



Week Six: May 25th-29th

Hello Dye Scientists and Engineers!

I hope your family is healthy and safe. Keep sending those texts and emails! I especially love the pictures!!! This week, you will test your reflexes and discover the importance of thumbs! ☺ Both activities involve challenging yourself. As you complete these two investigations, **HAVE FUN!**

Remember, there is **reading material, vocabulary, discussion questions and an online quiz** that correlates with each lesson. However, these are for **enrichment** and are **not required**. They are great opportunities to learn something new and test your knowledge without worrying about a grade.

I want to hear from you this week! A few have sent me messages and pictures, but **I WANT MORE!** ;-) Send me a **picture** of you doing STEM work. If you take the quiz, **share your score** with me. Tell me something you learned **from the video or the reading material**. I share pictures on my website so you can see all the great things students are doing for STEM.

If you contact me with any of these things I will send you back a Science Joke! Contact Information: Class Dojo-STEM Teacher Mrs. Thomas, email clthomas@carmanainsworth.org, or text 810-412-8829 or visit my website dyeelementarystem.weebly.com.

I hope your family is healthy and safe. Have fun with S.T.E.M. this week, and let me know how it goes!

Adios amigos,
Mrs. Thomas

Activity 1

<https://www.generationgenius.com/?share=96702>



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ALWAYS QUESTION. ALWAYS WONDER



DIY ACTIVITY

OPPOSABLE THUMB CHALLENGE

SUMMARY

- Challenge yourself to complete simple tasks without thumbs!
- Time Required: 15 minutes
- Difficulty: Easy
- Cost: \$0-5

MATERIALS NEEDED

- Pair of scissors
- Roll of tape
- Bag of chips
- Water bottle
- Piece of paper
- 6 Plastic cups
- Shoe with a lace

PROCEDURE

1. Carefully tape both thumbs to your index finger. Important: should not be tight.
2. Try to open a bag of chips.
3. Try to open a water bottle.
4. Try to stack 6 cups into a pyramid.
5. Try to cut a piece of paper with scissors.
6. Try to tie a shoelace as fast as you can.

WHAT IS GOING ON HERE?

Humans and primates (monkeys, apes and gorillas) have what are called "opposable thumbs" which makes doing certain tasks much easier. Our thumbs are attached to a different part of our hand than our other fingers, and the thumb can move separately. This challenge probably helped you appreciate how useful our opposable thumbs are. They are an external part that helps humans survive.

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Suggestions:

- **If you don't have tape, use a rubberband or string, but be sure it is not too tight!**
- **Feel free to take the activity a step farther, and look for other tasks around your house that you can attempt to do without thumbs (i.e. brushing your teeth, writing your name, etc.)**

Activity 2

<https://www.generationgenius.com/?share=79288>



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DIY ACTIVITY

THE RULER DROP EXPERIMENT

OBJECTIVES

- Learn about reaction times.
- Test their own reaction times in repeated trials.
- Experience how nervous system processes send signals to the brain from the sense of sight.

PROCEDURE

1. Divide the class into pairs. Give each pair a ruler. Have each student draw a 7 column, 2 row table in their science notebooks that looks like this: (add 2 more rows if performing optional tests)

Name	Trial 1 cm	Reaction time sec.	Trial 2 cm	Reaction time sec.	Trial 3 cm	Reaction time sec.
Visual Test						
Optional tests						
Auditory Test						
Touch Test						

2. Ask each team to discuss together what they think their results might be, and write their predictions in their notebooks.
3. Explain that in each team, one student (the dropper) will drop the ruler and the other student (the catcher) will attempt to grab the ruler between their fingers and thumb. The one who grabs the ruler (the catcher) will record in their own science notebooks the number (in cm) above where their fingers land on the ruler. Each person will perform 3 trials and then they will switch roles.
4. Ruler Drop Method:
Visual Test: The catcher will sit at a desk or table with their arm resting on the surface and their dominant hand (right or left) off the edge of the table. The dropper will go in front of the catcher and hold the ruler straight up and down, with

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MATERIALS NEEDED

- Science notebook and a pencil
- A ruler

Activity Duration: 30–40 minutes

their thumb and one finger at the 30-cm end (the 12-inch end), and with the 0 end lightly touching the catcher's index finger. When ready, the dropper will release the ruler without telling the catcher. The catcher will catch it with their thumb and forefinger as soon as they see it dropping, as fast as possible when the dropper lets go of it. The catcher will record the number where they caught the ruler at the top edge of their finger.

Optional Tests:

Auditory Test: The catcher will close their eyes and the dropper will say 'Drop' when they let go of the ruler, so the catcher will only *hear* the cue.

Tactile Test: The catcher will close their eyes and the dropper will touch them on the shoulder at the same moment they drop the ruler as a cue to catch the ruler, so the catcher will know to catch by *touch*.

5. Give the word for each team to begin when they are set to go.
6. After each team member has performed all their trials, have them find their reaction times in the chart below, based on their ruler measurements, and then fill in their tables in their notebooks.

Reaction Time Chart

cm distance	seconds	cm distance	seconds	cm distance	seconds
1	0.05	11	0.15	21	0.21
2	0.06	12	0.16	22	0.21
3	0.08	13	0.16	23	0.22
4	0.09	14	0.17	24	0.22
5	0.10	15	0.18	25	0.23
6	0.11	16	0.18	26	0.23
7	0.12	17	0.19	27	0.24
8	0.13	18	0.19	28	0.24
9	0.14	19	0.20	29	0.24
10	0.14	20	0.20	30	0.25

The chart is based on the following formula, $t = \sqrt{2d/g}$, where d = the distance the ruler fell in cm, g = the acceleration of gravity (9.8 m/s²), and t = the time the ruler was falling (seconds).

WHAT IS GOING ON HERE?

When the ruler is dropped, your eyes see it, but it takes time for the nervous system to send that information to your brain. Then, your brain needs to process it and decide what to do. In this case—grab it! A signal is sent to your hand, and the muscles contract, allowing you to catch the object.

FURTHER EXPLORATION

- Have students do the optional tests – auditory and tactile – and see whether their reaction times are faster using one sense rather than another.
- Have students try more than one sense – visual and auditory, visual and tactile, or all three senses – and explore whether their reaction times change, improve, or decrease using more than one sense.
- Have students try more trials to see how repetition affects reaction time. Look for trends of increasing reaction time due to fatigue or some other factor.
- Ask students to think of questions they have about reaction times and how their brain processes and responds to information from their senses. Ask them to design an investigation to answer their questions. Use class time for their investigations.

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Suggestion:

- If you do not have a ruler, use a piece of cardboard (perhaps an empty spaghetti box), a notebook or anything else lightweight and the approximate length of a ruler. Use a sharpie to make lines along your improvised ruler, so you can measure your reaction.