Inside the Bloodstream

Trace how blood components are built and what they do.

HAP.9.1 "Describe the structure, function, and origin of the cellular components and plasma components of blood."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline where blood components come from, circle details about their structure, and box their functions. Look for connections among the origins, structures, and jobs of red blood cells, white blood cells, platelets, and plasma.

What Travels in Blood?

1. A small cut on a fingertip turns blood from an invisible delivery system into something you can see. Blood is a tissue made of cells and cell fragments suspended in plasma, its liquid portion. Most new blood cells begin as stem cells in red bone marrow, the soft tissue inside certain bones. These stem cells develop into red blood cells and several kinds of white blood cells. Platelets form as pieces that break off from large marrow cells called megakaryocytes. The components travel together, but their shapes and sources help explain why each does a different job.

2. Red blood cells are flexible disks with a thinner center and no nucleus when mature. Their hemoglobin binds oxygen in the lungs and releases it to tissues. Their shape helps them squeeze through narrow capillaries, where this exchange occurs. White blood cells have nuclei and come in several forms. They protect the body by detecting and attacking microbes or coordinating other immune responses. Some white blood cells mature in organs such as the thymus after beginning in marrow. Platelets are tiny fragments without nuclei. At a damaged vessel, they stick together and help start a clot, limiting blood loss.

3. Plasma is mostly water, along with dissolved salts, nutrients, wastes, hormones, and proteins. Water taken in through the digestive tract enters the blood and helps form plasma. The liver makes many plasma proteins, including albumin, which helps keep water inside blood vessels, and fibrinogen, which helps form clots. Immune cells make antibodies, proteins carried in plasma that bind to specific foreign targets and help the body fight infection. Plasma carries nutrients toward cells and wastes away from them. Unlike the cells and fragments it carries, plasma flows around them, delivering dissolved materials as blood circulates.

2 ANSWER WITH EVIDENCE

Use the passage

1. A runner's leg muscles need more oxygen. Which blood component delivers it? State where that component begins and how one feature of its structure helps it reach narrow capillaries.

2. Microbes enter a person's body. Which blood component can respond? Describe one structural feature, its origin, and its role in the response.

3. A scraped knee starts bleeding. Explain how platelets and a plasma protein help limit blood loss. Include where each comes from.

4. A patient has too little albumin. Where is albumin made, which part of blood carries it, and what might happen to water in the blood vessels?

3 YOUR TURN

Your own words

In 4 to 5 sentences, challenge the idea that blood is only red cells by choosing an everyday event not named in the passage or questions. Explain how plasma and two other blood components help during that event, and include at least one structural detail and the origins of at least two components.

Inside the Bloodstream

PART 1 · READ AND MARK

Underline where blood components come from, circle details about their structure, and box their functions. Look for connections among the origins, structures, and jobs of red blood cells, white blood cells, platelets, and plasma. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	A runner's leg muscles need more oxygen. Which blood component delivers it? State where that component begins and how one feature of its structure helps it reach narrow capillaries.	**Red blood cells begin in red bone marrow. Their flexible disk shape helps them squeeze through narrow capillaries to deliver oxygen.**
2	Microbes enter a person's body. Which blood component can respond? Describe one structural feature, its origin, and its role in the response.	**White blood cells have nuclei and begin in red bone marrow. They detect and attack microbes or coordinate other immune responses.**
3	A scraped knee starts bleeding. Explain how platelets and a plasma protein help limit blood loss. Include where each comes from.	**Platelets break off from megakaryocytes in red bone marrow and stick together at a damaged vessel. Fibrinogen, a plasma protein made by the liver, helps form a clot.**
4	A patient has too little albumin. Where is albumin made, which part of blood carries it, and what might happen to water in the blood vessels?	**The liver makes albumin, which is carried in plasma. With less albumin, less water may remain inside blood vessels.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

After lunch, a student walks to class, and blood does more than carry red cells. Plasma carries absorbed nutrients toward body cells; some of its water entered the blood from the digestive tract. Flexible, nucleus-free red blood cells made in red bone marrow deliver oxygen to those cells. White blood cells, which also begin in marrow and have nuclei, help protect the student by attacking microbes.

Accept other everyday events if the response accurately connects plasma and two other components to their functions and meets the structure and origin requirements. Antibodies may be discussed as plasma proteins if students state that immune cells make them and that they bind foreign targets to help fight infection.