9. vein _____

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10. capillaries _____

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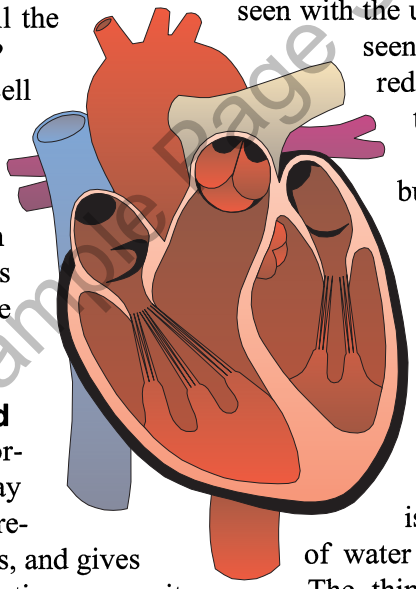
Read the following text for good understanding.

In the past few weeks, we have learned that the body needs oxygen to live and operate. This oxygen enters the body through respiration, or breathing. The lungs separate oxygen from the air that we breathe. But how does the oxygen get to all the organs of the body that need it?



Oxygen travels to every cell of the body by means of the blood. The body could not operate without the blood; in fact, if the blood is lost, death soon follows. The Bible tells us, "the life of the flesh is in the blood." (Leviticus 17:11)

The Purpose of the Blood

The blood has many important functions. On its way through the lungs, the blood receives oxygen from the air cells, and gives up carbon dioxide. In the digestive organs, it takes up food. It carries oxygen and food to all the organs and tissues, and it carries away the carbon dioxide and other waste substances. Through the lungs and kidneys and skin, it passes off waste material. Lastly, the blood, as it circulates, **distributes** to all parts of the body the heat produced by the activity of the muscles and glands. You will learn more about these two kinds of organs later. Briefly, it may be said that the blood has two functions: to take **nourishment** to all parts of the body and to take away the waste material.

The Composition of the Blood

The appearance of the blood under the microscope differs from its appearance when seen with the unaided eye. You have probably seen blood, and you know that it is red and thicker than water. Under the microscope, it does not appear to be a red liquid at all, but a watery-looking fluid, with many little white and colored **corpuscles** floating in it. The blood appears red, just as water in a pan, with many red cranberries or strawberries floating in it, looks red.

There are actually four parts to the blood. First, there is the thin, watery part composed of water and of the food that is eaten. The thin, watery part of the blood is called **plasma**. The nutritious parts of the food are taken up by the capillaries in the walls of the stomach and intestines and carried by the plasma.

Second, there are the corpuscles, so thin and round, known as the red corpuscles. Although looking at them singly, under the microscope, they are yellowish in color; they appear red when many are seen together. Each of them carries a load of oxygen from the lungs to the organs, as boats carry coal down the

10. fatigued_____

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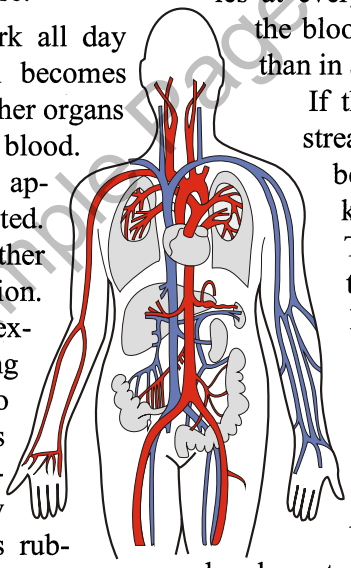
Read the following text for good understanding.

Improving Circulation

Does your face ever **flush**, even though you are not blushing, or when you are sitting by a fire? When you are older and study an advanced book in physiology, you will find out how muscular exercise affects the circulation. The glow and warmth resulting from active play and work are more **beneficial** to the body than the warmth that comes from a fire. The heart is **stimulated** by exercise.

People who sit at their work all day long find that their circulation becomes **sluggish** because the brain and other organs do not get enough oxygen-rich blood. Such people feel dull, lose their appetites, and become low spirited. Some of them take alcohol or other drugs to stimulate the circulation. What they really need is to take exercise. This makes deep breathing necessary and causes the heart to beat more rapidly. It does this without poisoning the body by alcohol and other drugs. A very cool bath, followed by vigorous rubbing, promotes the circulation better than poisonous stimulants.



Boys should not run, or girls jump the rope, long enough to injure the heart by making it do too much work. By running or exercising a little longer each day, the heart becomes so strong that it does not readily begin to thump when much effort is put forth.

Dangers to Circulation

It is more dangerous to cut an artery than a vein. This is because the walls of the veins are thin and flabby, so that when cut they have a tendency to fall together and close the opening. There is little danger from a cut vein unless it be one of the large veins of the neck, armpit, or thigh. On the contrary, the walls of the arteries are stiff and tough and do not readily close up, even if pinched together. The cut end often has to be tied to keep it closed.

The heart is pumping blood into the arteries at every contraction. This action forces the blood out of a cut artery in jets rather than in a steady stream.

If the blood comes in a slow, steady stream, we may know that a vein has been cut; if it comes in **jets**, we may know that an artery has been cut. The arteries are located deep below the surface and are therefore less likely to be injured than the veins.

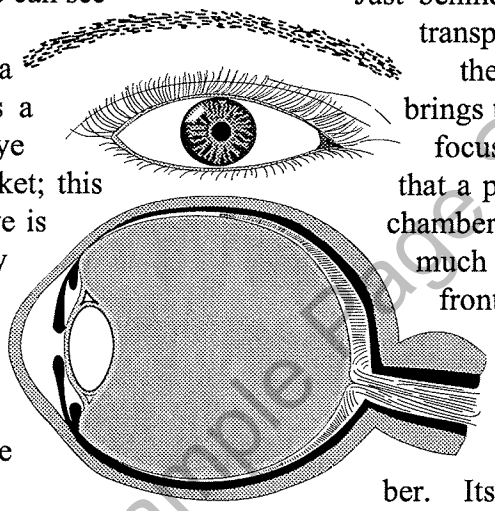
Bleeding from a severe wound may be stopped by tying around the limb close to the wound a handkerchief, towel, or anything at hand suitable for a bandage. Put a stick under the bandage, twisting it around and around, so as to hold the bandage tight and cause the knot to press upon the blood vessel. If an artery has been cut, the pressure must be applied on the artery between the wound and the heart. If a vein has been cut, the pressure must be applied on the side of the wound away from the heart.

When blood is exposed to the air, it thickens or coagulates by means of the platelets. The coagulated blood, by filling up the cut, stops the flow. The thickening is followed by little strings that form in the watery portion of

Read the following text for good understanding.

SIGHT

Touch, taste, and smell bring us into contact with the bodies that we perceive through these senses. But the senses of sight and hearing give us knowledge of things at a distance as well as of those at hand. The sense of sight enables us to look at a thing within a few inches of our faces one second, and at something else, miles away, the next second. There are things so far away that nobody has ever measured the distance, yet we can see them. What are they?



The eyeball is set into a deep bony socket. There is a cushion of fat between the eye and the hard wall of the socket; this cushion sinks in when the eye is struck, so that the eye may not be injured. A large nerve, called the optic nerve, goes from the brain to the eyeball, passing through an opening in the back part of the socket.

The eyeball is tough and almost round. Its tough outer wall or covering is lined with delicate membranes. Most of the wall is white, but the front part of the wall, called the **cornea**, is colorless like glass and bulges out a little. If you look for it in a mirror, you cannot see it well in your own eye. If you look at the side of another person's face, you can see the **transparent** cornea bulging out in the front part of the eyeball. Behind the cornea is a space filled with a watery fluid, forming the front chamber of the eye. At the back of this chamber hangs a curtain called the **iris** (meaning rainbow), which gives the color to the eye. The color of the iris is due to the pigment it contains. People with much pigment in the skin, making it dark, usually have dark eyes also. In the center of the iris is a hole called the pupil.

When we go from a dark room into a lighted room, the eyes are pained by the entrance of too much light. Soon the iris contracts around the pupil, which becomes smaller and smaller, until it shuts out enough light to cause the pain to cease. In going from a light room into a dark room, a person is unable to see anything at first. After a short time, the pupil of the eye dilates, until it admits **sufficient** light to enable the person to see things clearly.

Just behind the iris and the pupil is a transparent rounded body called the crystalline lens. This lens brings the rays of light to a point, or focus, in the back of the eye, so that a picture is formed. There is a chamber in the eye behind the lens, much larger than the chamber in front of the lens.

This chamber contains a clear, jellylike substance. The optic nerve spreads out on the lining of this chamber. Its lining is called the **retina** (ret'-i-na). Upon the retina the light is brought to a focus, forming pictures that remain for a moment and then gradually fade away. A bright light looked at for a short time may still be seen as a dim image for a few seconds after the eyes are closed and the head turned away. For the same reason, a stick with a glowing coal at one end, whirled around at night, looks like a bright ring.

Without the optic nerve to carry the impression to the brain, we could really see nothing. Although the picture might be made in the eye, we could not see it unless the brain could get the message.

Nearsightedness, or having difficulty seeing clearly at a distance, is caused by the eyeball being too long, the light coming to a focus before it reaches the retina. Farsightedness, or difficulty seeing objects near at hand, is

Lesson 4

Observe the pupil of the eye of a friend, and see how it reacts when you bring the light of a flashlight in front of it quickly and take it away. Do not shine the light directly into the eye. Record your observations below.

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Using an encyclopdedia or other resource book, color and label the picture of the ear below. Show the parts with arrows and names.