

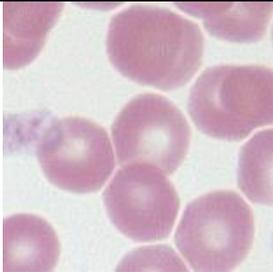
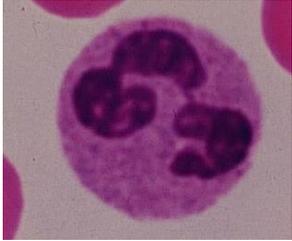
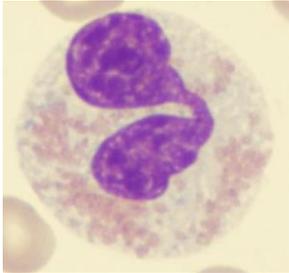
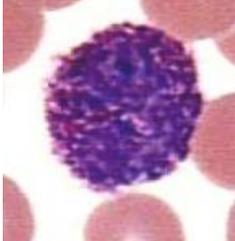
1. What type of tissue is blood classified as? **Connective**
2. What percentage of blood is plasma? What percentage is formed elements?

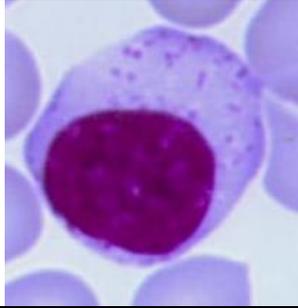
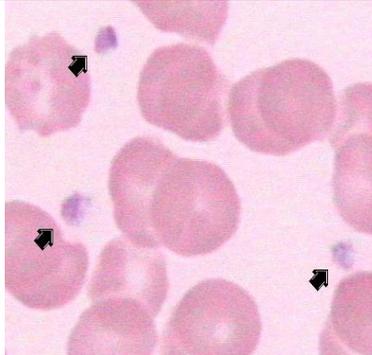
55% Plasma; 45% Formed elements

3. What is hematopoiesis and where does it occur?

The formation of blood cells; in the red bone marrow

4. Fill in the chart below

Blood Cell	Nucleus or not?	Draw a picture	Function and special characteristics	If a WBC: is this a granulocyte or agranulocyte?
Erythrocyte (red blood cell)	No		<ul style="list-style-type: none"> • main function is to carry oxygen; • Biconcave disks; • Essentially bags of hemoglobin • Anucleate (no nucleus) • Contain very few organelles • Outnumber white blood cells 1000:1 	N/A
Neutrophil (Phagocytic)	Yes		<ul style="list-style-type: none"> • Multi-lobed (usually tri-lobed) nucleus with fine granules; • Act as phagocytes at active sites of infection 	Granulocyte
Eosinophil (Phagocytic)	Yes		<ul style="list-style-type: none"> • Large brick-red cytoplasmic granules; • Found in response to allergies and parasitic worms 	Granulocyte
Basophil	Yes		<ul style="list-style-type: none"> • Have histamine-containing granules • Initiate inflammation 	Granulocyte

Monocyte/ Macrophage (Phagocytic)	Yes		<ul style="list-style-type: none"> • Largest of the white blood cells • Function as macrophages (large eaters) • Important in fighting chronic infection 	Agranulocyte
Lymphocyte	Yes		<ul style="list-style-type: none"> • Nucleus fills most of the cell • Play an important role in the immune response 	Agranulocyte
Platelets	No		<ul style="list-style-type: none"> • Derived from ruptured multinucleate cells (megakaryocytes) • Needed for the clotting process • Normal platelet count = 300,000/mm³ 	

5. What is erythropoietin? Where does it come from? What triggers its release?

A hormones that stimulates the formation of blood cells, it is released mostly by the kidneys in response to low oxygen levels in the bloodstream.

6. What type of cell does an erythrocyte originate from? What are these cells called?

Stem cells (hematocytoblast)

7. What are the physical/anatomical characteristics of erythrocytes?

Anucleate; biconcave disk; no nucleus or organelles; round, oval shape, contain iron heme groups and hemoglobin to carry oxygen.

8. What type of metal atom does a hemoglobin protein possess?

An iron atom

9. How long do RBCs live?

90-120 days

10. How many oxygen molecules can one hemoglobin molecule hold?

4 oxygen molecules

11. How many hemoglobin molecules are found in one red blood cell?

250 million, so there are about a billion oxygen molecules for every RBC

12. Which WBCs congregate at the site of an allergic reaction?

Eosinophils

13. Which leukocyte is most abundant?

Neutrophils

14. Which agranulocyte is most abundant?

Lymphocyte

15. What are the physical properties of a platelet?

Irregularly shaped, no nucleus, only cytoplasm surrounded by a plasma membrane

16. What are the three parts/stages involved in hemostasis?

Platelet plug, Vascular Spasms, and Coagulation

17. What is the most common blood type?

O+

18. What does agglutination mean and when does it occur?

Clumping of blood cells when antigens come in contact with antibodies (incompatible blood types)

19. What is plasma and what is it composed of?

Fluid, non-living matrix portion of the blood; 90 % water, nutrients, proteins, salts/electrolytes (metal ions), hormones, waste products and respiratory gases.

20. Describe how antibodies and antigens work (related to blood transfusions).

Antibodies are proteins that attack foreign invaders and are the main reason why doctors have to be careful about blood typing. If the incorrect blood type is given, then agglutination will occur and the person will be in danger of internal blood clotting and death. On each blood cell, there are antigens for differing blood types (A, B, A& B, or none). Doctors have to match up the correct blood as a result.

21. What is sickle cell anemia? How is it inherited (genetics)?

It is caused by inheritance of an abnormal type of hemoglobin which distorts the RBC's into sickle shapes. These sickle shapes can cause RBC collection in narrow areas causing unnecessary clotting and blockages. There is some research that says people with sickle cell anemia are more resistant to the malarial parasite because it affects the RBC. It is passed on through the parents genetically and is more common in African Americans.

22. What is hemophilia? How is it inherited (genetics)?

Hemophilia is a blood disorder where a person lacks the normal clotting factors to prevent blood loss. Even the slightest movement can rupture a blood vessel and that would not be repaired because of lack of clotting factors. Treatment includes injections of Factor VII and Factor VIII clotting factors. It is a sex-linked trait on the X chromosome and therefore more males have it than females.

23. What is the Rh factor? How can it affect a pregnancy?

Another antigen on the surface on blood cells. It was named after the rhesus monkey. When a fetus is Rh+ and the mother is Rh-, this can cause the mother's immune system to attack the fetus. 1st pregnancy is usually fine because not enough antibodies exist in the mother, but the second can be disastrous. There are drugs that will suppress this reaction.

24. What is leukemia?

A malignant cancer of the blood that leads to a massive increase in white blood cell formation. Treatment includes bone marrow transplant from a compatible donor.

25. What is anemia (general)?

It refers to a condition where there is a lower than normal oxygen level in the blood because its capacity for oxygen is diminished. Can be caused by a great many things such as low RBC count (low hematocrit), blood loss, iron deficiency, and other diseases.

26. Which organ(s) remove damaged or old blood cells?

Liver or spleen

27. **Sickle** cell anemia is caused by inheritance of an abnormal type of hemoglobin that distorts the RBC's into sickle shapes.

28. **Anemia** is any of a number of different conditions caused by an inability to carry sufficient oxygen to the body cells.

29. A blood clot is called a **Thrombus**.

30. A dislodged and free floating clot is called an **Embolus**.

31. A low white count (under 5,000/dl of blood) caused by diseases of the immune system is called **Leukopenia**.

32. A substance that reacts to an antigen, usually causing them to clump together is called a/an **Antibody**.

33. An abnormally high white blood cell count, usually because of infection, is called **Leukocytosis**.

34. Any substance that stimulates the production of antibodies is called a/an **Antigen**.

35. Platelets are also called **Thrombocytes**.

36. The clumping of antibodies and antigens is called **Agglutination**.

37. The iron containing protein that combines with oxygen is called **Hemoglobin**.

38. The liquid part of the blood that has not clotted is called **Plasma**.

39. The major function of the RBC's is to transport **Oxygen**.

40. The number one function of blood is **Transportation of nutrients and waste products**.

41. Normal blood pH is **7.35 to 7.45**.

42. Type A blood has the **A** antigen on its surface, while type B blood has the **B** antigen on its surface. Type AB blood has **Both A and B** and type O blood has **NO** antigens.

43. Where does hematopoiesis take place in an adult?

In the bone marrow of the pelvis, femur, and the skull bones.

44. How is RBC formation controlled? What is erythropoietin? What are factors that cause its release?

Damaged and old cells are removed by liver and spleen, but when more are needed, the kidneys, in response to low blood oxygen levels, release erythropoietin to stimulate the bone marrow to make more RBCs. Low oxygen levels and bleeding can lead to erythropoietin being released.

45. Describe why a person with blood type AB cannot give to a person with blood type B? Explain why blood type O is the Universal Donor, and blood type AB is the Universal Recipient.

Blood type AB cannot give blood to a type B person because Type AB has the A antigen on its surface and it would cause the A antibodies of the recipient to attack the transfused blood and agglutination would occur. Type O blood is the universal donor because it lacks both A and B antigens (agglutination would not occur if donated) whereas type AB has both A and B antigens on its surface and would have not have any reactions to any type A and type B blood making it the universal recipient.

46. A hematocytoblast gives rise to two different stem cells. What are they and what cells do they differentiate/change into?

Myeloid and lymphoid stem cells. Lymphoid stem cells become lymphocytes and myeloid stem cells from the bone marrow give rise to erythrocytes, monocytes, neutrophils, eosinophils, basophils, and platelets.

47. What is thrombocytopenia?

It is a condition where there is lack of platelets in the normal blood which could lead to internal bleeding.

Hemostasis

48. During hemostasis, Collagen fibers are exposed by a break in a blood vessel and Platelets become “sticky” and cling to fibers and also release chemicals to attract more platelets to form a platelet plug.
49. A hormone called serotonin is released by platelets to cause vascular spasms and therefore cause blood vessels to shorten to prevent blood loss.
50. Injured tissues will release a series of chemicals to cause a cascade of clotting which end in the production of hair-like fibrin which forms a meshwork (the basis for a clot).
51. Blood usually clots within 3 to 6 minutes.