

Playing with Paper

Necessary Supplies

- dark food coloring
- small plastic container or bowl for food coloring
- white Cray-Pas oil pastel or crayon
- plastic pipette or straw
- hand lens
- binder clips
- ruler
- scissors
- pen or pencil
- bowl of water
- various papers (e.g. copy paper, sack paper, news paper, release paper from stamps, etc)

Instructions (Diagrams on pages 3–6)

1. Submerge the tip of the pipette in the bowl of water, squeeze the bulb, and release to draw water into the pipette. Squeeze the bulb again to add ~20 drops of water to your small plastic container to wet the food coloring. The water should turn the color of the food coloring. Set aside.
2. Lay out all of the papers in front of you. Notice their similarities and differences. Feel each one for texture and thickness. Look closely at each paper with your hand lens. Gently bend each paper in both directions. What do you observe?
3. Start with one of the papers and orient the code on the paper to the bottom left corner ([see Diagram 1](#)). Holding the paper with both hands, gently tear along the right side of the paper straight down. Then, holding the paper with both hands, gently tear across the shorter top side. Save the torn strips with the main paper and label them with the code on the main paper. Repeat this tearing and labeling process with each piece of paper.
4. The main part of the paper will be used for experiments and notes about your observations. Write down your observations along the way and later you will combine these pages into a research You can start now with the materials properties of texture, thickness, and tearing. What different textures did you feel and see? How does the thickness and bendability compare between papers?
5. As you write on each paper, what do you notice about how the different papers feel and react to the pencil or pen you are using? Gently draw a line along two edges of each paper ([see Diagram 2](#)). Does it feel the same in each direction? Do the two torn edges look the same or different? You can use the lens to make detailed observations of the torn edges. Can you see any exposed paper fibers? If so, use the ruler and hand lens to estimate their lengths and record your observations on the main paper along each torn edge. Repeat for each paper.

6. From one of the torn strips, use scissors to cut a small square ([see Diagram 3](#)). With a pencil or pen, trace along the edges of the square so that you can record its original size on the main part of the paper (you can use the bottom right corner as shown in [Diagram 2](#)). Label the small square paper with the paper's code so that you can match them up later. Repeat for each paper.

7. Add all of your small paper squares to the bowl of water and submerge them in water overnight.

8. Use the pipette to draw up the food coloring and place one drop of the colored water on the main part of the paper (you can use the upper left side as shown in [Diagram 4](#)). Watch how the color soaks into the paper and begins to spread. After all of the droplet has had a chance to soak in and spread outward, use your ruler to measure its diameter. Is it perfectly circular? If not, measure the smallest length across and the largest length across. Record each measurement next to the drop.

9. Using the white Cray-Pas, draw a heart or diamond ([see Diagram 4](#)). Use the pipette to draw up the food coloring and add a drop of colored water inside and watch it spread. Notice how the colored water spreads and how it behaves in the enclosed shape. Do the lines act as a barrier to spreading? Or does the colored water pass through? Different papers may have different results, so record any differences.

10. Create your own drawing design with the white Cray-Pas and add a few drops of colored water. Allow the colored water to spread and record your observations. (See space on [Diagram 4](#)).

11. Repeat steps 8-10 for each type of paper. Record your observations on each paper.

12. The next day, take your pieces of paper out of the bowl of water. Pat them dry with a towel and let dry completely (perhaps overnight). Locate each paper's matching number and trace along the edges of the square again on your main paper next to the tracing from before it was soaked in water. What happened to the paper after it soaked and dried? Is the size and shape the same or different? Is it still flat? Record your observations next to your tracings.

13. Next, stack all your papers together (make sure they are dry) and use the binder clips provided to clip your papers together to create a research notebook that includes all your observations about the materials properties of the papers you investigated. You can add your own cover on top with your name and the date to complete your research notebook!

Diagram 1

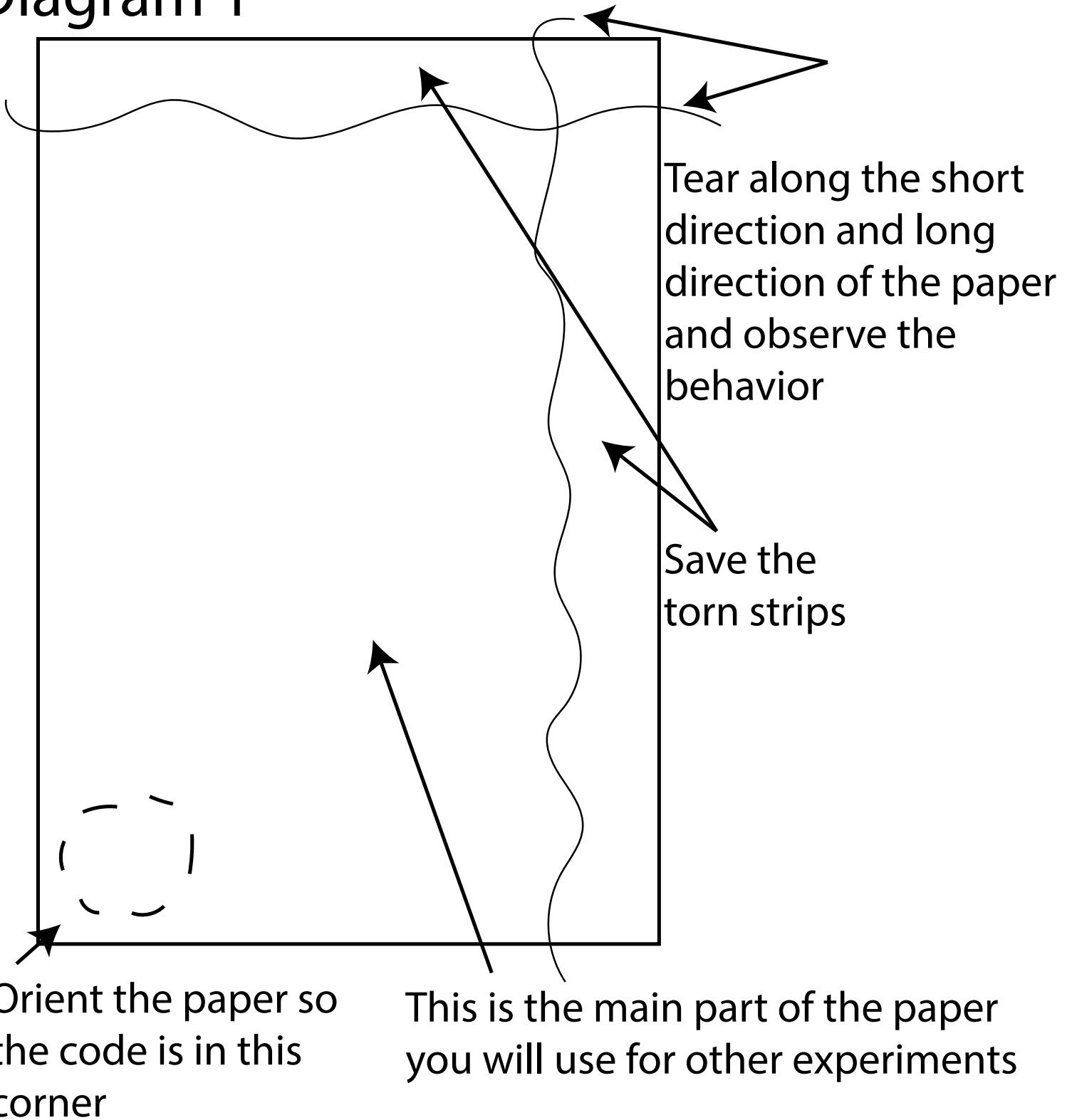


Diagram 2

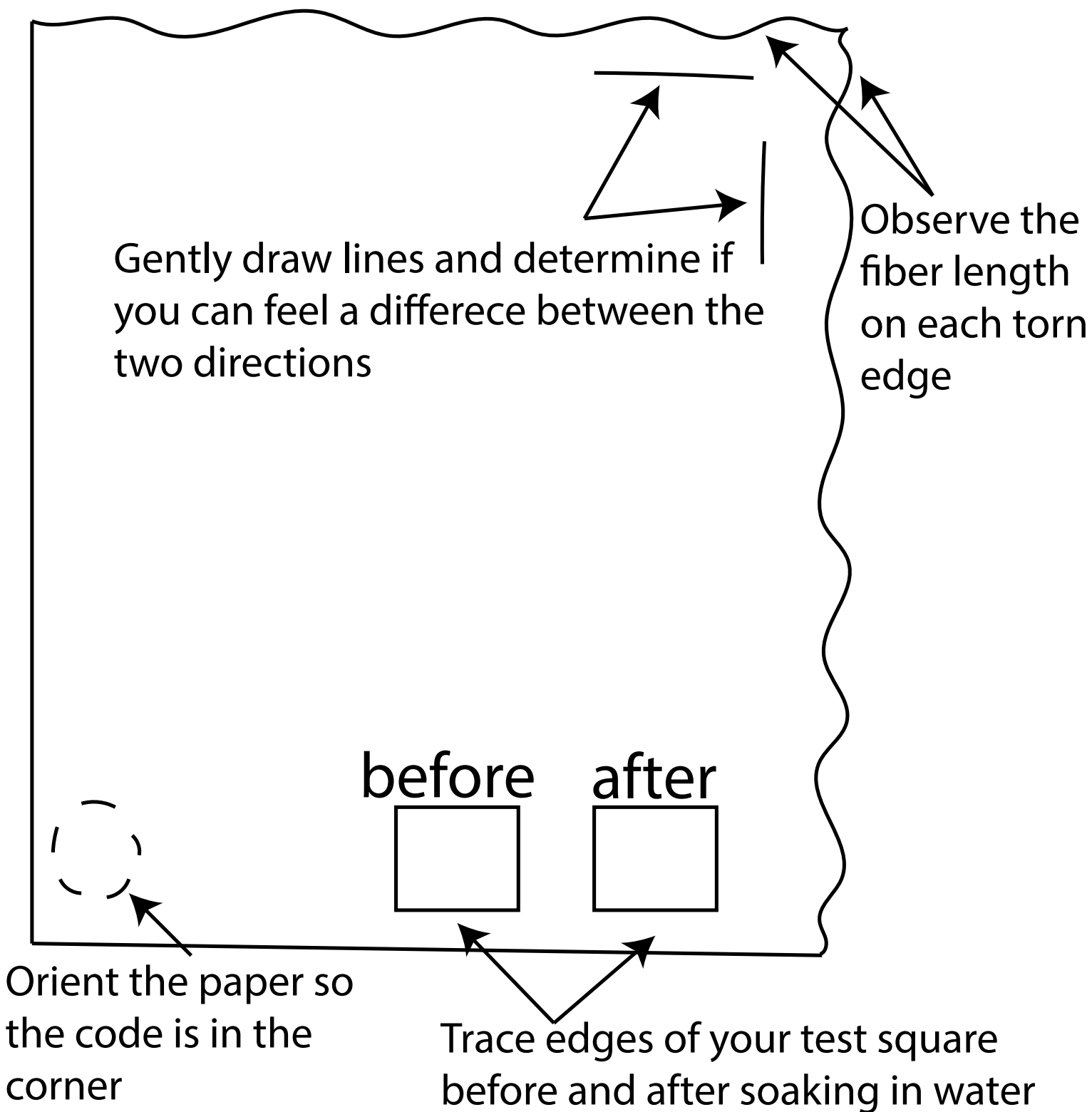
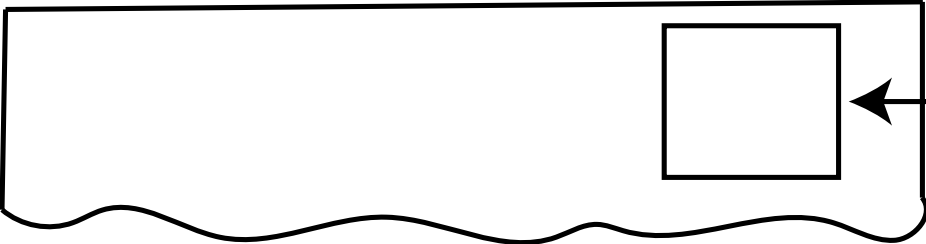


Diagram 3

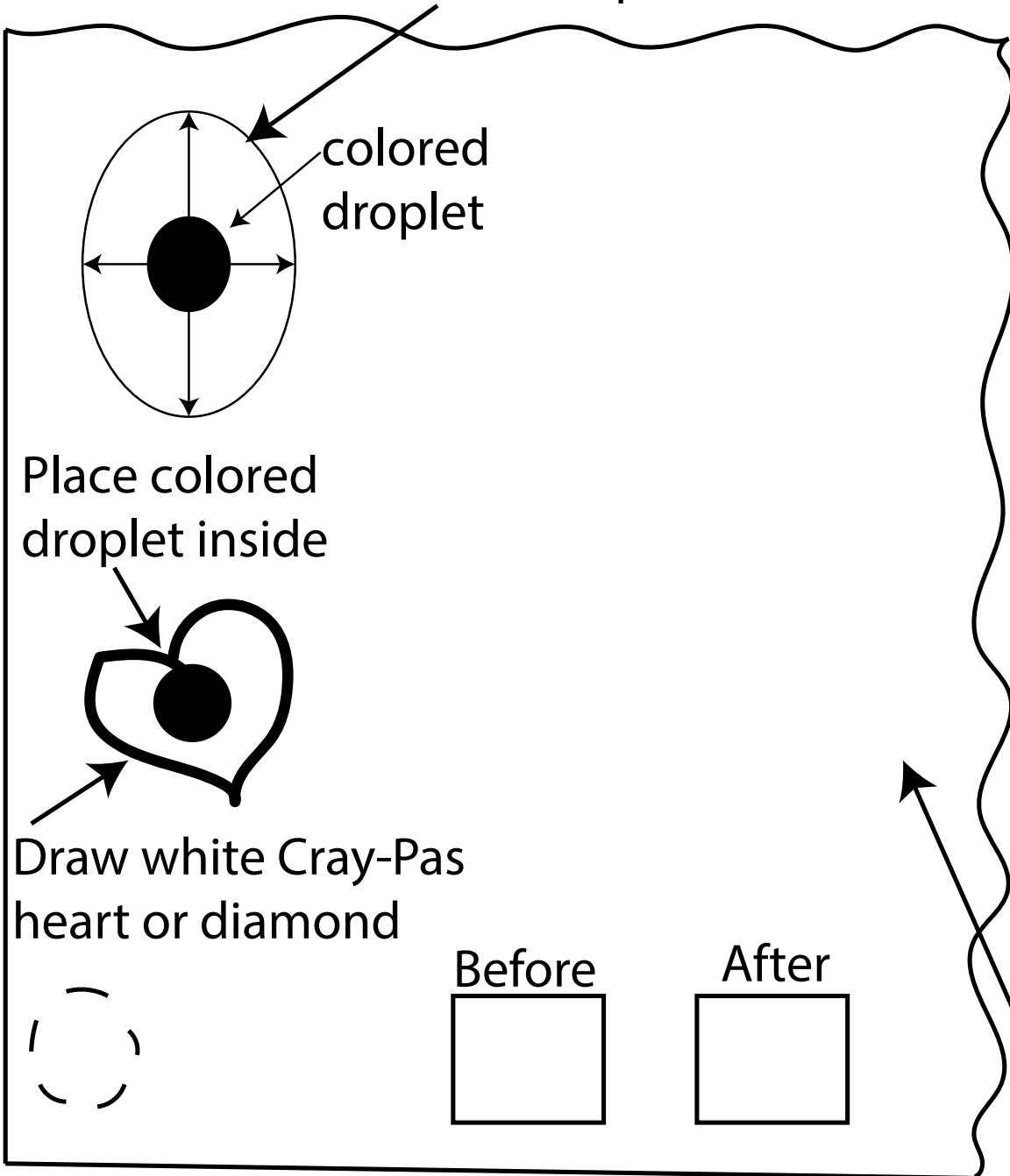
Cut out the test square



Write the code for this paper in the square you cut

Diagram 4

Measure across after the droplet has soaked in



Place colored droplet inside

colored droplet

Draw white Cray-Pas heart or diamond

Before

After

Use this space to make your own Cray-Pas drawing and explore the colored droplet interations