A photograph of two children, a boy and a girl, looking at a large anatomical model of a human torso. The boy is on the left, and the girl is on the right. They are both smiling and appear to be engaged in learning. The background shows a museum gallery with educational displays, including a poster with anatomical diagrams and labels. The entire image has a purple tint.

# EDUCATOR GUIDE ALL ABOUT ME

This guide introduces concepts and activities for educators to use with their students centered around the *All About Me* gallery at Arizona Science Center. This guide contains activities that are aligned to state standards and are organized by grade band.



Never stop wondering.  
Never stop imagining.™

# EXHIBITS OVERVIEW AND CONCEPTS

## ACHIEVE BALANCE

Balance activities vs. the foods that you consume using a scale.

**Concepts:** *Nutrition, Digestive System*

## A REAL DIGESTIVE SYSTEM

A full display containing real human tissue that illustrates the GI tract from beginning to end.

**Concepts:** *Digestive System*

## ARTIFICIAL JOINTS

A display that features real artificial joints used in joint replacement surgeries.

**Concepts:** *Skeletal System*

## BODY PUZZLE

A human anatomical model where Guests can try to figure out where different organs fit.

**Concepts:** *Body Systems*

## BONES ON A BIKE

Mr. Bones is not very good at riding his unicycle. He has artificial joints down the left side of his body and as he pedals, it is clear how some artificial joints move.

**Concepts:** *Skeletal System*

## CHOICES

Family history and personal habits have an impact on health. This computer program contains several parts that deal with these subjects and how they may affect your health.

**Concepts:** *Genetics, Family History, Personal Habits*

## CRACK THE CODE

An exhibit about decoding DNA. Guests first decode DNA to make RNA, and then use RNA to make amino acids. The sequence of amino acids gives the code to open the safe.

**Concepts:** *Genetics*

## ENERGY USE

A graphic detailing explaining the importance of foods for energy.

**Concepts:** *Nutrition, Digestive System*

## EYE OF INHERITANCE

Guests learn how to combine eye color genes from a mother and father to their child. This display only uses two eye colors: brown and blue.

**Concepts:** *Genetics*

## FEVER

A display showing the difference between a healthy individual and an individual with a fever.

**Concepts:** *Immune Response*

## FOOD IS FUEL

This exhibit demonstrates how much work it takes to burn off varying amounts of calories from different foods using a bicycle peddler. The time it takes to burn off the calories is measured by an hour of exercise.

**Concepts:** *Nutrition, Digestive System*



## FOOD QUIZ

How well do you know your foods? This is a quiz about what nutrients are found in certain foods.

**Concepts:** Nutrition, Digestive System

## GAS 'EM UP

A similar exhibit to Vital Network, this display includes the lungs, and traces the path of oxygenated and deoxygenated blood through the lungs and the body.

**Concepts:** Respiratory System, Circulatory System

## HEART BEAT DRUM

Guests hear their pulse played by a drum.

**Concepts:** Circulatory System

## HEART SURGERY THEATER

Watch as Arizona Heart Center's Dr. Dietrich performs an open-heart bypass surgery. This exhibit also includes a display of the tools heart surgeons use.

**Concepts:** Circulatory System

## IMMUNE RESPONSE

This display demonstrates how antibodies produced by the body's immune system are unique to invaders that cause disease.

**Concepts:** Immune Response

## JUST JOINTS

This display demonstrates the different types of joints in the body.

**Concepts:** Skeletal System

## LOAD BEARING BONES

A display illustrating how bones absorb stress from load-bearing exercises.

**Concepts:** Skeletal System

## LUNGS: TAKE A DEEP BREATH

A display that demonstrates how the lungs and diaphragm work together when a person inhales and exhales.

**Concepts:** Respiratory System

## MICRO DEFENSE

A video display and matching game that shows the different symptoms produced by different bacteria.

**Concepts:** Diseases

## MOLECULES

A graphic that details the different amino acids and macromolecules in the body.

**Concepts:** Biochemistry

## MONSTER STOMACH

Guests learn about the digestion that occurs in the stomach.

**Concepts:** Digestive System

## NOSE

Guests throw pollen and other irritants into a giant nose which then sneezes. It illustrates the importance of nose hairs.

**Concepts:** Immune Response

## ORIGINS: HAPPY BIRTHDAY

This exhibit includes a display case with models of the different stages of neonatal development. There is also a video detailing the birthing process or labor.

**Concepts:** Neonatal Development

## PARTS OF BLOOD

Demonstrates how a centrifuge works to separate out the components that make up blood.

**Concepts:** Circulatory System

## PLAY LAB

An area designed for the youngest guests, the lab contains toys that deal with the human body.

**Concepts:** Body Systems

## SEARCH FOR BALANCE

A video detailing the case of the Pima Native American people who have suffered from diabetes due to changes in modern diets.

**Concepts:** Nutrition, Digestive System

## SEEING WITH SOUND

A display of various ultrasounds.

**Concepts:** Neonatal Development, Medical Equipment

## SKIN

A display of how melanin produces different skin pigments.

**Concepts:** Integumentary System

## SNEEZE

Similar to the nose, this display sneezes on Guests when the doors are open. The graphics discuss how diseases are spread by this method.

**Concepts:** Disease Transmission

## STRETCH

A test of flexibility via horizontal toe-touching.

**Concepts:** Muscular System

## SWEAT: GET WET, GET COOL

This display allows Guests to find the surface temperature of their skin and compare that to after they have "sweated" via a squirt of water.

**Concepts:** Integumentary System, Homeostasis

## TAM

An interactive display by the Transparent Anatomical Model system. Guests can choose different body parts to explore, and TAM presents more information on them in short talks.

**Concepts:** Body Systems

## TODDLER HEART

A giant heart designed for toddlers! The balls represent blood cells: Some are oxygenated, others are not.

**Concepts:** Circulatory System

## VIEWS INTO YOU

An interactive scanner that Guests can use to learn more about the various body systems.

**Concepts:** Skeletal System, Muscular System, Digestive System, Neurological System

## VITAL NETWORK

This light-up display illustrates the network of blood vessels in the human body at the touch of a button.

**Concepts:** *Circulatory System*

## WHAT IS IN YOUR BODY

A breakdown of the percentages of different elements that make up the human body.

**Concepts:** *Biochemistry*

## WHAT OTHERS SAY

A public service video created by school children about the dangers of smoking.

**Concepts:** *Respiratory System*

## WHEELCHAIR RACER

A race between two wheelchairs. The point of the activity is to note the difference in heart rate before and after the race.

**Concepts:** *Circulatory System, Muscular System*

## YOU'RE NOT ALONE

This is a graphical display of the different microbes that live inside the human body.

**Concepts:** *Microflora*

## YOUR FATHER'S NOSE

There are two mirrored displays that allow Guests to compare their facial features to that of another Guest.

**Concepts:** *Genetics*

## YOUR INSIDE'S VOICE

This is a tool that can amplify the sounds that the human body makes such as the popping of joints to a heart beating—all via a stethoscope hooked up to a speaker.

**Concepts:** *Body Systems*

## ZIT

A cutaway display of a growing zit.

**Concepts:** *Immune Response, Integumentary System*

## ZOOM

A spin browser animation detailing the relative sizes of small objects starting with a coffee bean and ending with a carbon atom.

**Concepts:** *Size and Scale*



## ESSENTIAL QUESTIONS

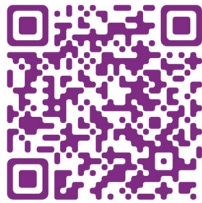
These four questions provide the framework for guiding learning through *All About Me*:

1. How are the connections between your long bones similar to doors?
2. When you are active, why is it important that your heart beats faster?
3. What causes your body to sneeze?
4. Compare and contrast the differences in yourself when you feel well as opposed to when you feel ill.

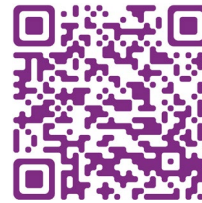
## EDUCATOR RESOURCES ALIGNED TO EXHIBIT STANDARDS



[EXPLORE THE SKELETAL SYSTEM](#)



[THE HUMAN BODY](#)



[ESSENTIAL ANATOMY APP](#)



[BODY DEPOT](#)



[CELLS: BUILDING BLOCKS OF LIFE](#)



[PARTS OF A CELL](#)

# EXHIBIT STANDARDS BY GRADE LEVEL

## 2018 ARIZONA SCIENCE STANDARDS

### KINDERGARTEN

**K.L1U1.7** Observe, ask questions and explain how specialized structures found on a variety of plants and animals (including humans) help them sense and respond to their environment.

### GRADE 1

**1.L3U1.9** Obtain, evaluate and communicate information to support an evidence-based explanation that plants and animals produce offspring of the same kind, but offspring are generally not identical to each other or their parents.

### GRADE 3

**3.L1U1.5** Develop and use models to explain that plants and animals (including humans) have internal and external structures that serve various functions that aid in growth, survival, behavior, and reproduction.

### GRADE 5

**5.L3U1.9** Obtain, evaluate and communicate information about patterns between the offspring of plants, and the offspring of animals (including humans); construct an explanation of how genetic information is passed from one generation to the next.

### GRADE 7

**7.L1U1.8** Obtain, evaluate and communicate information to provide evidence that all living things are made of cells, cells come from existing cells, and cells are the basic structural and functional unit of all living things.

### GRADE 8

**8.L3U1.9** Construct an explanation of how genetic variations occur in offspring through the inheritance of traits or through mutations.

**PRE-VISIT ACTIVITY**

**SAME BUT  
DIFFERENT**

**GRADES K-2**



# SAME BUT DIFFERENT

## OVERVIEW

Living things produce offspring of the same kind, but offspring are not identical with each other or with their parents. In this lesson, students will explore observable traits of various plants and animals in order to describe variations between offspring and their parents.

## BACKGROUND

Organisms have characteristics that can be similar or different. Plants and animals, including humans, resemble their parents in many features because information (traits) is passed from one generation to the next.

## ARIZONA STANDARDS

**1.L3U1.9** Obtain, evaluate and communicate information to support an evidence-based explanation that plants and animals produce offspring of the same kind, but offspring are generally not identical to each other or their parents.

## MATERIALS

- [Same But Different Plant and Animal Cards](#)
- Science Journals
- [Monster Mash-Up Handout](#)
- [Are You My Mother?](#) by P.D. Eastman

# SAME BUT DIFFERENT

## 5E LEARNING CYCLE

### ENGAGE

Begin today's lesson by reading *Are You My Mother?* by P.D. Eastman. Students will follow the story of a baby bird trying to find its mother. Ask students to pay close attention to each of the animals the baby bird thinks is its mother (kitten, hen, dog, cow, car, boat, plane, "big thing - Snort").

Debrief with students by leading a conversation about the book<sub>1</sub>:

- How could you tell that the kitten was not the baby bird's mother? **Possible student responses:** The kitten is not a bird. The baby bird is not a kitten. They look very different from each other (number of legs, fur vs. feathers, beak, etc.).
- Why could the Snort not be the baby bird's mother? **Possible student responses:** The snort is not an animal (living thing). It's a machine.
- When the baby bird's mother came back to the nest, how could you tell that she was his mother? **Possible student responses:** They look similar (size, shape, color, features, etc.).

### EXPLORE

Divide students into groups. Provide each group with one set of cards (Either rabbit, sunflower or siblings) from the *Same But Different Plant and Animal Cards*:

- Rabbits: 3 cards per group
- Sunflowers: 3 cards per group
- Siblings: 1 card per group

Prompt groups to observe the images and respond to the following prompts in their science journals<sub>2</sub>:

- Rabbit Group: Observe the images of the rabbits. What are some features that all the rabbits share? What is different about each rabbit?
  - Similar features include long ears, brown eyes, fur, whiskers, etc.
  - Different features include fur color, body size, etc.
- Sunflower Group: Observe the images of the sunflowers. What features of each sunflower are different? What characteristics are the same?
  - Different features include petal color, disk color (center of flower), petal shape, etc.
  - Similar features include presence of petals, presence of leaves, presence of disk (center of flower)

# SAME BUT DIFFERENT

## EXPLORE

- Siblings Group: Observe the image of the three brothers. In what ways do they look the same? In what ways do they look different?
  - Similar features include blue eyes, light skin, etc.
  - Different features include height, hair color, etc.

## EXPLAIN

Once students have recorded their responses in their science journals, discuss their answers as a class.

- What did you notice about the living things on your cards? **Possible student responses:** They are all the same type of living thing (bunnies, sunflowers or children). They all have the same number of arms, legs, eyes, ears, etc. They look similar to their parents.
- Why do you think that each of the living things on your card were not exactly the same (alike) even though they are the same type of living thing? **Possible student responses:** They are different animals/people. We are not all twins.

## EXTEND

Further explore the concept of inherited traits by creating your own monster family! Provide each student with a copy of the *Monster Mash-Up* handout. Students will use the provided parent monsters to design and create offspring based on observable traits like eye color, fur color, etc.<sub>3</sub>

## EVALUATE

Prompt students to share with their partner how they created their monster offspring. Students should be able to explain how their monster's features were inherited.

**Possible student responses:**

- My monster has blue eyes because mommy monster has blue eyes.
- My monster has spikes because daddy monster has spikes, etc.

# SAME BUT DIFFERENT

## DIFFERENTIATION SUGGESTIONS

1. Access prior knowledge by asking students to think about a relative (parent, grandparent, sibling, etc.). Has anyone ever told you that you look similar to them? Which traits are similar? Which traits are different?
2. For additional support, provide students with a chart to complete. Include specific characteristics (ear shape, color, size, etc.), and allow students to mark whether or not the subjects have similar or different features.
3. For additional support, allow students to cut body parts from the monsters (eyes, arms, mouth, etc.) and combine them to create a new monster (eyes from one monster and hands from another). Have a discussion about how the “offspring” monster has a combination of features from both of the parents.

**PRE-VISIT ACTIVITY**

**WHAT'S IN  
MY BELLY?**

**GRADES 3-5**

# WHAT'S IN MY BELLY?

## OVERVIEW

There are certain life functions that all organisms need in order to survive. One of these important life functions is getting nutrition. In this activity students will investigate how the human stomach works using a model.

## BACKGROUND

Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction. The stomach has a variety of functions necessary for survival, such as digesting the food we eat.

## MATERIALS

- 2 1-gallon zipper bags
- Diet cola or similar soda
- Ham and cheese sandwich (or similar)
- Potato chips
- [What's In My Belly? Data Collection handout](#)
- [What's In My Belly? Formative Assessment Probe](#)

## ARIZONA STANDARDS

**3.L1U1.5** Develop and use models to explain that plants and animals (including humans) have internal and external structures that serve various functions that aid in growth, survival, behavior, and reproduction.

# WHAT'S IN MY BELLY?

## 5E LEARNING CYCLE

### ENGAGE

Ask students to think about the last thing that they ate, then prompt students to share their ideas about what happened to the food after they ate it. **Possible student responses:** We chew and swallow our food; the food travels to our stomach; the food fills up our stomach.

**Say:** That's correct! After we swallow our food, it travels to our stomach. What happens to the food after it gets to our stomach?

Hand out the *What's In My Belly? Formative Assessment Probe*. Read through the prompt with your students, including each answer choice. Ask students to decide which statement they agree with most, and to provide an explanation as to why they chose that statement. Prompt students to share their chosen statement and explanation with their shoulder partner.

### EXPLORE

Students will demonstrate how the stomach works to break down food using mechanical and chemical processes by conducting an investigation:

1. Place the food into the zipper bag and pour in the can of soda.
2. Push out the extra air and zip the bag closed.
3. Place the closed bag of food into a second zipper bag, pushing out all of the air, then zip the bag closed.
4. Using both hands, squish the bag of food 20 times.
5. Record your observations on the *What's In My Belly? Data Collection* handout.
6. Squish the food in the bag 20 more times. Observe and record the information.
7. Repeat steps five and six until you have squished the bag 120 times total.

# WHAT'S IN MY BELLY?

## EXPLAIN

Ask students to consider the following questions<sub>2</sub>:

- What part of this activity do you think made the biggest difference in the food?  
**Possible student responses:** The squishing; the soda; the squishing and the soda.
- Which part of the body does the zipper bag model for us? **Possible student responses:** Your stomach; your digestive system; your belly; your gut.<sub>3</sub>
- Based on what you saw happening in the zipper bag, what can you predict about how the stomach in your own body functions? **Possible student responses:** Your stomach mashes up food; your stomach breaks down food; the stomach uses physical and chemical digestion to break down food.
- Predict how different your results would be if you used a different liquid or no liquid at all.  
**Possible student responses:** It would be hard to mash up the food without liquid; it would take longer to get the same results.

## EXTEND

Repeat this activity using salad, broccoli and other vegetables. Compare the breakdown of these foods to the sandwich and chips.

## EVALUATE

Prompt students to revisit their *Formative Assessment Probe* to provide an updated response using the evidence they collected during the lesson.



# WHAT'S IN MY BELLY?

## DIFFERENTIATION SUGGESTIONS

1. Allow students to write and/or draw their descriptions. For additional support, provide students with a list of characteristics and adjectives that they can refer to when recording their observations.
2. Depending on the needs of your students, these questions can be responded to in writing, or discussed orally as a whole group, small group or in partners.
3. For additional support, provide students with answer choices by referring to three different parts of your body (head, stomach, arm).

**PRE-VISIT ACTIVITY**

# **CELL CITY**

**GRADES 6-8**

# CELL CITY

## OVERVIEW

In this lesson, students will create an analogy relating cell structures and functions to a city's structures and functions, demonstrating the relationship between major cell structures and cell functions in both animals and plants.

## BACKGROUND

All living things are made up of one or more cells. Therefore, the basic processes of life are the results of what happens inside cells. Just peek inside cells and you will see a lot of activity! Just like a metropolitan city, cells have different structures, called organelles, that perform specific functions necessary for the operations of life. For example, the organelle called the mitochondria produces energy for the cell, similar to how a city's electricity provides energy for its homes.

## MATERIALS

- Science journal (1 per student)
- Pen or pencil (1 per student)
- [Cell City Stations Cards](#) (1 set per class)
- [Cell City Building Planning Sheet](#) (1 per group)
- [Example Cell City Map](#)

## ARIZONA STANDARDS

**7.L1U1.8** Obtain, evaluate, and communicate information to provide evidence that all living things are made of cells, cells come from existing cells, and cells are the basic structural and functional unit of all living things.

# CELL CITY

## 5E LEARNING CYCLE

### ENGAGE

**Teacher Tip:** Before facilitating this lesson, it's suggested that students have prior knowledge of cells as the basic building blocks of life, as this lesson plan will reference and build upon these learnings. Students should also have prior knowledge of analogies, as this lesson will reference and build upon the creation of an analogy.

**Say to the class:** Whew—it's been a busy morning! As I was driving to school, I noticed a lot of activity in our city. For example, I drove past a police officer monitoring a speeding car. I also saw a mailman leaving packages outside of a house. As I got even closer to school, something really caught my attention—there was a lot of construction in progress as new apartments were being built from the ground up!

It seems as though cities are very busy with many moving parts. Each part of a city has a specific function based on its structure. For example, I noticed a police officer helping to keep our city safe by enforcing laws. The structure of the police force houses police officers who protect the city by enforcing laws. Without the structure of the police station, it would be harder for our city to function safely! Just like our city, what else has many parts that help it function?

Prompt students to share their ideas out loud to the class. **Possible student responses:** Machines; electronics; the human body.

**Say to the class:** Great ideas! All of those systems are made up of many structures that carry out necessary functions. As we have recently learned, living things called organisms are made up of cells that help us perform the life processes needed to survive. Look even closer and you'll see that cells are made up of even smaller parts, just like our cities, that help them function! What are some parts or structures inside cells that help the structures carry out their functions? Let's engage in an activity to find out!

# CELL CITY

## EXPLORE

Prepare the classroom for the Cell City Stations activity by placing each Cell City Station Card at a table for a total of four stations. The stations are as follows:

- Station 1: Part 1 and 2
- Station 2: Part 1 and 2
- Station 3
- Station 4

Divide students into groups of four. At each station, student groups will have five minutes to read the station card directions, engage in the station activity and record their findings in their science journals by responding to the prompts on the station cards. Closely monitor and assist student groups during this exploration.<sub>1</sub>

After five minutes, prompt students to tidy up their stations and move to the next station. Once all groups have completed each station and recorded their findings, prompt students to return to their original seats.

## EXPLAIN

Tell students that they will be working in groups to create their own “Cell City” using their analogies that they explored during the station activity. Before allowing groups to begin creating their map, prompt students to share their own analogies that they created during the stations with their groups. Prompt groups to decide on which analogies they will use for their map by completing the *Cell City Building Planning Sheet*.<sub>2</sub>

## EXTEND

Each group will decide on a name for their city and work together to make a map using city buildings to represent the different organelles in the cell. Show students the example provided. Allow students 1-2 class periods to create their maps. Encourage creativity and color!<sub>3</sub>

## EVALUATE

Allow groups to present their Cell City maps to the class. Ensure that each group completes and turns in their *Cell City Building Planning Sheet* to be used as an evaluation tool.

# CELL CITY

## DIFFERENTIATION SUGGESTIONS

1. Give students more support by providing sentence stems to use when answering the follow-up questions. Depending on the needs of the students, they may also be given the option to explain their understanding orally to their classmates and/or an educator. Allow students to complete the activity independently, with a partner or as a group.
2. Prompt students to refer to their science journal notes to help them select city buildings for each structure. For additional support, provide students with a list of city buildings to choose from. Depending on the needs of your students, this activity can be completed independently, in a small group or as a whole group with varying levels of educator support.
3. For additional support, provide students with a blank city map template. Allow students to label each building. Encourage students to bring the city to life by coloring and adding supplemental city features (trees, traffic signs, etc.).

# BOOK YOUR FIELD TRIP TODAY!

If you have a group of 15 or more,  
you are eligible for group discounts!  
To schedule your field trip or group visit, head to  
**AzScience.Org.**



Never stop wondering.  
Never stop imagining.™