Standard

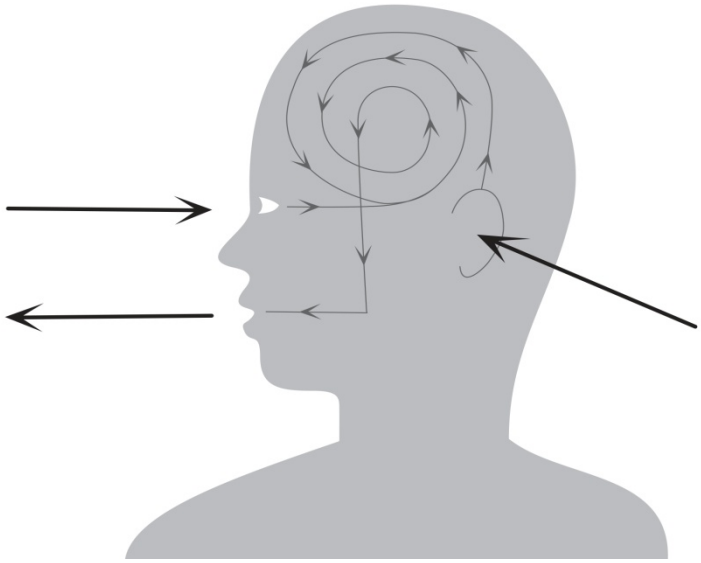
CT – 5.2 - Perceiving and responding to information about the environment is critical to the survival of organisms.
MA – Life Science (Biology) Gr. Pre-K-2, #6; Gr. 6-8 #13

Snap Decisions

Connecticut

Science

Center



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Connecticut Science Center

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Summary

This program provides you and your students with materials related to the topic of the Senses, focusing primarily on the concept of Reaction Time. During your visit, your students will enjoy opportunities to make observations, raise questions, and learn more about making "snap decisions" in one of our Discovery Center classrooms.

In addition, your students will explore the various galleries, including the Sight and Sound Experience.

Also included in this program are lessons that provide interdisciplinary connections, as well as additional resources such as websites, literature links, career information, home and school connections, and related videos.

This program was supported by Connecticut Health and Educational Facilities Authority (CHEFA). During the visit at the Connecticut Science Center students will complete activities related to specific health careers and videos of health professionals in those particular fields of interest will be shared with the students.

This program has been developed to complement some of the core themes, content standards and expected performances of the CT Core Science Frameworks, as well as the National Science Education Standards. It includes a visit to the science center which includes "hands-on" investigations that are inquiry-based and designed to engage students as well as to enhance and build upon their prior content knowledge. It may be integrated with other subjects or it may be taught in its entirety within the science classroom.

The complete CT Core Science Curriculum Frameworks is available at the website http://www.sde.ct.gov/sde/lib/sde/pdf/curriculum/science/PK8_sciencecurriculumstandards2009.pdf . See also: American Association for the Advancement of Science, *Atlas of Science Literacy*, and Project 2061. In addition, Grade Level Content Standards were released in June, 2007, to "unpack" the science content for grades K-5. This program will focus on the Senses. The original science frameworks were designed to give teachers an idea of what students *should know*. Grade Level Expectations were added in July, 2008, to further "unpack" the science concepts to give an idea of what students *should be able to do*. This gives teachers an idea of what sorts of activities are appropriate to do with students, and even some ideas as to what sorts of questions can reasonably be expected to appear on the CMT.

Following are the specific sections from the CT Core Science Curriculum Framework that are addressed in this unit. The B INQ information reflects the process skills intended for grades 3-5 specifically representing the content standards of scientific inquiry, literacy, and numeracy.

Inquiry Standards

Content Standards	Expected Performances
SCIENTIFIC INQUIRY ♦ Scientific inquiry is a thoughtful and coordinated attempt to search out, describe, explain and predict natural phenomena. **SCIENTIFIC LITERACY** ♦ Scientific literacy includes speaking, listening, presenting, interpreting, reading and writing about science. **SCIENTIFIC NUMERACY** ♦ Mathematics provides useful tools for the description, analysis and presentation of scientific data and ideas.	B INQ.1 Make observations and ask questions about objects, organisms and the environment. B INQ.2 Seek relevant information in books, magazines and electronic media. B INQ.3 Design and conduct simple investigations. B INQ.4 Employ simple equipment and measuring tools to gather data and extend the senses. B INQ.5 Use data to construct reasonable explanations. B INQ.6 Analyze critique and communicate investigations using words, graphs and drawings. B INQ.7 Read and write a variety of science-related fiction and nonfiction texts. B INQ.8 Search the Web and locate relevant science information. B INQ.9 Use measurement tools and standard units (e.g., centimeters, meters, grams, kilograms) to describe objects and materials. B INQ.10 Use mathematics to analyze, interpret and present data.

CT Science Standards, Grade Level Concepts & Expectations, & CMT Correlation

Structure and Function -How are organisms structured to ensure efficiency and survival?

GRADE 5

5.2 Perceiving and responding to information about the environment is critical to the survival of organisms.

Core Science Curriculum Framework	Underlying Concepts *Students should understand that…*	Grade-Level Expectations *Students should be able to…*	CMT Expected Performances
5.2.a The sense organs perceive stimuli from the environment and send signals to the brain through the nervous system.	1. Animals have sense organs that are structured to gather information about their environment. Information perceived by the senses allows animals to find food, water, mates and protection. 2. Each sense organ perceives specific kinds of stimuli. Some human senses are more or less developed than the senses of other animals. 3. Sense organs transfer information through a network of nerves to the brain where it is interpreted and responded to. The brain responds by sending messages to all parts of the body. The type of response and the amount of time it takes for the response to occur vary depending on the stimulus. 4. The human ear is structured to collect sound vibrations from the environment and pass them through the middle ear (eardrum and small bones) and inner ear (hair-lined tubes) to the auditory nerve where they are transformed into electrical signals that are sent to different parts of the brain. 5. The human eye is structured to collect light through the cornea and the pupil. The amount of light that enters the eye is controlled by the iris. The cornea and the lens refract the light and focus it onto the retina and the optic nerve where it is transformed into electrical signals that are sent to different parts of the brain. 6. For anything to be visible, light must be present. For a person to see an object, the light it reflects or produces must have a straight, unobstructed path to the eye. 7. Human eyes have receptors for perceiving shades of red, orange, yellow, green, blue, indigo and violet. 8. Sunlight (or "white light") is a combination of colors. White light passed through prisms, water droplets or diffraction gratings can be refracted to show its	1. Explain the role of sensory organs in perceiving stimuli (e.g., light/dark, heat/cold, flavors, pain, etc.) 2. Pose testable questions and design experiments to determine factors that affect human reaction time. 3. Conduct simple tests to explore the capabilities of the human senses. 4. Summarize nonfiction text to explain the role of the brain and spinal cord in responding to information received from the sense organs. 5. Identify the major structures of the human eye, ear, nose,	**B20**. Describe how light absorption and reflection allow one to see the shapes and colors of objects. **B21**. Describe the structure and function of the human senses and the signals they perceive.

	component colors: red, orange, yellow, green, blue, indigo and violet. 9. The perceived color of an object depends on the color of the light illuminating it and the way the light interacts with the object. The color humans see is the color that is reflected by the object. For example, an object that appears green is absorbing all colors except green, which is reflected to the eye. 10. Human skin is structured to detect information related to texture, temperature, pressure and vibration. Each sensation has different receptors distributed around the body; some areas of the body have greater concentrations of receptors for certain sensations, making those areas more sensitive than others to texture, temperature, or pressure. 11. Human noses are structured to collect and detect chemicals floating in the air (odors). Tiny hairs behind the nose have special receptors that respond to airborne chemicals and produce electrical signals that are transmitted to different parts of the brain by the olfactory nerve. 12. Human tongues are sense organs that are structured for detecting chemicals dissolved in saliva (flavors). Taste buds respond to 4 basic tastes: salty, sweet, sour and bitter. Special receptors in taste buds respond to tastes and produce electrical signals that transmit information through nerves to different parts of the brain. SCIENTIFIC LITERACY TERMINOLOGY: sense organ, receptor, stimulus, response, nervous system, vibration, reflect, refract, cornea, pupil, iris, lens, retina, white light, absorb	skin and tongue, and explain their functions. 6. Draw diagrams showing the straight path of light rays from a source to a reflecting object to the eye, allowing objects to be seen. 7. Describe the properties of different materials and the structures in the human eye enable humans to perceive color.	

Massachusetts Learning Standards

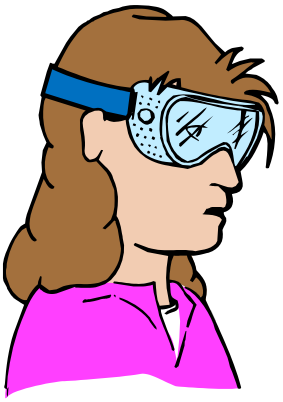
Life Science (Biology)

Grades PreK-2

6. Recognize that people and other animals interact with the environment through their senses of sight, hearing, touch, smell, and taste.

Safety Standards

- Review expectations for appropriate behavior, handling of materials, and cooperative group procedures to be sure those activities are accessible and safe for all students prior to beginning these investigations.
- Make any necessary student modifications.
- Monitor students to be sure they are acting appropriately, handling materials accordingly, and working cooperatively especially when working with the glass bottles and striking objects to make sounds
- For more comprehensive information on science safety, consult the following guidelines from the Council of State Science Supervisors; Connecticut Department of Education http://www.csss-science.org/downloads/scisaf_cal.pdf



Misconceptions and Facts

General Misconceptions about Sound and Hearing

Misconceptions	Facts
Loud sound is not dangerous, as long as you don't feel any pain in your ears.	Our threshold for pain is at about 120 - 140 dB SPL but sound begins to damage our hearing when it is above 85 dB SPL (for an 8 hour period).
Hearing loss after sound exposure is temporary.	Some of the hearing loss will be permanent. Indication of damage is ringing and noise in the ears (called tinnitus) after sound exposure. This is a clear indication that sound exposure took place. Another indication of that is the difficulty to communicate on the phone and in the noisy restaurant or cafeteria.
If you have a hearing loss already, you don't have to protect your hearing any more.	Hearing loss accumulates. More exposure to loud sounds leads to more hearing loss.
Hearing loss is mostly caused by aging.	Research shows that accumulative exposure to loud sounds, not age, is the major cause of hearing loss.
Hearing loss can be repaired by medicine, surgery or hearing aids.	Although certain improvements can be obtained by the use of hearing aids. In the case of hearing losses inflicted due to the noise exposure, the resulting quality of hearing will be far from normal. So far no drugs or therapy can correct noise induced hearing loss. This could affect your professional performance as a musician, sound engineer, medical doctor, air traffic controller, telephone operator, pilot and driver or in any other profession where performance depends on good hearing. Also, your enjoyment of music would suffer.
Loud sound only damages your hearing.	Loud sound can change your heart rate, vision and reaction time. It may make you more aggressive and in general, negatively affect you.

General Misconceptions about Sight Loss

Misconceptions	Facts
All blind people are totally blind.	There is a wide spectrum of sight loss among people who are legally blind, ranging from slight impairment of vision all the way to total blindness. Only about 10 percent of legally blind people are totally blind. The majority of people who are blind have some degree of vision remaining.
Legal blindness means total blindness.	Legal blindness is a term used by the IRS and other agencies to determine whether a person is eligible for disability benefits or other services. Legal blindness does not necessarily mean total blindness. You are considered legally blind if the central vision in your better eye, with the best correction possible, is no better than 20/200 (20/20 being normal); or if your peripheral vision is no greater than 20 degrees diameter in your better eye.
All blind people can read Braille.	Only about 10 percent of people who are blind or visually impaired can read and write Braille.

Misconceptions about the Brain

About function:

- Humans use only 10% or less of their brain. There is no scientific basis for this assertion. Many functional brain imaging studies show activated regions encompassing well over 10% of the brain. Perhaps the most remarkable thing about this myth is that nobody has ever been able to pin down its origin. Some possibilities have been discussed by Benjamin Radford, Eric Chudler, and The Two Percent Company.

- This misconception most likely arose from a misunderstanding (or misrepresentation in an advertisement) of neurological research in the late 1800s or early 1900s when researchers either discovered that only about 10% of the neurons in the brain are firing at any given time or announced that they had only mapped the functions of 10% of the brain up to that time (accounts differ on this point).
- Another possible origin of the misconception is that only 10% of the cells in the brain are neurons; the rest are glial cells that, despite being involved in learning, do not function in the same way that neurons do.
- Einstein is reported as quipping that people typically only use 10% of their brains. The popular press took this as fact, although the comment was meant only facetiously.
- Lower level of brain activation does not mean a lower performance of cognitive functions; this variable has confounded scientists, because some 'gifted' individuals showed less activity than the average person. Haier proposed that indeed more gifted individuals might possess more efficient brain circuits. Some New Age proponents propagate this belief by asserting that the"unused" ninety percent of the human brain is capable of exhibiting psychic powers and can be trained to perform psychokinesis and extra-sensory perception. However, there is still no proof of this, and neurologists say that this is not possible.

- Learning can be achieved more powerfully through subliminal techniques. The extent to which subliminal techniques can influence learning depends largely on what level of perception the techniques affect
- Learning in the sense of implicit memory formation has been demonstrated even in patients who are under general anesthetic. Words played to patients during operations were later found to influence implicit recall tasks.

About structure

- The human brain is firm and grey. The living brain is soft and pale grey in color. Neurosurgeons commonly compare the healthy brain with tofu. It becomes firm and darker grey when it is preserved with resins.
- Mental abilities are absolutely separated into the left and right cerebral hemispheres. Some mental functions such as speech and language (cf. Broca's area, Wernicke's area) tend to be localized to specific areas in one hemisphere. If one hemisphere is damaged at a very early age, however, these functions can often be recovered in part or even in full by the other hemisphere. Other abilities such as motor control, memory, and general reasoning are spread equally across the two hemispheres.

Source of list of misconceptions: http://amasci.com/miscon/miscon.html in conjunction with Operation Physics American Institute of Physics 1825 Connecticut Ave. NW, Suite 213 Washington, DC 20009 (202) 232-6688 http://www.aip.org

Additional research about misconceptions was found at:

http://www.project2061.org/publications/bsl/online/ch15/findings.htm#Ch5

Bibliography – STCSE Students' and Teachers' Conceptions and Science Education

http://www.ipn.uni-kiel.de/aktuell/stcse/stcse.html

Phi Delta Kappan – Look at brain based education

http://www.pdkintl.org/kappan/k_v89/k0802jen.htm

CT Science Center Classroom Visit Activity

The following highlighted GLCs and GLES are covered in this section:

Structure and Function -How are organisms structured to ensure efficiency and survival? GRADE 5			
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Making Judgments-Checking Your Reaction Time

How Fast Can You Judge What You See and Take Appropriate Action?

Intro:
Students will be introduced to reaction time by completing activities that requires them to make snap decisions. Students will be working in groups and as a class collecting data. Once the activity is completed we will discuss what they noticed as a class (as we review our accumulated data in an excel spreadsheet) and how that they individually and as a class were affected during the activity. Reaction time is then linked to specific health careers where quick reaction time is needed (EMTS, etc) and a video is shown related to those particular medical professionals.

Reaction Time Test- Human Reaction Time- at the beginning of the class students will be introduced on the Starboard to an online reaction time test and then will complete it on their own on laptop computers at each lab station.

The online test measures your reaction time by how fast you click the mouse when you see a light turn green.
http://mindbluff.com/reaction.htm

> The students will be able to find their average reaction time. During the test the students will click their mouse when they see the light turn color green. Their individual reaction time is recorded on the screen automatically. The students will individually complete reaction times and see their individual averages. Each group will share their individual averages and we will determine their group averages together as a class using an excel spreadsheet on the Starboard. We then will be able to see their average as a class on the excel spreadsheet. The students will have then seen how the reaction time is recorded as individual and as a group, and as a class. They will be asked what they have observed about the data that has been recorded. What is the average reaction time? In the activity that follows they will be recording their own individual reaction time, their group's average reaction time and finally will determine a class average.

Activity:
The setup for this activity gives students less than one second to make a decision and take action. The students are acting as police officers being trained to make snap decisions. In their work, a split second decision will sometimes be a matter of life or death for them or someone else. Their decisions must be quick and accurate. Can they identify a criminal accurately?

Each group is provided a tube with an end attached to a ring stand. The tube has one open section in it near the center. The tube can be positioned at 3 different slopes. The ring stand is labeled #1, #2, and #3. We start with the tube positioned at slope #1 (the lowest slope). One student will choose a colored marble out of a black bag (our criminal). One student (our officer) will observe the open area of the tube and try to determine what color the marble is as it rolls down the tube. They will only be able to view the marble for a short amount of time as it rolls down the tube. One student will record the data. (Our record keeper). How many did they get right out of 6 marbles? 1 out of 6?

(1/6), 2 out of 6? (2/6). Each student will get a chance to be the officer and each group will determine their average score and then we will take a class average. We will then repeat the process for slope #2 (a higher slope) and then finally slope #3 (the highest slope). Students will be asked what they are noticing about the data as the experiment progresses.

Once the first set of slopes is completed, we can then increase the number of balls to two at a time and repeat the process. If time permits or the class needs a challenge, we will then increase to 3 at a time and repeat the process.

We will record all the data on an excel spreadsheet on the Starboard. One student from each group is asked to come report their group data at the Starboard as soon as they complete each slope. Once all the group averages are entered we then see the calculation of the class average at the bottom of the spreadsheet. Students will be asked what they notice about the data. How did it change experiment to experiment? How did the different variables affect you individually, as a group, and as a class? We should be able to see the class average reaction time decreasing (number of balls the get correct) as the slope increases. It takes the students longer to respond when the ball is traveling faster at the higher slope. We can then create a graph at the end of the class to see that relationship.

Wrap-Up

Many health professionals also have to make quick decisions everyday that make a difference between life and death. One such profession is an EMT, Emergency Medical Technician. They are first ones to arrive at the scene of an accident or a crime scene. They have to make a quick diagnosis of a person's medical status and then act as quickly as they can to stabilize them and get them to the hospital. Choosing this health career you have to be prepared to make quick judgments every day. Not only are you making quick decisions medically but one of the EMTs are usually driving the ambulance as well which also involves having good reaction time while driving quickly to the hospital.

Video of the EMT: (3 minutes) Paramedic and EMT Dedication Video
http://www.youtube.com/watch?v=9CTiNciIF6Y

Teacher's Notes:
Emergency medical technician (EMT) is a term used in various countries to denote a healthcare provider trained to provide pre-hospital emergency medical services.
The precise meaning of the term varies by jurisdiction, but in many countries EMTs respond to emergency calls, perform certain medical procedures and transport patients to hospital in accordance with protocols and guidelines established by physician medical directors. They may work in an ambulance service (paid or voluntary), as a member of technical rescue teams, or as part of an allied service such as a fire or police department. EMTs are trained to assess a patient's condition, and to perform such emergency medical procedures as are needed to maintain a patent airway with adequate breathing and cardiovascular circulation until the patient can be transferred to an appropriate destination for advanced medical care. Interventions include cardiopulmonary resuscitation, defibrillation, controlling severe external bleeding, preventing shock, body immobilization to prevent spinal damage, and splinting of bone fractures.

Putting Science To Work In Connecticut – Health

Teacher Trail Guides

(Information regarding these OWC kiosks can be found in the Career section)

Trail Guide *Putting Science to Work in Connecticut*: 5.2 Snap decisions

Visit the **Picture of Health Gallery – 5th Floor South**
Find the Putting Science to Work in Connecticut video kiosk

View the two videos filmed at the following locations in the State of Connecticut:
Mount Sinai Rehabilitation Hospital, a SAINT FRANCIS *Care* Provider
Ahlstrom Nonwovens LLC

Please answer the following questions related to each video:

Mount Sinai Rehabilitation Hospital, a SAINT FRANCIS *Care* Provider

What is a Lokomat? What is it used for and how could it help a patient?

Ahlstrom Nonwovens LLC
What is a Nonwoven composite? Why is it important to maintaining good health?

What health careers are included in these videos?

There are many people that live and work in our State of Connecticut that contribute to keeping us healthy in our communities.

Teacher notes:
A Lokomat is advanced robotic therapy equipment that is able to train stroke damaged brains to regain control over their bodies . It allows people to recover and improve their lives. Patients basically relearn how to walk. Not only stroke victims but patients with spinal cord injuries and MS patients are now using this technology.
A nonwoven composite is a web of material- synthetic material is compressed into a sheet. It is a breathable viral barrier. Specialized plastics are used to create the non-woven, multi-layered materials which allow air and moisture to pass through, but block the passage of bacteria and even viruses. These materials are used in hospitals to protect both the patients and medical staff from potentially deadly contamination.
Physical therapist and Product Development Scientist are the careers seen in the videos.

Sponsored by State of Connecticut Office for Workforce Competitiveness

Putting Science To Work In Connecticut – Health Student Trail Guides

Trail Guide Putting Science to Work in Connecticut: 5.2 Snap Decisions

Visit the **Picture of Health Gallery – 5th Floor South**
Find the Putting Science to Work in Connecticut video kiosk

View the two videos filmed at the following locations in the State of Connecticut:

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What is a Lokomat? What is it used for and how could it help a patient?

Ahlstrom Nonwovens LLC
What is a Nonwoven composite? Why is it important to maintaining good health?

What health careers are included in these videos?

There are many people that live and work in our State of Connecticut that contribute to keeping us healthy in our communities.
Have you ever thought about pursuing a health related career in the future?

Sponsored by State of Connecticut Office for Workforce Competitiveness

Correlations with Gallery Programs:

The following Gallery Experiences complement this lesson. They are featured in our Body Lab located on Level 5 in the Picture of Health Gallery

Health Care Careers: Nursing and EMT

(Grade Level 5-12)

Employ hands-on nursing and first responder life-saving techniques using medical simulation technology. Assessment of vital signs in both real humans and a medical human simulator.

If you wish for your students to take advantage of this Gallery Science program, you must make arrangements with a Gallery Scientist 30 days prior to your visit. For more information please contact Gallery Scientist Joanna Correa at jcorrea@ctsciencecenter.org

Curriculum Embedded Performance Task

Elementary School Science

Content Standard 5.2

Catch It!

Teacher Manual

Connecticut State Department of Education
Bureau of Curriculum and Instruction

Acknowledgement

The Connecticut State Department of Education is grateful to the many dedicated science educators who contributed to the development of the elementary, middle and high school curriculum-embedded performance tasks and teacher manuals. Beginning with the initial ideas for tasks, through the classroom field testing and editing, to the guidelines for classroom implementation, these inquiry teaching and learning activities are the result of the creativity, experiences and insights of Connecticut's finest science educators. We thank all of you, too numerous to list, who gave your time and energy so generously to this project.

OVERVIEW OF THE ELEMENTARY AND MIDDLE SCHOOL CURRICULUM-EMBEDDED PERFORMANCE TASK MODEL

The Connecticut State Board of Education approved the Core Science Curriculum Framework in October of 2004. The framework promotes a balanced approach to PK-12 science education that develops student understanding of science content and investigative processes.

WHAT IS A CURRICULUM-EMBEDDED PERFORMANCE TASK?

Curriculum-embedded performance tasks are examples of teaching and learning activities that engage students in using inquiry process skills to deepen their understanding of concepts described in the science framework. Developed by teachers working with the Connecticut State Department of Education, the performance tasks are intended to influence a constructivist approach to teaching and learning science throughout the school year. They will also provide a context for CMT questions assessing students' ability to do scientific inquiry.

The three elementary performance tasks are conceptually related to Content Standards in Grades 3 to 5 and the three middle school performance tasks are related to Content Standards in Grades 6 to 8. The elementary performance tasks provide opportunities for students to use the Inquiry Expected Performances for Grades 3 to 5 (see Science Framework B.INQ 1-10 skills) to understand science concepts. The middle school performance tasks provide opportunities for students to use the Inquiry Expected Performances for Grades 6 to 8 (see Science Framework C.INQ 1-10 skills) to understand science concepts.

Teachers are encouraged to use the state-developed curriculum-embedded performance tasks in conjunction with numerous other learning activities that incorporate similar inquiry process skills to deepen understanding of science concepts. Students who regularly practice and receive feedback on problem-solving and critical thinking skills will steadily gain proficiency.

HOW ARE THE PERFORMANCE TASKS STRUCTURED?

Each performance task includes two investigations; one that provides some structure and direction for students, and a second that allows students more opportunity to operate independently. The goal is to gradually increase students' independent questioning, planning and data analysis skills. The elementary performance tasks introduce students to understanding and conducting "fair tests". The middle school performance tasks focus on designing investigations that test cause/effect relationships by manipulating variables.

Mathematics provides a useful "language" for quantifying scientific observations, displaying data and analyzing findings. Each curriculum-embedded performance task offers opportunities for students to apply mathematics processes such as measuring, weighing, averaging or graphing, to answer scientific questions.

Not all science knowledge can be derived from the performance of a hands-on task. Therefore, each curriculum-embedded task gives students opportunities to expand their understanding of concepts through reading, writing, speaking and listening components. These elements foster student collaboration, classroom discourse, and the establishment of a science learning community.

A useful structure for inquiry-based learning units follows a LEARNING CYCLE model. One such model, the "5-E Model", engages students in experiences that allow them to observe, question and make tentative explanations before formal instruction and terminology is introduced. Generally, there are five stages in an inquiry learning unit:

- Engagement: stimulate students' interest, curiosity and preconceptions;
- Exploration: first-hand experiences with concepts without direct instruction;
- Explanation: students' explanations followed by introduction of formal terms and clarifications;
- Elaboration: applying knowledge to solve a problem. Students frequently develop and complete their own well-designed investigations;
- Evaluation: students and teachers reflect on change in conceptual understanding and identify ideas still "under development".

The performance tasks follow the "5-E" learning cycle described above. However, the teacher can decide the role the performance task will play within the larger context of the entire learning unit. Early in a learning unit, the performance task can be used for engagement and exploration; later in a learning unit, the performance task might be used as a formative assessment of specific skills.

HOW ARE PERFORMANCE TASKS USED WITH YOUR CLASS?

Curriculum-embedded performance tasks are designed to be used as part of a learning unit related to a Framework Content Standard. For example, while teaching a unit about human body systems (Content Standard 7.2,) the teacher decides the appropriate time to incorporate the "Feel The Beat" performance task to investigate factors affecting pulse rate. In this way, the natural flow of the planned curriculum is not disrupted by the sudden introduction of an activity sequence unrelated to what students are studying.

The performance tasks are NOT intended to be administered as summative tests. Students are not expected to be able to complete all components of the tasks independently. Teachers play an important role in providing guidance and feedback as students work toward a greater level of independence. Performance tasks provide many opportunities for "teachable moments" during which teachers can provide lessons on the skills necessary for students to proceed independently.

There is no single "correct" answer for any of the performance tasks. Students' conclusions, however, should be logical, or "valid" interpretations of data collected in a systematic or "reliable" way. Variations in students' procedures, data and conclusions provide opportunities for fruitful class discussions about designing "fair tests" and controlling variables. In the scientific community, scientists present their methods, findings and conclusions to their peers for critical review. Similarly, in the science classroom, students' critical thinking skills are developed when they participate in a learning community in which students critique their own work and the work of their peers.

Performance tasks should be *differentiated* to accommodate students' learning needs and prior experiences. The main goal is to give all students opportunities to become curious, pose questions, collect and analyze data, and communicate conclusions. For different learners, these same actions

will require different levels of "scaffolding" as they move toward greater levels of independence. For example, if students have had experiences creating their own data tables, the teacher may decide to delete part or the entire data table included in the performance task. Other possible adjustments include (but are not limited to):

- Text readability;
- Allowing students to control all or some of the variables;
- Whether the experimental procedure is provided or student-created;
- Graph labels and scales provided or student-created;
- Expectations for communication of results; or
- Opportunities for student-initiated follow-up investigations.

There are many science investigations that are currently used in schools that provide inquiry learning opportunities similar to those illustrated in the performance tasks. Students need a variety of classroom experiences to deepen their understanding of a science concept and to become proficient in using scientific processes, analysis and communication. **Teachers are encouraged to use the state-developed curriculum-embedded performance tasks in conjunction with numerous other learning activities that incorporate similar inquiry processes and critical thinking skills.**

HOW ARE THE PERFORMANCE TASKS RELATED TO THE CMT?

The new Science CMT for Grades 5 and 8 will assess students' understanding of inquiry and the nature of science through questions framed within the CONTEXT of the curriculum-embedded performance tasks. Students are not expected to recall the SPECIFIC DETAILS OR THE "RIGHT" ANSWER to any performance task. The questions, similar to the examples shown below, will assess students' general understandings of scientific observations, investigable questions, designing "fair tests", making evidence-based conclusions and judging experimental quality.

CT Science Standard 5.2- Senses

Perceiving and responding to information about the environment is critical to the survival of organisms.

Here is an example of the type of multiple-choice question that might appear on the Grade 5 Science CMT. The question is related to the "Soggy Paper" performance task:

Some students did an experiment to find out which type of paper holds the most water. They followed these steps:

1. Fill a container with 25 milliliters of water.
2. Dip pieces of paper towel into the water until all the water is absorbed.
3. Count how many pieces of paper towel were used to absorb all the water.
4. Repeat with tissues and napkins.

If another group of students wanted to repeat this experiment, which information would be most important for them to know?

a. The size of the water container
b. The size of the paper pieces *
c. When the experiment was done
d. How many students were in the group

Here is an example of the type of constructed-response question that might appear on the Grade 8 Science CMT. The question is related to the "Feel The Beat" performance task:

Imagine that you want to do a pulse rate experiment to enter in the school science fair. You've decided to investigate whether listening to different kinds of music affects people's pulse rate.

Write a step-by-step procedure you could use to collect reliable data related to your question. Include enough detail so that someone else could conduct the same experiment and get similar results.

NOTE THAT THE CMT QUESTIONS DO NOT ASSESS A CORRECT "OUTCOME" OF A PERFORMANCE TASK OR STUDENTS' RECOLLECTION OF THE DETAILS OF THE PERFORMANCE TASK. Students who have had numerous opportunities to make observations, design experiments, collect data and form evidence-based conclusions are likely to be able to answer the task-related CMT questions correctly, even if they have not done the state-developed performance tasks. However, familiarity with the context referred to in the test question may make it easier for students to answer the question correctly.

INTRODUCTION TO "CATCH IT!"

In this performance task, students will explore factors affecting human reaction time. In Investigation #1, students will use a technique for measuring the reaction time of different individuals. They will observe how long it takes group members to catch a falling ruler. Noting that people have different reaction times, students will explore possible factors that might influence reaction time speed in Investigation #2. In both experiments, students will learn about the importance of controlling variables to make a fair test so that results are more reliable.

SAFETY NOTES:

1) Review expectations for appropriate behavior, handling of materials and cooperative group procedures prior to beginning this investigation.
2) Students will be testing various factors that may affect reaction time. Review each group's experimental design to assure that the methods are *accessible* and *safe* for *all* students.
3) For more comprehensive information on science safety, consult the following guidelines from the American Chemical Society - portal.acs.org/portal/fileFetch/C/WPCP_012300/pdf/WPCP_012300.pdf and the Council of State Science Supervisors - http://www.csss-science.org/downloads/scisaf_cal.pdf

FRAMEWORK CONTENT STANDARD(S):

Catch It relates conceptually to the following content standard. It should be used as one of several experiences during the learning unit that contribute to student understanding of how the sense organs perceive sights, sounds, smells, tastes and physical characteristics. *Catch It* provides a good opportunity for students to learn how the sense organs are connected to the brain and the spinal cord to comprise the nervous system.

5.2 - Perceiving and responding to information about the environment is critical to the survival of organisms.

- The sense organs perceive stimuli from the environment and send signals to the brain through the nervous system.

UNDERLYING SCIENCE CONCEPTS (KEY IDEAS):

- There are different systems within the body and they work independently and together to form a functioning human body;
- The central nervous system is divided into two parts: the brain and the spinal cord.
- The somatic nervous system consists of peripheral nerve fibers that send sensory information to the central nervous system and motor nerve fibers that deliver movement instructions to skeletal muscle
- The sense organs perceive stimuli from the environment and send signals to the brain through the nervous system.
- Some movements controlled by the brain are voluntary, and others are involuntary.

- The time it takes for the information and instruction messages to travel back and forth is a person's reaction time.
- Different areas of your brain deal with planning, carrying out, overseeing and remembering movements.
- Human reaction time is affected by a variety of physiological and environmental factors.

KEY INQUIRY SKILLS:

- Make scientific observations and recognize the difference between an observation and an opinion, a belief, a fact or a name.
- Formulate an investigable question based on observations.
- Identify steps to make a scientifically "fair test".
- Use a metric ruler to collect accurate data.
- Read and interpret a table of statistics.
- Record data in an organized way.
- Seek relevant information in books, magazines and electronic media.
- Use oral and written language to describe observations, ideas, procedures and conclusions.

MATERIALS NEEDED: Listed below are all the materials needed to complete the two investigations in *Catch It*. There is no starter kit for this performance task provided by the Connecticut State Department of Education. All materials are supplied by the school district:

1. A 30-cm metric ruler. Using different types of rulers (different colors, materials, transparent vs. opaque) provides another opportunity for students to investigate factors that may affect reaction time.
2. Calculators (optional)
3. Resources for recording and presenting observations (science notebooks, paper, posters, etc.)
4. Nonfiction reading materials – see "Resources" section

ADVANCE PREPARATION FOR THE TEACHER:

1. Carefully read through all teacher and student materials. Modify the Student Materials based on the needs of your students.
2. Gather a variety of 30-cm rulers. Try to get rulers of different colors and materials (wood, plastic, metal, transparent, etc.) This will provide many variables for students to investigate.
3. Create science notebooks if your students do not already have them.
4. Gather nonfiction reading sources from your library, media specialist, or language arts team.

ESTIMATED COMPLETION TIME AND PACING SUGGESTIONS:

Day 1 – Investigation #1 (with task directions) record observations and wonderings

Day 2 – Investigation #1 reaction time mini-lesson/ discussion of results/ questions for further investigations

Day 3/4 – Research

Day 5 – Students select investigation questions and design procedure

Day 6 – Conduct Investigation #2

Day 7 – Preparing to share results

Day 8/9 – Share and discuss results

PEDAGOGY: Consult the teacher notes accompanying each step of the performance task for suggestions related to classroom implementation, differentiation, assessment and extension strategies. The ▲ symbol is used to indicate a differentiation opportunity. Each Teacher Note is followed by a reference to the Framework inquiry skill featured in that task component. For example, the notation "B INQ.3" indicates an inquiry skill related to designing or conducting a simple investigation.

Catch It!

An Investigation of Factors Affecting Human Reaction Time

ENGAGE

The soccer goalie on the cover page sees the ball coming and has to move quickly to reach and catch the ball. In less than a second, he must see where the ball is traveling and know where to move his arms, legs and hands so he can catch the ball before it goes into the goal. How can the goalie make all these decisions so fast?

Teacher notes: The purpose of the introduction is to engage students in the concept of response to stimuli. Based on the needs and interests of your class, use different examples of stimuli and reactions to spark discussion. For example, you might use a video clip of a soccer game to enhance the introduction used above. Also, many students are familiar with the hand-eye coordination associated with video games, and will readily engage in a conversation on the topic. Other ideas include the game "Red Hands" in which a person holds out her hands, palms up, and her opponent places her hands on top, palms down. The first person then tries to quickly touch the backs of her opponents' hands. All are options for engaging students in the concept of response to stimuli.

EXPLORE

In this activity, you will explore how quickly people can react to catch a falling ruler. Then, you will investigate factors that may affect people's reaction times.

Investigation #1: Observing the Reaction Times of Different People

1. Explore by following steps (a) through (f). Record observations ("*Noticings"*) and questions *("Wonderings")* as you explore.

Teacher notes: During this exploration there is likely to be a great deal of variation in the way the students are dropping, catching and recording. Allow this variation to occur, as it will create "discrepancies" that will make for rich class conversation when the activity is complete. During the debriefing when students are sharing their "noticings" and "wonderings", ask students to suggest possible causes for different reaction times. Students may note, for example, that "Some of the rulers are plastic and some are wood" or "The researcher held the ruler with a different hand during the second trial". B INQ.1

   a. The "researcher" holds the ruler vertically (straight up and down). The "subject" opens the fingers of the catching hand and holds them near the bottom of the ruler, right next to the 0 cm line (without actually touching it).

b. Without warning, the starter lets go of the ruler and the subject catches it by quickly pinching the fingers around the falling ruler.

c. The researcher reads the measurement on the ruler at the point where the fingers are holding it. All members record the distance the ruler dropped in a data table. Repeat several times.

Teacher note: ▲ *If your students are experienced data collectors, you may want to increase the challenge in this task by removing all (or parts) of the data table below and requiring students to create their own data table to record important information about their experiment.* B INQ.4

Sample: Subject's Name	*Trial #*	*Distance*	*Time*	*Average Time*

d. In the chart below, find the distance closest to the one recorded for the subject. Then look at the Reaction Time column to find out how much time it took the subject to catch the ruler. If the exact distance is not listed in the chart, estimate the reaction time by using the numbers that are in the chart.

Distance Ruler Dropped (in centimeters)	Reaction Time (in seconds)
1	.05
2	.07
3	.08
4	.09
5	0.10
10	0.14
15	0.18
20	0.20
25	0.23
30	0.25

e. RECORD the reaction time data for each trial in the time column of your data table.

f. Switch roles and repeat.

Teacher notes: Students might need extra help understanding the Reaction Time chart. For example, display the chart on an overhead and explain how the columns relate to each other. If students are not familiar with decimals, explain that each time listed is less than a second. Students will need to estimate the reaction time for some measurements. You may want to do a few samples of estimating the time. BINQ.10

2. CALCULATE the average time it took for each subject to catch the ruler.

Teacher notes: ▲ *If students are familiar with averaging decimals, they can complete this portion on their own. If not, you may want to provide calculators and/or teach a mini-lesson on the skill. Allow extra time for this step if averages are a new concept.* B INQ.10

3. RECORD the average reaction times in your notebook.
4. INTERPRET the data. Which of your subjects had the fastest reaction time? What factors do you think contributed to the different reaction times?

Teacher notes: Students might discuss these prompts first with their partners, or in writing, before engaging in the class discussion. B INQ.5

5. SHARE findings with class. Compare findings of different groups.
    a. Did you notice any similarities among the people with the fastest reaction times?

Teacher notes: Provide students the opportunity to informally share their results. Begin your discussion by posting the following questions: Did all your subjects have the same reaction time? Which of your subjects had the fastest reaction time? What factors do you think contributed to the different reaction times? Encourage students to look for any patterns that might exist among those whose reaction times were fastest. B INQ.6

    b. Record observations and questions for further investigations.

Teacher notes: Guide a class discussion by charting students' observations and wonderings about what might affect reaction time. Classify the charted questions into those that can be answered by doing a fair test, and those that could be better answered by finding information in a book or on the internet (e.g., "Why are some people faster with their left hand?") Keep a visible record, such as a t-chart, of observations and questions. Examples of investigable questions include "Do the response times change if the subject isn't watching the researcher's hand?", "Can you decrease your response time by repeating the task many times?" or "Do girls react faster than boys?" B INQ.1

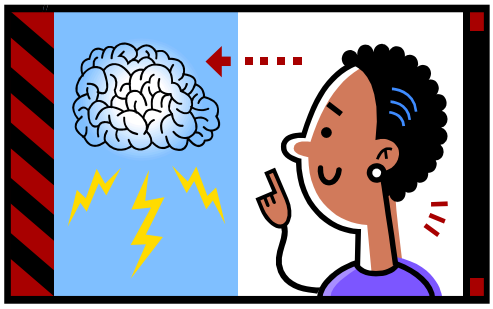
EXPLAIN

Investigate Through Research

Learn more about what's happening inside your body during the reaction test. Do some research on the internet to find out more about how your senses get information to your brain, and how your brain responds.

Write a reflection that explains your understanding of how the brain and senses work together to help you "react" to catch the falling ruler.

Teacher notes: This research can be done in class, in the media center, or as homework. See the "Resources" section of the Teacher Manual for some excellent kid-friendly websites about the nervous system. Students should learn about the major structures and functions of the central nervous system: the brain, spinal cord, and nerves. B INQ.8



ELABORATE

Investigation #2: What Affects Reaction Time?

In Investigation #1, you may have noticed that people have different reaction times. What conditions do you think might affect how fast someone can react? In Investigation #2, you will identify a question to explore.

Do your experiment following the steps below:

1. DECIDE on a research question. RECORD the question in your science notebook.

Teacher notes: Encourage students to discuss and write several possible questions of interest to them concerning reaction time. See notes to #5(b). Circulate and listen in on group conversations.

▲ *If needed, inspire students' curiosity by asking open-ended questions, such as: "I wonder what will happen when…?" "What do you know about…?" "Show me how you are...." "Tell me more about…" "I'm noticing…" "What else did you notice?" "What else are you wondering?" You may ask students to share their questions with the class and have the group discuss which ones are investigable vs. those that are researchable. For example, "Does a person's reaction time improve with practice?" is an investigable question. "Why do some people react faster than others", however, is a question that is better suited for research in books or the internet.* BINQ.1

2. DESIGN a plan to conduct your investigation.

Teacher notes: Explain to students that a scientific community critiques and confirms the work of its members in order to assure validity of claims. To do this, scientists must record their procedures in sufficient detail so that anyone could replicate the experiment and obtain similar results. You may want to have students draft their experimental plans, then have the students view each other's plans and provide feedback. This may be a good point to stop and continue the activity during the next science period. BINQ.3

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3. CREATE a data table in your science notebook that will help you keep your measurements organized. You will also want to record any unexpected observations and questions.

Teacher notes: You may refer students to the data collection tables they used in the previous investigation. BINQ.4

4. CONDUCT your experiment. Collect and record data for each trial in your notebook.

Teacher notes: If your students are inexperienced in conducting fair tests, this may be a good time for a mini-lesson about the importance of repeating a test several times. Facilitate a class discussion to stimulate student thinking about doing multiple trials in order to increase confidence in the data. Multiple trials can highlight "inconsistent" data within a pattern, and can help identify experimental errors. BINQ.3

5. CALCULATE the average time it took for each subject to catch the ruler. RECORD the average reaction times for each subject in your data table.

Teacher notes: Students might need extra help understanding the Reaction Time chart. For example, display the chart on an overhead and explain how the columns relate to each other. If students are not familiar with decimals, explain that each time listed is less than a second. Students will need to estimate the reaction time for some distances. You may want to do a few samples of estimating the time.

This is a good opportunity for students to understand the practical application of "average" in order to eliminate extreme highs and lows in a data pattern. If students are familiar with averaging decimals, they can complete this portion on their own. If not, you may want to provide calculators and/or do a mini-lesson on the skill. Allow extra time for this step if averages are a new concept. B INQ.10

6. DRAW a bar graph that compares the average reaction times of your subjects for the factor you tested.

Teacher notes: ▲ If students are familiar with bar graphs, they can complete this portion on their own. If not, you may want to provide a mini-lesson on some of the elements of constructing a bar graph. You may differentiate this step by providing some or all of the graph components. For example, provide students with unlabeled axes and expect them to draw and label the axes correctly. Or, you can use this as a mini-lesson on scaling a graph. Allow extra time for this step if bar graphs are a new concept. B INQ.10

7. INTERPRET the data. What conclusions can you draw based on the graph? Did the factor you investigated have an effect on the reaction times of your subjects?

Teacher notes: Students might independently reflect in writing, before engaging in the class discussion. While facilitating, assess for students' ability to formulate a logical conclusion based on data. Help students understand that in science, data is interpreted as evidence that either supports or does not support an assumption. It is not bad when the evidence does not support the original assumption because new understanding comes to light. There is no "correct" answer for this investigation since the outcomes depend largely on carefully controlling the variables in the experiment. Students should be guided to consider how reliable their data are. For example, was the ruler dropped the same way each time? Was the measurement taken in the same way each time? Encourage students to develop a respect for data, even when it supports a conclusion that was unexpected. Unexpected results lead to new questions, which have led to most of mankind's advances in scientific understanding! B INQ.5

Present Your Findings:

Work with your partners to make a poster that summarizes your investigation. Use the poster to make a presentation to your class to share the results of your investigation. They will want to hear what you found out in Investigation #2. Some of them may have done a similar investigation, and you will want to know if their findings were similar to yours.

Your poster should include:

- The question you were investigating;
- A brief description of how you did your experiment;
- A bar graph showing your findings; and
- The conclusion that is supported by your data.

Be prepared to tell your class about any data you collected that might not be accurate because of unexpected things that happened during your experiment.

Teacher notes: Each group should present for a short amount of time. You may have the rest of the class take notes, such as suggestions for ways the investigation could be modified or improved, or things that were interesting or innovative about the investigation. You may also allow a brief period for questions after each presentation. If possible, highlight questions or ideas that may relate to the nonfiction research project. B INQ.6

Teaching Resources

Human Body Systems:

http://www.sciencenetlinks.com/lessons.cfm?BenchmarkID=11&DocID=385

Student misconceptions about systems in general and specifically human body systems. A sample lesson to develop conceptual understanding of interactions among parts of a system

Brain and Senses Info for Teachers:

http://www.hhmi.org/senses/a110.html

Further Brain Explorations for Students:

http://www.dls.ym.edu.tw/neuroscience/bex/bex.html

Brain Explorers: an inquiry-based neuroscience learning unit created by Baylor College of Medicine for upper elementary grades

http://www.dls.ym.edu.tw/neuroscience/interr.html

A collection of internet-based activities and info for students

http://42explore.com/brain.htm

An amazing collection of websites with abundant information and activities for adults and students related to brain science.

Learning About Brain and Senses for Students:

http://faculty.washington.edu/chudler/introb.html#bb

http://faculty.washington.edu/chudler/bookse.html

http://www.sciencemuseum.org.uk/exhibitions/brain/index.asp

Nonfiction Text Resources:

Kids Discover: Brain

The Brain and Nervous System. Parker, Steve. Raintree, Chicago, Illinois. 2004.

The Brain. Simon, Seymour. Harper Trophy, 1999.

The Great Brain Book : An Inside Look At The Inside Of Your Head. Newquist, H.P. Scholastic Nonfiction, 2005.

Curriculum Embedded Performance Task
Elementary School Science
Content Standard 5.2

Catch It!

Student Materials

Connecticut State Department of Education
Bureau of Curriculum and Instruction

Catch It!

An Investigation of Factors Affecting Human Reaction Time

Engage

The soccer goalie on the cover page sees the ball coming and has to move quickly to reach and catch the ball. In less than a second, he must see where the ball is traveling and know where to move his arms, legs and hands so he can catch the ball before it goes into the goal. How can the goalie make all these decisions so fast?

Explore

You will explore how quickly people react to catch a falling ruler. Then, you and your partners will compare the reaction times of different people.

Investigation #1: Observing the Reaction Times of Different People

8. Explore by following steps (a) through (f). Record observations (*Noticings")* and questions *("Wonderings")* in a data table in your science notebook:
    a. The "researcher" holds the ruler vertically (straight up and down). The "subject" opens the fingers of the catching hand and holds them near the bottom of the ruler, right next to the 0 cm line (without actually touching it).
    b. Without warning, the starter lets go of the ruler and the subject catches it by quickly pinching the fingers around the falling ruler.
    c. The researcher reads the measurement on the ruler at the point where the fingers are holding it. All members record the distance the ruler dropped in a data table. Repeat several times. In the chart below, find the distance closest to the one recorded for the subject. Then look at the Reaction Time column to find out how much time it took the subject to catch the ruler. If the exact distance is not listed in the chart, estimate the reaction time by using the numbers that are in the chart.

Distance Ruler Dropped (in centimeters)	Reaction Time (in seconds)
1	.05
2	.07
3	.08
4	.09
5	0.10
10	0.14
15	0.18
20	0.20
25	0.23
30	0.25

d. RECORD the reaction time data for each trial in the Time column of your data table.

e. Switch roles and repeat.

9. CALCULATE the average time it took for each subject to catch the ruler.

10. RECORD the average reaction times in your notebook.

11. INTERPRET the data. Which of your subjects had the fastest reaction time? What factors do you think contributed to the different reaction times?

12. SHARE findings with the class. Compare findings of different groups. Are your results similar or different? What might explain these differences?

a. Did you notice any similarities among the people with the fastest reaction times?

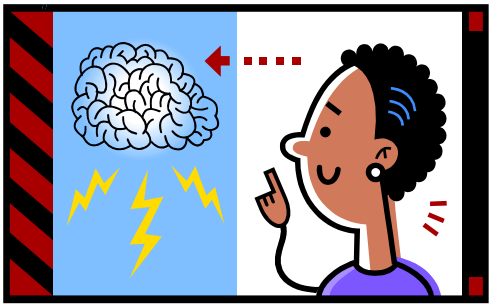
b. Chart observations and questions for further investigations.

EXPLAIN

Investigate Through Research

Learn more about what's happening inside your body during the reaction test. Do some research in books, magazines or the internet to find out more about how your senses get information to your brain, and how your brain responds.

Write a reflection that explains your understanding of how the brain and senses work together to help you catch the falling ruler.



ELABORATE

Investigation #2: What Affects Reaction Time?

In Investigation #1, you may have noticed that people have different reaction times. Through your research, you have learned how the senses and the brain communicate to cause reactions. What human characteristics or environmental conditions do you think might affect how fast someone can react? In Investigation #2, you will identify a reaction time question to explore.

Do your experiment following the steps below:

5. DECIDE on a research question. RECORD it in your science notebook.
6. DESIGN a plan to conduct your investigation.
7. CREATE a data table in your science notebook that will help you keep your measurements organized. You will also want to record any unexpected observations and questions.
8. CONDUCT your experiment. Collect and record data for each trial in your notebook.
9. CALCULATE the average time it took for each subject to catch the ruler. RECORD the average reaction times for each subject in your data table.
10. DRAW a bar graph that compares the average reaction times of your subjects for the factor you tested.
11. INTERPRET the data. What conclusions can you draw based on the graph? Did the factor you investigated have an effect on the reaction times of your subjects?

Present Your Findings:

Work with your partners to make a poster that summarizes your investigation. Use the poster to make a presentation to your class to share the results of your investigation. They will want to hear what you found out in Investigation #2. Some of them may have done a similar investigation, and you will want to know if their findings were similar to yours.

Your poster should include:

- The question you were investigating;
- A brief description of how you did your experiment;
- A bar graph showing your findings; and
- The conclusion that is supported by your data.

Be prepared to tell your class about any data you collected that might not be accurate because of unexpected things that happened during your experiment

Teacher Resources

Safety Disclaimer:

The content of this Teacher's Resource section is intended to serve as an educational resource for teachers and students.

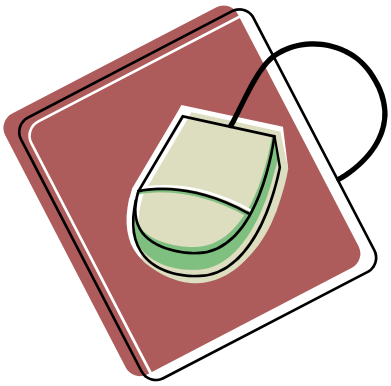
Preparing for the safety of yourself and your students is a critical step in planning for any hands-on science- related activities. Prior to conducting any of the activities included in this resource section, please familiarize yourself and your students with any potential hazards, and take the necessary precautions appropriate for each specific activity.

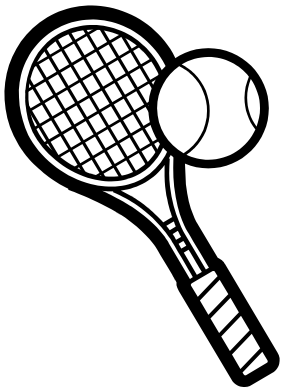
Connecticut Science Center is not responsible for the contents of any books, videos, websites or other resources to which we provide a reference and does not necessarily endorse the opinions, activities, services, products or information expressed within them.

Background for the Teacher

What is Reaction Time?

Reaction time (RT) is the elapsed time between the presentation of a sensory stimulus and the subsequent behavioral response. That is, it indicates how fast the thinker can execute the mental operations needed by the task at hand. The behavioral response is typically a button press but can also be an eye movement, a vocal response, or some other observable behavior. How fast can you click a mouse or hit a ball? Reaction time is quickest for young adults and gradually slows down with age. It can be improved with practice, up to a point, and it declines under conditions of fatigue and distractions.





Professional Development

Field Trip Professional Development Workshop

Come be a student for a day! Prior to bringing your class to the CT Science Center, you are encouraged to spend time at the Center and explore the exhibits and programs available to you and your students by participating in our two day Field Trip Professional Development Workshop.

During these two days, you will have an opportunity to explore the Sight and Sound Gallery, the Health and Sports Gallery, and other relevant galleries using our standards based Trail Guides. These guides will lead you and your students on the pathway toward enjoying the museum while maintaining focus on your grade level or content standard.

Interdisciplinary Extensions

Sense and Reaction Time

Language Arts

Sensory Poems- http://kiwiyert.tripod.com/sensory_poems.htm

Art

Art lessons for all grade levels-
http://www.princetonol.com/groups/iad/lessons/categorized_lessons.html

Technology

New technology that measures brain waves-http://www.neurosky.com

Math

Math Is Fun- Reaction Time Games-http://www.mathsisfun.com/games/reaction-time.html

Teacher Websites

Senses

Teacher Planet- Main page of activities related to the five senses:

.
http://www.teacherplanet.com/resource/senses.php

Alphabet Soup-Five Senses Activities-

http://www.alphabet-soup.net/me/senses.html

Exploratorium-Sense of Taste Activity-

http://www.exploratorium.edu/snacks/your_sense_of_taste/

Reaction Time

Fingertip Reaction Time Test-

http://hypertextbook.com/facts/2006/reactiontime.shtml

Human Reaction Time Lesson-

http://www.raft.net/ideas/Human%20Reaction%20Time.pdf

Online Reaction Time Test-

http://getyourwebsitehere.com/jswb/rttest01.html

Resources about Reaction Time-

http://www.topendsports.com/testing/reactime.htm

Literature Links

Senses

Teacher Resources:

Berger, Gilda. Teaching Guide: See, Hear, Touch, Taste, Smell. 1993. Newbridge Early Science Program.

Martin, Paul D. Messengers to the Brain: Our Fantastic Five Senses. 1988. National Geographic Society. Washington, D.C. ISBN: 0-87044-499-9.

Levenson, Elain. Teaching Children about Science. 1985. Prentice Hall, Inc. Englewood Cliffs, NJ. (ISBN: 0-13-891730-2)

Poppe, Carol A., and Nancy A. Van Matre. Science Learning Centers for the Primary Grades. 1985. The Center for Applied Research in Education, Inc. West Nyack, NY. (ISBN: 0-87628-749-6)

Reaction Time

Teacher Resources:

A Literature Review on Reaction Time

http://biology.clemson.edu/bpc/bp/Lab/110/reaction.htm

Videos

Paramedic and EMT Dedication Video-
http://www.youtube.com/watch?v=9CTiNciIF6Y

Classroom Kits

Catalogs for Teachers-extensive listing of catalogs that include classroom kits related to the senses and reaction time

http://www.catalogs4teachers.com/?__utma=1.102936767.1281458472.1281458472.1281458472.1&__utmb=1.4.10.1281458472&__utmc=1&__utmx=-&__utmz=1.1281458472.1.1.utmcsr=bing|utmccn=(organic)|utmcmd=organic|utmctr=teacher%20resources%20for%20senses&__utmv=-&__utmk=19381688

SOFTWARE

The websites that have been listed in this package provide interactive learning activities (for free). Students are able to engage with these resources, and no additional software is required.

Home/School/Community Connection

- Students could write newsletters home describing their experience at the CT Science Center and what they've learned about making judgments.
- Ask for parent volunteers to chaperone the trip to the CT Science Center.
- Invite different health professionals into your classroom to speak to the class about their careers.

Careers

Careers Related to Quick Reaction Time

EMT- Emergency Medical Technician- (EMT) is a term used in various countries to denote a healthcare provider trained to provide pre-hospital emergency medical services.

The precise meaning of the term varies by jurisdiction, but in many countries EMTs respond to emergency calls, perform certain medical procedures and transport patients to hospital in accordance with protocols and guidelines established by physician medical directors. They may work in an ambulance service (paid or voluntary), as a member of technical rescue teams, or as part of an allied service such as a fire or police department. EMTs are trained to assess a patient's condition, and to perform such emergency medical procedures as are needed to maintain a patent airway with adequate breathing and cardiovascular circulation until the patient can be transferred to an appropriate destination for advanced medical care. Interventions include cardiopulmonary resuscitation, defibrillation, controlling severe external bleeding, preventing shock, body immobilization to prevent spinal damage, and splinting of bone fractures.

Putting Science to Work in Connecticut STEM Career Video Kiosks
(Trail Guides have been provided within this package for your students to explore these kiosks)

Putting Science to Work in Connecticut -Health
Mount Sinai Rehabilitation Hospital, a SAINT FRANCIS *Care* Provider
Advanced Robotic therapy equipment is able to train stroke damaged brains to regain control over their bodies and allow people to recover and improved their lives.

Ahlstrom Nonwovens LLC
Specialized plastics are used to create non-woven, multi-layered materials which allow air and moisture to pass through, but block the passage of bacteria and even viruses. These materials are used in hospitals to protect both the patients and medical staff from potentially deadly contamination.

Student Resources

Safety Disclaimer:

The content of this Student's Resource section is intended to serve as an educational resource for students.

Preparing for the safety of yourself is a critical step in planning for any hands-on science- related activities. Prior to conducting any of the activities included in this resource section, please familiarize yourself with any potential hazards, and take the necessary precautions appropriate for each specific activity.

Connecticut Science Center is not responsible for the contents of any books, videos, websites or other resources to which we provide a reference and does not necessarily endorse the opinions, activities, services, products or information expressed within them.

Student Websites

Reaction Time

Reaction Time Tests-

http://www.humanbenchmark.com/tests/reactiontime/index.php

http://getyourwebsitehere.com/jswb/rttest01.html

Science of Baseball- Fastball Reaction Time
http://www.exploratorium.edu/baseball/reactiontime.html

Reaction Time game-
http://www.mathsisfun.com/games/reaction-time.html