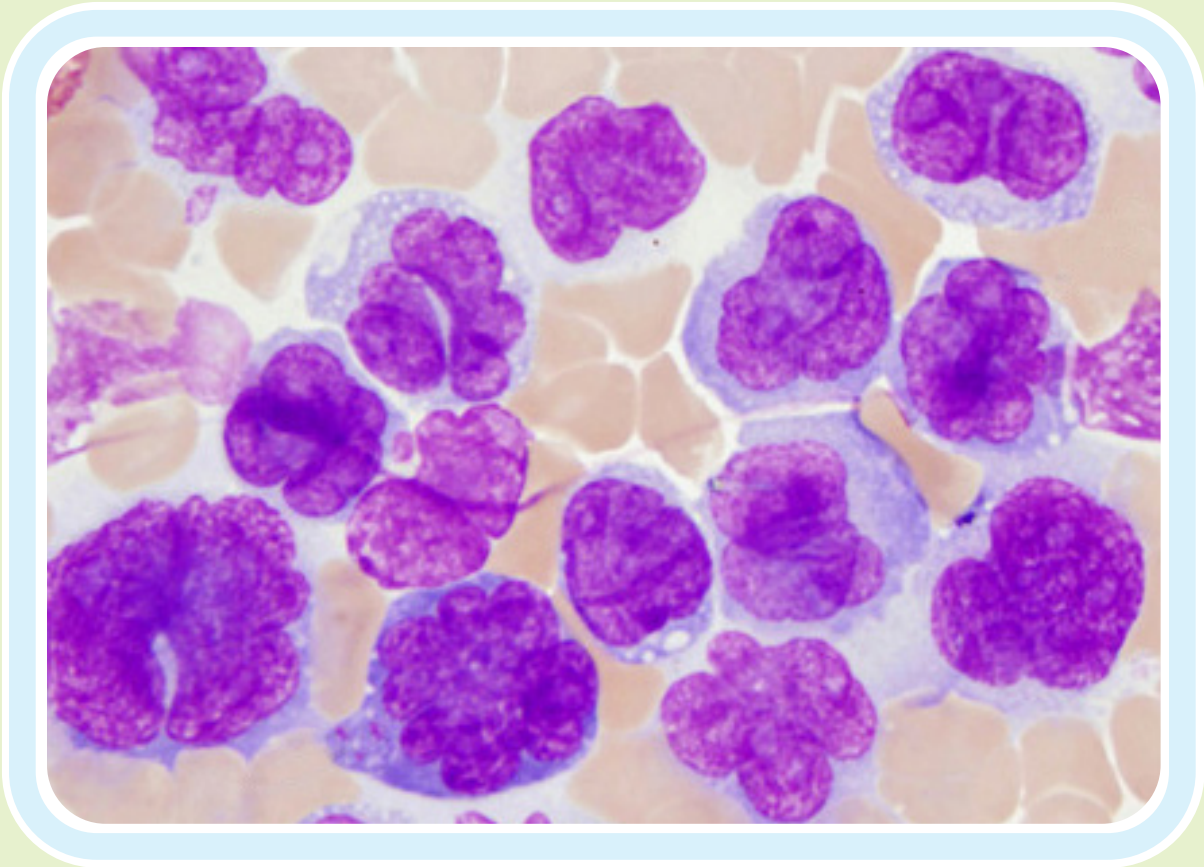


# Blood Smear

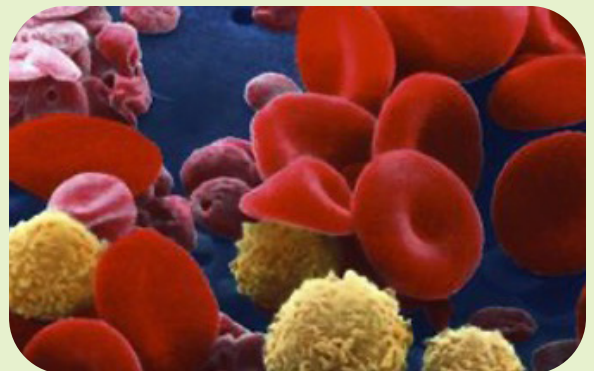


# Blood Smear

**Do you need an idea for a scientific study?  
Try out one of our ideas or make one of your own.**

**Start learning right now about the cells that make up human blood. Take the following brief quiz to see how much you already know about the different parts of blood. See the bottom of page 4 to check your answers.**

1. About how long does it take for a normal drop of blood to move from the heart, throughout the body, and then return to the heart of a human?
  - a. 50 seconds
  - b. 50 minutes
  - c. 50 hours
  - d. 50 years
2. A mature red blood cell does *not* have a nucleus.
  - a. true
  - b. false
3. About how much blood does the average human body contain?
  - a. 1.3 ounces
  - b. 1.3 pints
  - c. 1.3 quarts
  - d. 1.3 gallons
4. About how many red blood cells are in one pint of human blood?
  - a. 270,000
  - b. 2.7 million
  - c. 2.7 billion
  - d. 2.7 trillion
5. About how many red blood cells does the human body make *each second*?
  - a. 170,000
  - b. 1.7 million
  - c. 17 million
  - d. 1 trillion



# Making Money Blood

The proportion of each type of blood cells in a blood sample tells much information about the overall health of an individual. The typical blood sample consists of a RBC/WBC ratio of about 700 to 1. White blood cell types and percentages of abundance follow: Neutrophils = 55%, lymphocytes = 35%, monocytes = 6%, eosinophils = 3%, and basophils = 1%.

## Materials

- |   |                       |
|---|-----------------------|
| 10- pennies   | 6- nickels            |
| 3 - dimes   | 2- quarters           |
| 1- 50-cent piece  | 1 - large plastic cup |
| 1-cup of unpopped popcorn (contains about 2,000 pieces) |                       |

## Directions

- Place all the coins and unpopped popcorn in the large plastic cup.
- Place your hand over the open end of the cup so the contents will not fall out.
- Thoroughly shake the cup to distribute the contents evenly in the cup.
- Answer questions 1 – 2 below.
- Use the information in the above text to complete Table 1 below.

Contents	Represented this type of blood cell
penny	
nickel	
dime	
quarter	
50 cent piece	
unpopped popcorn	

- Using the exact expected proportions of each blood cell type presented in the above text, complete exactly how many of each coin type would be needed if the sample had a total of 70,100 coins and unpopped popcorn. Enter these values in Table 2.

Contents	Exact Number in a 70,100 Total Pieces Sample
penny	
nickel	
dime	
quarter	
50 cent piece	
unpopped popcorn	

## Questions

- How easy would it be to count the exact number of each coin type while in the cup?
- Propose a better way to count the exact number of each coin type

# Blood Smear

## Counting on Blood!

Way back in the early and mid-1600's, the importance of blood to the human body was known. In fact, van Leuwenhoek first discovered the red blood cell in 1674. About one hundred years later, the various white blood cells were discovered by Hewson. the first hemocytometer to count red and white blood cells was invented by multiple people during the mid-1800's. Fast forward to the early 1900's and the major blood groups (A, B, AB, and O) were identified.



Automated hematology analyzers are machines that provide blood cell counts for both red and white blood cells to determine abnormalities in terms of relative abundance of the blood cell types. The analyzer can also collect information about the size and shape of the different types of blood cells. However, up to 25% of all blood cell reviews require a person to manually conduct the test. People are still better at detecting abnormalities in blood cells than a machine.



A variety of factors can impact the quality of a blood cell count. These include poor blood collection techniques, poor temperature controls on stored blood samples, disorders and diseases affecting the viscosity of the patient's blood sample, antibody-related conditions in the patient, and many other factors. The importance of accurate blood test results relates to the expected need for about 10% more hematologists over the next decade.

Please visit our site for more helpful information:  
[STEMsims.com](http://STEMsims.com)

**Answers:** Page 2 Answers: (1) a, (2) b, (3) d, (4) d, (5) c. Page 3 Making Money Blood Answers: (1) Very difficult (2) Spread the contents out, like a blood smear. Table 1: penny = neutrophil, nickel = lymphocytes, dimes = monocytes, quarters = eosinophils, 50 cent = basophil, popcorn = red blood cells. Table 2: penny = 55, nickel = 35, dime = 6, quarter = 3, 50 cent = 1, popcorn = 70,000.

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