LET'S DO IT!

ISBN 978-1-847004-19-2

Teacher Edition

Science Is A Verb!

Part 3

Teacher Edition

Contents

Contents

Introduction to the lab manual:

This lab manual provides structure for teachers who wish to engage students in hands-on interactive learning but also provides support for teachers who are more comfortable with enquiry based learning. If you are a teacher who is taking his or her first "dive" into hands-on Science, the background material is designed to provide enough structure to help support the organisation of the lab and its materials. Most of the materials are commonly found in local supermarkets and department stores at a nominal cost. A few materials, like scales and hand microscopes can be found on-line. The lab sheets can be given to students so they follow step-by-step, or they can be told a general structure to follow.

The critical portion of any lab is to have a thorough discussion of the results and their thinking after the experiment is completed. It is suggested that you take as much time as the experiment to have this discussion with students. The real learning occurs not from the hands-on experiment, but from a deep discussion of the experiment, while making connections to the concept they are learning. For this reason, it is suggested that the students do the experiment FIRST and then have the students learn the concepts. They will have a better understanding of the concept if they first conduct an experiment, gain the experience and then discuss a new concept.

Even without a strong Science background, get into the habit of asking questions. The process of asking questions and being inquisitive will generate more excitement for students and will engage them in a deeper way of learning Science. "I don't know" is as important to learning as having all the answers. Together you can learn Science and discover the major ideas that Scientists' research.

If you are an experienced teacher, the Teacher Guided Questions to Enquiry are designed to provide prompts for students. These questions are not intended to be assessment questions, but ones that will engage students in the general direction of the benchmark. The teacher may select one or two, but not all of them, to have students start on an open enquiry approach to learning. The students will engage in their own experiment, create their own procedures and make conclusions from their data. For this reason, there are no answers to those questions. They are open ended and can be used to formulate interesting experiments for advanced students. The slight variation in some of the questions in each of the labs is designed to provide a sufficient number of prompts at various levels of Bloom's Taxonomy to engage students.

Throughout the year, encourage questioning, student dialogue and the scientific process. There is no one exact scientific method as is often suggested. The process of learning about the world and universe, drawing conclusions from facts and building these facts into strong scientific theories is the work of Science. Science is always growing, stretching and expanding its knowledge base. It is about challenging well-supported ideas to discover weakness. This is exactly what students should be encouraged to do! And in the end, Science is not something to study, it is something to do!

Science is a VERB!

Science is a Verb

LIFE SCIENCES

What characteristics do we inherit from our parents?

Description: Students will compare and contrast how young animals resemble their adult parents of the same species and then describe characteristics they have inherited from their parents.

Student Materials (per group):

- Animal cards - 5 adult and 5 young
- Students' family photos
- Observable traits survey

Background and Misconceptions:

Heredity is the passing on of genes from parent to offspring. Our genes, found in DNA, determine many of our observable physical and sometimes behavioural traits. Depending on the combination of genes (genotypes) of the parents, the offspring may have identical or different physical traits (phenotypes). Each parent shares two alleles (the genes) with the offspring. Genes can either be dominant or recessive. When both parents pass on dominant alleles then the probability of the offspring showing the trait for the allele is quite high. If both parents are homozygous, having two dominant alleles then the child will generally inherit the trait. But it is possible for some parents to share a dominant and recessive gene. In that case there would be a 75% probability that the offspring would show the dominant trait and a 25% chance that they may show the recessive trait. For example, both parents have the genes for brown eyes but the child inherits blue eyes. This will occur if both parents have heterozygous alleles, therefore having one dominant and one recessive gene they each pass on to the child. Since we are not clones of our parents there are slight variations in our appearance.

Observable physical traits that are genetically passed on include eye colour, the ability to roll the tongue, having or not having a widow's peak in the hairline, male and female pattern baldness, connected or detached earlobes, having hair on the fingers, straight or curved thumb, hair colour, freckles and dimples. In addition to observable traits there are many genes that are passed on from parent to offspring that can result in non-observable characteristics, including the tendency towards certain diseases.

The environment can also influence observable characteristics such as height and weight. Offspring can have genetic tendency to being tall but environmental factors such as nutrition can alter the observable trait.

Teacher Guided Questions to Enquiry:

Use these questions to get the students started on their own enquiry!

1. In what ways do you look like your parents?
2. In what ways do you not look like your parents?
3. Why are there some ways that you look like your parents and in other ways that you do not?

Additional Hints:

- Cut out and laminate the cards, one set for each group of students.
- Request from parents that their children bring their photos in a week ahead of time so they are ready to use when you need them. Keep them for the students so they do not become damaged.
- If a student does not have a family picture you can bring one of yourself or another teacher's family and have them find similar characteristics.
- The first part of the lesson engages students in thinking about similarities between organisms and their parents.
- The second part of the activity has students work in pairs helping each other complete the trait surveys. Diagrams of a widows peak, hitchhiker thumb and dimples will help students clearly see what to look for.
- After the students complete their own survey they will take the survey home and mark off whether any parent or sibling has the same trait.
- Ask students to bring in a family photo that shows them and their parent(s). Be sensitive that not all children have two parents at home, or they may be adopted. For children who are adopted you may want to have an infant photo of yourself and one as a child for them to compare, or if you have children use photos of them.
- Ask students if they have a pet dog or cat and have them describe them. They could then bring in photos to compare them. Discuss with the students why, if they are all dogs, they are all not alike (variations in species). Then discuss with the students why, if we are all humans, are we all so different.

Science is a Verb
Life Sciences:

What characteristics do we inherit from our parents?

TEACHER ANSWER KEY

Description: You will compare how young animals resemble their adult parents and how you resemble your parents.

Materials: A set of animals and their offspring cards
Your family photo
Observable trait survey

1. Match the cards of the young animals to their parents. Place them in the chart below.

Offspring	Adult Parent

Science is a Verb
Life Sciences:

What characteristics do we inherit from our parents?

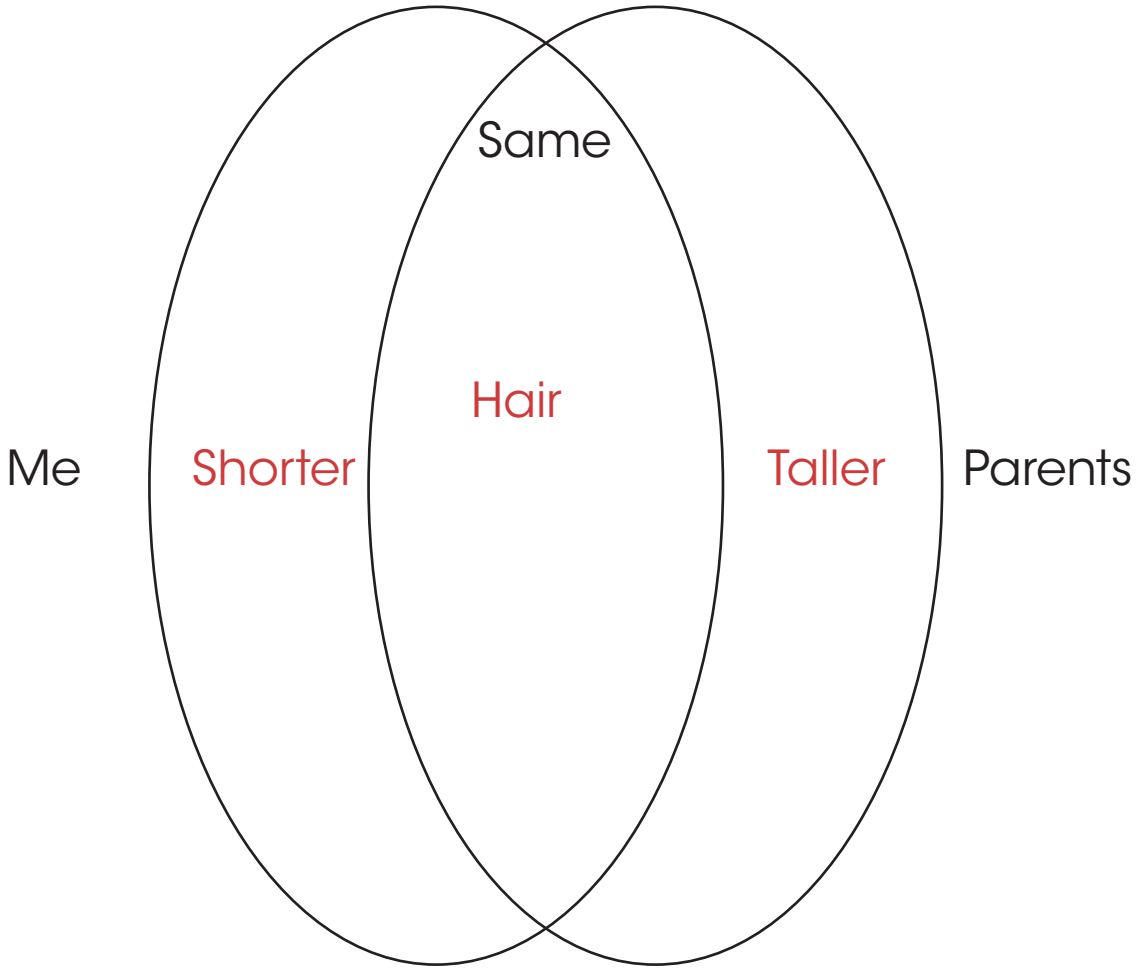
Offspring	Adult Parent

Science is a Verb
Life Sciences:

What characteristics do we inherit from our parents?

2. Now look at your family photo, in what ways do you look like your parents? In what ways do you look different?

   Fill in the diagram showing ways that you look alike and ways that you look different.



What characteristics do we inherit from our parents?

3. How were the young animals similar or different from their parents.

4. What colour are your eyes? What colour are your parents eyes?

   To investigate how some of your characteristics may come from your parents you will complete the Observable Traits Survey.

   Traits are observable characteristics that are passed down from parents to children. We inherit some physical features from our parents. The features are passed down by genes. For example eye colour is determined by the genes your parents have for their eye colour. Brown eye colour is most common.

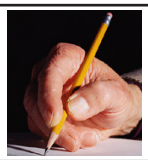
a. Work with your partner to decide if you have the observable trait. Then write yes or no for each trait under the Me column.

b. After you have completed your column, you will see who in your family might have a similar trait. Mark off who has the same trait as you in the other two columns. Bring your paper back with you tomorrow.

Science is a Verb
Life Sciences:

What characteristics do we inherit from our parents?

Observable Traits Survey

		Me	Parent	Sister/ Brother
Detached earlobes				
Hitchhiker's thumb				
Tongue roll				
Dimples				
Right-handed				
Freckles				
Curly hair				
Widow's peak				

Science is a Verb
Life Sciences:

What characteristics do we inherit from our parents?

Questions

1. What observable characteristics did the young animals and their parents have that were alike?

Same fur colour, same whiskers, beak shape.

2. Why do you think the young animals looked so much like their parents?

They get their features from their parents.

3. What observable characteristics do you have that your parents or siblings have?

Depending on the student they will list items from the survey, they may include eye and hair colour.

4. How did you get the characteristics that both you and your parents have?

I inherited them.

5. If we are all humans why don't we all look alike?

We all come from different parents with different traits.

Science is a Verb
Life Sciences:

What characteristics do we inherit from our parents?