

FRUIT DNA EXTRACTION!

Background

- All living organisms contain DNA inside their cells. DNA carries the genetic instructions that control how organisms grow, function, and reproduce.
- Scientists extract DNA to study genetics, diagnose diseases, and develop new medicines.
- In this activity, you will break open fruit cells and separate the DNA so it becomes visible.
- Some fruits, such as strawberries, bananas, and kiwi, work especially well because they release large amounts of DNA.

Objective

Extract visible DNA from fruit and learn how scientists isolate genetic material from cells.



Did you know?

If you stretched out all the DNA in a single human cell, it would be about 2 meters (6 feet) long! - yet it fits inside a microscopic nucleus!

Materials

- fruit (strawberry, banana, or kiwi recommended)
- ziplock bag
- dish soap
- salt
- plastic cup
- coffee filter
- plastic pipette or dropper
- rubbing alcohol (provided by teacher)



Instructions

- Place a small piece of fruit into the ziplock bag.
- Mash the fruit until it becomes a smooth mixture.
- Add a small amount of dish soap and a pinch of salt.
- Gently mix the solution for about one minute.
- Pour the mixture through a coffee filter into a plastic cup.
- Slowly add cold rubbing alcohol along the side of the cup so it forms a layer on top.
- Watch for white, cloudy strands forming between the layers. This is DNA.

Picture



Think & Explore!

1. Why do we use soap in this experiment?
2. What happens to the cells when the fruit is mashed?
3. Why does DNA appear when alcohol is added?

Engineering & Science Connection

Scientists extract DNA in laboratories to study genes, identify organisms, and investigate diseases. DNA analysis is used in fields such as medicine, agriculture, forensic science, and biotechnology.

The basic principles used in this experiment are similar to techniques used by researchers around the world.



Challenge

Try repeating the experiment with different fruits.

Which fruit produces the most visible DNA?

Record your observations and compare results with your classmates.



Picture

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Scan the QR codes below to:

Watch the demonstration Youtube video!

Upload photos of your classroom experiment!



BUILD A CIRCUIT!



Background

- Electric circuits allow electricity to flow through a complete path called a closed loop.
- A battery provides energy that pushes electric current through the circuit.
- When the circuit is complete, electricity flows and powers devices like lights.
- If there is a break anywhere in the circuit, the electricity stops flowing.

Objective

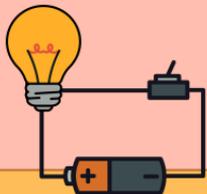
Build a simple electrical circuit and observe how electricity flows to light an LED.

Did you know?

If you stretched out all the DNA in a single human cell, it would be about 2 meters (6 feet) long! - yet it fits inside a microscopic nucleus!

Materials

- LED light
- coin battery (CR2032)
- copper tape or wire
- cardboard base
- tape



Picture

Instructions

- Place the coin battery on the cardboard base.
- Connect copper tape or wires from one side of the battery to one leg of the LED.
- Connect the other leg of the LED back to the other side of the battery.
- Make sure the longer leg of the LED is connected to the positive side of the battery.
- When the circuit forms a complete loop, the LED will light up.

Think & Explore!

1. Why does the LED only light up in one direction?
2. What happens if part of the circuit is disconnected?
3. Why must a circuit be a complete loop?

Engineering & Science Connection

Electrical engineers design circuits that power everyday technologies, including phones, computers, lighting systems, and medical devices. Understanding circuits is essential for building and improving modern technology.

Challenge



Try modifying your circuit:
Can you create a switch to turn the light on and off?
Can you add another LED to your circuit?

Picture

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RUBBER BAND POWERED CAR!

Background

- Rubber bands store energy when they are stretched or twisted.
- This stored energy is called elastic potential energy.
- When released, the energy is converted into motion.
- Engineers use similar principles to design machines that store and release energy.



Objective

Design and build a small car powered by energy stored in a rubber band.

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Materials

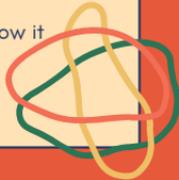
- cardboard base
- wooden skewers
- bottle cap wheels
- rubber band
- straw pieces
- paper clip
- tape



Instructions

- Tape two straw pieces to the bottom of the cardboard base.
- Slide wooden skewers through the straws to create axles.
- Attach bottle cap wheels to both ends of each skewer.
- Hook one end of the rubber band to the rear axle.
- Stretch the rubber band to the front of the car and secure it with a paper clip.
- Wind the back wheels to twist the rubber band.
- Release the car and observe how it moves.

Picture



Think & Explore!

1. Why does twisting the rubber band store energy?
2. How does friction affect how far the car travels?
3. What design change improved your car the most?

Engineering & Science Connection

Mechanical engineers design systems that use and control motion. Similar principles are used in machines like engines, energy storage systems, and transportation devices.

Challenge

Modify your car to travel the greatest distance.

Try:

- Using larger wheels
- Reducing friction
- Adjusting the rubber band tension
- Making the car lighter

Picture

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