WARNING:
This set contains chemicals that may be harmful if misused. Read cautions on individual containers carefully. Not to be used by children except under adult supervision.
Heavenly Hair—Activity Guide

How often do you think about your hair? Ten times a day, 100 times, every five minutes? We’re obsessed with our hair—for good reason. For starters, it’s so much fun to play with. We can curl it, color it, braid it, put it into ponytails, pin it into up-dos, cut it short, grow it long, and a million other things. It can change the way we look in an instant. And when we look amazing, we feel amazing. But on bad hair days, we just want to hide under a hat. If you want to look your best, it helps to get to know your hair:

In this kit, you’ll find everything you need to become an expert stylist. You’ll make your own shampoo and conditioner, which will keep your locks shiny, silky, bouncy and healthy—you’ll be the envy of all your friends. You’ll also learn some really cool science that explains why your hair looks the way it does—how it grows, what makes it curly or straight, why it’s a certain color, and more. Plus we have great tips from the pros on how to choose the perfect cut and style for your face and hair type. No more bad hair days!

In each activity, you’ll get to act and think like an actual scientist. You’ll measure, you’ll compare things and you’ll ask questions. You’ll also make observations using your different senses: You’ll use your eyes to see, your ears to hear, your nose to smell, and your hands and fingers to feel.

Let’s get beautiful!

Activity #1: Heads Up!

Have you ever wondered why we use shampoo our hair but soap on the rest of our body? That’s a very good question. Before you make your own shampoo, here’s a simple experiment that will show you why it’s good for your hair.

What’s included in Your Kit

- Shampoo base
- Conditioner base
- Fragrance/Dye
- Thickening agent

What You’ll need to get or use

- Mixing bowl
- Mixing spoon
- Towel hair wrap
- Brush
- Lemon juice
- Baking soda
- Water
- Paper towel
- Strands of hair
- Vegetable oil
- Mirror
- Bar of soap
- Strands of hair
- Vegetable oil

What You’ll need from Your Kit

- Mixing spoon
- Mixing bowl

What You’ll need to get or use

- Strands of hair
- Lemon juice
- Baking soda
- Water
- Paper towel

Fun Fact

Hair found on non-human mammals is called fur.

Hair grows all over the body, but most of it is short, thin and transparent—like the hair on your arms.

FUN FACT

Hair found on non-human mammals is called fur.

Hair grows all over the body, but most of it is short, thin and transparent—like the hair on your arms.
WHAT YOU DO:

**Step 1:** Find a couple of stray strands of hair that have fallen from your head. Run your fingers up and down the strands. How do they feel?

**Step 2:** Place a small amount of lemon juice in the mixing bowl—a teaspoon should be enough. Soak one strand of hair in the lemon juice, rinse completely, and set it on the paper towel to dry. Rinse the bowl thoroughly.

**Step 3:** Pour a little baking soda and water into the mixing bowl and stir to form a thin paste. Soak a second strand of hair in this mixture, rinse completely, and set it on the paper towel to dry. Rinse the bowl thoroughly for the next activity.

**Step 4:** Once the strands of hair are totally dry, run your fingers over them again. How do they feel? Do you notice any difference between the two? Is one smoother than the other?

---

**SCIENCE CONTENT: SHAMPOO VS. SOAP**

So why is shampoo better for your hair than soap? First you need to know a little something about the structure of hair.

The hair that you see on your head is called the shaft—it’s actually dead tissue made from a protein called keratin (that’s why it doesn’t hurt when you cut your hair). The outer layer of the shaft is known as the cuticle, which is made up of overlapping scales that protect the hair from damage. When you put hair in an acid solution like lemon juice, the scales of the cuticle become harder and lay flat and smooth (they get more protective). When you put hair in a base solution like baking soda, the scales of the cuticle swell and become rougher (less protective). You might have noticed this in the experiment above—the hair soaked in the lemon juice should have felt smoother.

What does this have to do with shampoo? Well, shampoos contain ingredients more like lemon juice, so they keep hair shiny and smooth. Soaps are more like baking soda, so they leave hair dull and coarse. Both soap and shampoo will clean your hair, but wouldn’t you rather have shiny and smooth?
Activity #2: All Mixed Up

Shampoo as we know it today has only been around since the 1930s. It’s designed to leave hair clean and shiny and smelling fresh. Let’s make our own!

What You’ll need from Your Kit
- Shampoo base
- Fragrance/Dye
- Mixing bowl
- Mixing spoon

Let’s get started!

Step 1: Pour the shampoo base into the mixing bowl. How does it feel? How does it smell?

Step 2: Now add the thickening agent and stir to mix thoroughly. Does the mixture feel different?

Step 3: Open the container of fragrance/dye. Touch a bit of the liquid with your fingers. How does it feel? How does it smell? Add half of the dye and fragrance to the shampoo base in the mixing bowl. (Save the rest of the fragrance/dye—we’ll use it to make conditioner.)

Step 4: Stir the shampoo and fragrance/dye together until the dye is completely mixed into the base. Does the color of the dye change during mixing or is it the same as the dye left in the bottle?

Step 5: Carefully pour the shampoo back into its original bottle. Voila! Here’s your very own shampoo! Be sure to wash the mixing bowl for a later activity.

Activity #3: Oil & Water

Why do we need shampoo at all? Why not just use water to clean our hair? Let’s find out!

What You’ll need from Your Kit
- Shampoo from previous activity

What You’ll need to get or use
- Vegetable oil

Keratin is a tough little protein. Hair fiber is about as strong as a copper wire of the same size. In fact, some circus performers have been known to hang upside-down by their hair!

FUN FACT

Eyelashes and eyebrows have very short active phases, which is why these hairs are so much shorter than the ones on your head. Thank goodness!
SCIENCE CONTENT: A HAIR-RAISING EXPERIENCE

So wait a minute. If hair is dead, how does it grow? There’s an answer for that.

Each strand of hair starts from a tiny hole in the skin called a follicle. There are about 5 million hair follicles covering your entire body (except the soles of your feet and the palms of your hands)—about 100,000-150,000 follicles are on your scalp. Living hair cells grow at the bottom of each follicle; they push their way upward, harden and form a hair shaft.

Hair actually grows in cycles. There’s an active phase and a resting phase. During the active phase, which can last for 2-6 years, new cells are forming in the follicle and continuing to push upward, which is how the hair lengthens—it grows from the bottom, not at the ends. (So the newest part of a hair is at the root, and the oldest is at the end.) Some people have a short active phase, so they have a hard time getting their hair to grow beyond a certain point. Other people have a long active phase—their hair can grow really, really long.

During the resting phase, hair just sits in the follicle—no new cells are made. When it becomes active again, the old hair resting in the follicle gets pushed out by a new hair. This is why we shed hair—about 15-100 hairs each day. We don’t lose all of our hairs at once because follicles aren’t all on the same active/resting cycle.

Let’s get started!

**Step 1:** Drop a small amount of vegetable oil onto your fingertips and rub it into your hands. How does it feel?

**Step 2:** Run your hands under a faucet and try to wash the oil off with plain water. What happens? Does the water mix with the oil or bead up? How do your hands feel—clean or greasy?

**Step 3:** Now drip a little bit of your shampoo onto your hands and rub it into your skin. How does it feel?

**Step 4:** Run your hands under the faucet again and try to wash the oil off your hands. What happens this time? Did the shampoo get rid of the oil?
Activity #4: Through Thick and Thin

No two heads of hair are alike. There’s thick and thin, straight and curly—and everything in between. Certain styles work better with different hair types than others. How do you know what kind of hair you have? Here’s a quick experiment to help you figure it out.

Let’s get started!

**Step 1:** If your hair is long enough, pull it into a ponytail. If the base of the ponytail is small—about the size of a dime—you have thin hair. If your ponytail is bigger—looks more like a horse’s tail—you have thick hair. Most people’s hair is somewhere in between. Compare with your friends and family—what kind of hair do they have?

**Step 2:** If you have shorter hair, here’s another trick to tell the thickness of your hair: Wet your hair thoroughly with water. Can you see your scalp through your hair? If you can, your hair is thin. If you can’t your hair is thick.

---

**Fun Fact**

Using a flat iron, it can take 30 minutes to an hour to straighten really curly hair.

---

**Science Content: Getting Down and Dirty**

All substances are made of molecules. Some molecules are called polar molecules—they like water. Other molecules are called non-polar—they don’t like water. Oil, dirt and grease happen to be non-polar. When they come into contact with water, they try to get away from it.

This is important to know when it comes to cleaning your hair. Each hair follicle is surrounded by glands that produce a natural oil called sebum. The good thing about sebum is that it keeps hair shiny and flexible. That bad thing about sebum is that it attracts dirt.

When you wash your hair, you want to get rid of the dirt, but keep some of the sebum so that you don’t completely dry out your hair. Water alone doesn’t work as cleanser; because the sebum just repels it (remember; the oil is non-polar). That’s where we get the phrase “oil and water don’t mix.” But water and shampoo are the perfect combination. Shampoo molecules are attracted to the water and the dirt and oil. The shampoo grabs onto the dirt and oil and then clings to the water when you rinse your hair. Together the water and shampoo strip the sebum—and the dirt attached to it—from the hair; but they leave enough oil behind to keep your hair healthy and strong.
The thickness of your hair is also known as volume, which really comes down to the number of hairs per square inch on your scalp. Some people have more follicles packed closer together—that’s thick hair—and other people have follicles spaced farther apart—that’s thin hair. Take a look at your scalp. Does it seem like your hairs are close together or farther apart? Does this match what you discovered in the experiment above?

It seems like people with thin hair always wish they had thick, and people with thick hair always wish theirs was thinner. You can’t change the number of follicles on your head—you’re born with a certain number and that’s how many you have for the rest of your life. But there are certain things you can do to make the most of what you have.

**Thin hair:** Blunt haircuts will make thin hair look like it has more volume. So will blow drying from the roots. Styling products such as protein conditioners, light gels and mousses will also give thin hair a lift. Be careful not to use heavy products that will weigh down your hair.

**Thick hair:** Thick hair can be hard to manage and will overwhelm people with smaller faces. Layered haircuts can help reduce some of the volume and give hair more shape. Styling products such as pomades and strong hair gels can help control thick hair.

Like thick and thin, curly vs. straight is something that people always want to change about their hair. You can temporarily add curl—with a perm or a curling iron—or make your hair straighter—with a relaxer or a flat iron. But just like with volume, you can’t permanently change your hair. That’s because whether you have curly or straight hair, which is also known as texture, starts with the follicle. Some people have follicles shaped like a circle—this gives them straight hair. Other people have follicles shaped more like an oval—this gives them curly or kinky hair. Since you can’t change the shape of your follicle, you can’t really change the texture of your hair.
Activity #5: Get in Condition

Conditioners originally were used to replace some of the oil removed during shampooing. Today they do that and so much more—they moisturize, provide shine and strengthen. That’s one hard-working styling product. Let’s make our own!

Let’s get started!

Step 1: Pour the conditioning base into the mixing bowl. How does it feel? How does it smell?

Step 2: Add the remaining fragrance/dye to the conditioning base and stir together until the dye is completely mixed into the base. The conditioner will form a layer on the surface of the hair and help bind the cuticle scales together—remember, that’s what makes hair smooth and healthy.

Step 3: Carefully pour the conditioner back into its original bottle. Voila! Here’s your very own conditioner! Set aside for the next activity.

What You’ll need from Your Kit

- Conditioner base
- Fragrance/Dye
- Mixing bowl
- Mixing spoon

SCIENCE CONTENT: DIFFERENT STROKES FOR DIFFERENT FOLKS

There are different kinds of conditioners for different types of hair. Each has its own chemical formula designed to produce specific results:

If your hair is dry, you might want to use a moisturizing conditioner. These contain chemicals called humectants, which attract and hold moisture in the hair.

If your hair is damaged, maybe with split ends, you might need a reconstructor. These contain proteins that strengthen the hair.

If you have fine hair, you might like an acidifier. These create shine and bounce without weighing down the hair, which can make fine hair look limp and lifeless.

If you style your hair with a curling iron or hot rollers, a thermal protector might be a good option. These contain compounds that evenly distribute the heat, which protects the hair from damage.

FUN FACT

In the old days, some conditioners used to contain so much oil, people had to pin extra fabric to chairs and sofas to keep the grease from rubbing off on the furniture.
Activity #6: Lather, Rinse, Repeat

Now that you have your very own homemade hair products, it’s time to use them! We’ll give you tips on the perfect way to shampoo and condition your hair.

**What You’ll need from Your Kit**
- Shampoo
- Conditioner

**What You’ll need to get or use**
- Brush
- Towel wrap
- Water

**Let’s get started!**

**SHAMPOO**

**Step 1:** Thoroughly wet your hair with cold or warm water (hot water can dry the hair and scalp).

**Step 2:** Pour a quarter-sized amount of shampoo onto your palm and rub your hands together to evenly distribute. Apply the shampoo to your scalp using the balls of your fingers. Your main goal is to clean your scalp, so be sure to massage gently.

**Step 3:** Rinse. This is when the shampoo runs through your hair.

**CONDITION**

**Step 1:** After rinsing out the shampoo, rub a dime-sized amount of conditioner between your palms (you may need more or less conditioner depending on the length of your hair). Apply the conditioner to your hair, starting at the middle of the shaft and working your way to the end—only apply to the scalp if the scalp is dry.

**Step 2:** Run the brush through your hair to make sure the conditioner is spread evenly. Leave the conditioner on your hair for a few seconds before you rinse.

**Step 3:** To rinse in the shower, gently lift your hair so that water can reach your scalp. You’ll know you’ve rinsed long enough when your hair feels clean when you run your fingers from your scalp to the ends of your hair.

**Towel Drying:**

Heat can damage your hair, so it’s good to allow hair to partially dry in a towel first before blow drying.

**Step 1:** Bend over at the waist and flip your hair forward, away from the base of your head. If you have longer hair, it should hang down in front of your face.

**FUN FACT**

“The first modern conditioner, called “brilliantine”, was introduced in Paris in 1900.”

“Dry shampoo” works without water. It’s made from a powder, such as starch or talc, that absorbs excess sebum before being brushed out.

**FUN FACT**

“The first modern conditioner, called “brilliantine”, was introduced in Paris in 1900.”

“Dry shampoo” works without water. It’s made from a powder, such as starch or talc, that absorbs excess sebum before being brushed out.

**Dry shampoo** works without water. It’s made from a powder, such as starch or talc, that absorbs excess sebum before being brushed out.
Step 2: Center the towel over the back of your head, with the ends hanging down.
Step 3: Twist the ends of the towel together around your hair.
Step 4: Flip the twisted ends of the towel back over the top of your head and stand upright. There’s your towel wrap!

---

**Activity #7: Shape Up!**

Have you ever shown your stylist a picture of a model or an actress and asked for the same haircut? Were you disappointed that your hair didn’t turn out the same? That’s because you might not have the same type of hair as the person in the photo—remember what you’ve learned about thick and thin, curly and straight—and you also might not have the same type of face. The shape of your face has a lot to do with the kind of style that looks best on you. Let’s find out what shape you are!

**What You’ll need from Your Kit**

- Mirror
- Bar of soap
- Water (optional)
Let’s get started!

**Step 1:** If you have long hair, pull it back in a ponytail, making sure to keep any bangs off your forehead. If you have short hair, slick it back with water.

**Step 2:** Looking straight into the mirror, trace the shape of your face onto the mirror with a bar of soap. Follow the hairline around your temples and forehead, down your cheeks and around your chin. (Don’t forget to wash the outline off the mirror when you’re done with this activity.)

**Step 3:** What do you think? Is your face oval, round, square, long/diamond or heart?

**Styling Tips:**

**Oval:** Oval is well balanced and can pull off nearly any style. Lucky you!

**Round:** Pixie cuts, side parts and tapered ends work well. Try to keep hair off the face near the cheekbones.

**Square:** Add curls, wispy bangs or height. Avoid straight bangs, center parts and long, hanging hair.

**Long/Diamond:** Add bangs and layers, curls or waves around the chin and temples. Avoid really long or really short cuts—these will make the face seem even longer.

**Heart:** The goal is to balance the shape of your face. Decrease the volume on the top and sides, and add curls or fullness near the chin. Wispy bangs or fringe work well.

Don’t be afraid to experiment, but also be sure to talk to your stylist before trying anything too crazy! Get her honest opinion—she’s the expert and will be able to tell you if a certain cut will look great on you or be a complete nightmare!
One of the things people most often want to change about their hair is the color. Some people wish theirs was lighter, others want to go darker. It's easy enough to try a new color with a chemical dye (though not always so easy to switch back if you don't like the results). Did you ever wonder why the dye isn't permanent? Again, it all comes back to the follicle. The dye only affects the shaft, which is dead. The follicle continues to produce new hair cells, which are the person's natural hair color. That's why a person's "roots" are the first to give away their secret when they dye their hair.

Along with hair cells, follicles also contain cells called melanocytes. These produce pigments called melanins, which give your hair its color. There are two kinds of melanin—one creates black and brown color and one creates red. Darker hair has more melanin in it, lighter hair has less. Grey hair has no melanin—melanocytes die off as we age. It's possible for different follicles on the same scalp to produce different amounts of melanin—that's why if you have brown hair, for example, some of your hair strands might be nearly black and some might be golden.

You can dye your hair any color under the rainbow—pink, purple, orange, green—but there are only four natural hair colors:

**Black**—Black is the darkest and has the most of the black-brown melanin. It's the most common hair color in the world.

**Brown**—Brown has a lot of brown-black melanin, but less than black. It's the second most common color, and the most common color among Europeans. Brown-haired people are also called brunettes.

**Blonde**—Blondes have very small amounts of melanin in their hair. The color can range from nearly white to golden. It is common in Europeans but rare among non-Europeans.

**Red**—Red is the rarest natural hair color. It can range from strawberry to deep burgundy. Redheads have the most of the red melanin.

Why does hair get lighter in the summer? Because the sun bleaches and destroys the melanin in your hair. To protect your hair, you should wear a hat, just like you wear sunscreen on your skin.

**FUN FACT**

We don't know if blondes really have more fun, but they do have more follicles. Typically, blondes have 120,000 scalp follicles versus 100,000 for dark-haired people and 80,000 for redheads.

Black—Black is the darkest and has the most of the black-brown melanin. It's the most common hair color in the world.

Brown—Brown has a lot of brown-black melanin, but less than black. It's the second most common color, and the most common color among Europeans. Brown-haired people are also called brunettes.

Blonde—Blondes have very small amounts of melanin in their hair. The color can range from nearly white to golden. It is common in Europeans but rare among non-Europeans.

Red—Red is the rarest natural hair color. It can range from strawberry to deep burgundy. Redheads have the most of the red melanin.