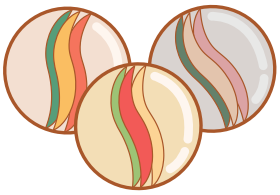
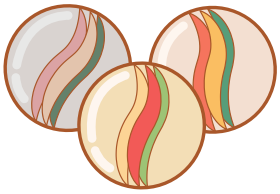


STEM Challenge

Vertical Marble Run



Objective

To create a vertical maze/obstacle course for a marble to run down.

Materials

- Marbles
- Straws
- Paper
- Pencil
- Optional: markers, stickers
- Cardboard tubes
- Cup
- Painter's tape or masking tape
- Scissors

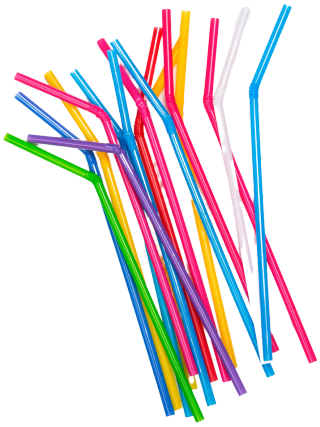
Instructions

1. Think about a design for your marble run before you start building. Look at the design choice page.
2. Find an empty section of wall or an appliance front.
3. Start your marble run fairly high off the ground.
4. Tape the tubes, slides and cups into place.
5. Try out your run.
6. Make adjustments and keep trying it out.
7. Show the class your marble run.

Challenge Questions

- Why did you need to start up high?
- What worked the best?
- What did not work?
- How would you change the design for a larger ball?
- How would you change the design for a smaller ball?

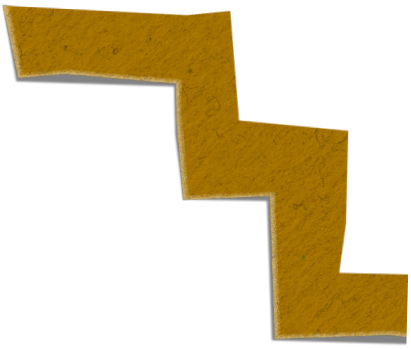
Picture Supply List



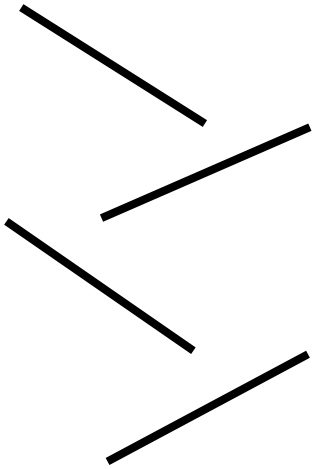
Design Ideas

zig zag

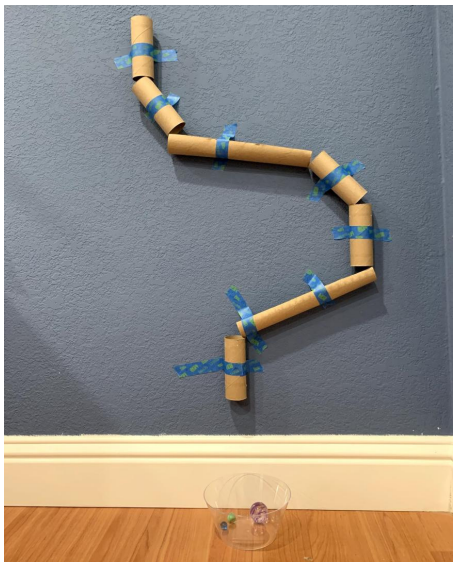
waves

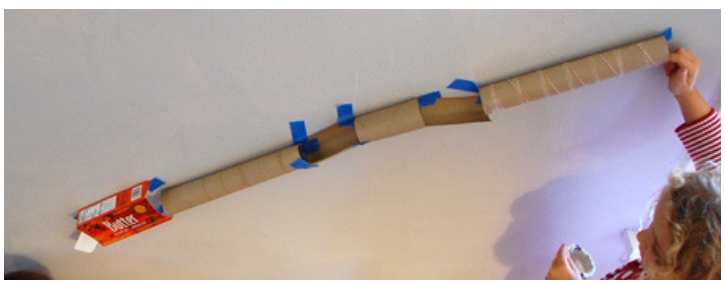


steps



jumps





STEM Challenge

Catapult Contest

Objective

Build a catapult to throw items.

Materials

- 2 (or 9) tongue depressors
- 7 popsicle sticks or 7 more tongue depressors
- plastic spoon (or plastic soda bottle cap and hot glue)
- Pom poms or similar to launch
- masking tape to mark landing spots

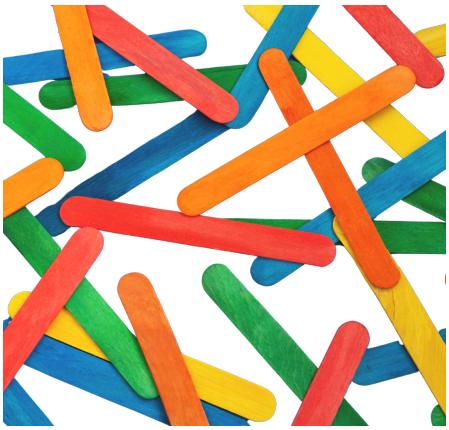
Instructions

- Stack the seven popsicle sticks together and use two rubber bands to hold them tight
- Rubber band the two tongue depressors together at one end
- Slide the popsicle stick bundle between the two depressors
- You need to add a couple of diagonal rubber bands to keep the popsicle stick bundle in place. Place a rubber band diagonally over the popsicle stick bundle/depressor intersection in both directions
- Use rubber bands to attach the spoon

Challenge Questions

- How far were you able to fire it?
- Whose went the farthest?
- What else can you fire with it?

Picture Supply List



optional/alternatives

STEM Challenge

Balloon Car

Objective

Build a balloon-powered car

Materials

- Plastic bottles
- Plastic bottle caps (4)
- Flexible straws (3)
- Wooden skewers (2)
- Balloon
- Rubber band
- Tape
- Scissors
- Hobby knife

Instructions

1. Cut two straws so they are slightly longer than the width of the bottle.
2. Tape the straws to the bottle. Make sure they are parallel.
3. Cut the skewers so they are slightly longer than the straws.
4. Use the hobby knife to make small holes in the center of all four bottle caps.
5. Push a skewer through one of the holes.
6. Thread the skewer through one of the straws, pointy end first.
7. Push a bottle cap onto the other end of the skewer. This makes an axle with two wheels.
8. Repeat steps 5–7 to make a second axle.
9. Make sure your axles spin freely. Put the car down and make sure it rolls smoothly. It might get stuck if the wheels wobble or the axles are not parallel. Adjust them if needed.

10. Slide the short end of the third straw into the neck of the balloon.
11. Tightly wrap a rubber band around the neck of the balloon.
12. Blow the balloon up through the straw to make sure there are no leaks.
13. Cut a small hole (big enough for the straw) in the top of the car.
14. Press the free end of the straw through the small hole and out the mouth of the bottle.
15. Tape the straw so it points backwards, not down.
16. Inflate your balloon; then put the car down and release! Cover the tip of the straw with your fingertip to keep the air in the balloon until you put it down.
17. If your car does not move at all, or moves very slowly, inflate the balloon more and try again.
18. If your car still does not move, double check your axles to make sure they spin freely. If the wheels and axles are not aligned, the balloon might not be strong enough to push the car forward.

Picture Supply List

STEM Challenge

Paddle Boat

Objective

To create a paddle boat that will cross a container of water.

Materials

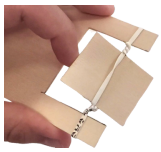
- Rubber band
- Materials for the boat, such as:
- Cardboard (requires duct tape for waterproofing)
- Balsa wood scraps
- Popsicle sticks (requires hot glue gun for assembly)
- Optional: Small pieces of foam or cork to make the boat float better
- Pencil
- Ruler
- Hobby knife or scissors
- sink, tub or large container of water

Instructions

1. Make the hull of your boat.
2. Create a board that is rectangular and about 3 by 5 inches.
3. Alternatively make an A shape with a square top out of popsicle sticks (cut one in half).
4. Cut corners or round off one end of the boat. This will be the front.
5. Cut out a section for the paddle, approximately a 2-by-2-inch square (no need if you built your frame from popsicle sticks).

6. Make the paddle.
7. If you are using cardboard or balsa wood, cut the piece you removed from the hull so it is narrower than the gap. This will ensure it has room to spin without getting stuck.
8. If you are using popsicle sticks, cut another popsicle stick in half, hot glue together side by side
9. If you are using cardboard, completely cover and seal both the hull and the paddle with duct tape to prevent them from getting wet.

10. Stretch a rubber band across the gap in the hull. Slide the paddle through the rubber band, and twist it at least 20 times to wind it up. Hold the paddle in place so it does not unwind.
11. Put your boat down in the water, release the paddle, and watch it go!



Challenge Questions

- Did it sink or float?
- Did it make it across the container?

Picture Supply List

or

or

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