Hair. We straighten it, we curl it, we color it, and we manipulate it into many styles. Did you ever wonder about the composition of hair? Hair is made of a protein called keratin. Hair has two structures: the hair follicle, which is in the skin, and the shaft, which is visible above the scalp. 

The hair follicle is a tunnel-like portion of the epidermis (outer layer of skin) that extends down into the dermis (inner tissue). The follicle is surrounded by both an inner and outer sheath for protection. The follicle has several layers that all have separate functions. At the base of the follicle is the papilla, which contains tiny glands that nourish the hair. The living part of the hair is in the bottom part surrounding the papilla, called the bulb. The cells of the bulb divide every 25 to 72 hours. Many people are curious about how fast hair can grow. Although hair growth rates vary from person to person, the average rate is one-half inch per month. There are three stages of hair follicles:

- Anagen: rates of hair growth: active growth, maturation, and rest. Every hair on your head goes through the growth cycle, but not at the same time. It is estimated that 15% of your hair follicles are resting, which can cause shedding and hair loss. Hair growth is affected by hormones, stress, consumption of protein, and medications.
- Telogen: Telogen is the resting phase in which hair is shed, hair loss can be caused by hormones, stress, and medications.
- Catagen: Catagen is the transition phase in which the hair follicle is growing back. With aging, pigment cells die, and hair turns gray.

Did you know that nutrition affects hair growth? Read More About Healthy Hair Here: http://www. beautylish.com/beauty/tips/achieve-healthy-hair.

Learning Standards: I can read a nonfiction article for main idea and supporting details.

### How Strong is a Strand of Hair?

Melted wax is pouring into a bottle. The bottle is being filled with wax that will harden into a strand of hair. The strand of hair is being measured with a ruler and then placed on a scale.

**Procedure:**
1. Melt a small amount of wax in a double boiler.
2. Carefully pour the melted wax into a small glass bottle.
3. Let the wax cool for a few minutes before using.
4. Measure the length of the hair strand using a ruler.
5. Place the strand of hair on a scale.
6. Record the weight.

**Results:** The strand of hair weighs approximately 0.005 grams.

**Discussion:** The weight of the hair strand is affected by the length and thickness of the hair.

**Conclusion:** The strand of hair weighs approximately 0.005 grams.

### Anatomy of Human Hair!

**Hair Shaft:**
- Hair shafts can be classified as three types: light, medium, and dark.
- The hair shaft is composed of hair keratin, which is a protein.
- The hair shaft is made up of three layers: the cuticle, the cortex, and the medulla.

**Cuticle:**
- The cuticle is made up of overlapping scales that protect the hair from damage.
- The cuticle helps to retain moisture and nutrients in the hair.

**Cortex:**
- The cortex is the main part of the hair shaft, which consists of cells arranged in cross sections.
- The cortex provides the hair with its strength and resilience.

**Medulla:**
- The medulla is the innermost part of the hair shaft, which consists of cells arranged in a single layer.
- The medulla provides the hair with its color.

**Hair Follicle:**
- The hair follicle is the root of the hair, which is embedded in the skin.
- The hair follicle is composed of a root sheath, a hair sheath, and a bulb sheath.

**Root Sheath:**
- The root sheath is the outermost layer of the hair follicle.
- The root sheath provides the hair with its shape and structure.

**Hair Sheath:**
- The hair sheath is the middle layer of the hair follicle.
- The hair sheath is responsible for the growth and shedding of the hair.

**Bulb Sheath:**
- The bulb sheath is the innermost layer of the hair follicle.
- The bulb sheath is responsible for the nourishment and protection of the hair follicle.

### Hair Problems!

- Did you know that hair grows at an average rate of about one-third inch per month?
- Did you know that hair growth rates vary from person to person?
- Did you know that hair growth can be affected by hormones, stress, and medications?

### Map Corner: Use the newspaper to complete these activities to sharpen your skills in the field of space, science, and technology.

**Activity One:** Letter to the Editor
- Imagine you are the main character in the novel you are currently reading. As the character, write a letter to the editor. Use specific details from the novel to support your argument.

**Activity Two:** Letter to the Editor
- Write a letter to the editor about a current event happening in your school or in your community. Use specific details from the news story to support your argument.

**Activity Three:** Letter to the Editor
- Write a letter to the editor about a current event happenin in your school or in your community. Use specific details from the news story to support your argument.

**Activity Four:** Letter to the Editor
- Write a letter to the editor about a current event happening in your school or in your community. Use specific details from the news story to support your argument.

### Science Stars

**Lyda A. Newman**

- African-American Inventor
- President of the African-American Branch of the Women's Suffrage Movement
- Member of the National American Woman Suffrage Association

Lyda Newman was born in Ohio in 1859. She was the daughter of a steelworker and a housewife. In the late 1890s, she moved to New York to live with her family. Bothered by inefficient hairbrush designs, she created a new design and applied for a patent. On November 15, 1898, at the age of 40, she received patent 581,335 for a new style of hairbrush. At that time, she was the youngest African-American woman to have a patent granted.

Newman's hairbrush had several unique features: a split comb and a compartment. Prior to this, hairbrush bristles were made of animal hair, which had difficulty going through tangled hair. The new hairbrush design had open slots to guide dirt and debris from the brush into a compartment. This compartment opened so that the debris could be dumped out. When using this hairbrush, there was better ventilation of the hair and scalp. With this new style of hairbrush, Newman improved both efficiency and hygiene. Newman's brush was durable, easy to make, and very easy to clean.

Not only did Newman make contributions with her patent, she also was a women's rights activist. In 1915, Newman was chosen to help women gain the right to vote. Unfortunately, there are not many records of Newman's life and there are a lot of unanswered questions about her biography.

**Discussion:** Conduct your own research to see what else you can find about Lyda Newman's life. What do you think is her most significant contribution to our society today?

**Learning Standards:**
- I can read a biography about a person who has made contributions in the field of science, math, and technology.
- I can interpret a primary source document.
- I can analyze primary source documents for bias and perspective.
- I can create a timeline to organize and sequence events.
- I can write a short essay to analyze a primary source document.

### MATH CONNECTION

#### Use your math skills to solve these word problems about hair.
- In a city, 60% of the population has brown hair, 25% has brown eyes, and 15% have both brown hair and brown eyes. A person is chosen at random. How many have brown eyes, what is the probability that they also have brown eyes? How many have brown eyes, what is the probability that they also have brown eyes? If they have brown eyes, what is the probability of them not having brown hair? If they have brown hair, what is the probability of them not having brown eyes? In John's class, 3/8 of the students have brown hair. Of the students with brown hair, 1/2 have brown eyes. What fraction of the students in John's class have both brown hair and brown eyes? Simplify your answer and write it as a proper fraction or as a whole or mixed number. To simplify fractions, divide both the numerator and the denominator by the greatest common factor.
- Helen has 2 inches of hair cut off each time she goes to the hair salon. If her length of hair she cut is c equals the length of hair after she cuts it, which equation would you use to find the length of Helen’s hair after she visit the hair salon? a. h = 2 - b = 2 - b = 2 - b = 2 - h = 2 - c = 2 Learning Standards: I can add, subtract, multiply, and divide to solve a word problem. I can use ratios and statistics to analyze a word problem.

**Discussion:** What is the solution to the word problem? What is the correct answer? Why is this the correct answer? How can you verify that your solution is correct? How can you check your work?

**Conclusion:** The solution to the word problem is correct and the answer is correct. You can verify that your solution is correct by checking your work. You can check your work by substituting the answer back into the original problem and verifying that it satisfies the conditions of the problem.