Spidey Senses

LESSON OBJECTIVE
- Understand how animals sense their environment and process that information in their brain

GRADE
- 4

STANDARDS
- Life Science

TIME REQUIRED
- 45 min

VOCABULARY
- Arachnid
- Arthropod: an invertebrate animal, such as an insect, spider, or crustacean

MATERIALS
- Ball of yarn
- Optional: snack for students

RECOMMENDED ASSESSMENT
- Student handout

introduction

Students will compare human senses to those of spiders and other animals and use our human Spidey Senses in a mindfulness activity.

State Standards

4-LS1-1: Students learn about internal and external structures that function to support survival, growth, behavior, and reproduction.
4-LS1-2: Use a model to describe how animals receive information through the senses and process the information in their brain.

Lesson Plan

Background Knowledge –
Spiders are arachnids, a class of arthropods that also includes scorpions, mites, and ticks. There are more than 45,000 known species of spiders, and the vast majority of spiders are harmless and serve a critical purpose of controlling insect populations that could otherwise devastate crops. Without spiders to eat pests harmful to agriculture, it's thought that our food supply would be put at risk. Though not all spiders build webs, every species produces silk and may use that silk for different purposes.

Activity –
1. Review the 5 human senses with students: sight, smell, taste, touch, and hearing. Ask students: why do we need our senses? How do they help us navigate the world? What do they think is happening when we sense something? How do we know we are touching something hot or smelling something nice? Our senses tell our brain how to react to something. If we touch something hot, our sense of touch tells our brain that we should move our hand away. If we hear the sound of the sound of "Class, class" from our teacher, our ears tell our brain that our teacher is trying to get our attention and we should be quiet. Our five senses all collect information about our environment that are interpreted by the brain and tells us how to act.

2. Do animals sense the world the same way that we do? Can anyone think of an example of an animal using their senses in a different way? *(Snakes use their tongues to smell, bats use echolocation to locate food, platypus can use electroreception to detect electrical impulses of their prey in water, catfish use their whiskers to taste the water, and bees and birds can sense Earth's magnetic field to navigate.)*

3. Spider anatomy: pass out student handout and have students label the parts of a spider. As a table group, can they figure out how the spider uses each part of its body?

   Answer Key: 1. Legs, 2. Spinnerets, 3. Pedipalp (feelers), 4. Abdomen, 5. Eyes, 6. Head

4. Watch the 4 minute video on jumping spiders from the BBC: https://www.youtube.com/watch?v=UDtlvZGmHYk

   [Vocab word from video: *Abseil* means to go down a very steep slope by holding onto a rope that is fastened to the top of the slope]

5. Spiders have senses that are a little different from ours:
   a. They can taste with their legs [have students put their hands on their desk – can they taste it?]
   b. Hear with the hairs on their body by sensing vibrations [if they plug their ears and watch the hair on their arms, can they sense noise that way like a spider?]
   c. They can detect odors through the pedipalp hair sensors on their feelers [can students smell through their hair?].
   d. Though most spiders have 8 eyes, some can have 6, 4, 2, or even no eyes! Jumping spiders have great vision, which is necessary since they are hunters. Many other spiders, usually web-builders, have very poor vision despite having a lot of eyes since their prey comes to them.
   e. Have students add these senses to their spider diagrams by writing "taste", "feel", and "hear" next to the spider's legs; "smell" next to the spider's feelers; and "see" next to the spider's eyes.

6. Giant web: A spider's silk web is more than a home – it's also a stringed instrument. Because spiders are extremely sensitive to vibrations, they are essentially listening to their webs and can hear if something makes contact with it. Have students stand in a big circle. Students will create a yarn "spider web" by throwing a ball of yarn to one another. Upon catching the ball, have each student name one of their senses and their favorite thing to use that sense for (for example, smelling flowers or hearing the recess bell or feeling a fleece blanket). Hold onto the yarn and throw the ball to someone else until everyone in the class has had a turn. As we saw in the video, spiders can sense when their web is plucked or disturbed. Have students close their eyes while still holding onto the yarn web. Reach out and pluck one part of the web several times. Can students identify where you were touching on the web? What else could spiders learn about their environment through sensing web vibrations?

7. Spider webs are stronger than steel. The yarn web the students just made is also strong – strong enough to hold something if we place an item on it. Try placing a clipboard or a book on the web. Can students feel how the tension on the yarn changes but doesn't break? Spiders can sense not only where something is on their web, but also the size and weight of what is on their web.

8. Spidey Senses Mindfulness: mindfulness means focusing all of your attention on what you are doing in that moment. You use all of your senses to truly experience the moment and get the most out of it. Have students return to their seats and get comfortable (stretch, get the wiggles out, etc.). Ask students to use their extra super Spidey-Senses by being aware of what they see (color, texture, shape, etc.), hear, smell, taste, and touch. Then talk about what this experience was like. Were there things they had never noticed before? This activity can be done with food during snack time. The room must be quiet, and the students need to remain silent, focused, and seated so they do not distract others. It may sound strange to "hear" food but of course there is a sound! It may be the sound it makes being chewed or held, broken, or picked up. Students need to eat slowly, so they have time to use all of their senses to experience the food. Have them write what they experienced on their handout.

Post Activity –
Have students practice a Mindful Moment every day for the next week and think about how they are using their senses during that time.

Take students on a sensory scavenger hunt (see the attached resource).

Discover Further

Extending the Lesson –
While the idea of the 5 senses is considered a universal truth, many neuroscientists are now debating whether we may have anywhere from 22-33 different senses. 3 of these senses are really important and ones that we can practice too: vestibular, proprioceptive, and interoceptive.

- The vestibular system lives in our inner ear and tells us information regarding head and body position. Try spinning around in a circle several times. That dizzy feeling comes from stimulating the vestibular system! The vestibular system is our body's compass which tells us which way is up when moving around in our environment.
- Proprioception is responsible for telling our brain the position of our body. Close your eyes and move your arms into a random position without touching anything. Can you tell where your arm is? If your elbow is bent? Is your palm facing up, down, or to the side? This is the magical sense at work telling your brain where you are even if things within your environment are not touching you.
- Interoception is our body's ability to identify sensations from internal organs. When it's almost dinner time and you feel the grumbling of your stomach, or it's hot outside and you feel thirsty, that's your interoception at work.

Learn More –
Some of the animals at the zoo also have unique senses! Our snakes use their tongues and a scent organ called a Jacobson organ on the roof of their mouth to smell. Our stingrays use a sensory organ called ampullae of lorenzini to sense electrical currents in the water when they are searching for food. The next time you're at the zoo, see if you can figure out how our different animals sense their environments!

fort wayne children's ZOO

Spidey Senses

Sensory Outdoor Scavenger Hunt

How many of these can you do?

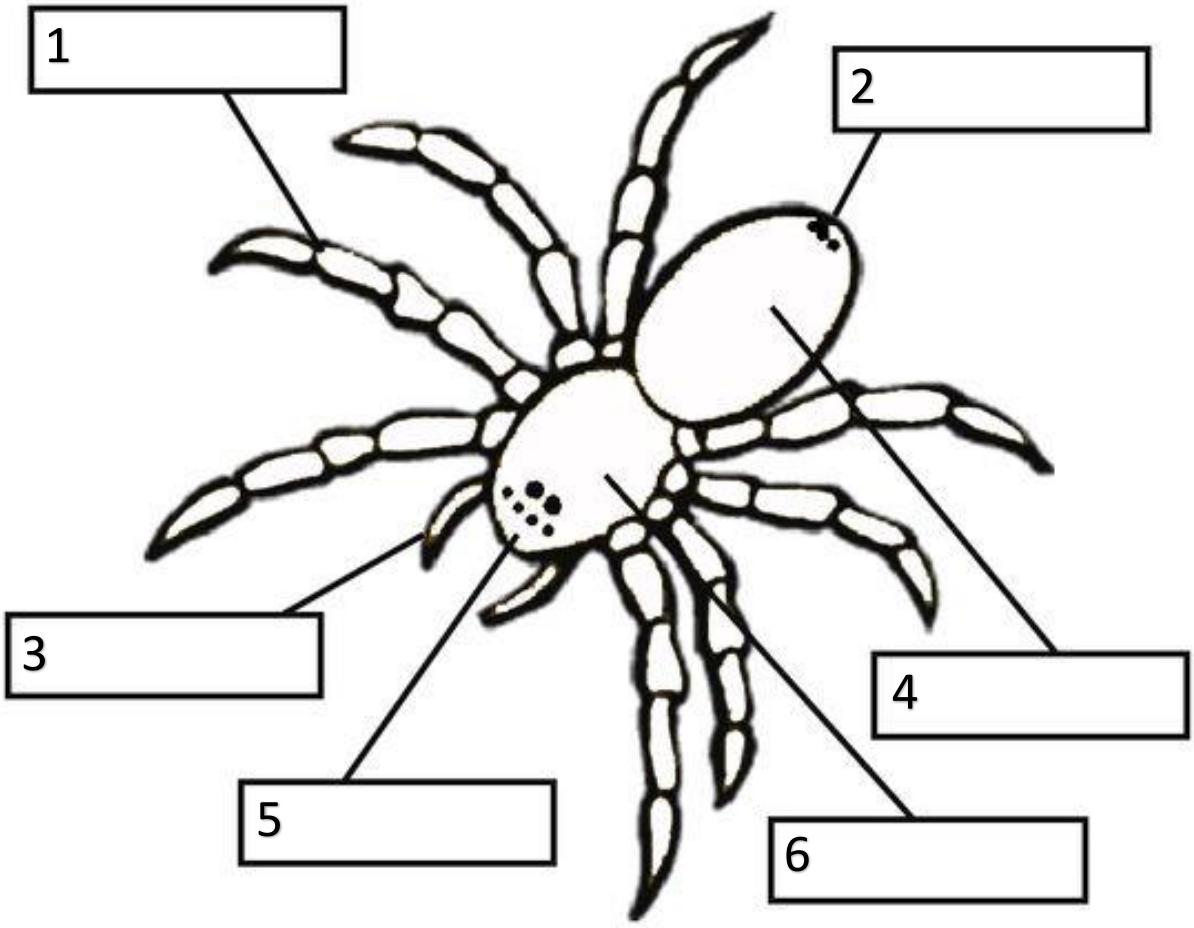
 FEEL the sun on your face	 SMELL a flower	 FEEL the wind	 LISTEN to running water
 LISTEN to the birds chirping	 WATCH bugs crawling	 FIND a rough rock, smooth rock, and sparkly rock	 SEE how many different animals you can spot
 FEEL 3 different kinds of leaves	 TOUCH a pinecone	 FEEL the bark of 3 different trees	 FEEL the dirt in your hands
 LISTEN to the wind through the trees	 LOOK for animal tracks	 SMELL the grass	 TOUCH some moss
 LOOK for signs of animals	 LOOK for feathers	 LOOK for patterns	 LISTEN to insects buzzing

Connecting kids and animals, strengthening families, and inspiring people to care.

Spidey Senses

Name: _____

Label the parts of the spider by using the words in the box below.

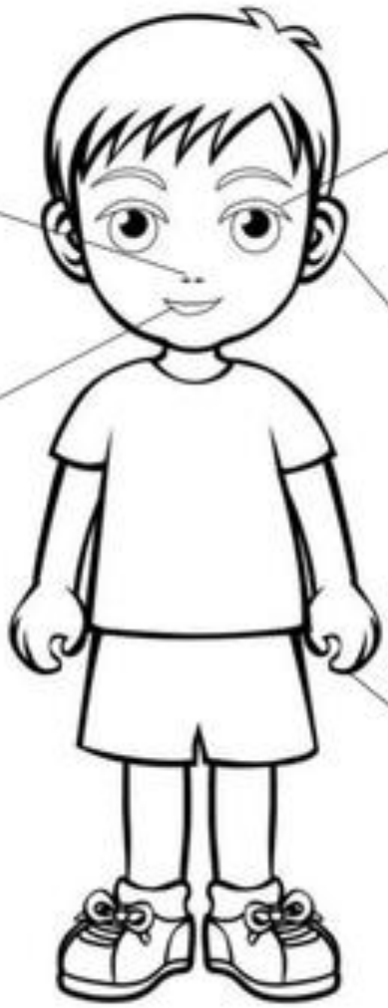


Eyes	Head	Pedipalp (feelers)
Legs	Abdomen	Spinnerets

Spidey Senses

What do you see?

What do you smell?



What do you hear?

What do you taste?

What do you feel?

Connecting kids and animals, strengthening families, and inspiring people to care.