1. Extracellular fluid makes up _________ of the body fluids.
   List the types of extracellular fluids.________________________________________

2. Intracellular fluid makes up _________ of the body fluids. Where is it found? _________

3. In which fluid space (intracellular or extracellular) do changes in fluid volumes occur first?
   ________________________________________________________________________

4. Describe what happens with water toxicity. ______________________________________

COMPONENTS OF WHOLE BLOOD

5. ____________ makes up 55% of whole blood; ________________ makes up 45%.

6. Name the 5 types of plasma proteins and give their functions.
   ________________________________________________________________________
   ________________________________________________________________________
   ________________________________________________________________________
   ________________________________________________________________________
   ________________________________________________________________________

7. What are the other 3 major components of plasma, and what molecules make up each
category? __________________________________________________________________
   ________________________________________________________________________
   ________________________________________________________________________

8. List the 3 types of formed elements and give their functions.
   ________________________________________________________________________
   ________________________________________________________________________
   ________________________________________________________________________

9. ________________ stems cells produce regular leukocytes and platelets.
   ________________ stem cells produce lymphocytes.

RED BLOOD CELLS

10. Describe the structure of a RBC. __________________________________________
    What is the advantage of the biconcave shape? ________________________________

11. How long do RBC live? ______________
    What happens at the end of their lifespan? ________________________________

12. Define hematocrit. ________________________________________________________
    Define anemia. __________________________________________________________

13. What is the function of hemoglobin? _________________________________________
14. Describe the structure of hemoglobin. _______________________________________
   Hemoglobin is functional at which protein structure. ______________________________
15. Hemoglobin carrying oxygen is called ____________________________.
   Hemoglobin carrying carbon dioxide is called _____________________________.
16. Describe the breakdown of hemoglobin. _______________________________________
   _______________________________________________________________________
17. What happens to bilirubin in the body? _______________________________________
18. _________________ is a disorder in which bilirubin builds up in tissues and is not broken
   down. It gives the skin a ________________ color.
19. Where does iron go when recycled and how is it transported? ______________________
20. _________________ anemia occurs when there is not enough iron in the diet or
   there are problems with iron absorption.
21. What molecule has a much greater affinity for heme than oxygen? _________________
   It gives the skin a ____________________ color.
22. What is the function of myoglobin? __________________________________________

BLOOD TYPES
Some helpful websites:
http://www.webmd.com/a-to-z-guides/blood-type-test
http://waynesword.palomar.edu/aniblood.htm#rhfactor
23. The surface markers on red blood cells are called ___________________________ or
   ____________________________.
   Define antigen ____________________________________________________________
24. _________________, or ____________________________ are proteins in plasma
   that will attack foreign RBCs.
25. Fill in the antigens (agglutinogens) and antibodies (agglutinins) for each blood type.

<table>
<thead>
<tr>
<th>BLOOD TYPE</th>
<th>ANTIGENS</th>
<th>ANTIBODIES</th>
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</thead>
<tbody>
<tr>
<td>A</td>
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<td>B</td>
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</table>
26. What happens if type B blood is given to a type A patient? ________________________

____________________________________________________________________

27. A person who is positive for the Rh factor has ______________________ on the RBC.
A person who is Rh negative ____________________________________________ .

28. Taking into account both surface antigens and Rh factor, a person with blood type _______ is
a universal donor. A person with blood type _________ is a universal recipient.

29. The mother is Rh negative. The father is Rh positive. The first baby is Rh positive. What
happens?____________________________________________________________________

Does this baby have any blood problems?___________

30. What happens during the mother’s second pregnancy with an Rh positive child?
____________________________________________________________________

What is this disorder called?______________________________________________
1. 1/3; plasma, interstitial fluid, CSF, serosal fluid in joints, fluid in eyes and ears
2. 2/3; in cells
3. extracellular
4. too much fluid goes into cells; cells die
5. plasma; formed elements
6. albumins - act like solutes; produce osmotic pressure so water moves
   immunoglobulins (antibodies) - body defense
   fibrinogen - blood clotting; becomes solid fibrin
   regulatory proteins - hormones, enzymes, proenzymes
   carrier proteins - carry hormones and enzymes
7. electrolytes - anions and cations that carry an electrical charge in solution
   nutrients - carbohydrates, proteins, lipids
   wastes - urea, uric acid
8. red blood cells - carry oxygen and carbon dioxide
   white blood cells - body defense
   platelets - packets of cytoplasm that begin the blood clotting process
9. myeloid; lymphoid
10. biconcave disc; no organelles; increased surface area for faster gas exchange
11. 120 days; macrophage ingests RBC and recycles parts
12. percent of whole blood that contains RBC; decreased number of RBC in blood
13. attracts oxygen
14. 4 protein chains (2 alpha and 2 beta helices) with a heme molecule in the center of each chain,
   and iron in the middle of each heme molecule; quaternary
15. oxyhemoglobin; carbaminohemoglobin
16. heme → biliverdin → bilirubin → unconjugated bilirubin → conjugated bilirubin
17. excreted in bile and becomes part of bile salts; excreted in urine and feces
18. jaundice; yellow
19. to bone via transferring
20. iron deficiency anemia
21. carbon monoxide; bright red
22. carries hemoglobin in muscles
23. surface antigens; agglutinogens; anything that causes an allergic reaction
24. antibodies; agglutinins

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<td>Anti-A</td>
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<tr>
<td>AB</td>
<td>AB</td>
<td>None</td>
</tr>
<tr>
<td>O</td>
<td>None</td>
<td>Anti-A, anti-B</td>
</tr>
</tbody>
</table>

26. The anti-A antibodies in the type B blood will bind to the A antigens in the type A blood.
   Agglutination and hemolysis occur.
27. Rh antigens; does not have any Rh antigens on the RBC.
28. universal donor – O negative; universal recipient – AB positive

29. At delivery, some of the baby's Rh positive RBC can enter the mother's circulation. The mother develops anti-Rh antibodies. ; no

30. The anti-Rh antibodies circulating in the mother's blood cross the placenta into the baby and attack the baby's blood.  
hemolytic disease of the newborn