Blood Composition

Grade Level: 5-8

Duration: 30-50mins

Classification: Classroom and/or STEM Spark

Subject(s): Anatomy, Biology

Categories (STEM): Science

Keywords: Anatomy, Blood Composition, Veins, Circulatory System, Platelets

Introduction

- Summary: Students will learn the composition of blood, how it travels through the body, and how it aids organ function.
- Description: Students will make a Ziploc blood bag to take home that is representative of the components of blood. Students will learn about arteries and veins and how blood perfuse through the circulatory system. The functions of platelets, red blood cells, white blood cells, and plasma will be discussed and their roles in clotting.

Resources:

- https://www.quirkles.com/science-experiments-for-kids.cfm?experiment=52C367E4-43DD-49B4-97E4AE8B8BFDF1FA

Materials

Material	Quantity	Reusable?
Corn syrup ($10-20/gallon)	1/2cup/kid (probably a gallon/class)	No
Copy Paper	1/kid	No
Pens/Pencils	1/2kids	Yes
Freezer-strength sandwich-size Ziploc	1/kid	No
White Jimmy sprinkles	1 container/class	No
Lima Beans	1 bag/class	No
Red Hots	1 bag /10kids	No
Spoon (plastic or metal)	3 total	Yes
Perfusion Sheet	1/2 kids	Yes

Red Blood Cells (erythrocytes) = Red Hots
White Blood Cells (lymphocytes) = lima beans
White Sprinkles = platelets
Corn Syrup = plasma

Directions

- Hand out copy paper and pencils/pens. Have kids draw out the pie chart below.
- Prepare and hand out materials to make a blood bag. Have kids add representative amounts of each blood component. Add 10 red hots (RBCs), 5 lima beans (WBCs), and a half a spoonful of sprinkles (platelets). Add ½ cup of corn syrup for plasma. Have students mix components by tilting the bag to the side repeatedly.
- Talk about the different functions of each component of blood
    - Red blood cells – carry oxygen to parts of our body and bring CO2 back to the heart to be disposed of
    - White blood cells – help fight infection and diseases, there are 5 different kinds
    - Plasma – made of water and other components to help move molecules through the body
    - Platelets – clotting factors to stop bleeding when you have a cut
- Have students share what they know about blood, heart, circulatory system, veins, and arteries.
- Talk about the blood, heart, and circulatory system using the Perfusion Sheet. **DON'T LET KIDS WRITE ON PERFUSION SHEETS. WE WILL REUSE THEM!**

Activity Extension

Show kids how to take a resting and active pulse. Have them take a resting pulse and count how many beats/min. Have students stand up and jog in place to get an active pulse in beats/min.

Discussion Questions

- What are the differences between veins and arteries? **Arteries are thicker and take blood away from the heart, to take oxygen to organs, veins bring blood to the heart to be oxygenated**
- What is perfusion? What does blood carry to organ systems? **The passage of blood, o other fluids through the blood vessels. Blood brings oxygen to the body**
- What are the two systems that blood goes through? **Systemic and pulmonary**
- Why is blood taken from a vein rather than an artery? **75% of blood pools in veins and they are closest to the surface**
- Why do veins and arteries run side by side? **To mediate temperature changes caused from blood flow**
- What makes red blood cells unique? **They don't have a nucleus**
- Why are the platelets so? **Platelets, need to easily move to sights of injury**
- What happens when someone cuts/scrapes themselves? What is the function of a platelet? **Platelets aggregate causing blood clots to stop bleeding**

What is happening?

- Students make a representative model of the components in blood and discuss perfusion through the circulatory system.

Applications:

- Majors
  - Biology
  - Anatomy
  - Laboratory Science
- Jobs
  - Phlebotomy (person who draws blood), Laboratory Scientists, Lab Technicians
  - Doctors & Medicine
- Hobbies
  - Donating whole blood (RBC + plasma) vs. donating plasma (only plasma)
  - Blood samples in arm are taken from the median cubital vein (never taken from arteries)
- Real world applications
  - Dialysis (filters blood for kidneys, often with diabetes patients)
  - Sickle Cell Anemia (disease where blood cells are not shaped properly)
  - Blood clots
  - Hemophilia (disease with reduced platelets, difficulty blood clotting)

Blood Components

Type	Structure	Function	% makeup
Red blood cells	No nucleus Disk-shaped, flexible Contains hemoglobin	Transports oxygen	45
White blood cells	Have a nucleus Short life span	Fights infections	<1
Platelets	Made of cell fragments	Blood clotting	<1
Plasma	Protein-rich liquid Contains electrolytes	Carries blood cells	55

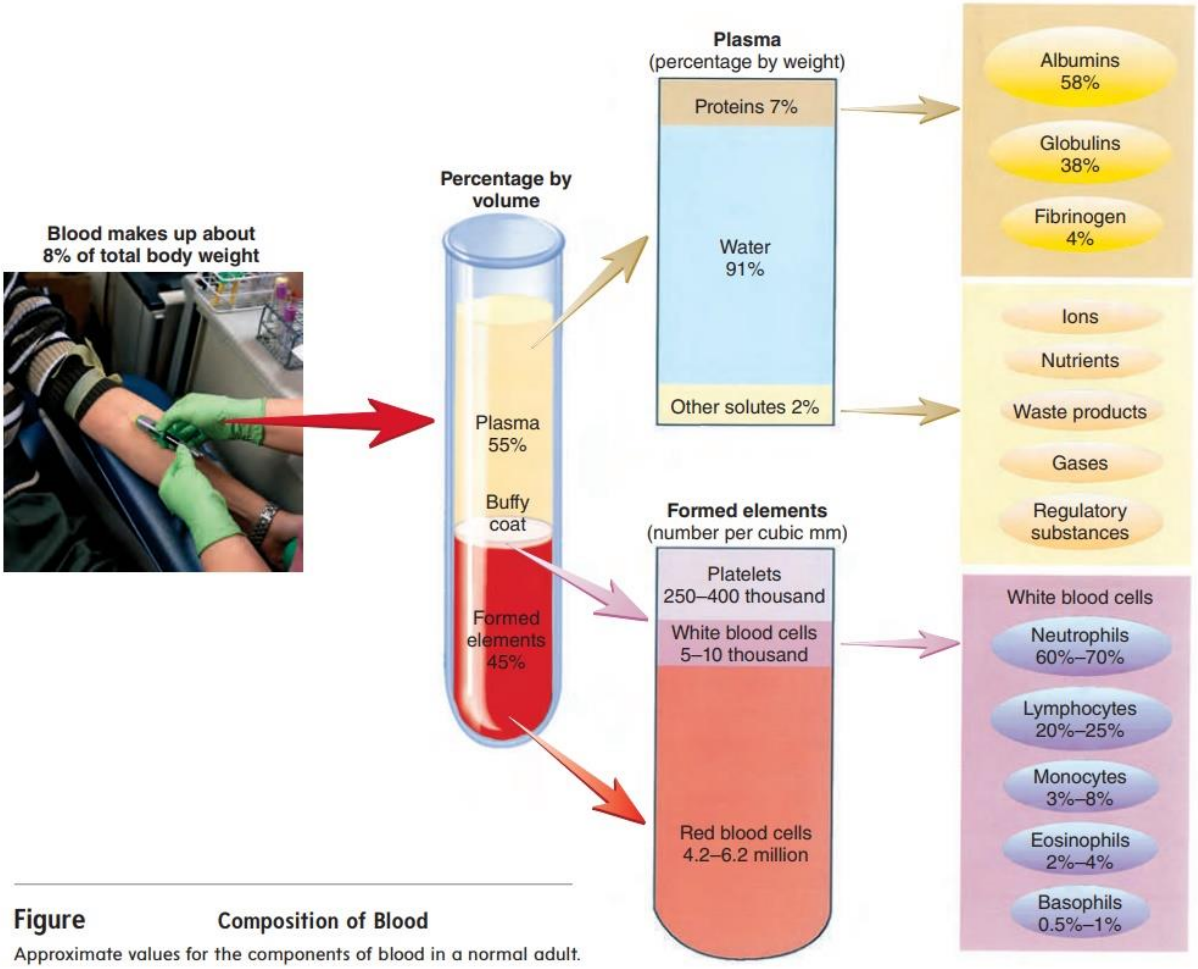
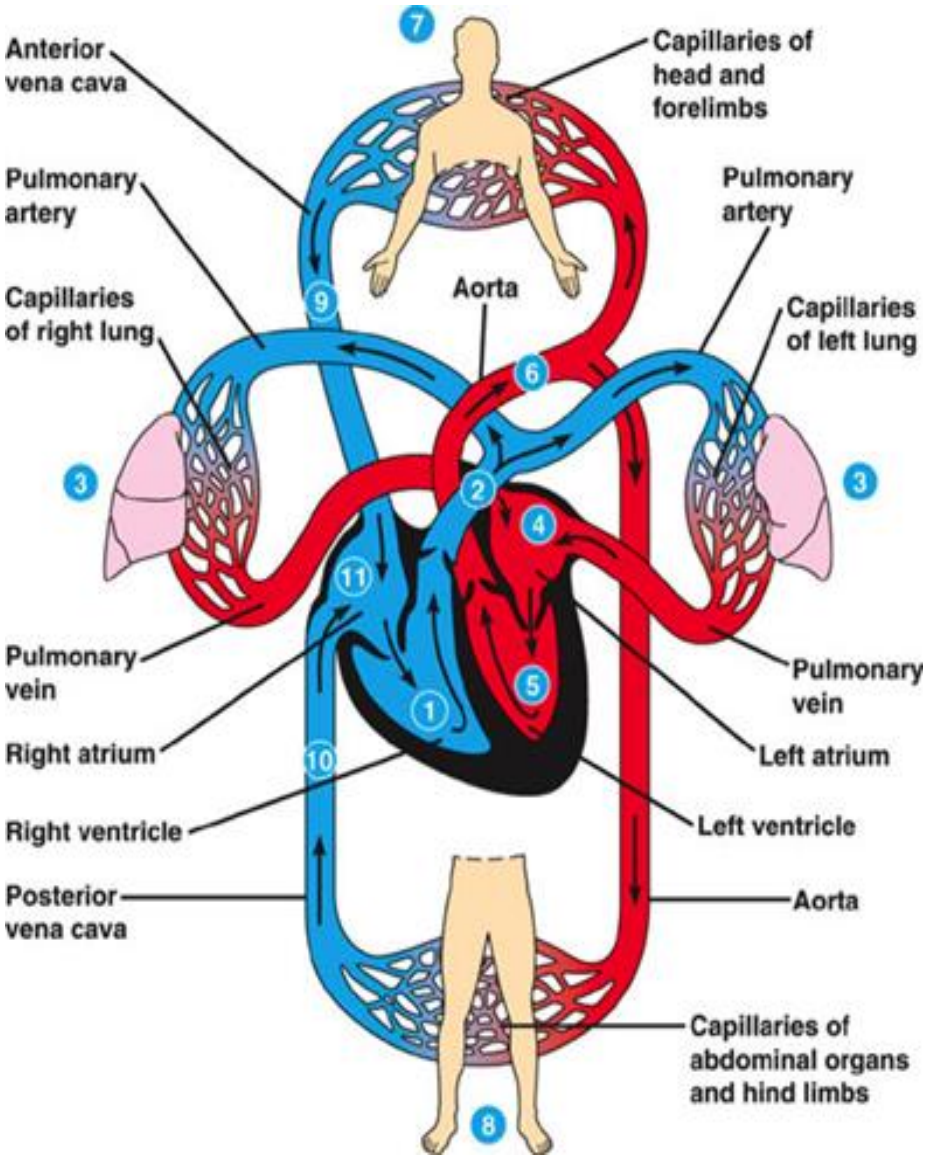


Figure **Composition of Blood**

Approximate values for the components of blood in a normal adult.


Anterior vena cava
Capillaries of head and forelimbs
Pulmonary artery
Pulmonary artery
Capillaries of right lung
Aorta
Capillaries of left lung
Pulmonary vein
Pulmonary vein
Right atrium
Left atrium
Right ventricle
Left ventricle
Posterior vena cava
Aorta
Capillaries of abdominal organs and hind limbs
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