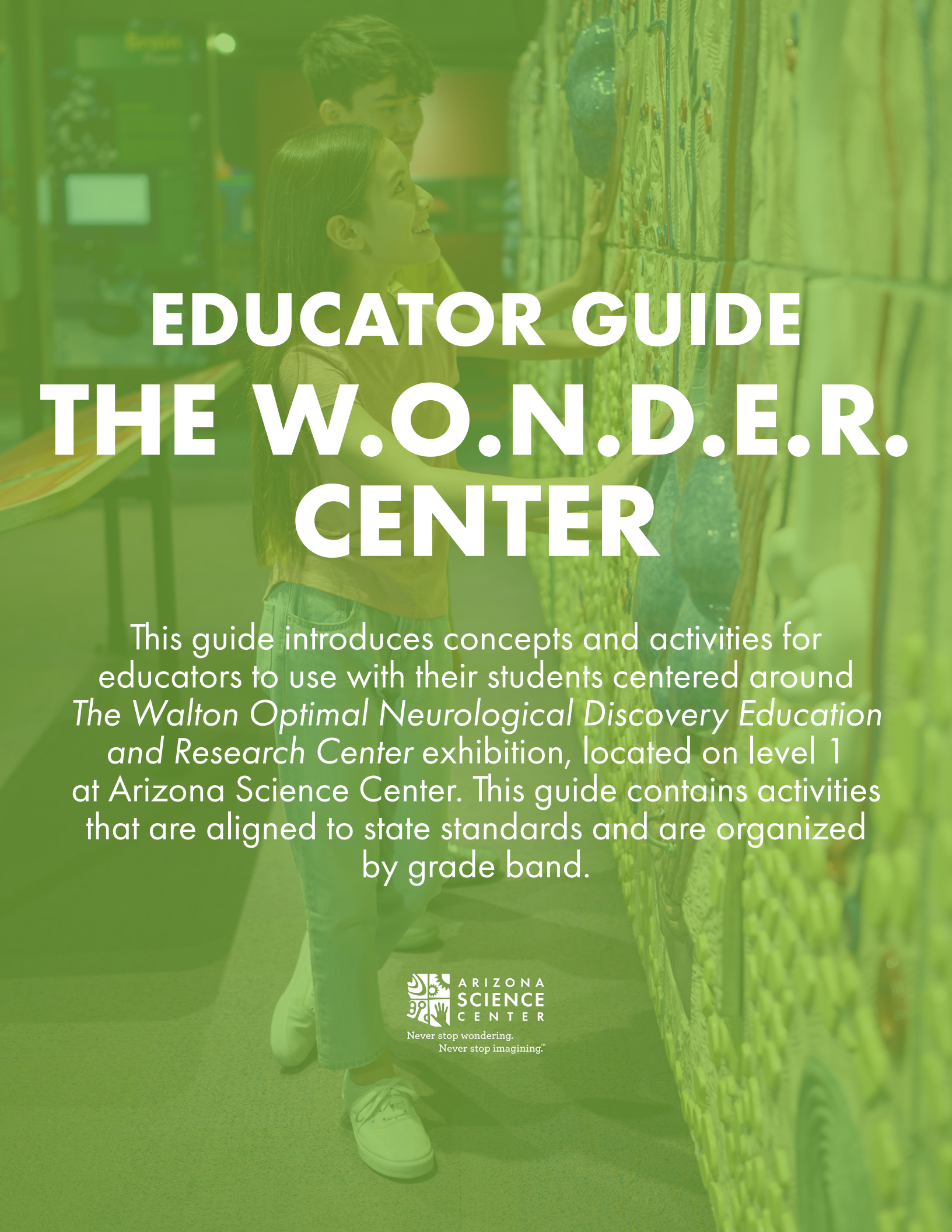

EDUCATOR GUIDE
THE W.O.N.D.E.R. CENTER

This guide introduces concepts and activities for educators to use with their students centered around *The Walton Optimal Neurological Discovery Education and Research Center* exhibition, located on level 1 at Arizona Science Center. This guide contains activities that are aligned to state standards and are organized by grade band.

ARIZONA SCIENCE CENTER

Never stop wondering.
Never stop imagining.™

EXHIBITS OVERVIEW AND CONCEPTS

ADDICTIVE BEHAVIOR
Learn about what different behaviors can become addictive by stimulating the brain's reward circuit.
Concepts: *Human behavior, The Brain*

ALZHEIMER'S DISEASE
Unravel the mystery of Alzheimer's Disease and discover how important memories are to our own identity.
Concepts: *: Neurodegenerative Disorders, Brain Organization and Function, Memory*

BRAIN MUSEUM
Compare several different real brains to discover their similarities and differences.
Concepts: *Brain Organization and Function, Animal Adaptations*

BRAIN POWER
Explore how your brain cells use electrical signals to control parts of your body.
Concepts: *Response to Stimuli, Our Senses, Nervous System*

EXERCISE YOUR BRAIN
Stimulate your brain by trying a mind-challenging activity!
Concepts: *Response to Stimuli, Cognition, The Brain*

EYES HAVE IT
Did you know your brain is wired to read emotions? Try this interactive exhibit to see if you can tell which emotions different eyes represent.
Concepts: *Human Behavior, Cognition*

FACE YOUR FEARS
Learn about your body's fear response, and how your emotions and your body are connected.
Concepts: *Response to Stimuli, Human Behavior, Nervous System*

HEAD'S UP
Your delicate brain is protected by your skull, but sometimes more protection is needed to protect your head from impact forces. Learn why wearing a helmet is critical in absorbing forces that could permanently damage your brain.
Concepts: *Brain Organization and Function*

INSIDE THE EARLY CHILDHOOD BRAIN
Discover how the early childhood brain develops, beginning before birth and continuing throughout a person's life.
Concepts: *Brain Organization and Function, Our Senses, Nervous System*

INSIDE THE TEEN BRAIN
Learn about the developmental growth that occurs as a person grows into maturity.
Concepts: *Brain Organization and Function, Our Senses, Nervous System, Human Behavior*

KEY PLAYERS IN THE BRAIN
Learn about your amygdala, hippocampus and prefrontal cortex in this exhibit.
Concepts: *Brain Organization and Function*

KNOW YOUR BRAIN

How well do you know your brain? This exhibit will refresh your memory on how your brain gathers information and recalls memories.
Concepts: *Memory, Brain Organization and Function*

LEARNING DISABILITIES

Explore the videos at this exhibit to learn more information about the difficulties in the way people take in and remember information.
Concepts: *Brain Organization and Function, Memory, Communication*

LIKE A BRAIN SURGEON

This activity mimics the disorienting effect of precisely using a tool while looking through a magnifier. Surgery takes a very steady hand, but skilled surgeons can be trained to talk while doing it. Can you?
Concepts: *The Nervous System, Communication, Response to Stimuli*

LOOKING AT THE BRAIN

View a video about the technologies that are used to produce increasingly clear and fine-grained images of the brain.
Concepts: *Technology, The Brain*

MEET YOUR NEURON

Discover how the brain's neurons carry information from the brain to the body, and back again.
Concepts: *Brain Organization and Function, The Nervous System, Our Senses, Response to Stimuli*

MEMORY MAPPING

Explore the many parts of the brain involved with making memories and forgetting them.
Concepts: *Memory, Brain Organization and Function*

MEMORY TEST

Play a game to challenge your memory and discover ways to keep your brain healthy.
Concepts: *Memory, Brain Organization and Function*

MINDBALL GAME

Are you good at relaxing? Then you'll win this game! The Mindball Game uses sensors in the headband to measure electrical activity in your brain. Use your brain signals to control a magnet that moves a ball back and forth across a table between two players.
Concepts: *Cognition, Stability, The Brain*

PROBE THE BRAIN

Try simulating each side of the motor cortex in this activity and see what happens!
Concepts: *Brain Organization and Function, Response to Stimuli*

RETRAIN YOUR BRAIN

Shoot some hoops to find out how hard work and practice can help your brain adapt to a new challenge.
Concepts: *Response to Stimuli, The Nervous System, Adaptation*

RISKY BUSINESS

Discover how thrill-seeking behavior evolved in the brain.
Concepts: *Human Behavior, Adaptations*

SEEING DYSLEXIA

Compare different brain scans of people with and without dyslexia to see the different areas of the brain light up when they read.
Concepts: *The Brain, Response to Stimuli*

SKIN WALL

Come to your senses and learn about how your skin senses the world around you. Discover the different types of nerves in your skin and try to identify them on the giant wall model.
Concepts: *The Nervous System, Our Senses, The Integumentary System*

TAKE A BRAIN BREAK

Every brain needs a break! Experience the MindUP Brain Break in this room designed to help you relax and quiet your mind.
Concepts: *Our Senses, The Brain, Response to Stimuli*

THE W.O.N.D.E.R. CENTER

Ever wonder about the neuroscience behind how your brain functions? At this exhibit, you can interact with a giant brain to see which parts control functions such as memory, movement, vision and more!
Concepts: *Brain Organization and Function, Memory, Communication*

TOUCHABLE BRAIN

Lift the life-sized brain to get a feel for how heavy your brain actually is.
Concepts: *Brain Organization and Function*

TRY MULTITASKING

Experience how difficult it actually is to multitask by trying a game that challenges you to complete multiple tasks at once.
Concepts: *Response to Stimuli, Cognition*

WAKE UP CALL

Learn about your 'biological clock' and how it regulates sleep, body temperature and certain hormones.
Concepts: *Adaptations, Brain Organization and Function*

WIRED FOR THOUGHT

Check out how your brain reshapes and reorganizes itself in response to everything you experience.
Concepts: *Response to Stimuli, The Brain, Adaptations*

WIRED FOR WORDS

Discover how people of all ages perceive sound and recognize rhyming patterns.
Concepts: *Language, Communication, The Brain*

ESSENTIAL QUESTIONS

These four questions provide the framework for guiding learning through *The W.O.N.D.E.R. Center*.

1. How do living things respond to their environment?
2. What is the function of the hippocampus in the brain? How about the amygdala?
3. What are some ways to keep your brain healthy?
4. How do our bodies respond to fear?

EDUCATOR RESOURCES ALIGNED TO EXHIBIT STANDARDS

NERVOUS SYSTEM FACTS

KIDS HEALTH: NERVOUS SYSTEM

ALZHEIMER'S RESOURCES FOR TEENS

ASU'S ASK A BIOLOGIST: A NERVOUS JOURNEY

TED-ED: HOW THE NERVES WORK

A LOOK INSIDE THE BRAIN OF A MOUSE ON DRUGS

EXHIBIT STANDARDS BY GRADE LEVEL
2018 ARIZONA SCIENCE STANDARDS

KINDERGARTEN
K.L1U1.6 Obtain, evaluate, and communicate information about how organisms use different body parts for survival.

K.P2U2.2 Design and evaluate a tool that helps people extend their senses.

GRADE 3
3.L1U1.6 Plan and carry out investigations to demonstrate ways plants and animals react to stimuli.

3.P2U1.1 Ask questions and investigate the relationship between light, objects, and the human eye.

GRADE 5
5.L4U3.12 Construct an argument based on evidence that inherited characteristics can be affected by behavior and/or environmental conditions.

GRADE 7
7.L1U1.11 Construct an explanation for how organisms maintain internal stability and evaluate the effect of the external factors on organisms' internal stability.

PRE-VISIT ACTIVITY

WHAT DID YOU SAY?

GRADES K-2

WHAT DID YOU SAY?

OVERVIEW

In this activity, students will design and evaluate a tool that helps people extend their sense of hearing.

BACKGROUND

Our senses help us experience and understand the world around us. Sometimes, we need help with our senses. For example, people with poor eyesight wear glasses.

ARIZONA STANDARDS

K.P2U2.2 Design and evaluate a tool that helps people extend their senses

K.W.2 With guidance and support from adults, use a combination of drawing, dictating, and writing to compose informative and explanatory texts in which they name what they are writing about and supply some information about the topic

K.SL.1 Participate in collaborative conversations with diverse partners about kindergarten topics and texts with peers and adults in small and larger groups

MATERIALS

- Poster paper
- *Materials Test* handout
- Wax paper
- Tin foil
- Cardboard tubes
- Empty, clean cans
- Laminated pieces of paper
- Pieces of felt
- Foam sheets
- *Can You Hear Me?* handout

5E LEARNING CYCLE

ENGAGE

Begin the lesson by revisiting previous learning. Instruct the class to reflect on the five senses: touch, hearing, sight, taste, and smell, and how they're all important to how we experience our world. Remind students that some people may have one or more senses that do not work well, or even at all. Let the class know that this activity will focus on those people and how we can help them.

Begin the Engineering Design Process by facilitating a discussion about what information students need to know in order to successfully design and create a tool to support hearing.

Ask students: *What would you need to know to create a tool that helps people hear better?*

Create a "Need to Know" list on the whiteboard or poster board based on student responses. Possible student responses: Why can't they hear well? Who will use the tool? How will they use it? Where will they put it?

Ask students: *How can we answer the questions that we need to know to create our tool?* Possible student responses: Speak with someone who needs to hear better and ask them; do an internet search; talk to my grandparents.

Ask students: *What has already been made to help people hear better?* Possible student responses: Hearing aid; megaphone; headphones.

EXPLORE

In order for students to make informed decisions about which types of materials might be best for their designs, it's important for them to explore the characteristics of different materials.

Place several pieces of each material (tin foil, wax paper, cardboard tubes, etc.) on a supply table. Group students in pairs, and provide each pair of students with the *Materials Test* handout. Instruct partners to record their test responses and observations on the handout.

Instruct students to work with partners. Within each group, students will test different materials to see which allows for the best hearing experience, with one student being the listener (Partner 1) and the other being the noise-maker (Partner 2).

WHAT DID YOU SAY?

EXPLORE

Students will choose three materials to test from the following list: Tin foil, wax paper, cardboard tube, empty clean can, laminated piece of paper, piece of felt or foam sheet.

To test the selected materials, students will make a tube or a cone out of each type of material. The educator will model how to do that so students can see how to actually form each material into a cone shape.

Students will begin without any of the materials, standing six feet away from their partner$_1$. Partner 2, ask Partner 1 "Can you hear me well?".

Partner 1, rate how well you can hear your partner on a scale of 1 to 3$_2$:
1. You had a hard time hearing your partner.
2. You could hear your partner a little.
3. You could hear your partner very well.

Instruct students to repeat the process using each of the materials you selected. Partner 1 will place the small end of the cone next to (not in) their ear. Partner 2 will use their normal speaking voice and ask their partner "Can you hear me well?"

Partner 1, rate how well you can hear your partner on a scale of 1 to 3:
1. You had a hard time hearing your partner.
2. You could hear your partner a little.
3. You could hear your partner very well.

Partner 2, record responses on the *Materials Test* handout.

WHAT DID YOU SAY?

EXPLAIN

Once partners have tested and recorded data for all three of their selected materials, engage students in a discussion. Ask specific questions that help the students analyze their results:

- Which materials helped you to hear your partner best?
  - Possible student responses:
    - Wax paper or laminated paper: Vibrates (which produces sound)
    - Foil or empty can: Sound bounces around
    - Cardboard tube: Tube shape projects sound
- Which materials made it difficult to hear your partner?
  - Possible student responses:
    - Felt: Absorbs and muffles sound
    - Foam: Absorbs and muffles sound
    - Cardboard: Absorbs and muffles sound depending on the thickness of the cardboard
- Encourage students to use their observations to create a tool based on what worked well.

Use the students' responses to create a class list, on the whiteboard or poster paper, of the materials that students decided were the best to use for creating and designing a tool to help with hearing.

Students may decide to rank materials from most effective or helpful to least effective or least helpful.

EXTEND

Distribute the *Can You Hear Me?* handout to each pair of students. Instruct students to begin imagining their tool. What will it look like? What materials will they use? Be sure to introduce constraints prior to providing pairs time to record their designs.

Instruct students to prepare and design their tools with the following constraints in mind:

- Your tool has to project sound, which means it has to help the sound become louder
- You may only use the materials that you tested and chose previously[3]
- There is a time limit of 15 minutes[4]
- You must draw and label your plan first

Give students 7-10 minutes to work with their partner to plan their design idea. Assist with labeling as needed. After 10 minutes, provide students 15 minutes to create their designs. Walk around and provide assistance when needed.

WHAT DID YOU SAY?

EVALUATE

After students have created their designs, guide them through the testing process.

Instruct partners to stand six feet apart. Instruct Partner 1 to place the tool near (not touching) their ear. Partner 2 will use their normal speaking voice to ask Partner 1, "Can you hear me well?".

Partner 1, rate how well you can hear your partner on a scale of 1 to 3:
1. You had a hard time hearing your partner.
2. You could hear your partner a little.
3. You could hear your partner very well.

Partner 2, record responses on the *Can You Hear Me?* handout.

Instruct students to decide if their tool could help someone hear better, and have them circle their answer on the *Can You Hear Me?* handout.

Prompt students to return to their seats, then engage students in a discussion about their designs. While discussing, encourage partners to record their responses on the *Can You Hear Me?* handout under "What Worked Well?" and "What Didn't Work Well?".

Ask students if they found it easy or difficult to build their design and why. Student answers will vary. Some students will be able to complete their design and build while others may have found it to be more challenging. They may have struggled with manipulating the materials selected or using tools.

Ask students if their design worked, and if someone would be able to use their tool to hear better. Student answers will vary. Some students may have experienced success and others not.

Ask students if their tool would help someone hear better. Student answers will vary depending on their design. Some may have created speaker-like devices, while others may have created headphones, telephones or microphones. Students may explain that it helps them hear better by making the sound louder, or that the sound just goes into the ear.

Ask students if they found any problems as they went through the design and build process. Student answers will vary. Some students may have had problems staying within the rules and constraints. Some may have had issues with the design itself.

Based on the students' responses to the design reflection questions, encourage them to consider changes or improvements to their existing designs. Prompt students to complete the "Improve" section of the *Can You Hear Me?* Handout. Then, provide time for partners to redesign their tools and reflect on the results.

WHAT DID YOU SAY?

DIFFERENTIATION SUGGESTIONS

1. Provide additional structure by giving each group two yard sticks to help measure six-foot distance. Ask a student to help you model for the class on how to use the yard sticks appropriately before beginning the activity.

2. An alternative to asking one partner to say "Can you hear me well?" is to provide students with a non-verbal way of making noise. This may be clapping their hands twice, ringing a bell, or playing a designated sound using a computer or other electronic device.

3. Give students time before designing their tools to look at the materials used the previous day. Allow students time to refresh their memory by discussing with a partner, or as a group, which materials worked the best. Have the materials available for students to refer to while completing the activity.

4. The time constraint may be adjusted to meet the needs of your students.

PRE-VISIT ACTIVITY

LETTING LIGHT IN

GRADES 3-5

LETTING LIGHT IN

OVERVIEW

The human eye works by letting light into our eye, then sends a message to the brain. In this activity, students will discover how the eye lets light in!

BACKGROUND

Our sense of vision allows us to see the world around us. We use it to see a family member smile, a bird flying past us, or the traffic light change from green to yellow and then red. The human eye does a great job of giving us visual information!

MATERIALS

- Cardboard tube (1 per student)
- *Eye Data Recorder* handout
- *Letting Light In* handout
- *Cardboard Pupil Model* handout
- Flashlights (1 per student group)
- Optional: Pupil Reactions video[1]

ARIZONA STANDARDS

3.P2U1.1 Ask questions and investigate the relationship between light, objects, and the human eye.

LETTING LIGHT IN

5E LEARNING CYCLE

ENGAGE

Introduce students to the topic by explaining how eyes are complicated organs that allow us to see the world around us. The reason we can see anything is because light gets into our eye and special cells send messages to the brain.

Direct students through the following steps for testing how light gets into the eye:

1. Take your hands and cup them over your face (like the peek-a-boo game).
2. With your eyes open, slowly move your fingers apart just a little bit so that there are cracks between your fingers.
3. How much of the room around you can you see? ***Teacher Tip:*** Student responses will vary depending on how much they opened their fingers, and may include very little, some of the room, most of the room or all of the room.
4. How much light do you see? ***Teacher Tip:*** Student responses may include just a small amount.
5. Now open your fingers just a little bit more. Did the percentage of the room that you can see change? How much light do you see? ***Teacher Tip:*** Student responses may include very little, some of the room, most of the room, all of the room or the amount of light I can see is more.
6. How does letting more light in change what you see? ***Teacher Tip:*** Student responses may include more light lets you see more of the room or less light makes you see less of the room.

EXPLORE

Prompt students to work with their shoulder partner for this next step. Distribute the *Eye Data Recorder* handout to each student.

In a well-lit room, have students sit across from their partner close enough for them to see the black part of their eye, called the pupil.

Have one partner close their eyes for one whole minute. Use a timer to measure one minute. After one minute, ask them to open their eyes.

LETTING LIGHT IN

EXPLORE

Prompt partners to watch carefully when their partner opens their eyes, and look only at the black center of the eye (pupil).

Ask students what they saw when they opened their eyes. ***Student responses may include:*** The eye moved, the black part got smaller, the colored part got larger.

Prompt students to record their observations on the Eye Data Recorder handout. Students should draw how the eye looked when they opened their eye and the change that happened.

Ask students what they think the pupil is doing when it changes size. ***Student responses may include:*** Letting us see, letting light into the eye, controlling how much light gets into the eye.

Prompt students to sit across from their partner again. Dim the lights so the room is slightly lit. Students should observe their partner's pupil at this time and record their drawings and observations in their *Eye Data Recorder* handout.

Have students hold a flashlight (in OFF position) about 30 centimeters away from their partner's eye. Instruct students to not look directly into the light when it turns on, but to instead look straight ahead and focus on something behind the student holding the flashlight (similarly to when you are at the eye doctor).

Prompt the student holding the flashlight to look at the pupil of their partner's eye and turn the flashlight on.[1]

Ask students what they saw when they turned on the flashlight.[2] ***Student responses may include:*** The eye moved, the black part got smaller, the colored part got larger.

Prompt students to record their observations on the Eye Data Recorder handout, ensuring that they draw how the eye looked **before** they turned on the flashlight, and **after** they turned on the flashlight.

Ask students what they think the pupil is doing when it changes size. ***Student responses may include:*** The pupil changes size depending on how much light there is, when the pupil is smaller it lets in less light, when the pupil is larger it lets in more light.

LETTING LIGHT IN

EXPLAIN

Prompt students to use the *Letting Light In* handout and the information that they recorded in their *Eye Data Recorder* handout to help them draw conclusions. Ensure that they:

- Draw what the pupil looks like in a well-lit room
- Draw what the room looks like when there is a lot of light
- Draw what the pupil looks like in a dimly-lit room
- Draw what the room looks like when there is not a lot of light

On the back of the handout, prompt students to write 2-3 sentences about what the pupil does and how it changes depending on the amount of light there is.[3]

EXTEND

Make a model of the pupil using a cardboard toilet paper tube. Follow the instructions on the *Cardboard Pupil Model* handout.

EVALUATE

Ask students to use their model of the pupil along with the evidence they collected during their flashlight activity to demonstrate how the pupil works.

LETTING LIGHT IN

DIFFERENTIATION SUGGESTIONS

1. An alternative option is to show students the Pupil Reaction video. Allow students to record and discuss their observations.

2. During this class discussion, draw an anchor chart summarizing student observations (i.e. pupil contracting when exposed to light). Display the chart for students to refer to throughout the remainder of the lesson.

3. Allow students to choose how to show their understanding. Options may include creating a labeled diagram, explaining their understanding to a teacher or classmate, creating a poster, or completing provided sentence stems.

PRE-VISIT ACTIVITY

REACTION TIME

GRADES 6-8

REACTION TIME

OVERVIEW

In this lesson, students will learn that they have an internal system that helps them react to the world around them. They will then test the reaction time of their nervous system, and use their data to draw conclusions about different factors causing fluctuations in reaction time speeds. Lastly, they will design their own experiment to test one of these factors and share their results with their classmates.

BACKGROUND

Living things have an internal system that helps them respond to their environment. This is called the nervous system, and it helps us with everything we do, like breathing, moving, and thinking. It also helps us sense and react to the world around us.

MATERIALS

- *Nervous System Image* handout
- Timer
- Science journals
- Ruler
- *Reaction Time Lab* handout

ARIZONA STANDARDS

7.L1U1.11 Construct an explanation for how organisms maintain internal stability and evaluate the effect of the external factors on organisms' internal stability.

REACTION TIME

5E LEARNING CYCLE

ENGAGE

Distribute a copy of the *Nervous System Image* handout to each student. Prompt students to view the picture of the human at the top of the page.

Ask students what they think this body system is responsible for. ***Student responses may include:*** For sending messages to the body, for moving and thinking, for sensing and feeling.

Prompt students to look at the picture of the neuron at the bottom of the page. Ask students what they think this could be. After students share their ideas, confirm that this is a neuron, which is a type of cell that carries messages all around your body, helping your body to do everything from breathing to moving to talking.[1]

Tell students that our class is going to demonstrate how a neuron works! Prompt students to stand up and form a circle around the room. Once a circle is formed, students should hold hands. ***Teacher Tip:*** It's a good idea to provide hand sanitizer before beginning this activity and after it ends.

Explain to students that you will be joining the circle as well, and that you represent the brain's role in the nervous system. The students will be acting as neurons, sending a message through the nervous system and back to the brain. Explain that you will start a timer and squeeze the hand of the student next to you. This squeeze represents a nerve impulse traveling through the body. Once that student feels the squeeze, they should 'pass' the 'impulse' to the student next to them by squeezing their hand. Explain that you will stop the timer once the impulse makes it all the way around the circle and back to you.

Begin the activity, and record the amount of time it took to get the impulse through the whole circle on the board.

Next, tell students that we are going to do the same thing, but this time we will be squeezing shoulders instead of hands. Ask students to predict if they think the amount of time it takes to send the impulse will increase or decrease.

Begin the activity again, this time with students standing so that one hand is resting on top of the next student's shoulder. Start a timer and gently squeeze the student's shoulder next to you, and stop the timer when the impulse has made it all the way around the circle and back to you. Record the time on the board.

REACTION TIME

ENGAGE

Ask students to make observations about the two recorded times (the shoulder squeeze time is expected to be faster—this is because the shoulder is closer to the brain than the hand, so the travel time for the nerve impulse is less). Ask students why they think the shoulder squeeze time is faster. Possible student responses: The shoulder is closer to the brain than the hand, it takes less time for the message to travel back to the brain.

Ask students to return back to their seats. Prompt students to record their observations from this activity in their science journals.

EXPLORE

Now that students have an idea of how a nerve impulse travels throughout the nervous system, it's time for an activity to explore reaction times further.

Prepare students by referencing the differing reaction times in the first part of the activity. Ask them if they think there will be a difference in reaction time between dominant and non-dominant hands.[2]

Break students into pairs. Distribute a copy of the *Reaction Time Lab* handout and a ruler to each pair. Prompt students to make a prediction about which hand will have the faster reaction time, and record their thinking at the top of their handout.

Model the following procedures to students:

1. One student holds the ruler at the 30 cm mark and lets it hang vertically.
2. Using their dominant hand, the other student places their thumb and index finger near the 0 cm mark, and is ready to catch the ruler once it drops.[3]
3. The student holding the ruler randomly drops the ruler, and the other student catches it, using only their thumb and index finger to do so.
4. Students record the measurement just above the student's first finger on the ruler.
5. Teams repeat this procedure for a total of five trials using their dominant hand, and another five trials using their non-dominant hand.
6. Teams will then find the average for each hand and record their findings on their handout.

As students are completing this lab, ensure that they are recording their data on their handout.
Teacher Tip: Students may need to review how to find the average of a set of numbers before starting this activity.

REACTION TIME

EXPLAIN

Once all students have had time to finish recording their data, allow students to participate in a gallery walk to view data from other groups. Encourage them to look for trends in data across all groups, and to record these observations on their handout.

EXTEND

Engage students in a class brainstorm on other ways that reaction times could be affected. Possible ideas include: Different ages, amount of sleep the night before, different times of the day, testing people with different finger lengths and more. Record their ideas on the board.

Prompt each team to choose one of these ideas to test, and to record this on the back of their handout in the form of an if/then statement (see handout).

Prompt teams to think of a way to test their hypothesis, and record their ideas on their handout. Then, each team should test their hypothesis and record their data on their handout. Teams should remember to test their hypothesis multiple times, similarly to how they tested each hand five times in the previous activity.

EVALUATE

Teams should use their data to answer the conclusion questions on their handout. Optionally, teams can present their findings to their class, and report on whether or not their hypothesis was supported or refuted.[4]

DIFFERENTIATION SUGGESTIONS

1. Add the image of a neuron and the definition to a class word wall, or have students draw a picture and write the definition in their science journals. Encourage students to refer back to this definition, as needed, throughout the lesson.

2. Explain to students that their dominant hand is the hand that they prefer to use most often. This is the hand that they write with, use to brush their teeth or throw a baseball. Prompt students to identify their dominant hand.

3. For additional support, wrap a piece of masking tape around, or place a small sticker on, the 30 cm and 0 cm marks so that students can easily and accurately identify the correct measurement points while completing the activity.

4. Allow students to choose how to show their understanding. Options may include creating a labeled diagram, explaining their understanding to a teacher or classmate, creating a poster, or completing provided sentence stems.

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ARIZONA SCIENCE CENTER

Never stop wondering.
Never stop imagining.™