SI A&P - Full Discipline Demo - Digital

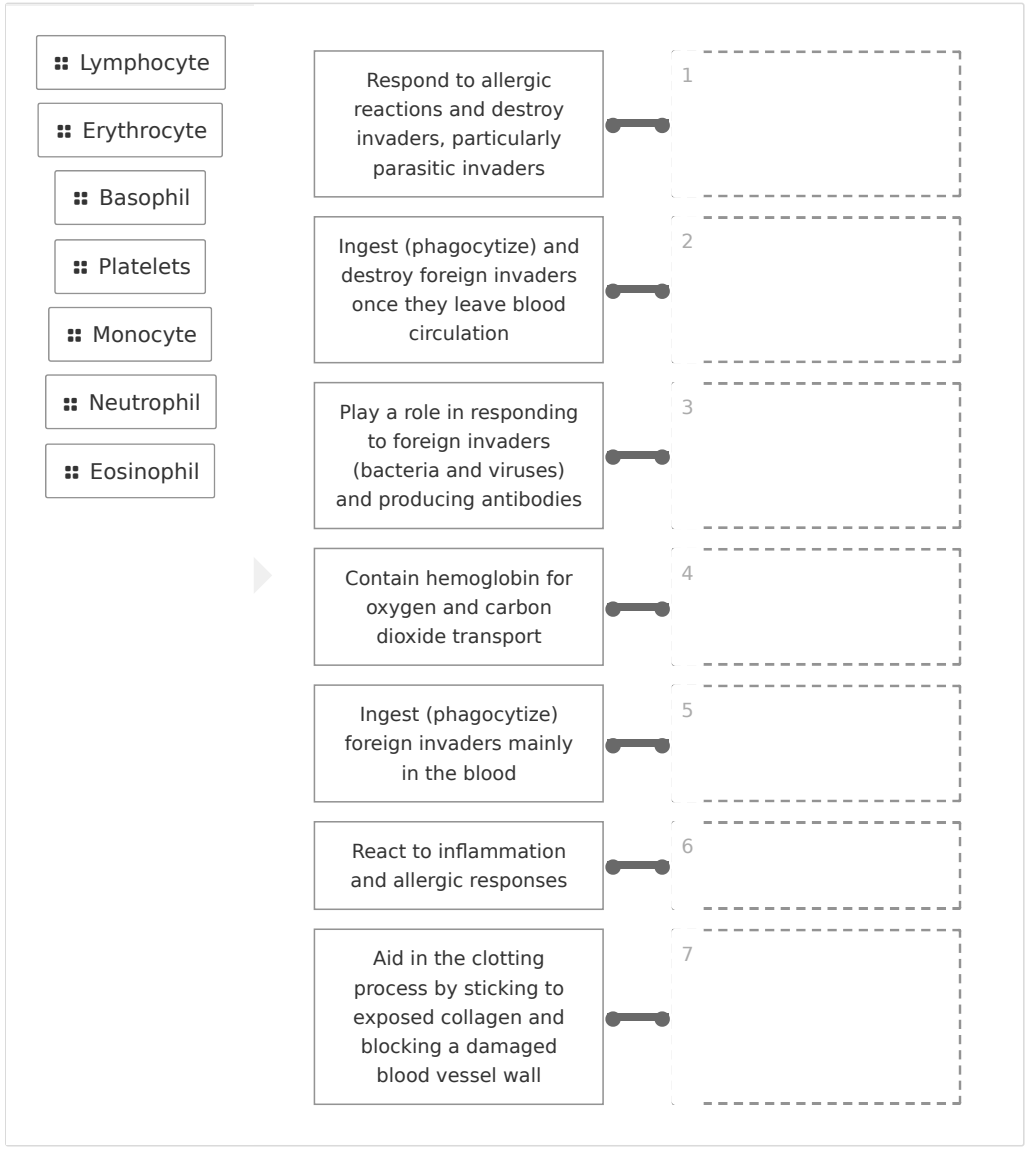
Blood - No Materials

Final Report - Answer Guide

Institution	Science Interactive University
Session	SI A&P - Full Discipline Demo - Digital
Course	SI A&P - Full Discipline Demo - Digital
Instructor	Sales SI Demo

Test Your Knowledge

Match each term with the best description.

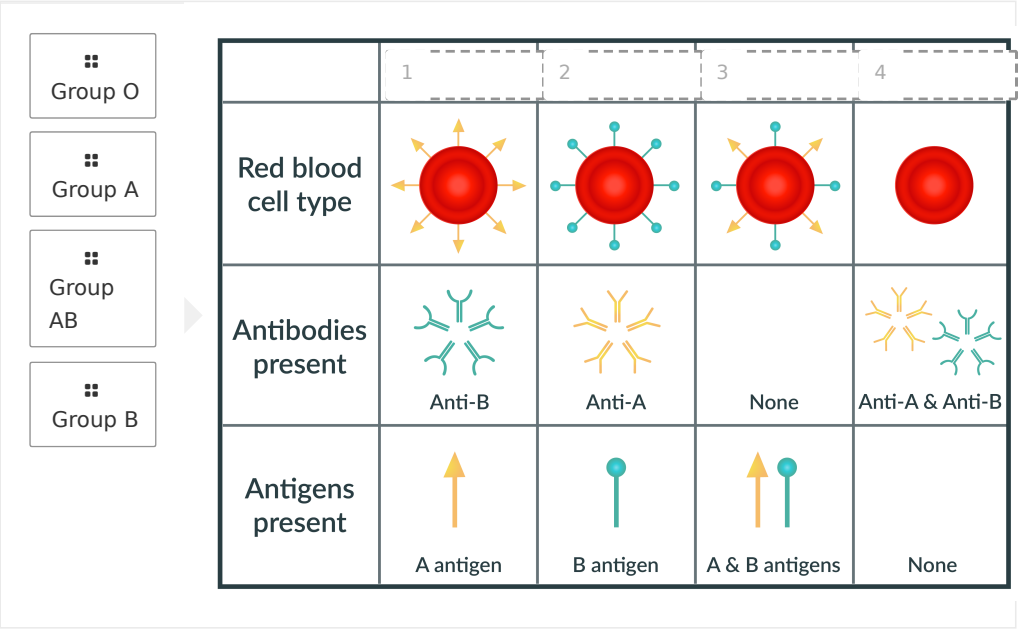


Correct answers:

1 Eosinophil 2 Monocyte 3 Lymphocyte 4 Erythrocyte

5 Neutrophil 6 Basophil 7 Platelets

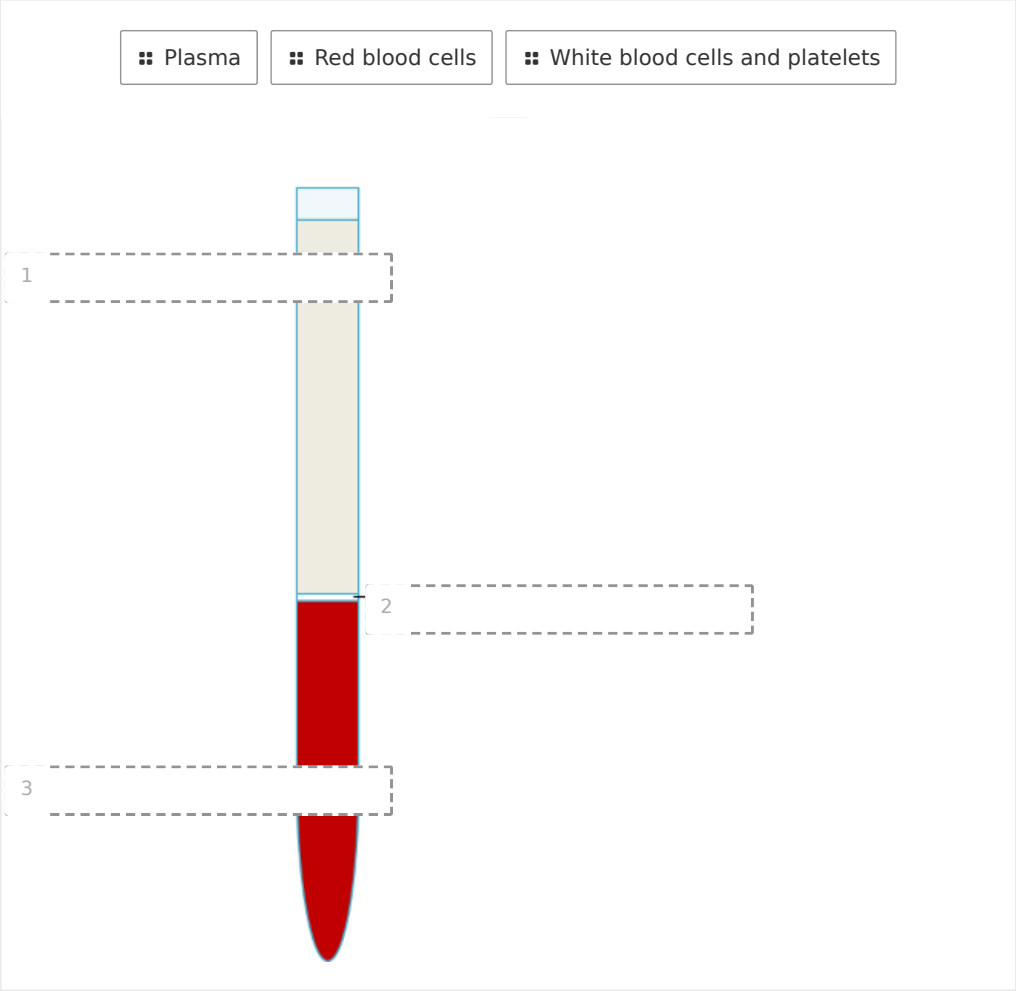
Label each blood group on the image below.



Correct answers:

1 Group A 2 Group B 3 Group AB 4 Group O

Label the blood components by volume on the figure below.



Correct answers:

1 Plasma 2 White blood cells and platelets 3 Red blood cells

Exploration

Human blood is composed primarily of white blood cells and platelets.

- True
- False ✔

____ ingest the foreign invaders found mainly in the blood.

- Monocytes
- Basophils
- Lymphocytes
- Neutrophils ✔

Patients lacking one of the ABO type or Rh factor antigens cannot receive blood from a donor with a blood type containing that antigen.

- True ✔
- False

Exercise 1

Describe the function and appearance of the five main types of leukocytes. Which types were present in your stained slide uploaded into Photo 1?

Basophil

- Function: **Basophils** react to inflammation and allergic responses.
- Appearance: Basophils have dark granules which contain histamine, heparin, and cytokines.

Neutrophil

- Function: **Neutrophils** ingest (phagocytize) foreign invaders mainly in the blood.
- Appearance: Neutrophils have a segmented nucleus that consists of three to five lobes (though immature neutrophils may have a horseshoe-shaped nucleus).

Eosinophil

- Function: **Eosinophils** respond to allergic reactions and destroy invaders, particularly parasitic invaders.
- Appearance: Eosinophils have granules that stain pink.

Monocyte

- Function: **Monocytes** ingest (phagocytize) and destroy foreign invaders once they leave blood circulation when they are then called macrophages.

- Appearance: Monocytes are the largest of the white blood cells, with a nucleus to cell ratio of 1:3.

Lymphocyte

- Function: **Lymphocytes** play a role in responding to foreign invaders (bacteria and viruses) and producing antibodies.
- Appearance: Lymphocytes have a large nucleus that occupies most of the cell.

Students should identify which types were present in the image uploaded into Photo 1.

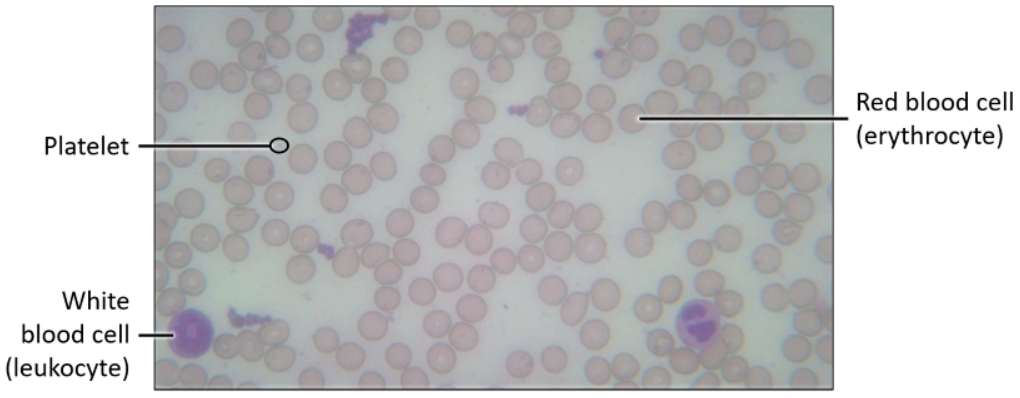
Which of the cells on your labeled slide contain hemoglobin? Relate the numbers of these cells appearing in Photo 1 to their function.

Erythrocytes, or red blood cells contain hemoglobin. Most of the cells observed in Photo 1 were red blood cells which function to transport oxygen throughout the body.

What is the function of platelets. How did these elements appear in the provided blood smear in Photo 2?

Platelets aid in the clotting process by sticking to exposed collagen and blocking damaged blood vessel walls. Platelets appeared as small fragments in Photo 2.

Photo 1: Magnified Blood Smear
(SAMPLE ANSWER BELOW)



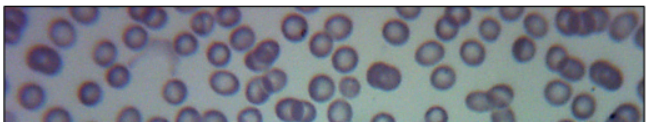
Data Table 1: Blood Smear Magnification and Characteristics

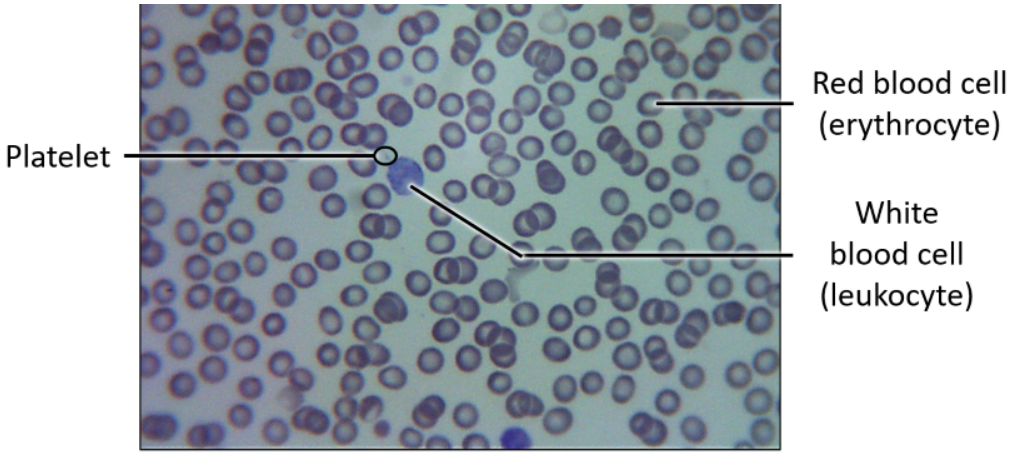
(SAMPLE ANSWER BELOW)

Structure	Magnification	Characteristics	Comments
Prepared Blood Smear	600X	The image includes mainly erythrocytes, but also some white blood cells, and platelets.	Students should only comment if they were unable to label a structure.
Provided Blood Image	600x	The image includes mainly erythrocytes, but also some white blood cells, and platelets.	Students should compare their blood smear to provided image.

Photo 2: Human Blood Provided Image

(SAMPLE ANSWER BELOW)





Exercise 2

What determines blood type?

Blood type is determined by the presence or absence of A, B, and/or Rh antigens on the surface of red blood cells.

What causes agglutination. How was it observed in this exercise?

Agglutination is the aggregation of red blood cells caused by the interaction between the antigens present on the outside of the cells and the corresponding antibodies in the blood plasma. Agglutination was observed in this exercise as clear plasma containing red dots as seen in the blood typing tray image uploaded into Photo 3.

Based on your results recorded in Photo 3 and Panel 1, which types of blood could the simulation individual receive in a transfusion to avoid the risk of an antibody/antigen reaction?

Student answers must match their results recorded in Photo 3 and Panel 1. General key:

Type A+ can receive from: A+, A-, O+, and O-.

Type A- can receive from A- and O-.

Type B+ can receive from B+, B-, O+, and O-.

Type B- can receive from B- and O-.

Type AB+ can receive from all other blood types.

Type AB- can receive from A-, B-, AB-, and O-.

Type O+ can receive from O+ and O-,

Type O- can only receive from O-.

Based on your results recorded in Photo 3 and Panel 1, which blood types could the simulation individual safely donate blood to?

Not to instructors: student answers will vary but must be supported by the results recorded in Photo 3 and Panel 1.

General key:

Type A+ can donate to: A+ and AB+

Type A- can donate to A+, A-, AB+, and AB-.

Type B+ can donate to B+ and AB+.

Type B- can donate to B+, B-, AB+, and AB-.

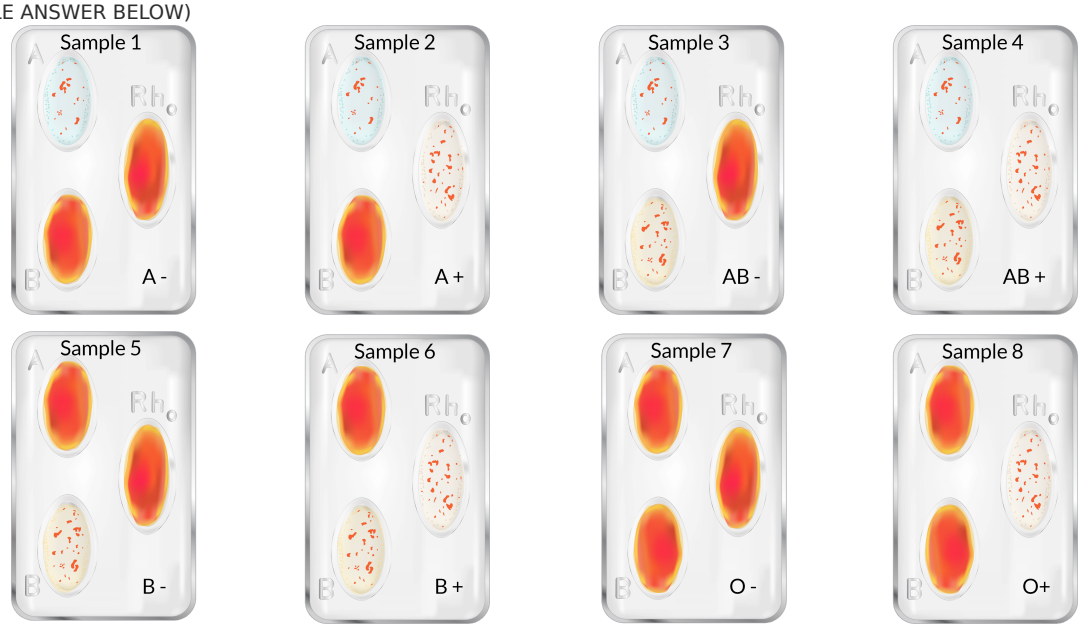
Type AB+ can donate to AB+.

Type AB- can donate to AB+ and AB-.

Type O+ can donate to A+, B+, AB+, and O+.

Type O- can donate to all blood types.

Photo 3: Blood Typing Results
(SAMPLE ANSWER BELOW)



Panel 1: Blood Typing Results

(SAMPLE ANSWER BELOW)

Student observations will vary based on sample received.

Sample Answer: The individual in sample 2 has A+ blood, because the anti-A serum reacted with the blood and the anti-D serum reacted with the blood.

Note that the agglutination of the Rh factor in the “Rh” well is more difficult to see in this image than the agglutination in the “A” well.

Competency Review

The formed elements of blood include ____.

- erythrocytes
- leukocytes
- platelets
- All of the above ✔

Human blood is composed primarily of plasma and red blood cells.

- True ✔
- False

_____ are cell fragments that aid in the clotting process.

- Erythrocytes
- Monocytes
- Platelets ✔
- Neutrophils

_____ are leukocytes with dark granules containing histamine and heparin.

- Basophils ✔
- Erythrocytes
- Thrombocytes
- Lymphocytes

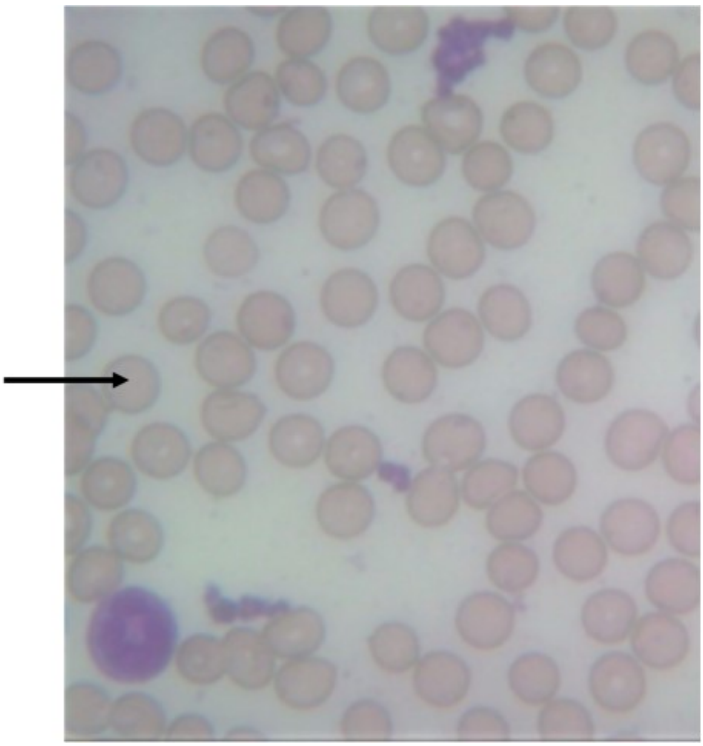
_____ are proteins embedded in the surface of red blood cells.

- Antibodies
- Antigens ✔
- Hemoglobins
- Cilia

Agglutination occurs when antibodies combine with antigens.

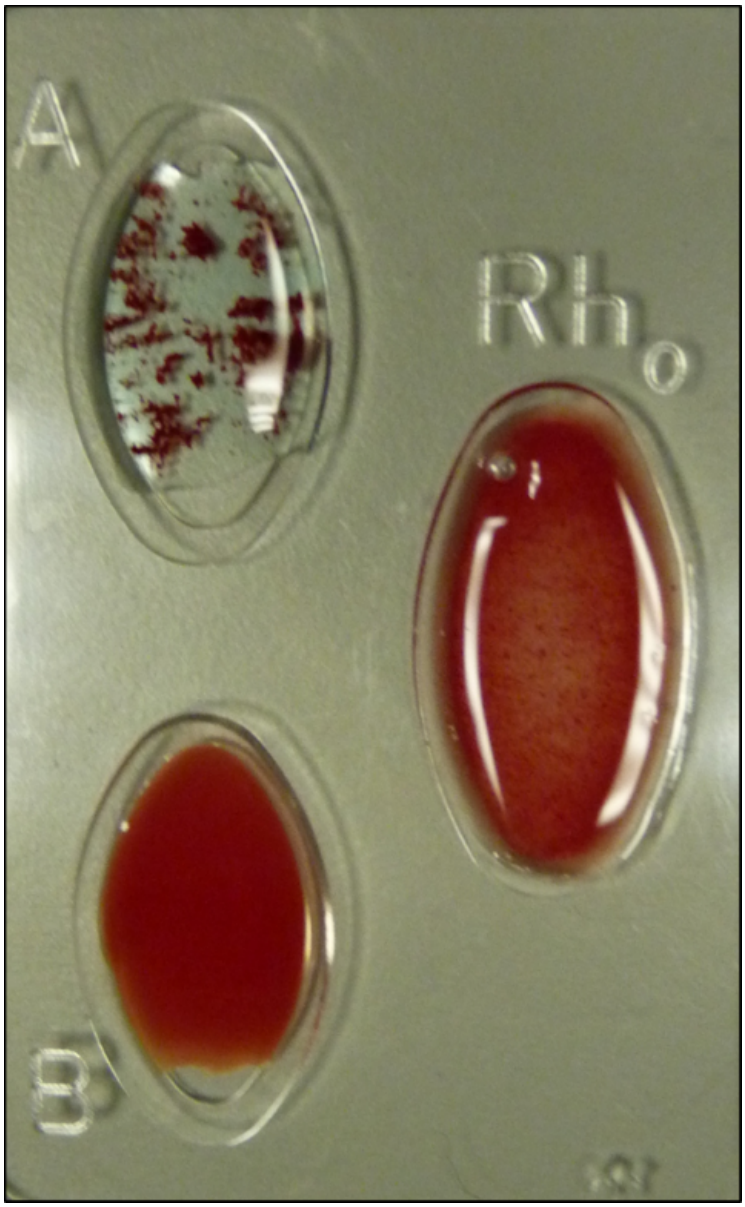
- True ✔
- False

The arrow in the image of a stained blood smear below is pointing to a(n) ____.



- erythrocyte ✔
- basophil
- monocyte
- platelet

The blood typing results in the image below indicate type _____ blood.



- O-negative
- A-positive ✔
- B-positive
- AB-negative

Extension Questions

Erythropoietin (EPO) is the hormone that promotes the production of red blood cells. Apply your knowledge of blood to explain why EPO is a popular "doping" drug for athletes. (SAMPLE ANSWER BELOW)

Red blood cells function to transport oxygen to cells throughout the body and exchange CO_2. Increased red blood cell numbers in the athlete's body would allow for higher levels of blood oxygenation and therefore higher performance outputs.