White blood cells are called leukocytes. They make up less than one percent of your blood. They are used to fight off infections; therefore, they are a part of your immune system. When numbers of WBC are not in a normal range it is an indicator that you are getting sick, fighting an infection, or may have cancer. There are 5 different types of white blood cells: neutrophils, lymphocytes, monocytes, eosinophils, and basophils. These are differentiated based on what their job is, the shape of their nucleus, the presence of granules, and the color of those granules.

**Neutrophils**
- Multi-lobed Nucleus
- Pale Red and Blue Cytoplasmic Granules

**Eosinophils**
- Bi-lobed Nucleus
- Dark Pink Stained Cytoplasmic Granules

**Basophils**
- Bi-lobed Nucleus (usually can’t be seen)
- Lots of Dark Purple Stained Cytoplasmic Granules that Take up the Entire Cell

**Monocytes**
- Kidney-Shaped Nucleus that May Appear Lobed
- No Granules
- Cytoplasm is Very Faintly Stained Blue

**Lymphocytes**
- Large Spherical Nucleus
- No Granules
- Thin Outer Rim of Faintly Blue-Stained Cytoplasm

Neutrophils make up 50 to 70 percent of leukocytes. They fight off bacterial and fungal infections. They are phagocytes which means they surround the disease causing agent and digest it. Neutrophils have a multi-lobed nucleus and have red or blue granules.
Lymphocytes make up 20 to 40 percent of White Blood Cells. They move between the blood and lymph nodes and produce T and B cells. T cells attack the cells directly. B cells send out antibodies to fight the disease. Lymphocytes have a circular nucleus and no granules.

Monocytes make up 1 to 10 percent of white blood cells. Monocytes are called macrophages because they digest the germ that is invading the body. They alert the body of infection. Monocytes have a kidney shaped nucleus and no granules.

Eosinophils make up 1 to 4 percent of White Blood Cells. They are used in allergic reactions. They also fight off parasitic infections by fighting off parasites too big to be engulfed. They also help with the inflammatory responses. Eosinophils have a bi-lobed nucleus and pink granules.

Basophils make up 1 to 2 percent of White Blood Cells. They release histamine for allergic reactions and cause symptoms associated with allergies. Basophils have a bi-lobed nucleus with purple granules.
Task #1

1. What are the 5 types of white blood cells?

2. What percentage of WBC are neutrophils?

3. What type of infections do neutrophils fight off?

4. Neutrophils are phagocytes. What does this mean?

5. What percentage of WBC are lymphocytes?

6. What three places in the body contain lymphocytes?

7. What are the two types of lymphocytes?

8. How do B cells fight off infections?

9. How do T cells fight off infections?

10. What percentage of WBC are monocytes?

11. Monocytes are macrophages/phagocytes. How do they fight off infections?

12. What percentage of blood makes up eosinophils?

13. What types of infections do eosinophils fight off?

14. What else are eosinophils used for besides parasitic infections?

15. What portion of WBC are basophils?

16. What are basophils used for?
**Task #2**

Identify the type of WBC below and fill in the chart.

![Images of WBC cells]

Fill in the chart below based on your reading.

<table>
<thead>
<tr>
<th>Type of WBC</th>
<th>Description of Nucleus</th>
<th>Description of Granules</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neutrophil</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monocyte</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lymphocyte</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eosinophils</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Basophils</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Task #3

1. Which of the following white blood cells is used to alert the body of infections?
   a. Monocytes
   b. Lymphocytes
   c. Basophils
   d. Eosinophils
   e. Neutrophils

2. Which of the following white blood cells is used for allergic reactions AND parasitic infections?
   a. Monocytes
   b. Lymphocytes
   c. Basophils
   d. Eosinophils
   e. Neutrophils

3. Which of the following white blood cells is used for fighting off bacterial and fungal infections?
   a. Monocytes
   b. Lymphocytes
   c. Basophils
   d. Eosinophils
   e. Neutrophils

4. Which of the following white blood cells releases histamine and is used in allergic reactions?
   a. Monocytes
   b. Lymphocytes
   c. Basophils
   d. Neutrophils

5. Which of the following white blood cells releases T and B cells to fight infections?
   a. Monocytes
   b. Lymphocytes
   c. Basophils
   d. Eosinophils
   e. Neutrophils

6. Which of the following white blood cells has a multi-lobed nucleus with red/blue granules?
   a. Monocytes
b. Lymphocytes  
c. Basophils  
d. Eosinophils  
e. Neutrophils

7. Which of the following white blood cells has a bi-lobed nucleus with pink granules?  
a. Monocytes  
b. Lymphocytes  
c. Basophils  
d. Eosinophils  
e. Neutrophils

8. Which of the following white blood cells has a bi-lobed nucleus with purple granules?  
a. Monocytes  
b. Lymphocytes  
c. Basophils  
d. Eosinophils  
e. Neutrophils

9. Which of the following white blood cells has a circular nucleus no granules?  
a. Monocytes  
b. Lymphocytes  
c. Basophils  
d. Eosinophils  
e. Neutrophils

10. Which of the following white blood cells has a kidney shaped nucleus with no granules?  
a. Monocytes  
b. Lymphocytes  
c. Basophils  
d. Eosinophils  
e. Neutrophils

Match the correct percentages to each white blood cell.  
11. Monocytes a. 50 to 70  
12. Lymphocytes B. 20 to 40  
13. Basophils C. 1 to 10  
14. Eosinophils D. 1 to 4  
15. Neutrophils E. 1 to 2