Resources:
https://www.mathsisfun.com/numbers/ratio.html
http://www.corestandards.org/Math/Content/6/RP/
https://study.com/academy/lesson/ratios-lesson-for-kids-definition-examples.html
http://www.pkwy.k12.mo.us/homepage/kscheff/file/shrinkydink.pdf
-this resource just explains more about the science behind the shrinky dinks. Good to have at least one person understand this in case the kids ask

Materials:
- Thin, plastic takeout container (needs to be number 6 plastic)
- Colored pencils
- Blank printer paper (not necessary, but so kids can practice their designs before drawing it on the plastic)
- Key chain rings
- Single hole punch
- Sandpaper
- Rulers
- Multi-colored objects (small blocks, pieces of paper, starbursts, jolly ranchers)
- Toaster oven
- Tin foil
- scissors

Learning Standards: CCSS

Understand ratio concepts and use ratio reasoning to solve problems.
CCSS.MATH.CONTENT.6.RP.A.1

Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. *For example, "The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak." "For every vote candidate A received, candidate C received nearly three votes."*

CCSS.MATH.CONTENT.6.RP.A.2

Understand the concept of a unit rate a/b associated with a ratio a:b with b ≠ 0, and use rate language in the context of a ratio relationship. *For example, "This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is 3/4 cup of flour for each cup of sugar." "We paid $75 for 15 hamburgers, which is a rate of $5 per hamburger."*1

CCSS.MATH.CONTENT.6.RP.A.3

Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.

CCSS.MATH.CONTENT.6.RP.A.3.A

Make tables of equivalent ratios relating quantities with whole-number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios.

CCSS.MATH.CONTENT.6.RP.A.3.B

Solve unit rate problems including those involving unit pricing and constant speed. *For example, if it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed?*

CCSS.MATH.CONTENT.6.RP.A.3.C

Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent.

CCSS.MATH.CONTENT.6.RP.A.3.D

Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.

Lesson

1. **Ask** if they've ever baked a cake before, or followed a recipe
    a. Discuss how there's usually more of one ingredient than another
        i. For example, there may be three cups of flour in your cake, and two cups of sugar
            1. So, you could say that in your cake, there are 3 cups of flour to two cups of sugar (write 3:2 on the whiteboard)
            2. **Ask** if anyone knows what this is called (ratio!)
                a. We use ratios to compare different things, whether it's objects, values, or the amount of different things
2. Pass out different colored objects, give the kids the same amount of each color (ie each kid gets 2 of one kind, one of another, and three of another)
    a. Ask them to figure out, in their groups, what the ratio of one group to another is, when just comparing those two objects
        i. Now, ask them to compare the number of one kind to the total number of objects
            1. This is an example of how you can use ratios to compare different things
3. Let's go back to the cake example.
    a. Say our recipe for cake is only for four people, but we want to have a party with 8 people
        i. We need to add more ingredients to make a bigger cake, but we need to keep the **ratio** of the ingredients the same, so that the cake still tastes ok
            1. So, we use multiplication on each side to keep the balance the same

2. For example, say we have a ratio of 2 cups of flour to 1 cup of sugar, and we want double the size but keep the relationship the same, we can multiply each side by two, giving us a ratio of 4 cups of flour to 2 cups of sugar
3. Using multiplication and division, we can change our ratios into an **expanded** or **simplified** form

4. Activity

a. Now that we've learned about how we can use ratios to compare objects, and different amounts of things, we're going to use it to compare sizes!
   i. Show example of shrinky dink, explain that we're going to be making keychains by shrinking the size of the plastic.
      1. And, we're going to use ratios to compare the sizes of our keychain before and after it shrinks

1) Give the kids the plastic trays, and a pair of scissors
2) Cut out just the center, flat piece (hold up example)
   b. Emphasize that we want our piece to be flat
5. Pass out pieces of sandpaper, and tell the kids to rough up their plastic. This is so the colored pencils we're using to make our drawings will stick onto the plastic
6. Give them a set amount of time for coloring (about 15 minutes?)
   a. There can be some overlap, as it's going to take some time to shrink everyone's design
7. Once they've finished drawing, tell them to measure a part of they're design (it can be anything, either edge to edge of the plastic, corner to corner, or the size of the drawing itself)
   a. Have them write down this measurement on a scrap piece of paper or notecard
8. As they finish, punch three holes bunched together (to create a larger hole) somewhere on their drawing
9. Place in the toaster oven (on tin foil!!), and heat until the design shrinks
10. When the design is done shrinking, take it out with the spatula, and let it cool on a flat surface for about a minute
11. Have the kids measure their design for a second time, and write down the measurement on the piece of paper

After the activity, ask the kids what their before-and-after measurements were, and write them up on the board. Explain how this is a ratio comparing the sizes of their keychain before and after it shrunk.
Ideally, once simplified, their different individual ratios should be the same.