

Standard Covered

CCSS.RI.K.10: Actively engage in group reading activities with purpose and understanding.

“Like a Car”

Answer Key

1. oil
2. blood

Standard Covered

CCSS.RI.K.10: Actively engage in group reading activities with purpose and understanding.

“Your Brain: The Boss”

Answer Key

1. fist
2. all

Healthy Habits

Read with your teacher.

Run. Jump. Ride a bike. Exercise makes your muscles strong. Exercise helps your body work well.

Eat foods that are good for you. They help your heart work well. Your body works better when your heart is healthy.



Circle.

Write.

1. Exercise is _____ for muscles.
hot bad good

2. Some _____ help your heart and blood work well.
cake foods TV



Standard Covered

CCSS.RI.K.10: Actively engage in group reading activities with purpose and understanding.

“Healthy Habits”

Answer Key

1. good
2. foods

A Winner

Read with your teacher.

This is Storm. Storm loves to play ice hockey. One day he found out that he was sick. He was too sick to play hockey. He needed special care.

Storm was brave. He worked for months to get better. He did not give up. Finally, he played hockey again. Everyone was happy. They clapped and cheered. They were proud of Storm.



Write.

1. I think Storm was _____ when he could not play hockey.

2. I think people were proud of Storm because _____

Standard Covered

CCSS.RI.K.10: Actively engage in group reading activities with purpose and understanding.

“A Winner”

Answer Key

(Wording may vary.)

1. sad
2. he did not give up.

So Important!

What works every minute of every day? Blood does! Blood flows in your body when you run. It flows in your body when you sleep. It flows all the time. Blood is like a supply truck. It takes things you need to all parts of your body.

Blood has many jobs. One job is to carry a gas called oxygen. Blood takes the oxygen to different parts of your body. You need oxygen to live. Another job is to fight germs. Part of your blood fights germs to keep you from getting sick. A third job of blood is to help you when you get a small cut. When a small cut bleeds, part of the blood makes a plug. The plug closes up the cut. Then the bleeding stops.

Blood helps our bodies in many ways. We count on blood to keep our bodies working well!



Did you know?

Healthy blood is important. The Leukemia & Lymphoma Society works to help everyone have blood that works well.

Write.

1. How is blood like a supply truck? _____

2. What are three ways that blood helps our bodies?

Standards Covered

CCSS.RI.1.1: Ask and answer questions about key details in a text.

CCSS.RI.1.10: With prompting and support, read informational texts appropriately complex for grade 1.

“So Important!”

Answer Key

1. It takes things the body needs to all parts of the body.
2. It takes oxygen to different parts of the body. It fights germs. It helps cuts to stop bleeding.

Mighty Fighters

Think about a time you were sick. Did you know that part of your blood was fighting germs? White blood cells are fighters. They protect you too. They float in your blood and look for germs. Most of the time you do not have a lot of white blood cells. Your body makes more when you are sick. Then there are more fighters to get rid of germs.



White blood cells are not really white. They do not have a color. There are different kinds of white blood cells. Each kind has a job. Some white blood cells block germs. They do not let germs get in your blood. Some white blood cells kill germs. All the white blood cells work like a team. They work hard so you can feel well!

Circle **True** or **False**.

- | | | |
|--|------|-------|
| 1. White blood cells try to get rid of germs. | True | False |
| 2. All white blood cells are the same. | True | False |
| 3. Your body always has a lot of white blood cells. | True | False |
| 4. Some white blood cells do not let germs in your blood. | True | False |
| 5. White blood cells try to keep you well in different ways. | True | False |

Standards Covered

CCSS.RI.1.1: Ask and answer questions about key details in a text.

CCSS.RI.1.10: With prompting and support, read informational texts appropriately complex for grade 1.

“Mighty Fighters” Answer Key

1. True
2. False
3. False
4. True
5. True

Keep Your Engine Running!

Your body is like a car. A car needs oil. The oil helps the car run well. Your body needs blood. Blood takes oxygen to all parts of your body. Your body needs healthy blood to work well.



There are some things people can do that are good for their blood. One thing is to move around a lot. Run and jump and play. Your heart beats faster when you are active.

That means it pumps blood faster. Another good thing people can do is eat well. Do not eat many foods that have a lot of fat or sugar. Eat fruit and vegetables each day. Healthful foods give blood what it needs to do its work. You can make good choices for your body!

Draw a line to match each sentence beginning with the best ending.

- | | |
|---------------------------------------|-------------------------------------|
| 1. Your heart beats faster when you • | • oxygen to all parts of your body. |
| 2. Your heart pumps • | • fruits and vegetables. |
| 3. Blood takes • | • sweets. |
| 4. Try to eat plenty of • | • move around. |
| 5. Do not eat many • | • blood. |

Do you think the title is good? Why or why not? _____

Standards Covered

CCSS.RI.1.1: Ask and answer questions about key details in a text.

CCSS.RI.1.10: With prompting and support, read informational texts appropriately complex for grade 1.

CCSS.W.1.1: Write and support an opinion.

“Keep Your Engine Running!” Answer Key

1. move around.
2. blood.
3. oxygen to all parts of your body.
4. fruits and vegetables.
5. sweets.
6. Answers will vary but should include that a human body needs blood.
If the blood isn't healthy, the body doesn't work well.

What's in a Name?

Some restaurants have special names. Steve McHugh's restaurant does. He named it **Cured**. He picked that name for two reasons. Cured is one way that meat can be prepared. Cured also means "made healthy." That means a lot to Steve. Several years ago, his blood did not work well. Steve's doctor helped Steve get lots of special care. It took a long time for Steve to get healthy. It took a long time for Steve's blood to work well.



Now Steve feels a lot better. He helps other people whose blood does not work well. One way he helps is with the "Cured for a Cure Dinner."

He plans the dinner each year. He raises money with it. The money is for research. The research helps people who are sick like Steve was. What a great way for Steve to help others!

Did you know? The Leukemia & Lymphoma Society funds research and provides lots of information. This helped Steve understand the treatment for his illness.

Look at the underlined words above. Circle the correct meaning.

- raises

lifts	collects	buys
-------	----------	------
- research

food	study	find
------	-------	------
- Write two words that describe Steve. Tell why you picked the words.

Standards Covered

CCSS.RI.1.1: Ask and answer questions about key details in a text.

CCSS.RI.1.10: With prompting and support, read informational texts appropriately complex for grade 1.

CCSS.L.1.4a: Use sentence-level context as a clue to the meaning of a word or phrase.

“What’s in a Name?”

Answer Key

1. collects
2. study
3. Answers will vary.

Bones: Inside and Out

A big part of your skeleton is made of **bones**. Bones support the body. They also give the body its shape. Plus, bones protect organs like the lungs, brain, and heart.

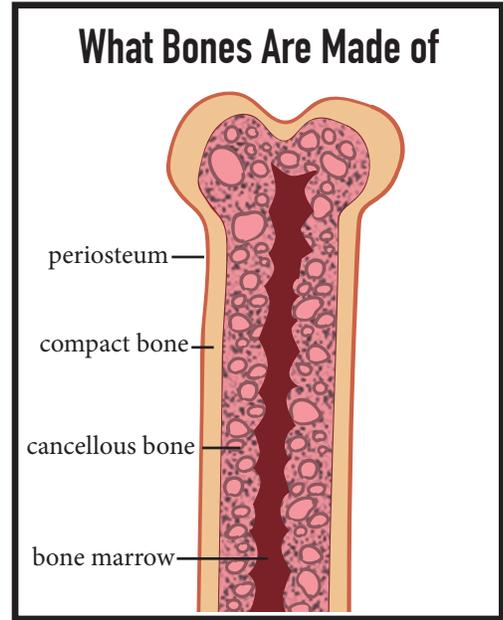
Bones are alive. They grow and change. All bones have blood vessels and nerves. Almost every bone in the human body is made of the same layers.

The outside layer is made of solid, hard tissue, but it is thin. This layer has nerves and blood vessels in it. It is called **periosteum** (say *pear-e-os-tee-um*.)

Below this layer is another hard layer. This layer is smooth. It is called **compact bone**. This is the hardest tissue in the human body.

The next layer looks like a sponge. It is called **cancellous** (say *can-sa-lus*) **bone**. It is not as hard as the layer above it, but it is still strong.

The center of the bone is filled with **bone marrow** (say *mare-oh*). Bone marrow looks like jelly. It can be yellow or red. Yellow bone marrow is mostly fat. Red bone marrow makes blood cells for the body.



Did you know?
Your bones provide support to your body. The Leukemia & Lymphoma Society (LLS) provides support in a different way. LLS supports blood cancer patients by giving them facts about their illnesses and making sure they get treatments they need.

Write a bold word from the passage to answer each question.

1. What is a big part of your skeleton made of? _____
2. Which layer of bone is the hardest tissue in the human body? _____
3. What is the outside layer of bone called? _____
4. What part of the bone looks like yellow or red jelly? _____
5. Which layer of bone is strong, even though it looks like a sponge? _____
6. What is the title of the bone diagram? _____

Explain: How does the diagram help you understand bones better? _____

Standards Covered

CCSS.ELA-LITERACY.RI.2.1: Ask and answer such questions as *who*, *what*, *where*, *when*, *why*, and *how* to demonstrate understanding of key details in a text.

CCSS.ELA-LITERACY.RI.2.7: Explain how specific images (e.g., a diagram showing how a machine works) contribute to and clarify a text.

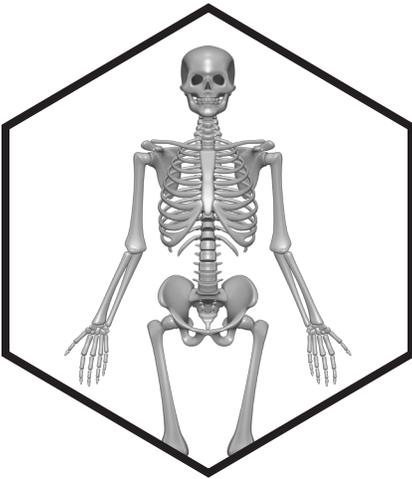
“Bones: Inside and Out”

Answer Key

1. bones
2. compact bone
3. periosteum
4. bone marrow
5. cancellous bone
6. What Bones Are Made Of

Explain: Answers will vary.

Bones by the Numbers



The human body is made of many things. There is skin and hair on the outside. On the inside there are parts like blood vessels, organs, muscles, and bones.

There are about 206 bones in a grown-up's body, and each bone has its own name. Some parts of the body have more bones than others. For example, you have 27 bones in each hand but only three bones in each ear. Your spine, or backbone, is made of 33 bones, but there is only one bone in your throat.

Some parts of your body have special bones. Your skull is one of these body parts. The bones in the skull protect your brain. They also form your face. There are 22 bones in the skull. Only one of these bones moves. It is called the mandible, or lower jawbone. This moving bone helps you chew and talk. The rest of the bones in the skull do not move. In fact, they are joined together like one big piece of bone.

The ribs are also special bones. Your ribs act like a cage. They protect your heart and lungs. They also help you breathe. Most people have 12 pairs of ribs. That makes 24 ribs in all! Some ribs are connected to a bone in the center of the chest. Some are connected to the ribs above them. A few ribs are called "floating ribs" because they do not touch any other bones. They stay in place with help from special body tissues.

The spine is made of small bones called vertebrae that are stacked on top of each other. The spine protects your spinal cord. It also supports your body and helps it move. The spine is special because the small bones work together as one bone.

Did you know?

Imaging tests, like x-rays and CT scans, take pictures of your bones. Some imaging tests show broken bones. Others show signs of disease in the body.

What does each number tell about bones?
For each number, write a fact about bones from the reading.

- ① _____
- ⑫ _____
- ⑫ _____
- ⑫ _____
- ⑫ _____
- ⑫ _____
- ⑫ _____

Standards Covered

CCSS.ELA-LITERACY.RI.2.1: Ask and answer such questions as *who*, *what*, *where*, *when*, *why*, and *how* to demonstrate understanding of key details in a text.

“Bones by the Numbers” Answer Key

Answers will vary but may include the following information.

- 1 There is only one bone in the throat.
- 12 Most people have 12 pairs of ribs.
- 22 There are 22 bones in the skull.
- 27 You have 27 bones in each hand.
- 33 Your spine is made of 33 bones.
- 206 There are about 206 bones in a grown-up’s body.

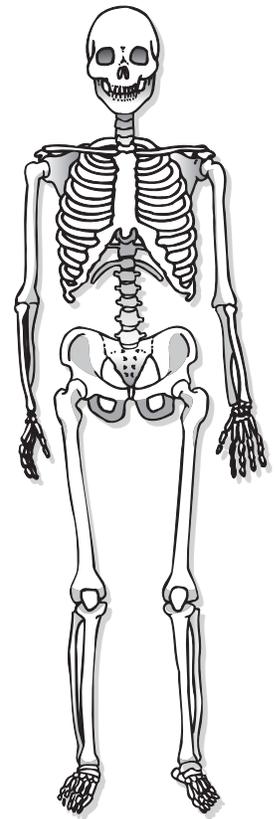
Your Changing Bones

Other than your clothes, what gets smaller as your body grows bigger? Believe it or not, it's your number of bones! Of course your bones get longer as you grow, but the number of bones in your body gets smaller as you get older. You are born with about 300 bones. That number changes to about 206 by the time you are 25 years old.

The bones you are born with are made of different things. Some of these young bones are made of a soft tissue called **cartilage** (say *car-tell-ij*). Over time, the cartilage changes. It gets harder. Sometimes, the cartilage combines with bones to form larger bones. That is why the number of bones you start with gets smaller.

As you get older, changes happen inside your bones too. Your bones are made of layers. The layer in the center is made of **bone marrow**. This is where blood cells grow. When you are born, all your bones have active marrow. This means all bones are making blood cells. After you become an adult, only the bones in your skull, spine, breastbone, ribs, shoulders, and hips make blood cells. The bones in your hands, feet, arms, and legs do not have blood-forming marrow. The marrow is filled with fat instead.

You won't notice them, but changes like these happen to your bones as you get older.



Did you know?

Sometimes a person who is sick needs new cells in his or her body to get well. This person might get a bone marrow transplant. Another person gives away some of his or her healthy cells. Doctors put these healthy cells in the sick person's body.

Answer each question. Use the passage to help you.

1. What is the topic of the passage? _____
2. What one word tells what the second paragraph is mostly about? _____
3. What is the third paragraph mostly about? _____

4. How many bones do you have when you are born? _____ Is this more or less than the number of bones you have when you are 25 years old? _____
5. What is found in the center layer of bone? _____
What grows there? _____

6. After you become an adult, what happens to bone marrow in places like your hands and feet?

Standards Covered

CCSS.ELA-LITERACY.RI.2.1: Ask and answer such questions as *who*, *what*, *where*, *when*, *why*, and *how* to demonstrate understanding of key details in a text.

CCSS.ELA-LITERACY.RI.2.2: Identify the main topic of a multiparagraph text as well as the focus of specific paragraphs within the text.

“Your Changing Bones” Answer Key

1. ways your bones change over time
2. cartilage
3. changes inside your bones (bone marrow)
4. 300; more
5. bone marrow; blood cells
6. marrow does not make blood cells but is filled with fat instead

Survivor Story: Katie



Katie was tired. She didn't want to eat. Katie just wasn't herself. Her parents took her to the doctor. Katie and her parents found out that Katie was sick. She had a blood cancer called leukemia.

Leukemia (say *loo-kee-mee-uh*) begins in the bones where blood cells are made. This part of the bone is called **bone marrow**. Here is what happens. First, a cell in the bone marrow changes from good to bad. The cell grows. Then more of these bad cells form. The bad cells build up. They make it hard for the remaining good cells to live.

Katie's leukemia was in many parts of her body. It was in her lungs, liver, and spleen. Katie needed a **bone marrow transplant** to make her better.

To get a bone marrow transplant, another person called a **donor** has to give up some of his or her own bone marrow. Also, the donor's bone marrow has to match the patient's bone marrow in order for it to help.

Doctors tried to find donor matches for Katie. They only found one. It was her sister, Ella. Most of the time doctors would be happy to find a match. But this was not good news to them. Katie's sister wasn't even two years old. She was small. Doctors wanted a donor who was older and bigger than Ella. This would help the doctors get more bone marrow cells to give to Katie.

In the end, Ella was Katie's bone marrow donor. Katie got the bone marrow transplant. She is getting stronger every day, thanks to help from her sister and a team of health care providers. Maybe one day she will join other patients who got bone marrow transplants at one of The Leukemia & Lymphoma Society's bone marrow transplant reunions. These events give survivors and their families a chance to talk about what they went through and to celebrate life.

Did you know?

The Leukemia & Lymphoma Society (LLS) wants to find cures for blood cancers like Katie's. LLS works to reach its one goal, to have a world without blood cancers.

Read each sentence. Circle "true" or "false."

For each "false" sentence, cross out the word that keeps the sentence from being true.

Above the crossed-out word, write the word or phrase that makes the sentence true.

1. Blood cells are made in bone marrow. true/false
2. Katie needed a spleen to make her feel better. true/false
3. A bone marrow donor has to give up some of his or her bone marrow cells for the sick person. true/false
4. Katie's sister was her bone marrow donor. true/false
5. Katie's doctors wanted a donor who was younger and bigger than Ella. true/false

Standards Covered

CCSS.ELA-LITERACY.RI.2.1: Ask and answer such questions as *who*, *what*, *where*, *when*, *why*, and *how* to demonstrate understanding of key details in a text.

“Survivor Story: Katie” Answer Key

1. true
2. false; Katie needed a **bone marrow transplant** to make her feel better.
3. true
4. true
5. false; Katie’s doctors wanted a donor who was **older** and bigger than Ella.

Blood Basics

Your body needs many things to stay alive, but what do you think is the most important? Your brain? Your heart? Your blood is actually the most important thing your body needs to stay alive. Without it, your body would stop working.

Blood is a fluid that is made of smaller parts. Each of these smaller parts has a job. The parts work together to keep you alive and healthy.

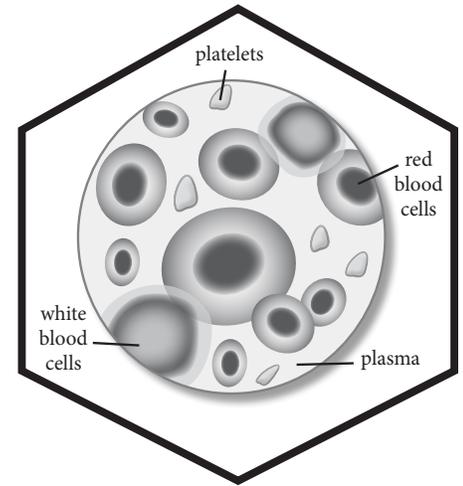
Plasma makes up more than half of your blood. It is almost all water and by itself, plasma is a light yellow color. Its job is to move some of the things your body needs—like nutrients, hormones, and proteins—where they are needed.

Red blood cells give your blood its color when combined with oxygen. These cells are very tiny. They are round and flat. Their job is to take oxygen and food to cells in the body and then remove carbon dioxide and waste from the same cells.

White blood cells are actually colorless. Like red blood cells, they are round. They help fight infections. How? Some kinds of white blood cells kill and eat germs that might make you sick. Other kinds of white blood cells release chemicals that fight off diseases.

Platelets are small, flat disks. They help stop bleeding when you get a cut. How? Platelets stick to the edge of a cut and form a plug. That helps close the wound.

You cannot live without a healthy supply of blood in your body. It's a good thing the four parts of your blood work together to keep you healthy.



Did you know?

Blood tests are one way doctors diagnose, treat, and manage blood cancers, as well as many other illnesses. The most common blood test (called a “complete blood count” or “CBC”) measures the number of red blood cells, white blood cells, and platelets in the blood.

Use the passage to answer each question and complete its task.

- What is blood made of? _____
Underline the bold words in the passage that support your answer.
- What is the job of red blood cells? _____
Draw a star next to the sentence in the passage that supports your answer.
- How do white blood cells help fight off infections? _____

Circle the sentences in the passage that support your answer.
- Can you live without blood? _____ Draw a rectangle around the sentence or sentences that support your answer.
- Which blood part do you have more of: plasma or platelets? _____
Draw an arrow pointing to the first word of the sentence that supports your answer.

Standards Covered

CCSS.ELA-LITERACY.RI.3.1: Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers.

CCSS.ELA-LITERACY.RI.3.5: Use text features and search tools (e.g., key words, sidebars, hyperlinks) to locate information relevant to a given topic efficiently.

“Blood Basics”

Answer Key

Your body needs many things to stay alive, but what do you think is the most important?

Your brain? Your heart? Your blood is actually the most important thing your body needs to stay alive. Without it, your body would stop working.

Blood is a fluid that is made of smaller parts. Each of these smaller parts has a job. The parts work together to keep you alive and healthy.

→ **Plasma** makes up more than half of your blood. It is almost all water and by itself, plasma is a light yellow color. Its job is to move some of the things your body needs—like nutrients, hormones, and proteins—where they are needed.

Red blood cells give your blood its color when combined with oxygen. These cells are very tiny. They are round and flat. ☆ Their job is to take oxygen and food to cells in the body and then remove carbon dioxide and waste from the same cells.

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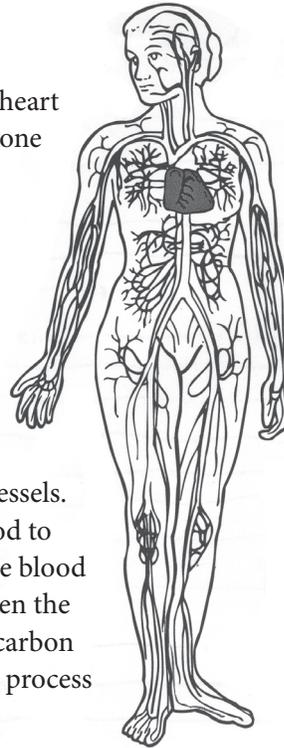
1. plasma, red blood cells, white blood cells, platelets
2. to take oxygen and food to cells in the body and then remove carbon dioxide and waste from the same cells
3. Some kinds of white blood cells kill and eat germs that might make you sick. Other kinds of white blood cells release chemicals that fight off diseases.
4. no
5. plasma

Blood Movers

Your body needs blood. Blood takes food and oxygen to your cells, fights infection, keeps your body temperature at a safe level, and much more. But how does blood move around the body? A team of tubes works with the heart to send blood around the body. This process is called **circulation**.

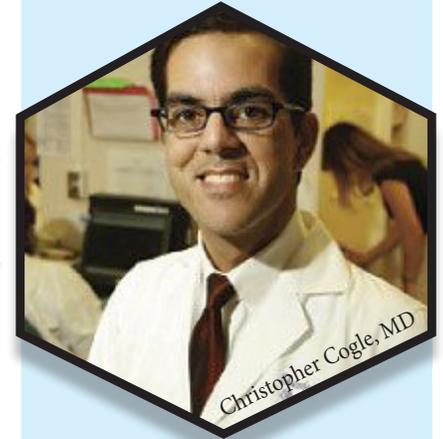
Your **heart** is the hub, or center of activity, for circulation. It consists of two pumps that rest side by side. Each time your heart beats, blood travels through your body. The blood moves in one of three kinds of **blood vessels**. They are veins, arteries, and capillaries.

Veins carry blood from the body into the heart's right-side pump. From there, the blood goes to the lungs, where the blood gets **oxygen**. Next, the blood flows into the heart's left-side pump. The left-side pump moves the blood through large blood vessels called **arteries**. As the blood travels throughout the body, the arteries become smaller and smaller. Blood enters **capillaries**, the smallest of the blood vessels. The thin capillaries move the oxygen and food from the blood to the cells. The cells release **carbon dioxide** into the blood. The blood travels along the capillaries. The capillaries get bigger and then the blood moves into the veins. The veins bring blood carrying carbon dioxide back to the heart, and the process begins again. This process happens every time your heart beats, about once a minute.



Fun Facts

- An adult's heart is the size of a fist.
- Your heart pumps about 1,800 gallons of blood each day.
- If they were stretched out in a line, your blood vessels would cover more than 60,000 miles. That is long enough to circle the earth almost two times!



Meet a Researcher

Did you know researchers study blood vessels? Christopher Cogle, MD, is one of these researchers! He is learning how blood vessels play a role in some kinds of blood cancers. His research, along with the work of many like him, is putting us one step closer to having a cure for blood cancers.

Complete each sentence.
Use the passage to help you.

1. The center of circulation is the _____.
2. Veins, arteries, and capillaries are all types of _____. (two words)
3. _____ carry blood away from the heart.
4. _____ carry blood from the body to the heart.
5. When blood leaves the heart, it has _____ in it.
6. _____ is the process of moving blood around the body.
7. When blood gets to the heart, it has _____ in it. (two words)
8. The smallest blood vessels are called _____.

Standards Covered

CCSS.ELA-LITERACY.RI.3.4: Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a *grade 3 topic or subject area*.

“Blood Movers”

Answer Key

1. heart
2. blood vessels
3. Arteries
4. Veins
5. oxygen
6. Circulation
7. carbon dioxide
8. capillaries

Special Hospital Helpers

Have you ever been to a hospital? A hospital has many health care workers. Some of these workers work with patients of different ages and with varying needs. Others specialize, or focus their time, on a certain body part, age group, or disease. **Oncology** (say *on-call-o-gee*) is a branch of medicine that works to prevent, diagnose, treat, and study cancer. An **oncology nurse** is one who is specially trained to work with cancer patients. A **hematology oncologist** is a doctor specially trained to work with patients who have blood cancers like leukemia and lymphoma.

Oncologists use different kinds of tests to diagnose, or recognize, blood cancers. A **blood test** is one tool used. The most common blood test is called “CBC.” This stands for “complete blood count.” It tells how many red blood cells, white blood cells, and platelets are in a patient’s blood. If the numbers are higher or lower than normal, cancer may be present. **Bone marrow tests** are also used to detect cancer. These tests show what is happening inside bones, where blood cells are made. These tests can tell doctors the kind of blood cancer. A **pathologist** is a doctor that looks at the cells and tissues from these tests. He or she studies the cells and tissues under a microscope.

Another test is called an **imaging test**. Machines such as x-rays, ultrasounds, CT scans and MRI scans, are used to see inside a patient’s body. The machines create clear pictures that a doctor called a **radiologist** looks at to see if there are signs of disease or to see if a disease—like cancer—has spread.

A **radiology technician** is trained to take images of a patient that a radiologist would study. A **lab technician** takes blood from a patient that a pathologist examines later. These health care workers play a role in identifying patients with many different health problems and diseases, including cancer.

While all hospital workers are important, not all have the special job of helping cancer patients.

Did you know?

The Leukemia & Lymphoma Society offers free information and patient services for individuals and families touched by blood cancers.



Circle the best answer to complete each sentence.

- The branch of medicine that deals with cancer is called _____.
 - hematology
 - pathology
 - oncology
- Tests help oncologists recognize, or _____, blood cancers.
 - diagnose
 - treat
 - prevent
- _____ show what is happening inside bones, where blood cells are made.
 - Blood tests
 - Bone marrow tests
 - Imaging tests
- A _____ is a type of imaging test.
 - CT scan
 - platelet
 - microscope
- A _____ is the most common type of blood test. It tells how many red blood cells, white blood cells, and platelets are in a patient’s blood.
 - CT
 - CBC
 - MRI
- A doctor who is specially trained to work with patients who have blood cancers is called a _____.
 - pathologist
 - radiologist
 - hematology oncologist

Answer each question on the back or on another sheet of paper.

- What are the three kinds of doctors named in this passage? What does each doctor do?
- What are the other three health care workers named in this passage? What does each worker do?

Standards Covered

CCSS.ELA-LITERACY.RI.3.1: Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers.

CCSS.ELA-LITERACY.RI.3.4: Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a *grade 3 topic or subject area*.

“Special Hospital Helpers”

Answer Key

1. C
2. A
3. B
4. A
5. B
6. C
7. A hematology oncologist is a doctor specially trained to work with patients who have blood cancers like leukemia and lymphoma. A pathologist is a doctor that studies cells and tissues under a microscope. A radiologist looks at pictures from imaging tests to see if there are signs of disease or to see if a disease—like cancer—has spread.
8. An oncology nurse is specially trained to work with cancer patients. A radiology technician takes the pictures a radiologist uses. A lab technician takes the blood a pathologist examines.

Survivor Story: Jane

Jane loves to paint. In fact, she was an art teacher for many years. After she retired from teaching, Jane learned she was sick. Doctors told her she had multiple myeloma, a cancer of the plasma cells. It was found in some of her bones. Myeloma can be treated but not cured. That did not stop Jane. She found ways to get better and, in the process, help others.

Doctors have given Jane many treatments to try to stop her cancer and make her feel better. Now her bones are fragile. To keep her mind off her cancer and keep her body moving, Jane does exercises like chair yoga. She does yoga at the pool too. Jane also swims laps at the pool. These exercises do not put a lot of stress on her fragile bones. They also help Jane keep her mind and spirit healthy.

Painting also helps Jane cope with her cancer. She says, "Painting has been very therapeutic for me. The sound of the water and the movement of the paint over the paper soothes me. I love to get lost in a watercolor and focus on the details; it takes me away from the aches and pains."

Living with cancer can be hard, but Jane has many positive people in her life. This includes her family and friends. Jane is also part of a support group of other cancer survivors. She found this group through The Leukemia & Lymphoma Society (LLS). When the group members meet, they share with each other the good and the bad things they've gone through. Jane makes sure other people with blood cancer feel supported too. Through LLS, Jane gives her time to new cancer patients. She talks with them one-on-one. She gives them information and hope. Jane and LLS do more than just invest in research; they help improve the lives of blood cancer patients and survivors.

Jane does not let multiple myeloma hold her back. She lives her life doing the things she loves and helping others.



Did you know? Myeloma is the second most commonly diagnosed blood cancer. It cannot be passed from one person to another and rarely affects people who are younger than 40 years old.

Choose three different words that you think describe Jane.

Explain why you chose each word. Use evidence from the reading to support your answer.

admirable brave caring determined resourceful strong other: _____

1. _____

2. _____

3. _____

Standards Covered

CCSS.ELA-LITERACY.RI.3.1: Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers.

“Survivor Story: Jane”

Answer Key

Answers will vary.

Blood Cell Basics

Thirty-seven trillion is a huge number. According to recent research, that's also about how many cells are in the human body. One of the most important types of these cells is found in blood. Blood is made up of red and white blood cells and tinier blood cells called *platelets*. These blood cells all float together in a watery fluid called *plasma*.

Most blood cells develop in *bone marrow*, a spongy, soft tissue in the center of your bones. Your bone marrow makes about 200 billion new blood cells every single day. So why does your body need all these blood cells? Like all cells, they have important jobs to do.

Seeing Red

Red blood cells are the truckers of your body. Their job is to carry oxygen from the lungs to cells throughout the body. These small, hardworking cells are each shaped like a disc. Both sides of red blood cells are *concave*, or curved in. This makes them flexible enough to almost fold in half so they can squeeze through narrow blood vessels. Red blood cells give blood its red color.

Your Body's Warriors

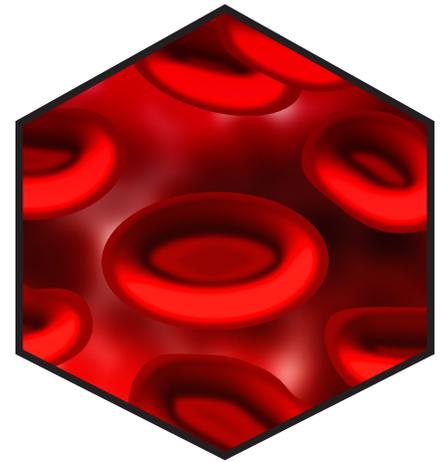
White blood cells are the soldiers of your body. They protect the body from enemies, like viruses and infections. Some white blood cells release substances called *antibodies* that can destroy germs. Others absorb or "swallow" bacteria and viruses that can harm the body. White blood cells are colorless. They are usually larger than red blood cells, but not as numerous. In fact, for every 600 red blood cells there is only one white blood cell.

Tiny, But Important

Platelets are the body's repair kit. These tiny blood cells help make blood set, or *clot*. Clotting stops a wound from bleeding. When platelets get to the site of an injury, they grow structures that help them stick together. They also send out signals for other platelets to come help out. This pile of platelets then forms a scab to protect the wound.

Blood Cell Problems

As hardworking as cells are, sometimes problems happen with them. For example, cancer occurs when cells that aren't normal grow too fast and spread out of control. Leukemia and lymphoma are two types of blood cancers. In these diseases, the body produces lots of white blood cells. But instead of being germ-fighting warriors, these white blood cells grow out of control and harm the body. Doctors and researchers are learning more about blood cancers. They are finding better medicines and more effective ways to fight these diseases.



Red blood cells



Working Toward a Goal

Like the cells in your body, The Leukemia & Lymphoma Society works hard too. Its goal is to someday have a world without blood cancers.

Use the passage to answer these questions.

1. What does bone marrow have to do with blood cells?

2. How are white blood cells different from red blood cells?

3. What do you think the word *numerous* means in the fourth paragraph based on the context?

4. What do platelets do when you get a cut?

Standards Covered

CCSS.ELA-LITERACY.RI.4.1: Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.

CCSS.ELA-LITERACY.RI.4.2: Determine the main idea of a text and explain how it is supported by key details; summarize the text.

CCSS.ELA-LITERACY.RI.4.3: Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in a text.

CCSS.ELA-LITERACY.RI.4.4: Determine the meaning of general academic and domain-specific words or phrases in a text relevant to a grade 4 topic or subject area.

NGSS 4-LS1-1: Construct an argument that plants and animals have internal structures that function to support survival, growth, behavior, and reproduction.

“Blood Cell Basics” Answer Key

1. Blood cells are developed in the bone marrow.
2. They are colorless, while red blood cells are red. They protect the body from enemies and invaders, while red blood cells carry oxygen from the lungs to cells throughout the body. White blood cells aren't as numerous as red blood cells.
3. Answers will vary.
4. They go to the site of the injury and stick together. They also send out signals for other platelets to come help out. The platelets pile together to form a protective scab.

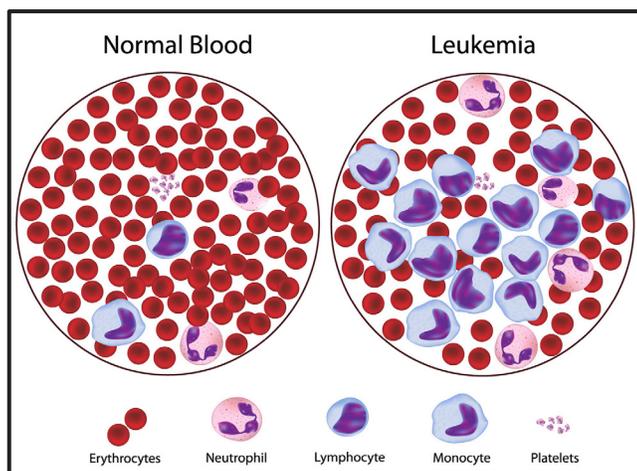
When Cells Don't Work Quite Right

Pretend you are driving a car when you realize the gas pedal is stuck. The car is going too fast. You hit the brakes, but nothing happens. Uh-oh, you can't slow down. This series of events is similar to what happens when some of your body's cells don't work the way they should.

Your Body's Defenders

Some of the most important cells in your body are white blood cells, or *leukocytes*. They are your body's defenders. When viruses and bacteria invade your body, your bone marrow makes and releases leukocytes. These cells attack and destroy the invaders.

Your body produces several kinds of leukocytes. Each has a special job. *Lymphocytes* can detect harmful invaders and make substances called *antibodies* that attack them. *Macrophages* can change their shape and "swallow" germs. Other lymphocytes help your body respond to a reaction caused by an allergy.



Out of Control and Dangerous

Normal body cells grow and divide into new cells. They know when to stop growing, and they eventually die. But sometimes cells that aren't normal grow out of control. They don't die when they are supposed to. These cells create a mass of growing cells called a *tumor*. A tumor can kill normal cells and damage the body. Cells from a tumor can also spread to other parts of the body. This type of disease is called *cancer*.

Several types of cancers occur in the blood. In *leukemia*, the bone marrow produces lots of white blood cells. But instead of fighting infection, they grow out of control and fill up the bone marrow. This makes it hard for healthy white blood cells to form and protect the body. The bad cells also crowd out healthy red blood cells that are needed to carry oxygen throughout your body. They also crowd out the platelets that help your blood clot.

Lymphoma is a blood cancer that starts in your lymph nodes. Your body has hundreds of lymph nodes. Like white blood cells, lymph nodes help fight off germs and other invaders. In lymphoma, white blood cells grow out of control. They create tumors that enlarge the lymph nodes. Tumors in leukemia and lymphoma can make a person very sick.

Saving Lives

Doctors are learning more about how to treat blood cancers. Some treatments kill cancer cells. Others help the patient's own body destroy the bad cells. The Leukemia & Lymphoma Society helps to fund research to eliminate blood cancers. LLS has funded many of today's most promising advances, bringing us closer to cures. More lives are being saved every day. That is good news!



Did you know?

One person who helps leukemia and lymphoma patients is a *pathologist*. A pathologist is a doctor who studies cells and tissues under a microscope in order to identify a disease. Because of the pathologist, other doctors can start treatments to help a blood cancer patient.

Use the passage to answer these questions.

1. How do leukocytes help your body when it gets sick?

2. According to the passage, what are *antibodies*?

3. What is the difference between a normal cell and a cancer cell?

4. What happens in the bone marrow of a patient with leukemia?

5. Write a one-sentence summary of this passage.

Standards Covered

CCSS.ELA-LITERACY.RI.4.1: Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.

CCSS.ELA-LITERACY.RI.4.2: Determine the main idea of a text and explain how it is supported by key details; summarize the text.

CCSS.ELA-LITERACY.RI.4.3: Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in a text.

CCSS.ELA-LITERACY.RI.4.4: Determine the meaning of general academic and domain-specific words or phrases in a text relevant to a grade 4 topic or subject area.

NGSS 4-LS1-1: Construct an argument that plants and animals have internal structures that function to support survival, growth, behavior, and reproduction.

“When Cells Don’t Work Quite Right” Answer Key

1. They attack and destroy the germs that make a person sick.
2. Antibodies are substances produced by lymphocytes to attack and destroy germs.
3. A normal cell eventually stops growing and dies. A cancer cell keeps growing out of control and doesn’t die when it’s supposed to. These cells create harmful tumors.
4. White blood cells grow out of control and fill the bone marrow. This makes it hard for bone marrow to form healthy white blood cells, and it also crowds out healthy red blood cells.
5. Sentences will vary.

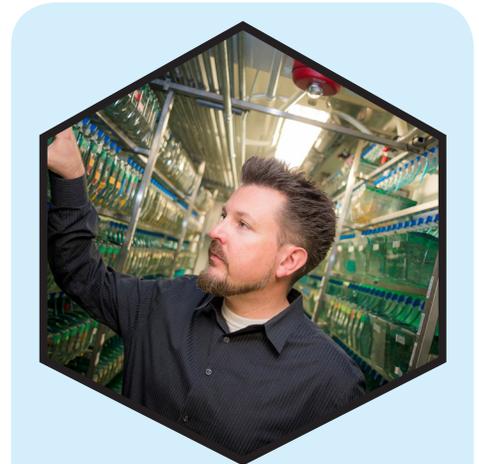
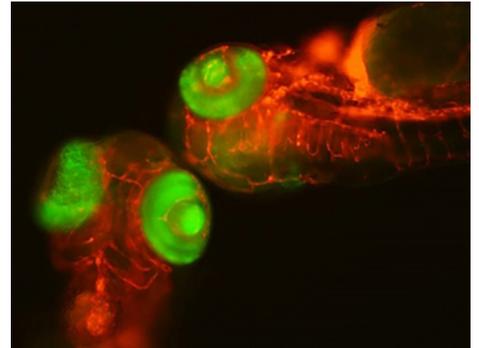
A Fish Joins the Fight!

What can one small fish do to help cure blood cancers? More than you might think! Today, some cancer researchers turn to the zebrafish to help them learn about cancer tumors. What is it about this little fish that makes it the perfect tool for studying cancer?

Walk into any pet store today and you'll probably see a tank of zebrafish. This tropical fish is native to Southeast Asia. It grows to a length of about 2.5 to 4 centimeters. Zebrafish are hardy and pretty. When it is in the larval stage, the zebrafish is transparent, or see-through. As it grows older, it develops stripes along the length of its body.

More and more scientists are turning to zebrafish to learn about the causes of and treatments for diseases like muscular dystrophy, tuberculosis, and cancer. One estimate is that zebrafish research is being done in at least 600 labs all over the world.

What exactly makes the zebrafish such an ideal tool for medical research? There are several reasons.



Meet a Researcher

David Traver, PhD, teaches at the University of California, San Diego. He received a Career Development Program grant from The Leukemia & Lymphoma Society to use zebrafish to study cancer. "Research like this may be the key to better understanding how to beat blood cancers in patients," Dr. Traver explains.

Did you know?

If you remove part of a zebrafish's heart, it can grow back in just a few weeks! Researchers hope they can use the same principle to eventually help humans with heart disease.

- **Zebrafish have many of the same structures and organs that humans do.** Like humans, the zebrafish has a backbone, brain, spinal cord, heart, liver, pancreas, kidneys, bones, and cartilage. Its eyes, muscles, and blood are also similar to a human's. These similarities make zebrafish an ideal research model.
- **The zebrafish embryo grows outside of the mother's body.** Not only is the embryo in full view, but it is also transparent for the first few days of its life. This makes it easy for researchers to see what's going on inside an embryo that has been infected with cancer cells.
- **Zebrafish have lots and lots of babies.** Scientists need a huge supply of embryos to study. A zebrafish mom and dad can provide hundreds of new offspring every single week. In comparison, a pair of lab mice can only give birth to 15 babies in 21 days.
- **Zebrafish have many of the same genes as humans.** Genes are found in every cell. They carry the information that determines an organism's traits. Seventy percent of the genes found in humans are also found in zebrafish! Even more astonishing: 84 percent of the genes that cause human diseases are also found in zebrafish. This means that zebrafish can develop most of the types of tumors humans can.

Researchers have been able to use zebrafish research to develop new drugs for treating cancers such as leukemia. Zebrafish with cancer also can be used to test how well a new cancer drug might work. They can help scientists develop drugs that stop tumors from growing or even kill cancer cells. With the help of these tiny fish, researchers are getting closer to eliminating cancers like leukemia and lymphoma forever. All because of a tiny striped fish with a funny name!

Use the passage to answer these questions.

1. Why is the zebrafish easy to study when it is in the larval stage?

2. True or false: The zebrafish shares many similarities with humans.

3. How do you know your answer to number 2 is correct?

4. Why is it important to researchers that zebrafish have lots of babies?

5. What is a good synonym for the word *ideal* in the fourth paragraph?

Standards Covered

CCSS.ELA-LITERACY.RI.4.1: Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.

CCSS.ELA-LITERACY.RI.4.2: Determine the main idea of a text and explain how it is supported by key details; summarize the text.

CCSS.ELA-LITERACY.RI.4.3: Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in a text.

CCSS.ELA-LITERACY.RI.4.4: Determine the meaning of general academic and domain-specific words or phrases in a text relevant to a grade 4 topic or subject area.

“A Fish Joins the Fight!” Answer Key

1. It is transparent, making it easy for researchers to study an embryo that has been injected with cancer cells.
2. True
3. Zebrafish have many of the same body structures and organs that humans do. Seventy percent of the genes found in humans are found in zebrafish, and 84 percent of the genes that cause human diseases are found in zebrafish.
4. Researchers need lots of embryos to study.
5. Answers will vary.

Two Tenacious Fighters

Ira and Dean have a lot in common. Both men are accomplished athletes who pursue their sports with passion. Both believe in the power of a positive attitude. Unfortunately, both also have faced a diagnosis of *leukemia*, a blood cancer. Finding out they had this disease didn't stop these two athletes. Instead, they resolved to fight their way back to a clean bill of health. Now, Ira and Dean can both say, "I'm a survivor!"

When Ira turned 48, he was literally in the best shape of his life. An avid cyclist, Ira rode more than 150 miles a week. (Do the math: that's more than 20 miles a day!) But one day during a ride, Ira noticed something that concerned him. He did not have the endurance, speed, or stamina he usually did. Five days later after a trip to the doctor, Ira had a diagnosis: he had a form of leukemia called B-cell acute lymphoblastic leukemia, or ALL. At first, the diagnosis was hard for Ira to handle. But this tenacious cyclist soon decided he would learn everything he could about the disease and defeat it.

Ira's hard work paid off. After 10 months of treatment and over 60 days in the hospital, he is in remission. (*Remission* is a time period during which symptoms decrease or disappear.) Ira receives regular treatments that help make sure the disease never returns. To help other patients, Ira organized a local cycling event to raise awareness and funds for The Leukemia & Lymphoma Society. Back on his bike and as active as ever, he credits his recovery to the support of family and friends, his medical team, and his passion for cycling.

Dean got his diagnosis of chronic lymphocytic leukemia (CLL) in the summer of 2013. Instead of giving in to despair, Dean decided to follow the advice from a quote by famous physicist Albert Einstein: "There are only two ways to live your life. One is as though nothing is a miracle. The other is as though everything is a miracle." Despite his diagnosis, Dean resolved to pursue an impossible dream: he would become the first person in history to swim the entire 184 miles of Oregon's Willamette River. He accomplished his dream. Dean swam 8 to 13 miles every day for 22 days. The river water was a frigid 40–50 degrees. But he finished the swim. Just days later, his doctors delivered incredible news: Dean's blood counts were normal.

Dean now inspires others facing leukemia to believe that they can have their own miracle of healing. As he says about his battle with CLL, "It helped me see firsthand that we are 'swimming in miracles.'" This tenacious survivor demonstrates that a cancer diagnosis doesn't mean you have to give up on your dreams.



Did you know?

At 94 years old, three-time cancer survivor Harriette Thompson became the oldest person in history to run a half-marathon (13.1 miles) when she completed the San Diego Rock 'n' Roll Half Marathon in June 2017. Her efforts have raised thousands of dollars for The Leukemia & Lymphoma Society. Way to go, Harriette!

Use the passage to answer these questions on another sheet of paper.

1. What do you think the word *tenacious* means in the title and in the second and last paragraphs?
2. How are Ira and Dean alike? List at least five similarities.
3. Write a paragraph telling why you do or do not agree with Albert Einstein's quote in the fourth paragraph. Include at least three reasons for your opinion.

Standards Covered

CCSS.ELA-LITERACY.RI.4.1: Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.

CCSS.ELA-LITERACY.RI.4.3: Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in a text.

CCSS.ELA-LITERACY.RI.4.4: Determine the meaning of general academic and domain-specific words or phrases in a text relevant to a grade 4 topic or subject area.

CCSS.ELA-LITERACY.W.4.1: Write opinion pieces on topics or texts, supporting a point of view with reasons and information.

“Two Tenacious Fighters”

Answer Key

Answers will vary.

The Outer Fighters of Your Immune System

Imagine a castle of old. Every day millions—that's right, millions—of invaders surround the castle and try to get inside. If not for the tall walls that protect the castle, the invaders will take over. In the same way, your immune system defends your body against invading germs that can hurt you. The different parts of your immune system all work together to keep out harmful germs and attack and destroy any that manage to get in your body.



Your body is attacked every day by pathogens. A pathogen is something (like a type of bacteria or virus) that causes disease. The human body has a defense, called the immune system, that protects your body from disease. The first line of defense in this system includes these “outer fighters”:

- **Skin:** Your skin is like your body’s bodyguard. The largest organ in the body, it provides a barrier to germs. The skin is tough, flexible, and resists penetration. Because it is also waterproof, it acts just like a raincoat, covering and protecting everything inside your body. This marvelous organ even has glands that make substances that can kill some bacteria. It also has special cells that warn the body about incoming germs. Even though your skin is covered with germs all the time, they can’t get through unless you have a cut or break in your skin.
- **Tears:** Tears keep your eyes moist. They also wash out dust, germs, and other foreign objects that get in your eyes.
- **Mucus:** This is the sticky stuff inside your nose. You think it’s gross, but it’s also one of your body’s best defenders. Mucus is found in your mouth, lungs, stomach, and intestines. Its job is to protect your lungs. The air is full of dust, germs, and other icky stuff. When you breathe it in, all that junk gets stuck in the mucus so it can’t travel to your lungs and make you sick.
- **Saliva:** Saliva is the liquid produced in your mouth. It has special enzymes which break down the cell wall of many bacteria and viruses.
- **Cilia:** These very fine hairs line your windpipe, the tube in your neck and chest that carries air into and out of your lungs. Cilia help to move trapped particles like bacteria away from your lungs where they could cause irritation or infection. Cilia are also found in the nose and in other parts of the body.
- **Digestive Juices:** Every time you eat, the acid in your stomach breaks down the food. It is also on the front line defending you from getting sick. Digestive juices kill most of the germs that have been swallowed in food.
- **Urine Flow:** Did you know your body is defending you against germs every time you go to the bathroom? The flow of urine flushes out germs from your bladder area.
- **Neutrophils:** These white blood cells act like microscopic ninjas. They can find, kill, and “eat” pathogens that are trying to get into your body.

So, the next time you think skin is just skin and spit and snot are just plain gross, remember this: they are part of a team that fights every day to keep you from getting sick.

Use the passage to answer these questions on another sheet of paper.

1. How is your body’s immune system like a castle?
2. What are pathogens?
3. How does the skin help to prevent disease?
4. How would you explain to someone that spit and snot are helpful to the body?
5. List three examples from the passage that support this statement: The human body is designed to keep out harmful germs that cause disease.

Did you know?

Because of support from The Leukemia & Lymphoma Society, researchers are developing new therapies that can selectively kill cancer cells. They are also developing drugs that help a patient’s own immune system destroy cancer cells.

Standards Covered

CCSS.ELA-LITERACY.RI.5.1: Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.

CCSS.ELA-LITERACY.RI.5.2: Determine two or more main ideas of a text and explain how they are supported by key details; summarize the text.

CCSS.ELA-LITERACY.RI.5.3: Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in a text.

CCSS.ELA-LITERACY.RI.5.4: Determine the meaning of general academic and domain-specific words or phrases in a text relevant to a grade 5 topic or subject area.

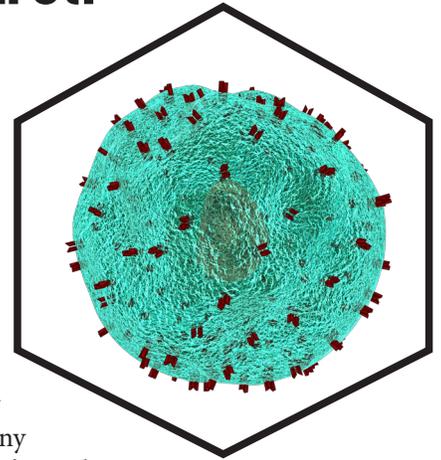
“The Outer Fighters of Your Immune System” Answer Key

1. It protects your body from germs that want to invade it and make you sick.
2. Pathogens are things that cause disease, such as bacteria and viruses.
3. It provides a barrier to germs; it covers and protects everything inside the body; it has glands that make substances that can kill some bacteria; it has special cells that warn the body about incoming germs.
4. Answers will vary.
5. Answers will vary.

T Cells and B Cells on Patrol!

No one likes being sick. But, thankfully, our bodies have their own “army” of soldiers that work to defend the body against infection and disease. Who are these defenders? They are white blood cells, also known as *leukocytes*. If they detect that an infection has developed in your body, these hardworking cells attack and destroy the bacteria, virus, or other organism that has caused it.

Your body actually has a factory that cranks out huge numbers of white blood cells. That factory is your bone marrow, the thick, spongy substance inside your bones. Your bone marrow makes several different types of white blood cells, each with a special job to do. Two of these specialized cells are T cells and B cells. When your body is infected with a specific germ, only certain T cells and B cells will respond. Think of them like hands that can pick up bananas and *only* bananas. They can recognize specific germs and then quickly multiply so there are lots of them to fight the infection. Because your body produces so many different T cells and B cells, the immune system can recognize almost any invader. And here’s another cool thing these special blood cells can do: they can remember an invader. This “memory” makes you *immune*, which means you won’t be affected by a second attack.



What exactly do T cells do? These white blood cells are named after an organ in your body called the thymus. After T cells leave the bone marrow, they move to the thymus so they can mature. Once mature, T cells travel around the body looking for infections and abnormal cells. When they recognize an invader, different types of T cells go into action. Helper T cells send chemical instructions to the rest of your body, telling it to produce the best weapons it can to fight the invaders. Killer T cells have something like X-ray vision! They can recognize virus-infected cells and kill them directly.

Another special kind of white blood cells are called B cells. B cells also patrol the body looking for invaders. But these microscopic defenders have an ability all their own. They make special Y-shaped proteins called *antibodies*. Antibodies stick on the surface of germs. By doing this, B cells mark the invaders so other cells can recognize and then destroy them.

Together T cells and B cells work hard to give a knockout punch to any bacteria, virus, or organism that is making you feel crummy. With these special cells on patrol, infection and disease don’t stand a chance!



Did you know?

T cells and B cells aren’t the only defenders against infection and disease in your body. NK cells (natural killer cells) attack infected cells that might cause cancer.

Circle T or F.

On the back of this page, rewrite each false statement to make the sentence true.

1. T F Another name for white blood cells is viruses.
2. T F Bone marrow makes one type of white blood cell.
3. T F T cells and B cells are cells that perform specific functions.
4. T F Your body can recognize different types of invaders because there are so many different types of T cells and B cells.
5. T F T cells produce antibodies that mark the germs for destruction.
6. T F Helper T cells kill germs directly.
7. T F Both T cells and B cells patrol the body looking for invaders.
8. T F If you are immune to an invader, that means you can get sick from the same germ again.

Standards Covered

CCSS.ELA-LITERACY.RI.5.1: Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.

CCSS.ELA-LITERACY.RI.5.3: Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in a text.

CCSS.ELA-LITERACY.RI.5.4: Determine the meaning of general academic and domain-specific words or phrases in a text relevant to a grade 5 topic or subject area.

“T Cells and B Cells on Patrol!” Answer Key

Rewrites of the false sentences will vary.

1. F
2. F
3. T
4. T
5. F
6. F
7. T
8. F

Harnessing the Power of the Immune System

Did you know your body is a lot like a Super Bowl champion? Every Super Bowl-winning team has a strong defense, a group of players whose job is to protect their goal. Your body has a defense system too. Its job is to protect your body from infectious organisms and other invaders. This defense system is called the immune system. Your immune system attacks organisms and substances that invade your body and make you sick.

Certain diseases, like the blood cancers leukemia and lymphoma, weaken the immune system and make it harder for your body to fight infection. Medical researchers are studying how to use a patient's own immune system to fight diseases like cancer. This promising field is called *immunotherapy*. In immunotherapy, doctors stimulate a patient's own immune system so it can do a better job of fighting cancer. Many experts believe that the immune system could be "the perfect anticancer weapon."



One promising immunotherapy treatment centers around the use of antibodies. *Antibodies* are substances produced in your body by special white blood cells. They weaken the effects of a disease germ. Researchers can now produce special man-made antibodies in a lab. Then they can inject these antibodies into a cancer patient to boost the patient's immune system.

Sometimes the immune system doesn't recognize cancer cells as invaders. Researchers are developing cancer vaccines that try to "teach" the patient's immune system to recognize cancer cells and go after them. In some cancer patients, the immune system does recognize cancer cells, but it isn't strong enough to destroy them. So researchers are developing new cancer drugs that can stimulate the immune system to start attacking cancer cells that are in the body. Researchers are working on ways to decrease the side effects of these drugs so they can be safely used to help cancer patients fight the disease.

A third new type of immunotherapy is called CAR-T immunotherapy. In this treatment, T cells are removed from a patient's body. (T cells are white blood cells that look for and kill cells that are hiding invaders or are different from normal cells.) The T cells are reprogrammed in a lab so that they have a substance on them that recognizes cancer cells. Then these reprogrammed T cells are injected back into the patient's body, where they start multiplying and killing cancerous cells. This treatment was first developed to treat patients with blood cancers. It has had exciting results. Now it is being tested to treat several other types of cancer.

Researchers believe that learning to harness the power of a patient's own immune system could be a game changer where cancer is concerned. A world without blood cancers is the goal, and immunotherapy could well be one of the reasons it happens.



Did you know?

In one research project funded by The Leukemia & Lymphoma Society, researchers are making a personalized vaccine from each patient's lymphoma cells. It is hoped that adding this vaccine to other treatments will keep the disease from coming back.

Use the passage to answer these questions.

1. How is your body like a football team?

2. What do diseases like leukemia and lymphoma do to the immune system?

3. What does immunotherapy do for a cancer patient?

4. What do researchers do to a patient's T cells when they use the CAR-T immunotherapy?

5. Would you like to be a researcher who develops new immunotherapies? Explain your answer.

Standards Covered

CCSS.ELA-LITERACY.RI.5.1: Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.

CCSS.ELA-LITERACY.RI.5.3: Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in a text.

CCSS.ELA-LITERACY.RI.5.4: Determine the meaning of general academic and domain-specific words or phrases in a text relevant to a grade 5 topic or subject area.

“Harnessing the Power of the Immune System” Answer Key

1. It has an immune system that defends it against disease, similar to how a football team has players who defend its goal.
2. They weaken the immune system, which makes it harder for your body to fight infection.
3. It stimulates a patient’s immune system so it can do a better job of fighting cancer.
4. They remove them from the patient’s body, reprogram them so they will recognize cancer cells, and then inject them back in the patient’s body.
5. Answers will vary.

Meet Mara!

When fall 2017 rolls around, Mara Hunter will start a new adventure. She will begin her freshman year of college at Ohio State University, where she recently earned a scholarship to play field hockey. It's an opportunity Mara once thought she'd never have.

Several years ago, Mara was a student and field hockey player at Olentangy Liberty High School in Powell, Ohio. She began to have some unusual symptoms, starting with her left ear. The symptoms worsened over time until one day Mara passed out during field hockey practice. After being rushed to the hospital, Mara had a bone marrow biopsy. A *biopsy* is a procedure during which doctors remove a small piece of tissue from a patient's body so they can study it. Only a few hours after the biopsy, Mara was diagnosed with ALL, acute lymphoblastic leukemia.



Mara Hunter and Kerri Walsh Jennings

Mara spent the next 11 days in the hospital, beginning her journey toward recovery. Even though she had to miss playing on the field hockey team for her junior year, Mara kept up her studies by taking classes online. It was a difficult time, but Mara fought hard to get better. By the time she hit her senior year of high school, Mara had recovered well enough to play field hockey again. In fact, she came back so strong that she scored six goals during the team's first seven games! Not bad for a girl who had once said that she "never thought I'd be able to play again."

Mara has inspired other people facing leukemia and lymphoma by sharing her story. She has helped to bring awareness about blood cancers. Mara



has also been on the receiving end of encouragement. She received a surprise visit from another inspirational athlete, Kerri Walsh Jennings, an Olympic gold-medalist in beach volleyball. Kerri encouraged Mara to keep moving towards her dreams: "Don't be afraid to fail, don't be afraid to get frustrated, work through it and you're going to get where you want to go." Mara is a survivor who is committed to shining a light on the need to find new treatments and cures for blood cancer patients.



Did you know?

Mara helped raise funds for The Leukemia & Lymphoma Society by joining LLS's Light the Night Walk, an inspirational fundraising walk where she served as Columbus, Ohio's, Honored Hero. During the event, Mara shared her inspiring story with other walkers.

In the ovals, list three character traits you think Mara demonstrated in her fight against cancer. Then, on your own paper, write a paragraph that explains why you chose the traits.

Standards Covered

CCSS.ELA-LITERACY.RI.5.1: Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.

CCSS.ELA-LITERACY.RI.5.3: Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in a text.

CCSS.ELA-LITERACY.W.5.2: Write informative/explanatory texts to examine a topic and convey ideas and information clearly.

“Meet Mara!”

Answer Key

Character traits and paragraphs will vary.