

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Period: BIO \_\_\_\_\_

**Instructions:** *Construct a pedigree for the given scenario. Shade in affected individuals. Label the generations and individuals. Determine the possible genotypes for all of the individuals.*

1. Freckles are dominant over no freckles (recessive).
2. There are two people in generation 1.
  - a. The male in generation 1 is homozygous recessive for freckles (has no freckles).
  - b. The female is homozygous dominant for freckles (has freckles).
3. There are 4 people in generation 2:
  - a. 3 are children of the first generation (2 males & 1 female).
  - b. All children are heterozygous for freckles.
  - c. The female child is married to a male that is heterozygous for freckles.
4. There are 3 people in generation 3:
  - a. 2 people are children of married couple from the second generation (both male).
  - b. The first male died shortly after birth.
  - c. The second male is homozygous recessive for freckles.
  - d. The 3<sup>rd</sup> person is a female married to the surviving male. She is heterozygous for freckles.
5. There are 5 people in generation 4:
  - a. All 5 people are children from the couple in generation 3 (4 females & 1 male).
  - b. 3 females and 1 male are homozygous recessive for freckles.
  - c. 1 female is heterozygous for freckles.

## **The Thacker Family: Constructing a Pedigree**

My Name is Steve Thacker and I'd like to tell you about an experience I had that taught me some important lessons about genetics. For years my dad, John Thacker, has been telling me stories about his family- his father and mother, his two sisters, and his three brothers. Our family moved from his hometown in Ohio to California when I was only a year old. So I have never really known the people he was talking about. His stories made me very curious about all these relatives of mine that I had never known.

Last summer I got a chance to satisfy my curiosity. The Thacker family decided to have a family reunion on the 4<sup>th</sup> of July in the old hometown of Cos Cob, Ohio. Dad could hardly wait to get back and see family again for the first time in fifteen years. My mother, Marie, is from the same town, and she was eager to see her own family as well as my dad's. My 12-year-old twin sisters, Laura and Mary Jo, and my 8-year-old brother, Tom, also had heard a lot about the people in Cos Cob. They were delighted at the thought of a trip to Ohio.

We decided to make a real vacation out of our trip back for the reunion. We drove back at a leisurely pace, sightseeing and camping along the way. We did so much sightseeing that, on the morning of July 3<sup>rd</sup>, we realized we were still 700 miles from Cos Cob. And the reunion was to begin the next morning at 10 o'clock! Dad said we would have to drive straight through and get a good night's sleep so we would be ready to meet all our relatives and enjoy the reunion. It was a long 14 hour drive. We got in to Cos Cob about 9 o'clock the evening of the 3<sup>rd</sup>. Everybody was so tired we decided to get motel rooms and go right to bed.

In spite of all the travel and excitement, I slept pretty well and so did Tom and the twins. In the morning, after we all got cleaned up, we had a late breakfast. Then we set out for Grandpa and Grandma Thacker's house on Pine Street. We got there at exactly 10 o'clock and were amazed to find that we were the last of the Thacker clan to arrive at the reunion. For about 15 minutes there was a lot of hugging and kissing and squealing. I was introduced to all those aunts and uncles, and cousins that I had heard about but never met. But I have to admit that I didn't get all the names and faces straight.

After the turmoil of the initial meeting was over, I was able to step back and take a better look at my relatives. It was obvious that we all are family. My dad's brother and sister are easy to spot because they look so much like him. My grandparents are older copies of their sons and daughters. The third generation- my sisters, my brother, all our cousins and I - are alike in many ways. At the same time, all of us have our own special traits that make us different. I remembered one of the big lessons I learned in Biology last year. The set of chromosomes we inherit, half from our mothers and the other half from our fathers, interacting with our environments is responsible for the similarities and the differences that I was observing.

Then I noticed Grandpa Thacker's hands. I thought my dad had been joking when he used to say that Grandpa Thacker had two little fingers on each hand. But sure enough, it was true. I then checked out Aunt Shirley, Uncle Pat, and Uncle Dave. Again Dad was right! They too have extra digits. Aunt Shirley's daughter Sue does not have extra digits. Uncle Pat has three girls and a boy. One of the girls, Maureen and the boy Mike, has the extra fingers. Uncle Dave has a boy, Dan who does not have extra digits and a girl Karen who does (His wife also has extra fingers!) Dad's sister Betty and her son Jim do not have the sixth finger. His other brother Gary and his two daughters Patty and Barbara also do not have the sixth finger. Of course nobody in my immediate family has the variation.

After my initial observation of this variation in our family, I promptly forgot it and spent the rest of the day meeting, talking and playing volleyball with my grandparents, my five uncles and aunts, my ten cousins and of course my immediate family. The big event of the day was a sit-down dinner that evening. We ate one of the best meals I have ever had. Many stories were told, and every member of my family- all 28 of us- was included in the stories at least once. Before we knew it, it was nearly midnight and time for the reunion to end.

We said "good night" and went back to our motel, we where talked among ourselves for another hour or so. We spent two more days in Cos Cob visiting my mothers and fathers old friends. We also did some fishing and picnicking out in the country around Cos Cob.

It wasn't until we where back in California that I remembered the variation I had observed in my grandpa, my aunt and two uncles, and three cousins. I knew that this had to be a genetic trait, but I was curious to find out more about it. In my Biology class, I had learned that one of the first things you should do to learn about a trait is to make a family history and trace the transmission of the trait through the family. I remembered that you use a square to stand for a man, a circle to stand for a woman. You shade in the squares and circles of people who have the trait (in this case an extra little finger). With that little background, I began to construct our family history. After I had constructed the pedigree, I was able to answer a few questions.

**Questions:**

1. In your logbook, construct a pedigree for the Thacker Family.
2. Is the "extra finger" trait dominant or recessive? How do you know?
3. Are the people with the trait homozygous or heterozygous?

**Challenge Question (optional)**

4. Is the trait carried on the autosomes or sex chromosomes?



One question that pedigree did not answer for me was "What is the medical term for the variation of having an extra little finger"? For the answer I had to go to the library. When I did, I learned much more about this variation and many other variations common to humans. The name of the genetic variation of having extra fingers is called polydactyly.