2022 Denver Science Fair
Virtual Activites Fair



CoorsTek - Ceramics through Playdough

Learn the basic processes to making ceramics: material preparation, forming, firing, and finishing! You'll make your own playdough and bake it at home!

Neuroscience Outreach Group

Learn what Zebrafish can teach us about the brain and motor systems in this live, interactive zebrafish experiment!

Association of Women in Mathematics - Mathemagical Card Tricks

Have you ever wanted to become a magician?! Well, have we got the activity for you! Stop by our virtual activity fair booth to learn some amazing card tricks that don't require a slight of hand or a special deck of cards. These mathemagical card tricks only require a little math!

Donor Alliance

Join us for a set of fun and educational activities to help learn about the importance of organ and tissue donation.

NSA Colorado

Come learn the history and chemistry behind Invisible Ink! Then try out your spy skills by making some Invisible Ink of your own!

Young Hands in Science

Learn about your eyes and the way they work! You will learn about the anatomy of the eyeball, how your eyes have a “blind spot” (plus you will get to see where it is!), and experiencing the McGurk effect and other visual illusions.

Think Like a Scientist

In this experiment, we will investigate changing surface tension using milk, food coloring, and surfactants to create a 'dancing' work of scientific art!

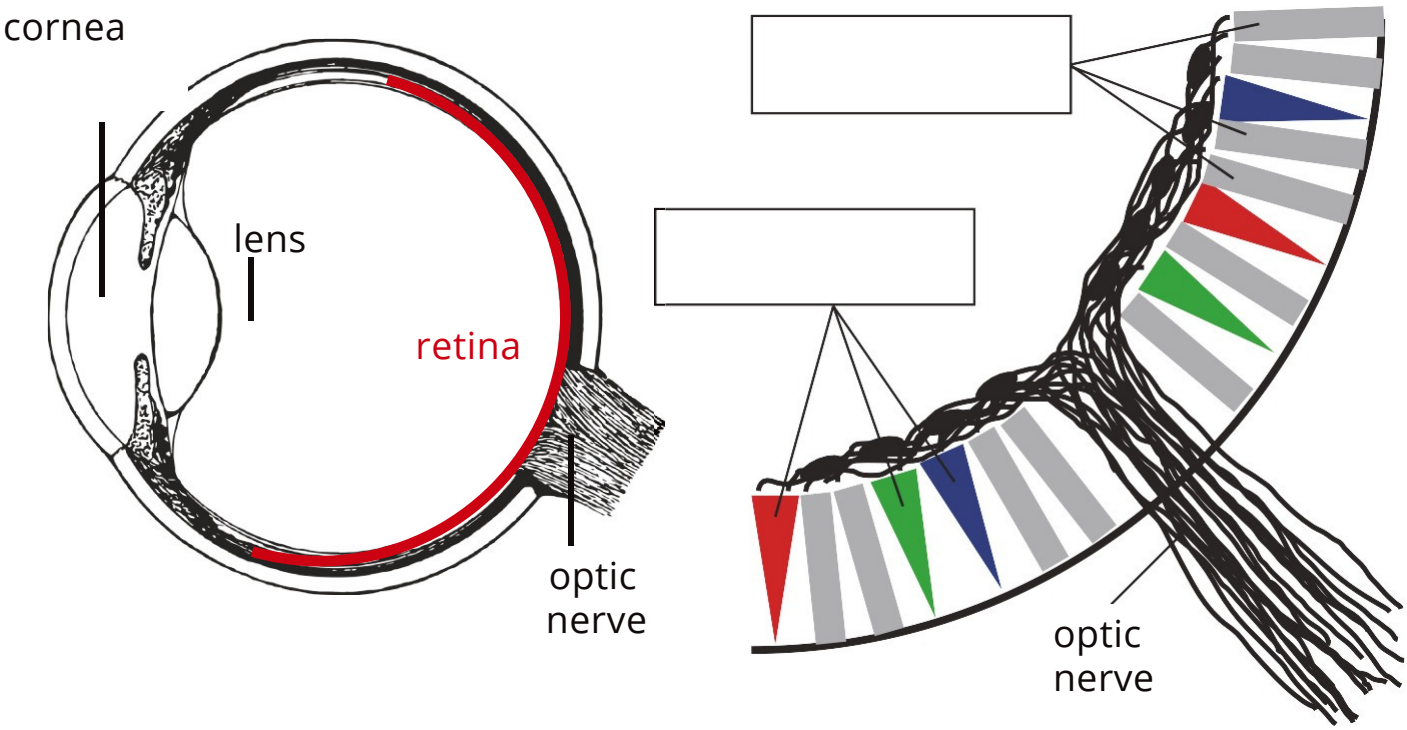
www.clas.ucdenver.edu/denversciencefair

Young Hands In Science

Neuroscience: Your Visual System!

Learn about your eyes and the way they work! You will learn about the anatomy of the eyeball, how your eyes have a "blind spot" (plus you will get to see where it is!), and experiencing the McGurk effect and other visual illusions.

explore your visual system



Can you find your blind spot?

•Each of your retinas has a spot with no rods or cones. Can you find yours using the papers marked with a + and a ●?

•What happens to the circle in your blind spot? What is your brain trying todo?

How does vision interact with hearing?

•Watch the McGurk effect video from ASAP science to understand how yourvisual and hearing systems work together. Which sense overrode theother?

Think Like a Scientist

"Science at Home" Experiment

MAGIC MILK

The Science Behind the Experiment

Milk is made up of molecules of water and fat. In the milk we drink, these water and fat molecules are equally spread throughout the milk. The force of each of the molecules pushing against each other in the milk creates surface tension.

In this experiment, we will investigate changing surface tension! When we add drops of liquid food coloring to the milk, we notice that it stays in place because of the surface tension – the force of the molecules in milk pushing against each other. But when we add dish soap to the milk, the dish soap binds to some of the molecules in the milk and changes the surface tension causing the food coloring to move and "dance" around the plate.

If you really want to be fancy, scientists call dish soap a "surfactant" because of its ability to change surface tension.

Materials Needed



- Milk
- Plate or bowl
- Food coloring
- Toothpicks (2)
- Dish soap
- Small container for a few drops of dish soap

The Steps of the Experiment



1 Add a few drops of dish soap into a small container



2 Pour a small amount of milk (about ½ cup) on to the plate



3

Add a few drops of food coloring onto the milk on the plate



4

Dip the toothpick into the container of food coloring



5

Touch the surface of the milk with the dish-soap coated toothpick.





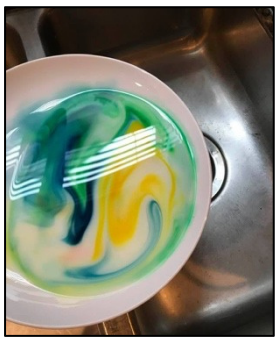
Do this in several different spots around the milk on the plate.

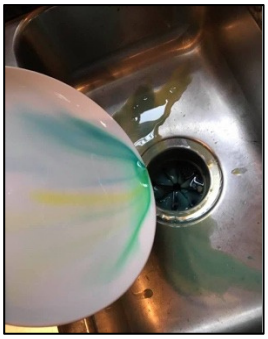
What Do You See?

You should observe the milk and food coloring moving around the plate.

Why?

Because you disrupted the surface tension of the molecules in the milk and food coloring with the dish soap on the tip of the toothpick!





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Clean up your experiment

All of the ingredients are safe and can be drained into your kitchen sink.

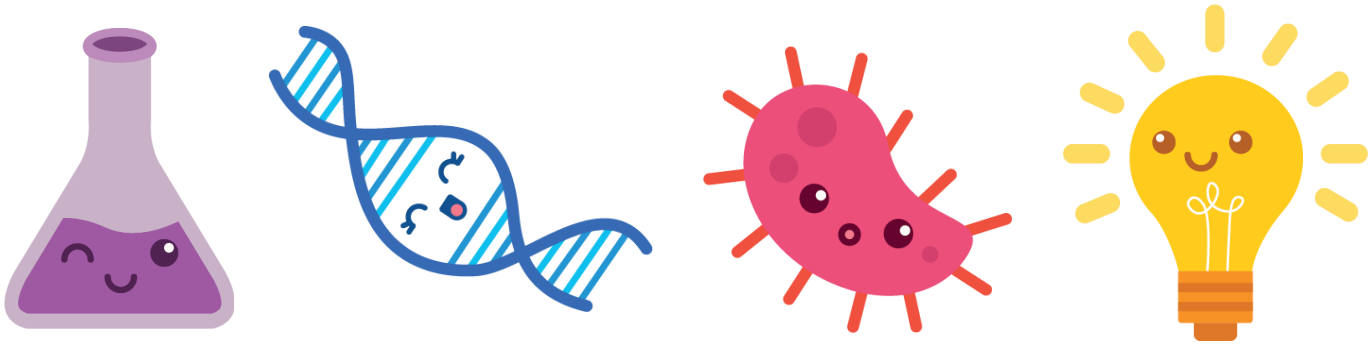
Repeat the Experiment

To do a true repeat of the experiment you need to do it the exact same way again and compare the results of your first experiment with your second experiment.

Repeat the Experiment – But with a Twist!

To answer even more questions, how could you do the experiment differently?

- Use a different kind of milk – skim, 1%, 2%, or whole
- Try even smaller drops of food coloring OR really big drops of food coloring
- Use a toothpick that has NOT been dipped in dish soap – compare it to a toothpick that has been dipped in dish soap
- What would happen if you use water?



Great Work!

Donor Alliance

Activity 1: What does it feel like to wait for an organ transplant?

Objective

You will perform an activity that will simulate what it feels like to wait for a lung transplant. Read the instructions below, then use the conversation starters to discuss your experience.

Activity Instructions

- As a group, perform light physical activity such as jogging in place from one point to another. Pay attention to how this feels!
- Now, take one stir stick straw and place it in your mouth. At the same time, use your fingers to pinch your nose shut. Now perform that same activity for 30 seconds. STOP if you feel dizzy!
- This is what it feels like for someone who may need a lung transplant.

Conversation Starters

- Did you notice a difference in how it felt to breathe through the straw? Was it harder?
- How would your life be different if this was what life was like every day? Would this affect your hobbies? Your chores and responsibilities? Your school or work?
- Can you name a few ways you can help protect the health of your lungs?

Quick Facts

- Some lung conditions, such as asthma, are treated with medications. Other conditions, such as cystic fibrosis, are sometimes treated with a lung transplant.
- A person can donate part of a lung when they are alive. Upon death, a person can save the lives of two people if they donate both of their lungs.

Activity 2: Who will get the transplant?

Objective

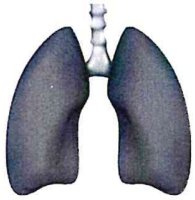
In this activity, you will learn about the important factors doctors take into account when trying to match an organ from a donor hero to the person who will receive the organ.

Activity Instructions

- Review the images below of the different organs that can be donated and transplanted.



Heart



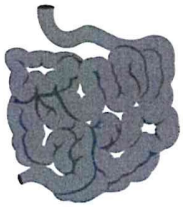
Lung (x2)



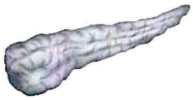
Liver



Kidney (x2)

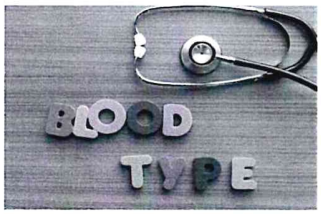


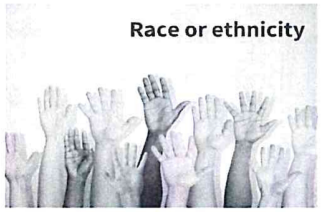
Small Intestine



Pancreas

- Review the different factors below and work together to determine which are important in the matching process and which are not. Then use the pen to mark each as follows:
  - Important - Circle these factors
  - Sometimes important - Mark with a star (Hint: there is only one factor in this category!)
  - Not important - Strike through with an "X"

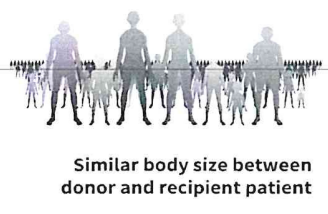
















Did you know?

A living donor can donate one kidney or part of their lung or liver.

DONATE LIFE Indiana

station 2 activities

Exercise

DIRECTIONS
Use the information about the organ donor and the criteria below to determine the best match for the donor heart. Base your decision upon science, not emotion.

BACKGROUND OF DONOR
A young man who lives in Denver, Colorado suffers a brain injury caused by a motorcycle accident. He is pronounced brain dead at a local hospital and his heart is now available for transplant. He is 30 years old, 6 feet tall, approximately 155 pounds. You have 6 people who are potential matches to the donor. Using the criteria listed below, determine which candidate is best one to receive this heart.

CRITERIA

) Height and weight (body size)
Are there any candidates that are simply the wrong size to receive this organ? If so, you must rule them out and they must continue to wait for a better match.

REMEMBER: A person's heart is roughly the size of their closed fist. Imagine how large each of the candidates hearts would be. The size of the heart they receive must be a close match for a successful transplant.

) Age
Are the remaining candidates too young or too old to receive this organ? If so, you must rule them out and they must continue to wait for a better match.

REMEMBER: A person is never too old or too young to donate or receive a transplant. Doctors will do their best to match the age of the recipient with the donor.

) Geographic location
Look at the region map on page 30 and determine which region the donor is in. Do all your remaining candidates live in the same or close region? If not, they must wait for a heart to become available in their region.

REMEMBER: A heart must be transplanted within 4-6 hours of recovery.

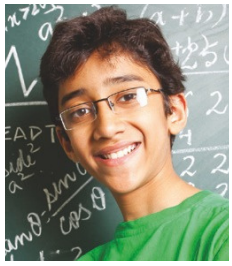
) Current state of health
Are all of the remaining candidates healthy enough to endure the transplant procedure? If they aren't, they must continue to wait.

REMEMBER: A person who has an active infection would be considered high risk for receiving a transplant and be temporarily removed from the waiting list. Once the infection has been successfully treated, the patient could again be listed for transplant.

) Urgency of need Of the remaining candidates, who will receive the heart?

The names and photos of all of the people below have been changed to protect their identities.

STEVEN



AGE: 14 years old
HEIGHT: 5'8"
WEIGHT: 140 lbs.
LIVES IN: Galveston, TX

PERSONAL INFORMATION:

- Freshman at Galveston Central High School
- Member of the tennis team and drama club
- Has 10-year-old twin sisters
- Parents both work at Wal-Mart
- Has damaged heart valves from a strep infection when he was little
- Has been on the Transplant Waiting List for 3 months

DEBBIE



AGE: 31 years old
HEIGHT: 5'6"
WEIGHT: 154 lbs.
LIVES IN: Cheyenne, WY

PERSONAL INFORMATION:

- Mother
- Husband works in sales and travels 3-4 days per week
- Must pay a Home Health Aide to help care for home and children when husband is away
- Has an enlarged heart
- Has been on the Transplant Waiting List for 5 months

DAV I D



AGE: 40 years old
HEIGHT: 6'2"
WEIGHT: 220 lbs.
LIVES IN: Denver, CO

PERSONAL INFORMATION:

- Firefighter for 18 years
- Volunteers in a homeless shelter
- Likes bicycling and snowboarding with his girlfriend
- He is currently being treated with antibiotics for a blood infection
- Has been on the Transplant Waiting List for 6½ months

PETER



AGE: 22 years old
HEIGHT: 5'11"
WEIGHT: 158 lbs.
LIVES IN: Boulder, CO

PERSONAL INFORMATION:

- Senior at the University of Colorado, Boulder
- After graduation, plans on becoming a counselor for at-risk teens
- Only child
- His heart disease is advancing rapidly
- Has been placed on the Transplant Waiting List for immediate heart transplant

ISABELLA



AGE: 6 months old
HEIGHT: 20"
WEIGHT: 5 lbs. 3 oz.
LIVES IN: Colorado Springs, CO

PERSONAL INFORMATION:

- Has 2 healthy siblings, ages 5 and 3
- Father, Ed, is stationed at Fort Carson Army Base
- Mother, Candy, works part-time in a dentist office
- She was born with a heart defect which requires transplant
- Has been on the Transplant Waiting List since birth

SUSAN



AGE: 13 years old
HEIGHT: 5'2"
WEIGHT: 101 lbs.
LIVES IN: Arvada, CO

PERSONAL INFORMATION:

- Has one healthy sibling, age 9
- Parents have been happily married for 27 years
- Currently a 7th grader at Arvada Central Junior High School
- A bacterial infection caused her to be placed on the Transplant Waiting List for immediate heart transplant

Ceramics through Playdough

CoorsTek

WHAT YOU'LL NEED:

DRY INGREDIENTS

Flour: Proteins in flour provide structure and adds stretchiness to dough.

Cornstarch: Acts as a thickener and adds smoothness to dough.

LIQUID BINDERS

Water: Hydrates the proteins in flour and triggers chemical reactions of modifiers/additives.

Vegetable Oil: Works as a lubricant and improves ease of handling.

Glue: Polymers in glue bind powders together.

MODIFIERS / ADDITIVES

Salt: Gels proteins and can be used as a binding agent.

Baking Soda: Produces gas that increases volume during baking.

Baking Powder: Contains baking soda and the right amount of acid to react with it.

Invisible Ink

NSA Colorado

WHAT YOU'LL NEED:

Water (preferably warm), 1/4 cup is more than enough.

Baking Soda 1 Tbsp

Cotton swabs or a thin paint brush

Paper

100% grape juice (red/purple works best)

Scissors (optional)

Paper towels