The University of Texas at Austin
Environmental Science Institute

Two Eyes Are Better Than One

Lesson Plan for Grades: 5
Length of Lesson: 45 min
Title: Two Eyes Are Better Than One

Authored by: UT Environmental Science Institute
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Subject area/course:

- Science

Materials:

- Per 2 Students:
  - A marker or pen that can be balanced in an upright position

TEKS/SEs:

§112.16. Science, Grade 5, Adopted 2017.
(10) Organisms and environments. The student knows that organisms have structures and behaviors that help them survive within their environments. The student is expected to:

- (A) compare the structures and functions of different species that help them live and survive in a specific environment such as hooves on prairie animals or webbed feet in aquatic animals; and
- (B) differentiate between inherited traits of plants and animals such as spines on a cactus or shape of a beak and learned behaviors such as an animal learning tricks or a child riding a bicycle.

Lesson objective(s):

- Students will be able to explain the benefits of binocular vision.

Differentiation strategies to meet diverse learner needs:

- Students unable to conduct the vision portion of this experiment can be recorders and fulfil role B.
- Students should be paired with partners that complement the students' strengths. If additional assistance is needed the teacher should float around the room and provide guidance.

ENGAGEMENT (5 minutes)

- Show class the *Engagement Handout* (Fig. A) containing pictures of animals. What do they notice about the animals' features? What similarities and differences can they think of when comparing the animals' lifestyles?
- Point out that some animals have two eyes facing in one direction (like us) while, others have one eye facing in a direction (like us if we cover an eye).

EXPLORATION (20 minutes)

- Create groups of two.
- Each group of students will have a pen or marker that can be balanced in an upright position.
- Students should use the *Exploration Student Handout* (Table 1) to record their results.
- Have students balance pen on the table about an arm's length away from Student A. Student A will cover one eye (monocular vision). In one sweeping motion from their side to the marker (think 180° to 90°), student A will attempt to tap the pen with their index finger and touch it.
- Student B will reset the pen if necessary and record each attempt as a hit or a miss.
- Repeat this process 5 times. Switch roles and repeat 5 more times.
- Have students repeat all five attempts, each, without covering an eye (binocular vision). Record the results.

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- Teachers should allow for student-directed learning during this time, but should also be highly engaged while students are performing activities, asking questions of the students one-on-one or while they are working in groups.
- Ask each group, "Is it easier to knock down the pen with one eye or two eyes?"
- "Why might it be beneficial for the animals with two forward facing eyes pictured in (Fig. A) to have the ability to perform tasks similar to knocking over the pen?"

EXPLANATION (5 minutes)

- Have students share their results. Anticipate that students were much more successful when they used both eyes.
  - "Is it easier to knock over the pen with one eye or two eyes?
  - "Why might it be beneficial for the animals with two forward facing eyes pictured in (Fig. A) to have the ability to perform tasks similar to knocking over the pen?"
  - View this section of Dr. Christopher Kirk's *Hot Science At Home* for an example illustrating the importance of binocular vision: (10:50 – 13:08 https://youtu.be/xz-dR-dK25Q?t=651)
  - "What do the animals with 2 forward facing eyes eat? (other animals) How do they get their food? (Hunting with precision and speed)

ELABORATION (10 minutes)

- Introduce the terms binocular vision and monocular vision. Show students the *Elaboration Handout* (Fig. B) depicting the two. See Dr. Christopher Kirk's *Hot Science At Home* for an example of how to determine where your field of binocular vision ends and your monocular vision begins: (9:20 – 9:53 https://youtu.be/xz-dR-dK25Q?t=561)
- Use these terms to classify the two groups of animals in Fig. A and the two rounds of the activity. Animals with binocular vision are better at perceiving their surroundings in three dimensions, this is known as depth perception. Better depth perception makes it easier to knock over a pen with their finger, leap from tree to tree, or hunt prey.
- "What do the animals with monocular vision eat? Why don't they have good depth perception? What do they have instead? (Monocular vision allows for a very large field of view). Explain that some animals with monocular vision can even move their eyes independently!
- Explain to students that scientists are still trying to figure out exactly how some animals evolved to have binocular vision while others have monocular vision. For example, do gorillas need good depth perception? Let students know that there are lots of scientists, including Dr. Kirk studying this, and they can too!

EVALUATION (throughout entire lesson)

- Students will undergo formative assessment throughout the activity as the teacher floats around and asks questions.
- To conduct a summative assessment, show students the *Evaluation Student Handout* (Fig. C). Have them identify the animals as having binocular or monocular vision. Have them jot down some things we might be able to infer about these creatures based on their vision and what we've learned? Are they likely predators or prey?

SOURCES AND RESOURCES

- ***Dr. Christopher Kirk, Hot Science – Cool Talks #1.9, I Spy the Eye of the Aye-Aye*",** https://www.esi.utexas.edu/talk/i-spy-the-eye-of-the-aye-aye/
- **Science World – Penny Drop,** https://www.scienceworld.ca/resource/penny-drop/
- Image: "Cow ready for milking-5+, https://search.creativecommons.org/photos/6c527698-54e2-4abb-9988-2c03a4adafa3

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- Image: "Cat", https://search.creativecommons.org/photos/5c917852-6dad-4c43-b823-35a23e83fc55
- Image: "Pigeon", https://search.creativecommons.org/photos/001b8038-5688-42c7-be30-da64485846ef
- Image: "Owl", https://search.creativecommons.org/photos/a39f93dc-be34-4cdd-817f-de9f8fb617ec
- Image: "Shiras Moose - Grand Teton National Park", https://search.creativecommons.org/photos/c2d4c4c2-d3c6-4427-bee1-cc73e0895805
- Image: "Keanu Reeves", https://search.creativecommons.org/photos/28cccd08-48c1-40a1-871e-6fd2f07c9b37
- Image: "The elusive nocturnal Kiwi bird in a bird park near Rotorua. A two legged Kiwi without thongs or flip flops.", https://search.creativecommons.org/photos/d4e216d2-c202-4e92-b989-8f45fe7dbe77
- Image: "Tongue of a Lizard", https://search.creativecommons.org/photos/e24ed277-5dce-4800-a7d4-590a0e9c1292
- Image: "Aye-aye (Daubentonia madagascariensis), Tsimbazaza Zoo, Madagascar", https://search.creativecommons.org/photos/ba856e26-fa48-4b06-bd68-9986713b0993

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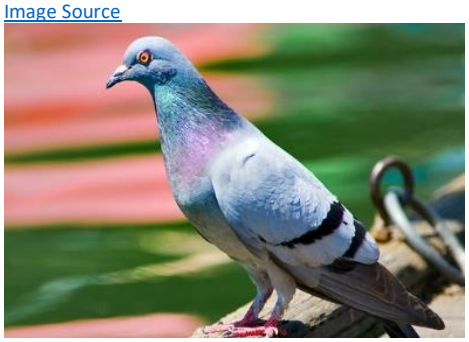
ENGAGEMENT HANDOUT (FIGURE A)

Image Source

Image Source



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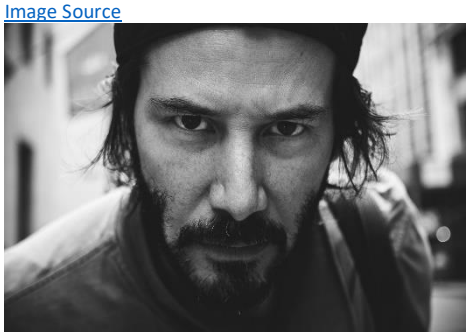

Image Source

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EXPLORATION STUDENT HANDOUT

TABLE 1:

Student A – 1 eye covered		
Attempt	Hit	Miss
1		
2		
3		
4		
5		

Student B – 1 eye covered		
Attempt	Hit	Miss
1		
2		
3		
4		
5		

Student A – No eye covered		
Attempt	Hit	Miss
1		
2		
3		
4		
5		

Student B – No eye covered		
Attempt	Hit	Miss
1		
2		
3		
4		
5		

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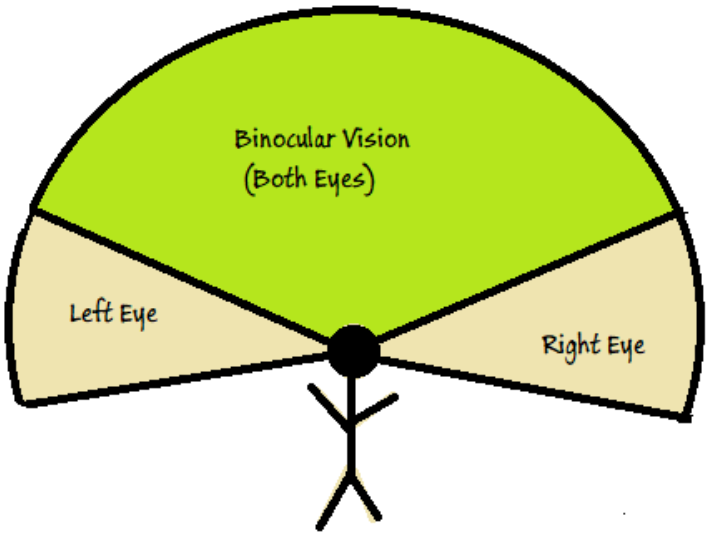
ELABORATION HANDOUT (FIGURE B)



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EVALUATION STUDENT HANDOUT (FIGURE C)

1.)

Image Source

2.)

Image Source

3.)

Image Source