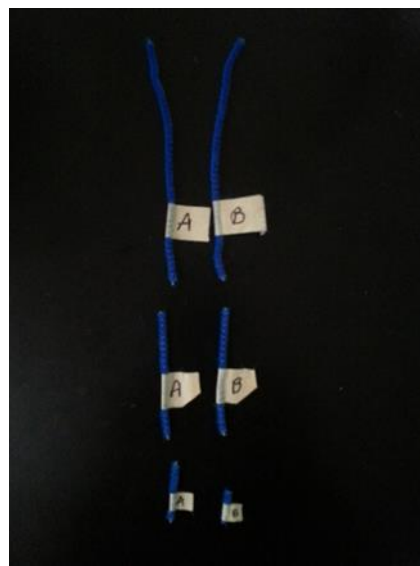
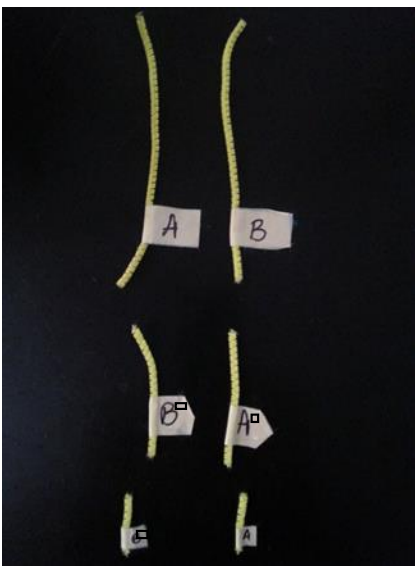


Heredity Kit Instructions

In their most simple form, these kits can be 2 sets of pipe cleaners each a different color cut into 2 long, 2 medium and 2 short segments. One set should have a short and super short chromosome (representing the X and Y sex chromosomes respectfully).

The 2 long, 2 medium, short, and super short of one set are labeled A and B with small tape flags and the other 2 long, 2 medium, and 2 short are labeled A' and B'. You may also choose to have your students label the “chromosomes” however they choose. The main objective is to understand that half your chromosomes come from your mom and half from your dad. We can track this by the A, B, A', B' labels. At this point we have not spent much time figuring out DNA, so these are just chromosomes that come in pairs and the pairs though similar, carry different versions of the heritable information.



It is helpful to have 1 kit for each pair of students, but the activity can be done in groups of 4 as well.

Each group should also have a whiteboard and a marker.

Directions for the Make a Baby Activity

Note: At this point we will not draw, label or write down much about what we are doing with the pipe cleaner chromosomes. We want the students to play, fail, try again and mostly think about what is happening without the constraints of stopping to draw or take notes. We will sketch it out later so the students will have a record of what they did.

To help us figure out how parents pass on their chromosomes we will work with pipe cleaners from the Heredity Kit. The Heredity Kits contain 3 pairs of different size pipe cleaners in 2 different colors. One color represents Mother and the other color represents the father.

Students first draw 2 circles at the top of their whiteboard

Ask students to separate the chromosomes into 2 parents. Or you can ask students to group the chromosomes into 2 distinct groups (that usually gets the chromosomes into color groups)

Next students organize the chromosomes in the 2 circles. The chromosomes should be organized in matching pair length: 2 long, 2 medium, and 2 short. (One set has a short and super short, more on that later)

Don't worry too much about how the chromosome pairs are organized in the circle, the main idea is that the students figure out that the chromosomes come in pairs. Check each group to see that they have the chromosomes separated and organized in their 2 circles.

Next, students figure out who is the Mother and who is the Father. Give students time to think about this. Some will know right away, and others will need some time to think about why. The chromosome set with the short and super short chromosome is the father. This is because males have 1 X chromosome and one Y chromosome. Two different chromosomes are 2 different sizes. Females have 2 X chromosomes. They are the same size.

Students play with the chromosomes to come up with a combination that will make a viable baby. LET THEM FAIL! It is OK, they're only pipe cleaners. Once a group thinks they have a baby have them put up their red cup or some other signal, so you know to come check. Try to not let other groups "see" the viable baby, we want everyone to figure this out for themselves. There are several possible combinations, but as long as there is a long, medium, and short from the mother and a long, medium, and short from the father, they have a baby. Ask students if they have a boy or a girl, and how they know.

Students will complete this activity at different times, so challenge the early finishers with making a baby with the opposite sex, or ask how many "different" babies can they make out of the same sets of parental chromosomes?

Once every group has had a chance to figure out how to make a viable baby, we put the parents back and do it again. We're going to make another baby but this time we will let chance decide. We do this to emphasize that the chromosome from each pair, contributed to the baby, is totally random. 2 different people take the 2 different poker chips. Decide who will represent the Mother and who will represent the Father. Together, they toss and catch. If you represent the Mother and flipped an A', take the long A' from the Mother Circle and contribute it to the baby. The Father representative does the same. Then both repeat for the medium and then the short chromosomes.

Not only does this show that the contributed chromosome from each pair is at random, it also shows that each chromosome in each pair has a 50/50 chance of being contributed.