurer. Give each group a You Got the Beat Handout.

3. Direct the recorder in each group to add the pulses of each group member to the data table under resting heart rate. Youth should use the pulse using the tool.

4. Instruct youth to check their pulse, one at a time, using the pulse tool after each of the following activities. The timer should keep track of the time and let the other group members know when to start and stop counting. The recorder should record all data on the table. After one group member has completed all the activities, have the group change roles until each has had a turn at each role (Slide 5).

a. Stand for one minute.

b. Jump in place for one minute.

c. Walk at a leisurely pace for three minutes.

d. Jog in place for two minutes.

e. Complete 25 jumping jacks.

Wrap-up:

1. Distribute the You Got the Beat Graph. Working in their small groups, direct each youth to make a bar graph using their individual data from the activity.
2. Once all graphs are complete, ask: *Did your heart rate remain constant? Which activity had the highest heart rate after one minute? Which activity had the lowest? Why do you think your heart rate increased? As your heart rate increased, what was happening to the blood in your body?*
3. Ask youth: *Other than right now, where else have you had your heart rate measured? Who took it? What did they use to measure your heart rate? Why do you think they care about your heart rate?*

Implementation

Career Connection:

- Share the career profile for an emergency medical technician (EMT).
- Play the Who Can Help? game. Give each youth a Who Can Help card. One by one, have youth read their scenario to the whole group. Have the group decide if a nurse, EMT, or someone else would be able to help. Have youth explain their answers. Consider asking what the medical professional would do to help.
- Day in the Life of a Nurse: Together with youth, explore this interactive story about the decisions a school nurse might make during a new viral outbreak.
- Nurse Practitioner: Show youth this video in which nurse practitioner Meghan Dwyer talks about what the job involves and what she enjoys about it.

Lesson 3: Eggs-perimenting with Measurement

In this lesson, youth will be able to:

- Explain the nutritional value of an egg.
- Use common measurement tools to perform accurate measurements.
- Compare and contrast characteristics of an object.
- Use the scientific method to make an hypothesis, complete an experiment, collect data, and draw conclusions.

Time needed: 60 minutes

Preparation

Materials	• Egg Handout • Extra large eggs, boiled (1 per group) • Medium egg, boiled (1 per group) • Paper plates (2 per group) • Measuring tape • Kitchen scale • Pencil • Food Group Labels • Food Cards
Setup	• Boil eggs. Each small group of 2 or 3 youth will need one extra large egg and one medium egg. • Copy Egg Handout. • Hang Food Group Labels in six different areas around the room.
Presentation	Slides

Facilitation

Overview:

In this activity, youth will practice their measurement skills while comparing different size eggs based on their physical characteristics. Youth will make connections to the career of a dietician.

Engage:

- Ask youth: *What color are eggs? Are all eggs the same color?* Explain to youth that most chickens lay white eggs, but some chickens lay brown, green, or blue eggs. People can tell the shell color of the egg by looking at the earlobe of a chicken. A chicken's earlobes are little hairless spots on the sides of its head. Chickens with white earlobes lay white eggs while chickens with red earlobes lay brown eggs. We can find colorful eggs at local farmers markets (Slides 2–3). Do not buy eggs that are not cracked and do not wash eggs before storing them. Washing removes a protective coating on the shell. Egg shells are porous, so destroying the outer coating can allow bacteria to get inside the egg. Ask youth: A*re eggs good for you? What food group do eggs belong to* (Slide 4)? Explain to youth that eggs are high in protein, vitamins, and minerals. The protein found in eggs provides our bodies with amino acids.

Exploration:

1. Divide youth into small groups of 2 or 3. Give each group an extra large hard-boiled egg, a medium hard-boiled egg, two plates, a measuring tape, a plastic knife, a pencil, and a handout.
2. Demonstrate to youth how to measure the length and circumference of an egg.
3. Allow each group time to measure the length, circumference, weight, shell color, and yolk color of their eggs. Direct youth to record this data on the handout.

Wrap-up:

1. Bring the group back together to discuss their findings. *What do both eggs have in common? What is different about the two eggs? Why do you think one is called extra large?*

2. Tell the group: *Eggs are part of the protein food group. What are the other food groups* (Slide 6)? Now, we are going to play a game called Five Corners (Slide 7). The object of the game is to be able to identify foods into their correct food group. Place the food group labels around the room. Draw a food card and show it to the group. Play some music. When the music begins, have youth move to the food group to which they think the food belongs. When the music stops, all youth should be in front of a food group. Play several rounds to familiarize youth with the food groups. When a disagreement arises about classification, discuss the reasoning for the food's classification.

Implementation

Career Connection:

- Share the career profile for a medical service manager.
- Dietician: As a group, make a healthy snack. Some ideas include:
    - No Bake Trail Mix Granola Bars
    - Frozen Yogurt Bark
    - Fruit and cheese kabobs
- Dietician: Invite a dietician from a local hospital or university to speak to the group
- Space Food Scientist: NASA space food scientist Xulei Wu discusses what considerations go into preparing food for the astronauts on the International Space Station. Learn how Wu trains astronauts for dining in space and how she has met the challenges of eating in a microgravity environment.
- Chavonda Jacobs-Young discusses her role as a senior executive scientist with the U.S. Department of Agriculture and how food science and agriculture are much more than just farming.

Lesson 4: Make the Connection

In this lesson, youth will be able to:

- Name careers in the healthcare sector.
- Explain responsibilities or duties of several healthcare careers.
- Connect school subjects to specific healthcare career skills or duties.

Time needed: 20 minutes

Preparation

Materials	• Small whiteboards and markers (1 per group)
Presentation	Slides

Facilitation

Overview:

In this activity, youth will identify specific healthcare careers and match them to job duties and school subjects.

Engage:

1. Ask youth to name any of the healthcare careers they remember from previous activities. Allow time to discuss any careers youth remember. Remind youth of the career profiles shared so far: radiology technologist, physical therapist assistant, medical and health service manager, emergency medical technician (EMT), and pharmacist.

2. Ask youth what subjects they think are important to study in order to be good at each of the careers.

Exploration:

1. Divide youth into groups of 2 or 3 and give each group a small whiteboard and marker. If you do not have small whiteboards, youth can use paper.

2. Explain the rules of the game:
    - I will read and show a short scenario.
    - After reading the scenario, I will set the timer for 30 seconds. You will work with your group to identify which of the healthcare careers we have discussed are described in the scenario.
    - You must write your answer on the whiteboard before the timer goes off.
    - When the timer goes off, I will ask for your answers and all groups MUST share their answers at that time.
    - Each group with the correct answer will earn a point.
    - Each group that answers correctly will get 10 additional seconds to write what subject in school is important to develop skills needed for the career. Each group with correct subjects will earn 2 additional points.
3. Ask groups if they have any questions. Display the first scenario and set the timer. Continue play until all scenarios have been discussed.

Wrap-up:

Ask youth if anyone would be interested in one of these careers. Ask if anyone knows anyone who works in a health field. Discuss other healthcare careers, such as nurse, speech therapist, pharmacist, etc.