



# Be a Scientist!

Use arts and crafts materials to build a 3-D model of the layers of the human skin. Choose materials that will represent the properties of each layer on the basis of what you learned in this book. Label special features found in each layer and the functions of each.

Now add two examples of skin damage to your model and label them. Use your model to teach others about the layers of their skin and how they can keep their skin healthy.



## Beyond the Book

Use the library or the Internet to research ways to protect your skin from the Sun's ultraviolet rays.

FOCUS Book

# Skin

## It Has You Covered



Science A-Z



## Notes

# Skin

## It Has You Covered



### FOCUS Question

What are the functions of your skin?

Systems and System Models

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## Your Amazing Skin

Skin! Your body is covered in it. But what is skin, and why do you need it?

Skin is the body's largest *organ*. An organ is a part of the body that has a specific and important function, such as your heart or lungs. Skin is a part of the *excretory system*, the system that rids the body of waste. But it does much more than that.

Skin covers and protects your muscles, bones, blood vessels, and other parts of the body. It protects your body from the outside world. It keeps most fluids inside the body and germs out. It's a waterproof coat, and it keeps the body from getting too hot or too cold. Skin also allows us to sense the outside world.

### Math Moment

Skin makes up about 15% of a person's body weight. If a person weighs 160 pounds, about how much does their skin weigh? (Hint: Multiply by 0.15 to solve the problem.)

From birth, people use their skin to sense things around them and respond to touch.



## Read-Think-Write

Write your answers on separate paper. Use details from the text as evidence.

- 1 What kind of body part is skin, and which body system is skin a part of?
- 2 From outside to inside, what are the three layers of the skin?
- 3 According to the book, what are two important functions of pores?
- 4 What are two processes that help skin heal from a cut?
- 5 How does keeping skin clean help it stay healthy?

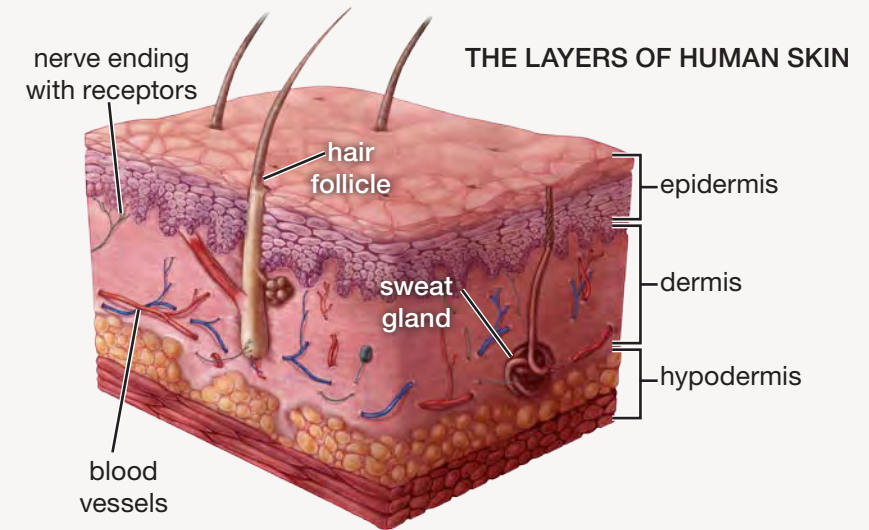
### FOCUS Question

What are the functions of your skin? Describe the three layers of your skin and explain the function of each. Include in your description the components of each layer.



## On the Surface

Skin covers your whole body, but it is thicker in some places and thinner in others. The area around your eyes and eyelids has the thinnest skin. The bottom of your feet and palms of your hands have the thickest skin.



All skin is divided into three layers: the *epidermis*, the *dermis*, and the *hypodermis*. The epidermis is the thin outer layer. It is composed of dead, flattened cells at the surface of the body. Epidermis cells are constantly dying, flaking off, and being replaced by cells from below. Washing your skin helps remove the dead cells. We replace our epidermis about every thirty-five days.



Did you know that your nails and hair are part of your skin? Like all skin, they contain *keratin*, a type of protein produced in the epidermis.

Keratin gives your body a strong, flexible covering. It helps make skin waterproof and keeps out germs and chemicals from the environment.

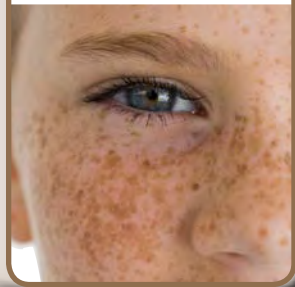


People's skin color can vary significantly, from very light to very dark.

The epidermis also produces a substance called *melanin*. Melanin protects skin from the harmful ultraviolet rays of the Sun. It also gives skin color. People born with darker skin produce more melanin than people with lighter skin. When exposed to sunlight, your skin produces more melanin and becomes a darker color.

### Do You Know?

Freckles are small groups of cells that contain more melanin. People with lighter skin are more likely to form freckles.



## Skin Changes Over Time

Even without an injury, skin changes as we age. Babies have thin skin that becomes thicker and less sensitive as they grow to be children, teens, then adults. As adults get older, the skin thins again and produces less collagen. Less collagen means the skin becomes wrinkled and less stretchy.

The skin bruises more easily and may show signs of long-term sun damage. Some aging of the skin is natural. But too much exposure to sunlight and chemicals, such as cigarette smoke, can produce more wrinkles and age spots at a younger age.

Your skin will stay healthy if you keep it clean, drink plenty of water, and get enough sleep. Protect your skin so your skin can protect you!



Skin changes over the course of a lifetime.

## Skin's Healing Power

When your skin is injured, other parts of your body go to work. If your skin is cut, the circulatory system first slows blood flow to the damaged area to reduce bleeding. Then *scabs* form to protect the wound from germs until new skin grows. Scabs usually heal fairly quickly and leave little or no sign of injury.

If the wound is deep, your body creates *scar tissue* from collagen. Scar tissue has no hair follicles or sweat glands. It also has less protection from ultraviolet rays so it must be protected from sunlight even more than normal skin. Unlike scabs, scars are often permanent.



Scar tissue and scabs are both ways that skin protects and heals itself.



## Below the Surface

The dermis is the middle layer of your skin (see diagram on page 3). It contains *collagen*, a type of tissue that connects the body together. Collagen makes skin firm but allows it to stretch and return to its shape like a rubber band.

Tiny holes in the dermis, called *pores*, extend up into the epidermis. Some pores contain hair *follicles*—small tubes in the skin that hold each hair's root. *Sebum* is a kind of oil that moves up through the pores. Sebum keeps the skin moist, helps make it waterproof, and helps protect it from germs.



The skin contains millions of pores.

### Do You Know?

Too much sebum can block pores with oil, dirt, and dead epidermis cells, and then become infected. The results are pimples! Washing your skin to remove extra sebum can help keep pimples from forming.





Blood vessels in the dermis provide nutrients to the skin. These blood vessels, along with sweat glands, help control your body's temperature. When your body is too warm, the blood vessels expand to release heat at your body's surface. The sweat glands release water through pores. Water evaporating from your skin's surface cools the body. The dermis also has *receptors* and nerve endings that sense pressure, touch, pain, and temperature.

The hypodermis (see diagram on page 3) is the deepest layer of skin. It attaches the dermis to muscles and bones. The hypodermis stores fat for quick energy. Fat also provides padding and insulates the body from temperature changes.



Sweating helps keep the body cool during and after exercise.

## Skin Damage

While interacting with the world, skin sometimes gets damaged. Lucky for you, skin can change to protect itself. In areas that get a lot of friction, like where hands grip tools, a *callus* may form. A callus is a thick, hard area on the skin that gives extra protection to the area.



Too much friction can cause a *blister* to form. A blister is a fluid-filled sac beneath the epidermis. Blisters can also form due to sunburn, irritants like poison ivy, or extreme hot or cold temperatures. A blister hurts, but it cushions the dermis from further injury.



The repeated rubbing of fingers against the strings of an instrument can cause calluses.