Blood in a Beaker

I Wonder Why.....

1. we added water to the jar?

The water represents the plasma, an important part or the blood.

2. we added red beads to the jar?

These represent red blood cells which carry oxygen for us.

3. we added the small colored beads to the jar?

These represent the white blood cells, important parts of our immune system.

4. are red blood cells red?

They contain a pigment called hemoglobin which carries oxygen for us.

5. there are so many kinds of white blood cells?

Each of them have a specific job in the body's immune system.

Think Like a Scientist.....

1. What is the plasma and its use?

It is liquid, mainly water, which carries many important substances in the blood.

2. What are erythrocytes?

Red blood cells, produced in the large bones, these carry oxygen.

3. What are platelets?

Small cells which function to clot the blood when a blood vessel is cut.

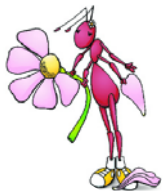
4. What are antibodies?

Chemicals produced by white blood cells which help fight disease.

5. Why is blood analysis so important to a doctor studying your condition?

These cell numbers indicate specific types of problems in the body.

Blood in a Beaker



The Science Connection

Blood Transfusions

A loss of too much blood is fatal. Today, blood typing and getting the proper blood, plasma, or other blood fraction is a common process in modern medicine. However, getting a blood transfusion was a pretty fatal process in early medicine. The first experiments involved giving animal blood to people, giving blood by the mouth, and many other bad ideas. These all led to the banning of blood transfusions by some countries.

However, science won out. Learning about the different blood types was important. So was realizing the blood could be separated into fractions, or parts, like red blood cells, clotting factors, and plasma. The blood bank, where blood is collected, separated, and preserved for later saved many lives in WWI. Separating blood fractions like plasma, which could be given on the battlefield, was discovered by a Dr. Charles Drew, an African-American, and along with blood banking, combined to save many lives in WWII.

A persistent urban legend about Dr. Drew dying because he was denied a blood transfusion after a serious car accident because of his race is false. However, Dr. Drew had some unique medical issues , and had he been given a transfusion, his doctor friends said he would have died even faster. His fellow doctors in the accident who suffered minor injuries stated the hospital took superb care of everyone in the accident.

The best thing you can do for others is to give blood when you're old enough. In the United States there are more than 15 million units of some blood fraction given each year. This simply means the more donors, the more people can survive.

Blood in a Beaker Teacher's Guide

The Initial View (Introducing the Activity)

You could require latex gloves to simulate the proper technique for dealing with blood and body fluids! Have the kids dry out and separate the materials, use them again next year!

Take a Deeper View! (More Science)

Plasma is about 55% of the blood **Volume**, the **Cells** make up the rest. These cells are extremely small *but very numerous*! In a cubic millimeter of **Blood** (that's a tiny drop) there's about 5 million **Erythrocytes** or **Red Blood Cells**, 250-400 thousand **Platelets** and 5-9 thousand **White Blood Cells**. Irregularities in these numbers represent serious medical problems. The ten beads represent different kinds of **Leukocytes** or white blood cells. (wbc's) The five beads of one color represent **Neutrophils**, the most common wbc's. The two similar colored beads represent **Lymphocytes**, and the other three different colors represent **Basophils**, **Monocytes**, and **Eosinophils**, other kinds of wbc's. The actual percentages shown are close but not exact! The cell sizes are also not in proportion, but again remember this is just a **Model**!!

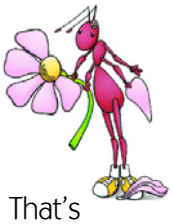
More and Bigger Views! (Additional Classroom Ideas)

1. This could be a great time to study **Blood-Borne Pathogens**, **Diseases** like **Hepatitis B Virus** and **HIV**, the virus which causes **AIDS-Acquired Immune Deficiency Syndrome**. Have the kids research ways to protect themselves from these diseases and their effects. Find out how HIV affects white blood cells! How does HIV eventually lead to death?
2. Find out more about **Antibodies**, where they're made and how they work.
3. Invite a medical technician to visit class to show how blood testing is done.
4. Have someone from the **American Red Cross** visit to explain about blood donation.
5. Research the **Human Blood Types** and how **Genetics** determine your blood type.
6. Learn about the ways of stopping blood flow. Find a First Aid instructor who can come to class and teach blood loss control. How can a person protect themselves from disease?
7. The Olympic Training Center is in Colorado. Why? (altitude increases rbc's)
8. "Blood Doping" is a method of cheating in long distance athletic events. Find out more about this way of increasing red blood cells without training. Why is it hard to detect?
9. Find out how HIV destroys white blood cells. Make maps showing world areas most affected. How many people have HIV? How many orphans has it caused?
10. White blood cells gobble disease organisms by a process called **Phagocytosis**. Find out more about how disease causers are "eaten" by white blood cells!
11. Research **Leukemia**, a serious blood disease. What is it and how is it treated?
12. What kinds of blood vessels are there? Make a chart of what you found out.
13. Once the students have their "cell count" done in step #7, they can now model various diseases or blood conditions. Give them a red blood cell bag that has fewer beads. This represents **Anemia**! Prepare another bag with the normal number of red beads along with several red beads you've cut in half. This represents **Sickle Cell Anemia**.
14. Do the activity with a bag that contains few platelets. This models **Hemophilia**.
15. Do the activity using a bag with many white blood cells. This models an **Infection** or possibly **Leukemia**.

Answers

1. (you're sick, or even in danger of dying)

Blood in a Beaker



Safety Alert:

Slippage

Getting Ready

You're going to make a model of blood! That's right, *Blood in a Beaker*!

Stuff to Make it Happen (Materials)

plastic jar
water*
bags of red blood cells, platelets, and white blood cells
craft stick

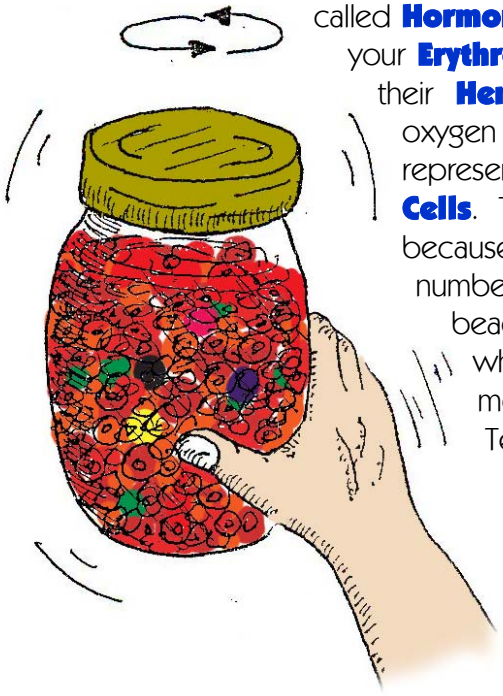
Making it Happen *(Be very careful with the jar and water, it could get slippery!)*

1. Empty the red blood cell bag into the jar.
2. Open the white blood cell bag, pour them in the jar. This bag contains five beads of one color, two beads of another, and three more of different colors. (Ten total beads with five colors represented.) These represent different types of white blood cells.

3. Pour the beads from the platelet bag into the jar. Use a craft stick to stir the beads.
4. Fill the jar almost full of water. Screw the lid on firmly.
5. Rotate the jar very carefully with your fingers. Watch your "blood" closely! (Hang on to the jar carefully! It could be slippery and you could drop your "blood"!)

Understanding the Science

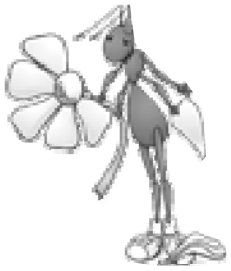
You just made a **Model** of human **Blood**. Your blood is a fantastic **Fluid** containing mostly a water-based **Liquid** called **Plasma**. That's represented by the water you used. **Plasma** contains dissolved **Nutrients**, **Waste Products**, **Gasses** like carbon dioxide and oxygen, disease-fighting chemicals called **Antibodies**, chemical messengers called **Hormones**, and many other substances! The red beads represent your **Erythrocytes**, or **Red Blood Cells**. These get their color from their **Hemoglobin**. This red-colored iron-rich chemical carries oxygen and gives blood its color. The other colored beads represent important cells called **Leukocytes** or **White Blood Cells**. Their job is fighting disease. You added five different colors because there are five different types. You added different numbers because there are different numbers of each. The tiny beads represent special small cells called **Platelets**, cells which function to **Clot** blood to prevent its loss! One of the most important medical tests done on blood is a **Cell Count**. Technicians do cell counts to check our health!



Let's Check the View! (Questions and Assessments)

1. What might happen if any of these kinds of cells were suddenly gone?

Name _____



"Annie" the Ant **says it's time to learn more about this activity! Follow your teacher's directions!**

Blood in a Beaker

Student Assessment

Let's Think About It!

1. The main part of our blood is a liquid called _____.

2-4. Name three types of cells found in the blood.

A) B) C)

5-7. Name the three kinds of blood cell below. Tell what their job is in the blood.

A)

B)

C)

8. Antibodies; _____
   - A) help us fight disease
   - B) make us sick
   - C) carry oxygen in our blood
   - D) makes our blood clot up solid

9. Finding too many leukocytes in our blood means; _____
   - A) the blood cannot clot
   - B) the blood can't flow easily
   - C) we could be sick
   - D) we can't get enough oxygen

10. What gives blood its color?

Optional; Why would a cell count be an important medical test?

Name _____

"Annie" the Ant **says it's time to learn more about this activity! Follow your teacher's directions!**

Blood in a Beaker

Student Assessment

Let's Think About It!

1. The main part of our blood is a liquid called __plasma _____.

2-4. Name three types of cells found in the blood.

red blood cells, white blood cells, platelets

A) B) C)

5-7. Name the three kinds of blood cell below. Tell what their job is in the blood.

carry oxygen, fight disease, clot blood

A)

B)

C)

8. Antibodies; _____

A) help us fight disease
B)make us sick
C) carry oxygen in our blood
D) makes our blood clot up solid

9. Finding too many leukocytes in our blood means; _____

A) the blood cannot clot
B) the blood can't flow easily
C) we could be sick
D) we can't get enough oxygen

10. What gives blood its color?

the hemoglobin or red blood cells

Optional; Why would a cell count be an important medical test?

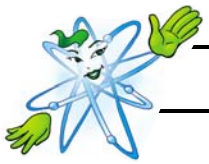
are we sick, not enough of a certain cell, etc.

Student: _____ Date: _____

Blood in a Beaker

Think It Through Questions

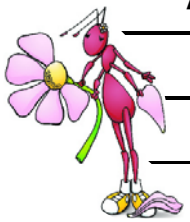
1. **Why is blood so important to you?**



2. **List and describe important cells in your blood.**

3. **What important materials are dissolved in your blood?**

4. **How does your blood help fight disease?**



5. **Why are blood cells counted during medical tests?**

SeeLA Science

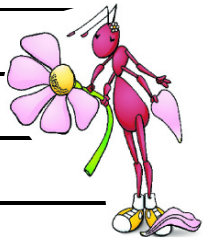
The Learning Zone

Student: _____ Date: _____

Blood in a Beaker

Observations, drawings and things I did

My Discoveries —- What did I find?



Internet ideas and places

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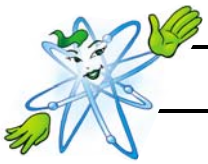
The Learning Zone

Student: _____ Date: _____

Blood in a Beaker

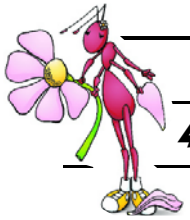
Think It Through Questions — How have my thoughts changed?

1.



2.

3.



4.

5.

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The Learning Zone