

Day 1: Rainbow Bridge

Materials: 1 container of playdoh, 12 pipe cleaners, 1 Dixie cup, 20-30 pennies

Don't have play doh? Use tape or anything sticky.

Don't have pipe cleaners? Use anything flexible you find around the house.

Any light plastic cup will work.

Quarters, nickels, dimes work too! Be creative and use what you have!

Challenge: Construct a rainbow bridge that will hold the heaviest pot of gold (Dixie cup with pennies inside).

Instructions: The play doh is used at the two ends of the rainbow. The pipe cleaner is the rainbow. When built, place the Dixie cup on top of the rainbow and fill it with pennies. Redesign as necessary until the rainbow bridge holds all of the pennies.

Day 2: Design a Windmill

Materials:

Cardboard tubes, milk cartons, styrofoam balls, metal fasteners, toothpicks, wooden skewers or pushpins, paper in various weight, aluminum foil, plastic spoons, and straws will all be useful.

Challenge: Windmills have an important part in history for grinding up flour and pumping water. Today they are important in the task of harnessing wind power.

Instructions: How will the blade be designed (size, material)? How many blades should the windmill have? Will it turn freely? How can you make sure that the blades are spaced equally?

Day 3: Powerful Pompom Launcher

Vocabulary:

projectile: An object fired or launched.

potential energy: The energy an object has due to its position; stored energy.

kinetic energy: The energy an object has due to being in motion.

elastic force: A force arising from deformation, such as stretching or compressing an object such as a spring; the force acts to return the spring to its initial length.

tension: A pulling force, such as on a string, rope, or cable.

Materials:

paper towel rolls, binder clips, rubber bands, plastic spoons, pipe cleaners, index paper, tape, paper clips, and craft sticks.

Challenge:

launch 10 pompoms and record how far they all went.

Either have your students add up their three longest distances or take an average (if they know how to find the mean). Make it more challenging: Have a target that has to be hit (such as the paper cup towers)!

Instructions: Build a catapult and test it out! You don't have to use PomPoms if you don't have them. Be creative! What materials go the farthest? How much force do you need to make the catapult work?

Day 5: Bake

Bake a cake (it's my birthday tomorrow!!) or cookies or cupcakes

Vocabulary:

Recipe: a set of instructions

Ingredients: any foods combined to make a dish

Materials:

flour, sugar, eggs, butter, vanilla, baking powder, baking soda, salt.....(depends on the recipe)

Challenge:

Bake a cake, cupcakes, or cookies.

Instructions:

[Basic Chocolate Cake](#)

[Basic Vanilla Cake](#)

[Buttercream frosting](#)

Chocolate Chip Cookies - look on the back of your chocolate chips

Day 6: Shadow Puppets

Vocabulary:

shadow puppet :a flat, one-dimensional **puppet** designed to cast a **shadow** or form a silhouette on a white screen

Materials:

Paper, glue, sticks, flashlight, dark room

Challenge:

Use **shadow puppets** for telling a story by moving them in front of a light to make shadows on a wall.

Instructions:

Draw a character or symbol onto paper. Cut the character or symbol out of the paper. Glue a stick to the character or symbol. Once the shadow puppet is made, turn the flashlight on and the lights in the room off. Project the flashlight onto the wall and put the puppet in front of the light. You will see the shadow on the wall.

Day 7: Make a Blanket Fort**Vocabulary:**

Shelter: a place giving temporary protection from bad weather or danger
Fort

Materials:

furniture, blankets, pillows, sheets

Challenge:

Build a Blanket Fort and read a book inside. Take a picture and email it to me!

Instructions:

[Link with specific instructions if you need it!](#)

Day 8: Design a Maze**Vocabulary:**

design: To plan/draw the look and function of a system.

tolerance: The allowable amount of variation in the dimension.

dimension: The measurable amount in one direction.

fabrication: The process of manufacturing something.

objective: The goal.

Materials:

marble, shoebox/cardboard box and play-doh or modeling clay is a fast and easy choice, but try out other materials such as paper towel rolls with holes cut in the sides or even building bricks!

Challenge:

Test your maze and record the time. How fast was your maze? What obstacles were involved in your maze?

Harder Maze: Create a 3-D maze, or one where the marble isn't visible the whole way through! In the image with the cardboard tubes above, you can't see the marble when it is in each tube, but you can see it in between the tubes. An even more challenging maze relies on both listening skills to hear where the marble is and possibly feeling the vibrations as it travels through the tubes.

Instructions:

Design a maze. Test the maze. Re-design if needed. Test again.

Day 9: Create a fidget

Vocabulary:

sensory: related to our senses. Some fidget toys are textured, others make noise or have lights.

texture: the characteristics of a material, such as smooth, rough, bumpy, soft, squishy.

ergonomic: avoiding stress or injury – designed to be comfortable for the intended user.

Materials:

Pipe cleaners, buttons, balloons, sand, beans, uncooked rice, pantyhose, plastic wrap, craft sticks, straws, and toothpicks were all used in the fidget toys shown above. The balloon is filled with oobleck!

Instructions:

The fidget toy should be something easy to hold, so you may set a dimensional criteria that it must be between 2 and 8 inches long, or you may instead decide that you'd like it to have at least two different textures!

Day 10: Bubble Maker

Vocabulary:

surface area: the area that the surface of an object occupies. In a cube, the surface area is the area of the six squares that cover it.

surface tension: the tendency of liquids to have the least surface area possible (which is why bubbles are spheres).

evaporate: to change from liquid state to vapor. If you don't pop a bubble, it will pop on its own as the water in the bubble evaporates. It takes longer for water to evaporate in colder temperatures, so if you do your bubble challenge on a cooler day, the bubbles will hang around longer.

film: a thin sheet. In bubbles, it is a thin sheet of water between soap molecules.

solution: a homogeneous mixture, or a mixture with uniform composition, of two or more substances.

Materials:

Straws are great for this challenge and can be used either to create 3D bubble makers (by inserting linked paperclips in the ends of the straws), or as bubble blowers if each student only uses their own bubble maker. I recommend aiming for wands that avoid contact with the mouth if you are doing this activity with a large group. If you are making the wands indoors and can use melted/fused beads, the shape of the wand head can be easily laid out and then attached to

a craft stick. Try pipe cleaners, wire hangers, or large paper clips that can be reshaped to the desired design.

Instructions:

Ask your students to create two wands – one that makes a large bubble, and another that makes several bubbles. How are the designs different?

Test it. Which design makes the biggest bubbles? Which makes the most bubbles?

Pro Tip. Make your own bubble solution. I usually use Joy dish washing soap (some), water (a good bit), and corn syrup (a small amount, or you can use glycerin if you have it). There are proportions and recipes all over the Internet.

Day 11: Lego Challenge

Vocabulary:

Brick – A generic name for a any LEGO piece.

Diorama or Dio – A large scene built out of LEGO

Inventory – The list of LEGO elements included in any official set

Materials:

Lego's!

Instructions:

Try out these [Lego challenges](#)

Day 12: Float a Boat

Vocabulary:

buoyancy: A force that causes an object to float.

volume: The amount of space an object takes up.

stability: The ability to recover equilibrium.

center of gravity: The point in an object where if all of the mass were concentrated at that point, the object would remain in equilibrium.

equilibrium: The state of an object being at rest where the net forces acting on it are zero.

Materials:

paper towel rolls, aluminum foil, plastic wrap, building bricks, rubber bands, plastic plates, plastic cups, tape, and craft sticks.

Instructions:

Construct a boat that will fit inside the container. Use pennies to test the buoyancy of the boat.

Test it! Use a bin filled with water, and have your child(ren) place their boats in the water. If the boat floats without a load, move onto the next step of seeing how much weight the boat can hold before sinking!

Make it more challenging: Define a base material that is not water-proof or water-tight, such as cardboard or building bricks. Your child(ren) will have to figure out a way to make the boats water-proof.

Day 13: Fast & Slow Sled

Vocabulary:

force: A push or a pull.

motion: The process of changing position.

friction: The force that resists the relative motion of two bodies.

velocity: An object's speed and direction.

mass: A measure of how much matter is in an object.

Materials:

For this one you will need a ramp of some kind. Use a folding table with one set of legs collapsed, or a large cardboard box covered with an inexpensive vinyl tablecloth.

various fabrics to cover the bottom of the sleds, such as felt, tablecloths, aluminum foil, plastic bags, cotton, silk, even sandpaper sheets! You will need some kind of base. Small plastic containers work well. The containers above are cut from plastic egg cartons. You will also need a way to hold the fabric to the sled: binder clips or clothes pins are the easiest choices. Vary the load in the sled as well. Use pennies, marbles, or dice.

Instructions:

Set up the ramp. Build a "sled".

Test it! Send the sled down the ramp and see how long it takes to get to the bottom. Try to make the slowest and fastest sled you can.

Make it more challenging: Set a time range between which the sled has to reach the bottom, or limit the weight in the sled.

Day 14: What a drag!

Vocabulary:

drag: The resistance to an object's motion, caused by a gas or liquid.

area: The size of a surface.

canopy: The large piece of the parachute's fabric beneath which someone is suspended.

gravity: The force that attracts an object toward the center of the earth.

distributed: Separated evenly over the entire length of an object, used with load in this case. Distributed load is a force that acts over a length, area, or surface.

Materials:

felt, tablecloths, and plastic bags for the parachute material. You will also need to attach string (use a single holepunch to thread the string) and a weight, such as a small figure, unifix cube, or even washers. Cut the fabric into various diameter circles ahead of time if you are working with lower elementary students.

Instructions:

Design a parachute! You can either do a drop-down parachute or one to experience the drag by having your child(ren) run with the parachute behind them (as shown above).

Test it! Drop the parachute down from your test height and see how long it takes to get to the bottom. Try to make the slowest parachute you can.

Make it more challenging: Set a time range between which the parachute has to reach the bottom, or limit the size of the parachute fabric.

Day 15: Design a Greeting Card for Medical Staff

Vocabulary:

Greeting: a polite word or welcome, a thank you

Materials:

paper, cardstock, construction paper, markers, crayons, colored pencils, stickers

Instructions:

1. Make a thank you card for the medical staff (nurses, aides, doctors, patients, etc.) at the hospital St. Francis Hospital. One of our Dawes parents works at St. Francis and would like to deliver cards to the medical staff workers. She will place a water proof bin outside her yard for families to drop it off. She would pass out these thank you cards upon returning to work!
2. **What:** Thank You Cards for Medical Staff at St. Francis Hospital
3. **Who:** Students
4. **Drop Off Location:** 1617 South Blvd
5. **Parent Email:** suzanne.nathan@gmail.com

April 13-17th

Tallest Tower

tower: A tall, narrow structure.

foundation: A structure at the base of a building that provides support.

rigidity: The stiffness that allows a structure to resist bending, buckling, or twisting.

collapse: To fall or give way.

height: The measurement from the base to the top.

materials: craft sticks, pipe cleaners (this is a challenging one!), paper or plastic cups (easier), wooden planks/dominoes, building blocks, or biodegradable packing peanuts.

Set the timer! Adding a 5-minute time constraint really changes the way the students approach the problem.

Measure it! Make sure you have your students accurately measure how tall their tower is. You can plot them all on a bar graph afterward and compare.

Make it more challenging: reduce the time even more, or if you are able – have your students do this one with their eyes closed!

April 20-24

Challenging Maze

design: To plan/draw the look and function of a system.

tolerance: The allowable amount of variation in the dimension.

dimension: The measurable amount in one direction.

fabrication: The process of manufacturing something.

objective: The goal.

Choose materials: shoebox/cardboard box and play-doh or modeling clay is a fast and easy choice, but try out other materials such as paper towel rolls with holes cut in the sides or even building bricks!

Test it! Have your students try each maze that has been created and record their time. See who got the fastest time on each maze, and which maze was the hardest! Make it more challenging: Create a 3-D maze, or one where the marble isn't visible the whole way through! In the image with the cardboard tubes above, you can't see the marble when it is in each tube, but you can see it in between the tubes. An even more challenging maze relies on both listening skills to hear where the marble is and possibly feeling the vibrations as it travels through the tubes

April 27-May1

Design a Hammock

Vocabulary:

tension: the pulling force on a string or cable. The opposite of tension is compression, which is the force of pushing together.

support: something that holds up or bears the weight of something else.

deflection: how much something is displaced/how much it moves when it is subjected to a load.

factor of safety: how much stronger something is than it needs to be. If you expect the hammock needs to be able to hold 300 pounds, but it doesn't break until it is holding 600 pounds, the factor of safety is 2.

distributed load: in contrast to where all the force is applied at one point, a distributed load is spread out over an area.

Choose materials: felt, tablecloths, and plastic bags for the hammock material are good options. You could also request that they try to weave the hammock out of yarn, or if you have any students that have done finger knitting, this would be a fun implementation of that. You will also need to attach string or wire, and have materials for a stand. They may want to make an A-frame out of craft sticks or pencils, or use cardboard Tubes.

Test it! Make sure that the hammock can support the weight and that the object doesn't fall out.

Make it more challenging. Require that the hammock must not tip over or lose the object when the hammock swings 20° from center.