Make Your Own Cartesian Diver – Four Versions

For this activity you will need:

- A tub
- Plastic bottle with lid
- A tall cup
- Paper towels
- Pipettes
- Scissors
- Hexagonal nuts
- Water
- 2 wires of different lengths
- Small rubber bands
- Colorful twist ties
- Permanent maker
- Various plastic sport ball beads
- Spinning diver fan templates

Video instructions can be found here:

https://tinyurl.com/4wzqyogu

Basic Cartesian Diver Directions:

1. Cut off most of the long tube part of the pipette. Leave about half an inch, and cut it at an angle.

2. Screw a hexagonal nut onto the part that’s left. You might need to pinch the tube a little to get it to fit in the hole of the hexagonal nut. Twist to the right and it should thread onto the tube part of the pipette. Now you have a Cartesian Diver!

3. Fill your cup with room temperature water and place the cup in your tub. Hold the Cartesian Diver you made below the surface of the water and squeeze out some of the air bubbles and let some water flow into your diver. You want to fill your Cartesian Diver about halfway with water.

4. Test your Cartesian Diver by dropping it in the cup of water. You want it to just barely float. If it sinks, squeeze out a few drops of water and test again. If you drop it in the cup and it takes a second to come up to the surface, it’s probably okay.

5. Fill your bottle with room temperature water. Place your Cartesian Diver in the bottle and screw the lid on tight. Now squeeze your bottle. Your Cartesian Diver should sink! When you let go, it should float again. If your diver does not sink, it means you have too much air in it. Take your diver out of the bottle and go back to step 3 above.

Now that you’ve mastered the basic steps, try one of the four versions on the back of this paper.
**Version 1 – Between the Lines Game**

Follow steps 1-5 on the front of this paper to make a basic Cartesian Diver.

Put two lines all the way around your bottle. Use colorful tape or small rubber bands. Make sure the lines are parallel. Leave enough room for a Cartesian Diver to fit between the two lines.

Squeeze the bottle just enough so that your Cartesian Diver stays within those two lines.

Challenge a friend to see who can hold their diver between the lines the longest.

Without changing the rules, how could you make this game easier? How could you make it harder?

**Version 2 – Spinning Diver**

Follow step 1 on the front of this paper.

Cut out the spinning diver fan template which is made of clear plastic.

Cut along the straight lines between the letters U and D. Don’t cut all the way to the center circle. The U stands for “up” so fold each corner with a letter U up. The D stands for “down” so fold each corner with a letter D down.

Put the spinning diver fan on the stem of the pipette, then continue with steps 2-5 on the front of this paper.

You can decorate your spinning diver to make it look like a ballerina!

Can you make it spin faster? Try different fan shapes and designs and see what happens.

**Version 3 – Sports Game**

You will need two Cartesian Divers for this version.

The first Cartesian Diver is a little different than usual. It will sink to the bottom of the bottle.

First, follow steps 1 and 2 on the front of this paper. Attach one end of a wire to the stem of diver #1. Make a loop at the other end of the wire. Make sure the loop is big enough for the sport ball bead to fit through it, and small enough so that the loop will fit through the opening of your bottle. Secure the wire to the pipette bulb with a small rubber band. Fill the pipette more than halfway with water so it sinks.

To build the second Cartesian Diver, follow steps 1-2 on the front of this paper. Then, attach one end of a twist tie to a plastic sport ball bead, and attach the other end of the twist tie to the stem of the pipette. Continue with steps 3-5 on the front of this paper.

Put both divers in the bottle and close the lid. Squeeze the bottle and try to get the sport ball on one diver through the loop on the other.

**Version 4 – Catch and Release Game**

You will need two Cartesian Divers for this version.

To build the first Cartesian Diver, follow steps 1-2 on the front of this paper. Attach one end of a wire to the stem of the pipette. Form the other end of the wire into a J-shape to make a hook. Continue with steps 3-5 on the front of this paper.

The second Cartesian Diver is a little different. It will be sunk to the bottom of the bottle.

First, follow steps 1 and 2 on the front of this paper. Attach one end of a wire to the stem of diver #1. Make a loop at the other end of the wire. Fill diver #2 with enough water so that it just barely sinks.

The goal is for the first diver to be able to rescue the second diver and bring it to the surface. Check to see that when both divers are connected they will float. (Step 4 on the front of this paper.)

Put both divers in the bottle and close the lid. Squeeze the bottle and use the hook on one diver to catch the loop on the other diver.