

Build a Cell

Supplies

- 1 plastic bag
- 1 plastic capsule
- 6 pipe cleaners

Note

Different animals and plants have different numbers of chromosomes:

- Humans have 23 pairs
- Carrots have 9 pairs
- Mosquitos have 3 pairs
- Giraffes have 31 pairs
- Adder's Tongue ferns have 630 pairs!

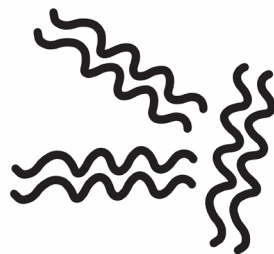
What to do

1. The plastic bag will represent the outer lining of the cell. Use a marker to label it "cell membrane".
2. The plastic capsule will represent the brain or boss of the cell. Use a marker to label it "nucleus". The nucleus of a cell holds all the instructions for the cell to do its job.
3. The pipe cleaners will represent the chromosomes of the cell. The cell's instructions are located in DNA which is found in genes that are linked together in long structures called chromosomes. This is the genetic material for the cell.
4. Arrange the pipe cleaners in pairs on the table. Chromosomes come in sets of two, one from the biological mother and one from the biological father. This is how traits or characteristics are passed on.
5. Twist the chromosome pairs in a spiral around your finger or a pencil. In order to fit into the nucleus, the genetic material is in a special shape or form - a spiral shape called a helix.
6. Place the chromosomes inside the nucleus.
7. Place the nucleus inside the cell membrane.

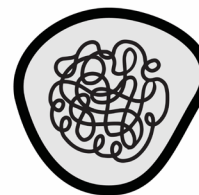
? What type of cell did we make?



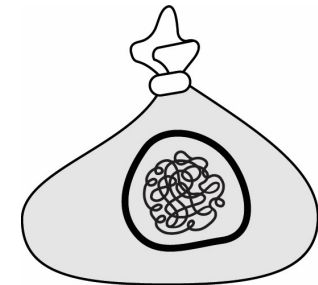
Chromosomes



Nucleus



Cell Membrane



Capillary Flowers

Supplies

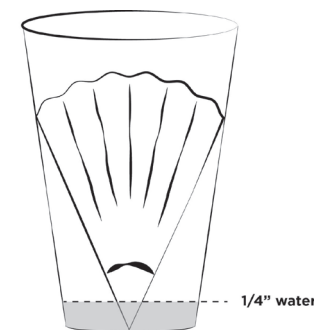
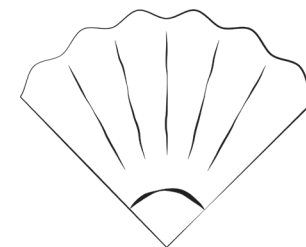
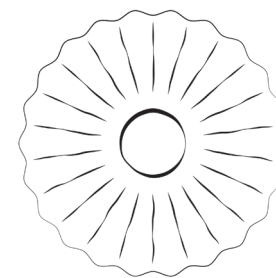
- 1 cup with water
- 1 coffee filter
- 1 washable marker
- 1 pipe cleaner

What to do

1. Stretch open the circular coffee filter and draw a circle about an inch away from the center of the filter.
2. Fold the paper in half and then in quarters, so that it looks like a pizza slice.

Note: Make sure the marker line is above the water line by placing the quartered filter paper OUTSIDE of the cup, point down. If the ink is below the water, the ink will simply wash into the water and this experiment won't work as well.

3. Place the filter paper point down in the water and watch the capillary action.
4. Observe the paper for a few minutes: What is happening to the water? The marker line?
5. When the water has nearly reached the top, lift the filter paper out of the water and let any extra water drip back into the cup.
6. Gently open the filter paper and allow it to dry for 5-10 minutes. (Perhaps go do another activity and then come back!)
7. When the paper is dry enough to handle without ripping, gently fold the filter paper back into quarters and wrap a pipe cleaner around the point to make the flower stem.



Computer Vision

Supplies:

- Computer with internet connection and webcam (you can also use your phone!)

Computer vision is a type of Artificial Intelligence where people train a computer to recognize objects. You can experiment with this!

What to do

1. Choose an object, such as a pencil, and hold it up so the camera can see it.
2. Click the Webcam button and HOLD to record many images. Be sure to move the object around so the computer can see it from many sides and angles.
3. Take at least 100 image samples, 200 is best!
4. Do this again for Class 2, use a different object like an eraser.
5. You can also add more classes by scrolling down the page and choosing Add a Class.
6. After you have at least two classes (3 or more is even more fun!), click Train Model.
7. Wait Patiently! The computer takes a minute to learn how to identify the objects you've taught it. Stay on the page.
8. When it says Model Trained, hold up one of your objects. Does it correctly identify your item? What happens when you try new items, like a different colored pencil?

Can you:

- Try hand signals and facial expressions?
- Have different people hold the objects?
- Move closer or further away?

Signed out?

- go to <https://teachablemachine.withgoogle.com/>
- choose Get Started, then Image Project.



Fingerprint Patterns



Arch

Ridges form a hill or tent-shaped pattern



Loop

Ridges form an elongated loop pattern



Whorl

Ridges form a circular pattern



Galilean Cannon

Supplies

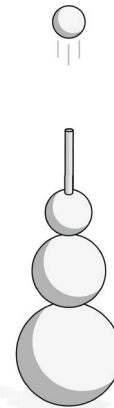
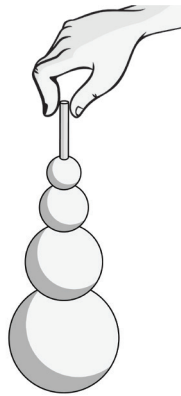
- a stack of balls (known as a seismic accelerator)
- safety glasses

SAFETY NOTE

In this activity, the top ball can shoot off at high speeds! Be sure you wear the safety glasses when using the seismic accelerator - or are at a safe distance when the balls are dropped.

What to do

1. Hold the bouncy ball between two fingers, stretch out your arm, and observe the height of the ball.
2. Release the ball so that it drops and strikes the ground.
3. Observe how high the ball bounces relative to the original height of the ball.
4. Add the bouncy ball to the top of the seismic accelerator.
5. Hold the top of the seismic accelerator contraption between two fingers, stretch out your arm, and observe the height of the top ball.
6. Release the entire contraption. Stand back - the top ball can shoot into the air at high speeds!
7. Compare how high the ball bounced when it was on the stack versus not on the stack.



Garden In A Glove

Supplies

- 1 disposable glove
- 1 permanent marker
- 5 cotton balls
- water
- 5 different seeds
- 1 craft stick
- 1 twist tie

What to do

1. Use a permanent marker to write the names of the 5 seeds on the fingers of the glove (one type per finger).
2. Dip a cotton ball in water and gently wring it out.
3. Place 1-2 seeds of the same type in the wet cotton ball.
4. Put the cotton ball in the finger of the glove that is labeled with that seed name. You may need to use a craft stick to push the cotton ball down to the bottom.
5. Repeat this process for the remaining 4 kinds of seeds.
6. Gently blow a little air into the glove and close the twist tie around the top to keep the air from escaping.

When you get home:

1. Keep the glove in a warm place until the seeds germinate.
2. Once the seeds have sprouted and leaves begin to appear, hang the glove in a sunny window.
3. When your seeds have roots, you can plant them in a container using potting soil.
4. Cut the finger off the glove and throw away the plastic. If you can't separate the roots from the cotton, plant the cotton and seeds/ roots together in potting soil.
5. Watch your garden grow!

What's Happening?

Each seed contains a baby plant and food for initial growth.

Most seeds only need water and a warm place to begin to grow. Seeds have their own food stored inside of them, a tissue rich in starch and protein called endosperm, so they do not need sunlight or nutrients from soil until they have sprouted and developed roots.

The seeds will germinate (begin to grow/sprout) in about 5 to 7 days.

Transplant (remove and plant in another place) the seeds after about 14 days by cutting the tips off the fingers of the glove.

Take the seedling out of the plastic and place the cotton ball and germinated seeds into a small pot or cup of soil.



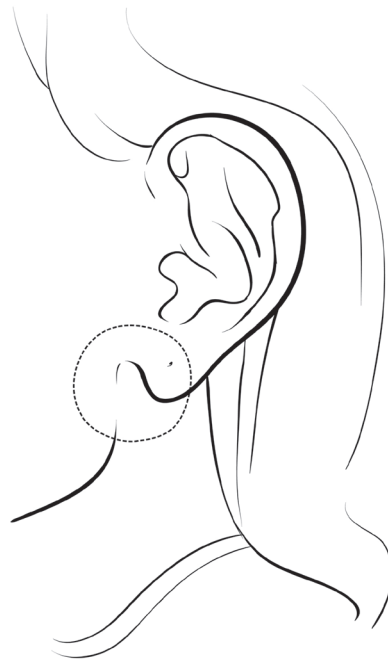
Genetic Trait Bracelet

Supplies

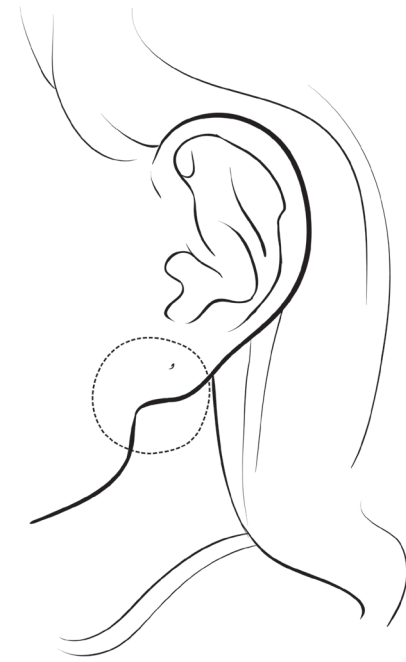
- pipe cleaner
- bright pink beads
- light pink beads

Take a look at your earlobes.

Do they hang free or are they attached to your head?



If your earlobes are free,
add a **bright pink** bead.



If your earlobes are attached,
add a **light pink** bead.



Genetic Trait Bracelet

Supplies

- pipe cleaner
- blue beads
- light blue beads

Try to roll your tongue like a taco.
Can you do it?



If you can roll your tongue,
add a **blue** bead.

If you can't roll your tongue,
add a **light blue** bead.



Genetic Trait Bracelet

Supplies

- pipe cleaner
- yellow beads
- ivory beads

Pull your hair back from your forehead.
Is your hairline pointed or straight?



If you have a pointed hairline,
add a **yellow** bead.



If you have a straight hairline,
add an **ivory** bead.



Genetic Trait Bracelet

Supplies

- pipe cleaner
- green beads
- light green beads

Smile! Do you have any dimples in your cheeks?



If you have any dimples,
add a **green** bead.



If you don't have any dimples,
add a **light green** bead.



Genetic Trait Bracelet

Supplies

- pipe cleaner
- purple beads
- light purple beads

Do you have any freckles?



If you don't have freckles,
add a **purple** bead.



If you have freckles,
add a **light purple** bead.



I Spy with my Microscope Eye

Supplies:

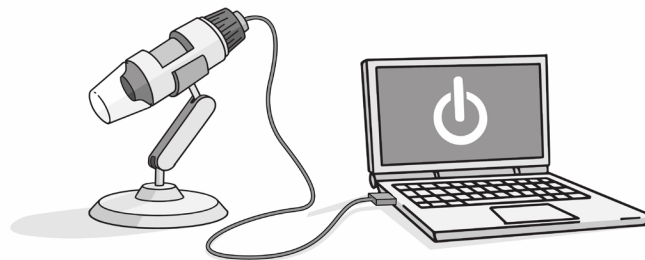
- Digital Microscope interfaced with a computer

Notes:

- The scope can be used when held in your hand or clipped into the stand.
- Make sure the cap has been removed from the plastic tip.
- Take care to ensure objects (including fingers) do not come into contact with the microscope lens.
- The buttons on the scope will not work with most computers.

What to do

1. Hold the microscope right up against an object. The clear plastic tip will help prevent the object from coming directly into contact with the microscope lens. Do not touch the lens.
2. Turn the small wheel on the cord to adjust the brightness of the lights on the scope.
3. You should be able to see an image on the computer screen. You may need to move the scope or the object to ensure it is in the viewing field of the microscope lens.
4. Turn the big silver wheel on the scope until the object comes into focus.
5. To get a clear image, you may also need to move the scope either closer to or farther away from the object.



I Spy Challenges:

What do you see if use the microscope to look at:

- Your skin
- Your fingerprint
- Your fingernail
- Your hair
- Your clothing



Parachutes

Supplies:

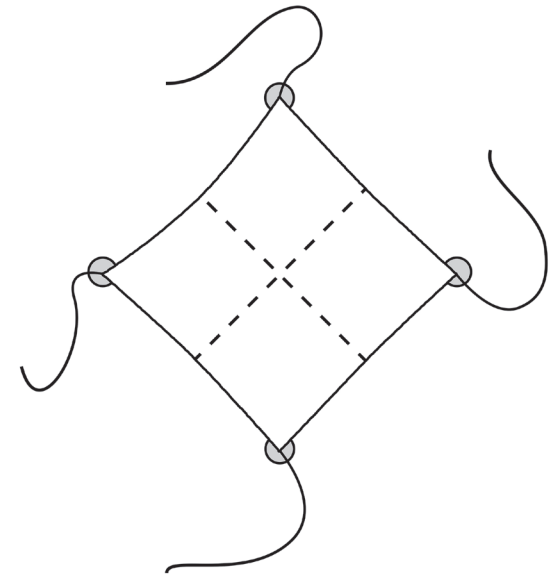
- 1 napkin
- 1 paper clip
- 4 pieces of string
- 4-5 pieces of masking tape

What to do

1. Cut four equal length pieces of string, each approximately 12 inches long.
2. Unfold a paper napkin so that it is laying flat.
3. Use a piece of masking tape to secure one piece of string at each corner of the napkin.
4. Bring the loose ends of the strings together and thread them through one end of a paperclip.
5. Fold the loose ends of the string up to form a loop (the paperclip should hang down from the loop).
6. Tie a knot or wrap a piece of masking tape around the loose strings to secure the loop and the paperclip.

Test your parachute

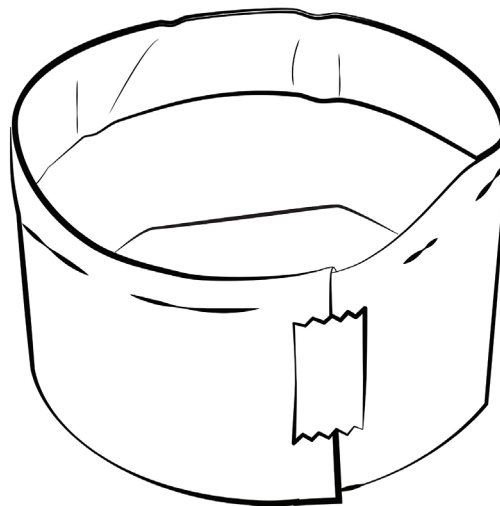
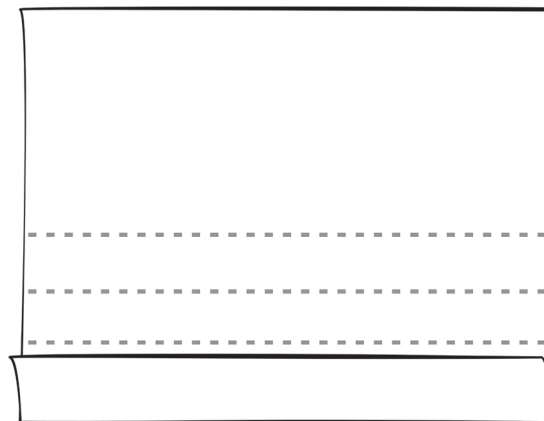
- Hold your parachute up so that the strings and paperclip hang down, then drop.
- Mark your spot with a sticky note (optional)
- Are there any changes you could make to your parachute to make it land more accurately?



Ring Gliders

What to do

1. Hold your half sheet of paper in front of you “hot dog” style.
2. Fold up the bottom edge about 1/2 of an inch to make the nose of your ring glider.
3. Fold up this edge three more times. Make sure your folds are tight!
4. Roll your sheet of paper into a ring. Put one end of the folded edge into the other and tape to hold the ring into place.
5. The glider is ready to fly! Play catch, try to hit a target or see how far your ring can glide.



****For the best throw, hold your ring with the folded nose facing forward. Gently toss it underhand and watch it glide!****

