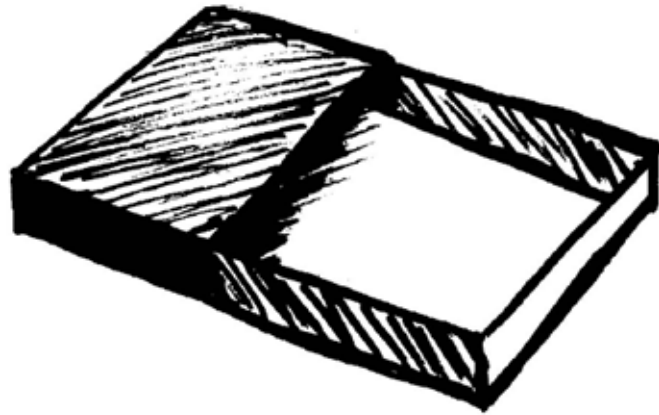
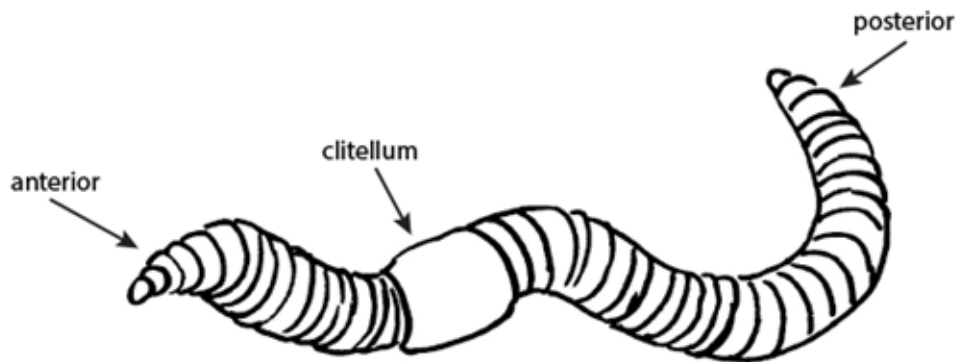


Graphic 1



Graphic 2



Option 2: Reaction Time

For this option, you and some friends or family members will take an online test to check reaction time to visual stimuli. You need to find two to four people to participate. Try to get people of different ages and genders (for example, your mom, your brother, and your grandmother).

You and each participant will go to the following web link and will follow the instructions for the test. After five rounds, the tester will receive an average reaction time for that round. Write each person's average in the first column on the "Reaction Time" sheet. Each person should complete this test twice, thus giving two averages per person. Once you've collected all of the test data, answer the questions on the sheet.

Red Light, Green Light Reaction Time Test

www.movingbeyondthepage.com/link/2629/

Have each tester follow the instructions at the top of the webpage. Note that the tester can either click the button or press a computer key when the light turns green.

□ Activity 2: Animals and Stimuli

In this activity you will continue your exploration of how organisms perceive and respond to stimulus. There are two options. For Option 1, you will see how earthworms respond to the stimulus of gravity. In Option 2, you will read about some animals that can sense or perceive stimuli in ways that humans cannot.

Option 1: Earthworms' Response to Gravity

For this option, you will see how earthworms react to gravity (geotaxis). You will need 4-5 earthworms/redworms, a 10" x 10" piece of cardboard, a stopwatch or timer, a ruler, and a book that is about 2" thick. Follow these steps:

1. Use a ruler or straight edge to draw a line across the middle of your piece of cardboard.
2. With the cardboard flat on the desk, position two earthworms so that the anterior end of each earthworm is on the line. Refer to Figure 1.
3. Set a timer for one minute. At the end of one minute, measure approximately how far the worm moved forward (in centimeters [cm]). Choose the worm who moved the farthest (either forward or backward) and measure from the line to the anterior tip of the worm. Record the number on the "Gravity Response" page. (If neither worm moved, record a 0. If the worm moved backward, record a negative number.)
4. Repeat Steps 2-3 twice more.
5. Prop one end of the cardboard on the side of a book to form a ramp.
6. Position two earthworms so that their anterior ends are on the line facing upward. Refer to Figure 2.

Activities

Activity 1: Response to Stimuli

This activity measures organisms' response to stimuli. If you were able to obtain earthworms, your child can complete Option 1. Otherwise, he should choose Option 2, where your child and friends and family members test their response times to visual and auditory stimuli.

Option 1: Earthworms' Response to Light

In this option your child faced different ends of earthworms in light and dark and tested their reaction to light. Your child should find that the anterior ends move toward darkness. When the anterior is in the light, the earthworms should move more quickly to get into the darkness and thus move farther in one minute. When the posterior is in the light, the anterior is already in the dark, so the earthworms should move more slowly and thus not move as far in one minute.

Check to see that your child created a bar graph of his results.

Option 2: Reaction Time

For this option, your child investigated how quickly he and some friends or family members responded to a test of visual stimuli. Each tester should follow the instructions. Your child should find at least two others to take the test and up to four people, preferably mixing ages and gender.

Answer Key:

1. Did age or gender seem to make a difference in response times to the external stimuli? (Generally, reaction times increase as we age. You will probably find that your child has better reaction times than you. Gender has not been shown to have a significant impact on reaction times.)
2. Did the averages for each participant change with each test? What conclusion can you draw from this? (Answers will vary depending on the data, but your child may find that reaction times shortened or improved, showing that we can practice and improve our reaction times.)
3. What might your findings mean in a real world example such as driving or avoiding a venomous snake while hiking? (Younger drivers may have faster reflexes, but this is often outweighed by the experience of more seasoned drivers. Faster reaction times can be beneficial (avoiding an accident) or detrimental (over-correcting in a skid.) As drivers age, their reaction times may slow down requiring a higher level of attention to the external stimuli of other traffic, pedestrians and road conditions. Often the first warning we get from venomous snakes is the shaking of a rattle or the rustling of leaves as the snake moves. The ability to respond to auditory stimuli will increase a hiker's ability to avoid an unfortunate encounter.)

Activity 2: Animals and Stimuli

If your child did the earthworm experiment for Activity 1, he will also probably want to use earthworms again for this activity. In Option 1, he will examine how earthworms respond to gravity. If your child prefers (or if you did not obtain earthworms), then he should choose Option 2, in which he will read about some animals that can sense or perceive stimuli in ways that humans cannot.

Option 1: Earthworms' Response to Gravity

For this option your child tested worms' response to gravity. Results will vary.