

Name: Teacher

Date: _____

Practice: Blood Groups

Use the following legend to represent the antigens present on the red blood cells:

A antigen



B antigen

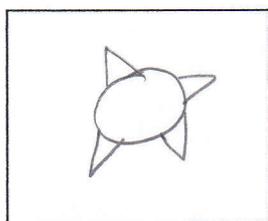


Rh antigen

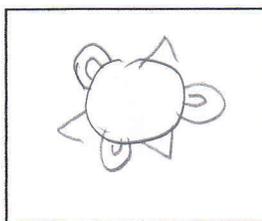


1. Using the above symbols, represent the following:

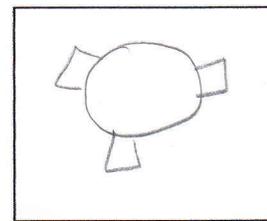
a) A red blood cell belonging to the group B-



b) A red blood cell belonging to group AB-

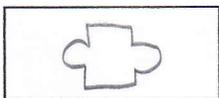


c) A red blood cell belonging to O+



2. Draw symbols that could represent antibodies for the three symbols representing antigens above:

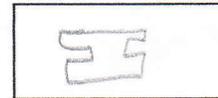
Anti-A:



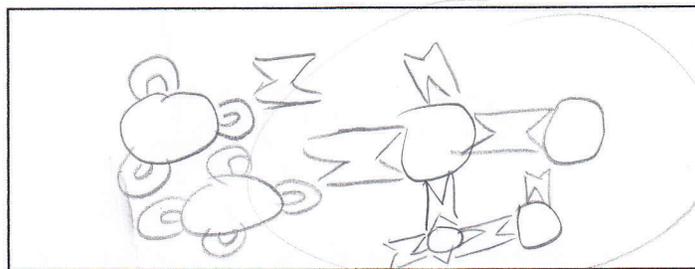
Anti-B:



Anti- Rh:



3. Models help us predict the behavior of matter. Draw what would happen if a person with A- blood type would receive blood from a person with B- blood:



4. What are the four blood types compatible with B+?

B+

B-

O+

O-

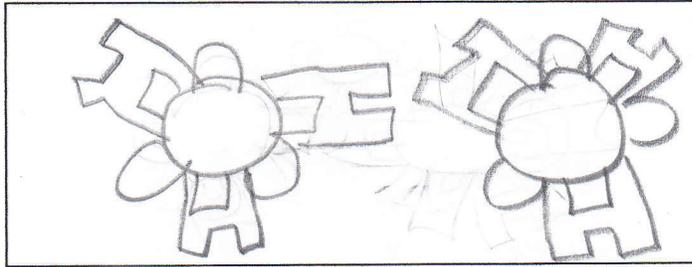
5. What blood type can we consider is the "Universal Donor"? Explain.

O- β antigens

6. What blood type can we consider the "Universal Recipient"? Explain.

AB⁺ has all antigens

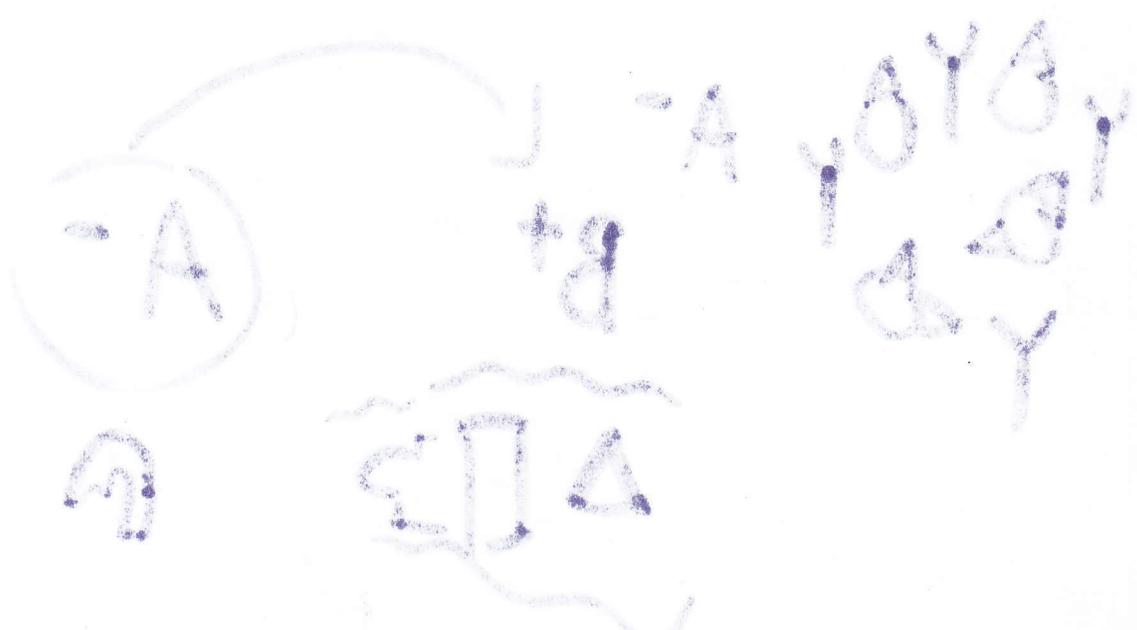
7. What would happen if someone with AB- blood type would receive blood from someone with A+ blood type?



8. a) Component of blood that transports nutrients and waste: Plasma
 b) Component of blood that plays a role in coagulation (scabs): Platelets
 c) Component of blood that carries oxygen: Red blood cells
 d) Component of blood that plays a role in body's defense against pathogens: White Blood cells

9. What antibodies are present in people who are O+? A & B

10. Donor	Recipient	Yes or No?	Reason
A+	AB-	<u>NO</u>	<u>Rh-antibody</u>
O+	A-	<u>NO</u>	<u>Rh-antibody</u>
B-	O+	<u>NO</u>	<u>B antibody</u>
A-	AB+	<u>yes.</u>	<u>AB⁺ has A antigens (universal recipient)</u>
AB-	B+	<u>no</u>	<u>B has a antibody</u>



Name: Answer Sheet

Date: _____

Circulatory System Review

1. What do we call the liquid component that makes up blood? What is its role?

Plasma: transports substances such as solid components, waste, nutrients

2. The active ingredient of aspirin is acetylsalicylic acid. This substance is found naturally in the bark of the willow tree, but it has also been manufactured in labs since the beginning of the 19th century to help with fever and pain. However, aspirin cannot be taken before a surgery because of how it can prevent coagulation.

- a) What component of our blood do you think it affects? Why? ^{aspirin thins the blood & the platelets will not be able to}

Platelets: platelets are what coagulate blood! therefore help prevent excessive blood loss.

- b) Why do you think doctors advise us to take aspirin after a heart attack (where coronary arteries become blocked)?

Aspirin is a blood thinner - will reduce blood's ability to coagulate

3. What are antigens? What three types of antigens can we have?

Protein on the surface of red blood cells which determine blood type A, B, Rh.

4. What are antibodies? What three antibodies can we have?

anti-a, anti-b, anti-Rh - act against ^{we do not possess} foreign antibodies to neutralize them

5. If a person is AB-, what antigens do they have on their red blood cells?

A & B antigens

6. If a person is AB-, what antibodies do they have in their blood?

Rh antibodies

7. Why can't someone who is AB- give blood to a person who is A+? Explain.

Someone who is A+ has A antigens

& Rh antigens

They will have anti-b antibodies

& therefore will refuse the B- antigens on AB- blood!

Total : 38

Name: Teacher

Date: May 07

Test: Circulatory System and the Blood V2

1. Complete the following sentences using the following words: lungs, cells, carbon dioxide(2), oxygen(2). (3 marks)

a) In the pulmonary circulation, the blood rich in CO₂ will become rich in O₂ after the gas exchange occurs in the capillaries surrounding the alveoli.

b) In the systemic circulation, the blood rich in O₂ will become rich in CO₂ after the gas exchanges that occur in the capillaries surrounding the body.

2. List 2 differences between veins and arteries? (2 marks)

veins: thin walls, ↓ pressure
arteries: thick walls, ↑ pressure

3. The antigens present at the surface of the red blood cells determine the blood type of a person. With the ABO and Rhesus systems, what are the eight possible blood types? (2 marks) A⁺ A⁻ B⁺ B⁻ AB⁺ AB⁻ O⁺ O⁻

4. Which blood type is the universal donor? Explain why. Use words like antigens and antibodies. (2 marks)

O⁻ has no antigens, no antibodies against it

5. If a person has AB+ blood type, what antigens do they have on their red blood cells? Which blood type can they give to and why? (2 marks)

A, B, Rhesus, AB⁺ only - other blood types will have antibodies

6. Jack has a blood pressure of 150/98 mm of Hg. What does this mean? Is Jack suffering from hypotension or hypertension? What can Jack do to bring his blood pressure back to normal? (3 marks)

↑, hypertension, exercise
↓ diet
alcohol / smoking

7. What is the role of plasma? (1 mark)

transports r/w b c, platelets, nutrients, antibodies, hormones, waste, clotting factor, liquid flows

8. Which blood type is the universal recipient? Explain why. Use words like antigens and antibodies. (2 marks)

AB⁺, has all antigens = & antibodies

9. Imagine you are a red blood cell. Describe the path you will take through the body starting with the left atrium. Include a description of what will be added or taken out of the blood at the appropriate points. (3 marks)

left atrium, left ventricle, aorta, arteries, arterioles, capillaries (diffuse O₂ - cells, CO₂ to blood), venules, veins, inf/sup vena cava, right atrium

10. A woman is in a massive car accident. She is taken to the hospital where they find that she needs a blood transfusion. The nurse tests her blood, she is type AB⁻. What blood types can she be safely given? Why can she not be given the other blood types? Explain fully. (3 marks)

A⁻ B⁻ O⁻ AB⁻ - Rhesus antibodies

11. Blood components present different characteristics and functions. Complete the following sentences by writing the name of the constituent described. (3 marks)

Platelets

Red blood cells

White blood cells

- a. The only blood cells that have a nucleus are the white.
- b. The platelets are important for the coagulation of blood.
- c. The Red are responsible for the transportation of oxygen and carbon dioxide.

12. What is the function of a valve? (1 mark)

back-flow

13. Blood is ejected from the heart with great pressure and travels through the arteries. When it reaches the capillaries, it travels in a very slow motion and when it reaches the veins, the pressure is very low. How does the blood make its way back to the heart? (2 marks)

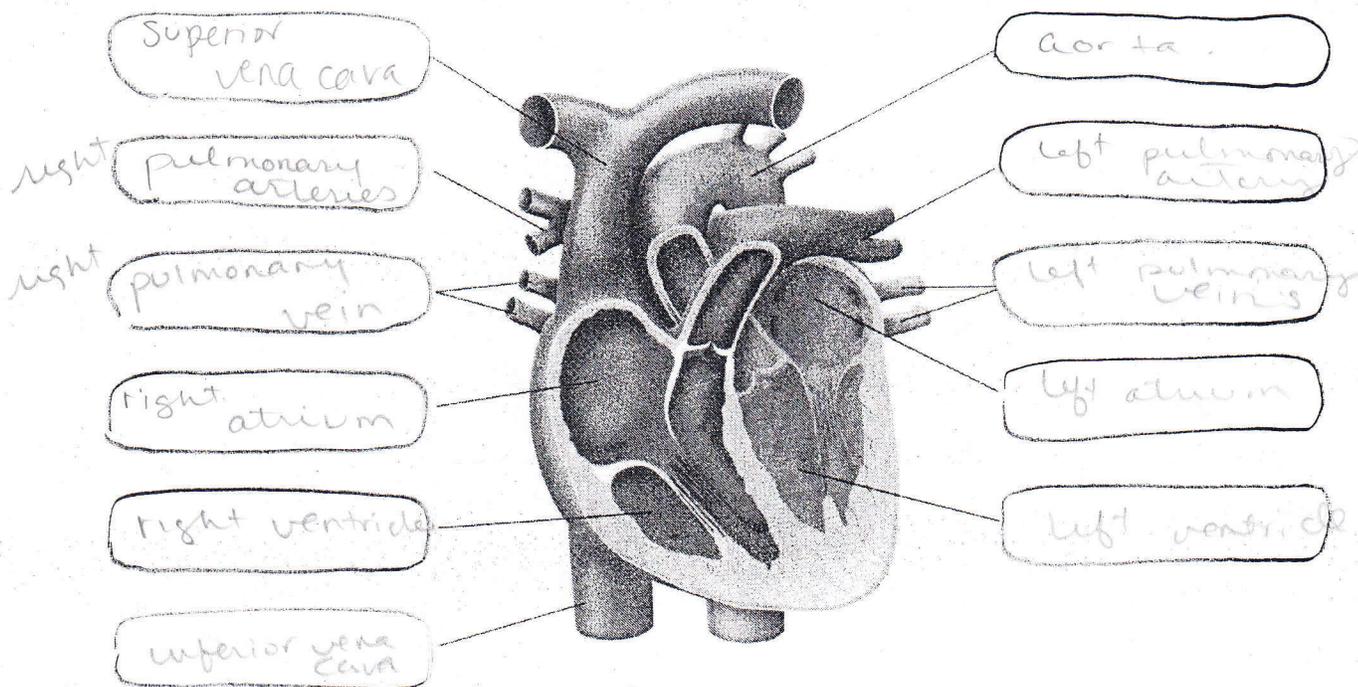
muscle contractions

14. What is the protein present in red blood cells that allows for the transport of oxygen and carbon dioxide? (1 mark)

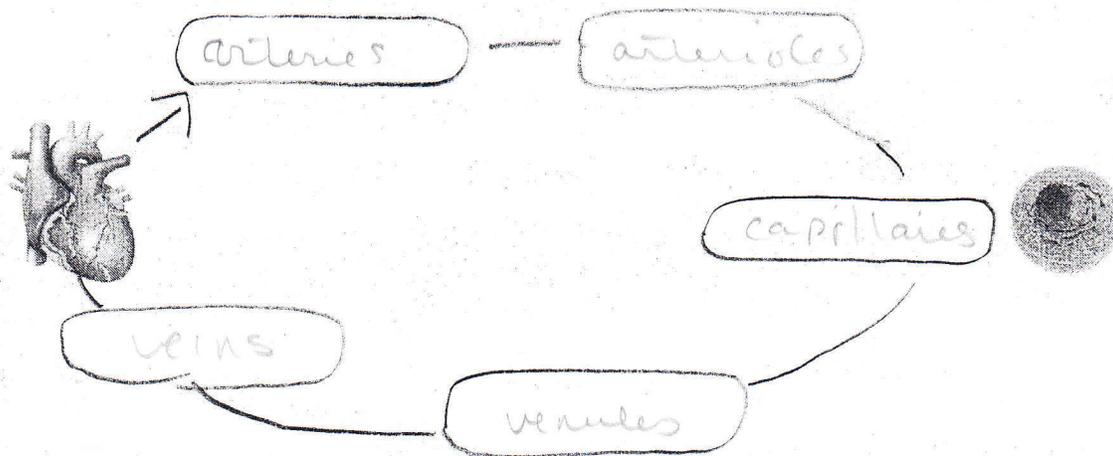
hemoglobin

Diagrams = 8 marks total

15. Complete the following schema.



16. Complete the following schema of the different blood vessels taken by the blood to go through the body.



Bonus: 2 marks

What is the name of the device with which you can listen to your heart beat?
stethoscope

BLOOD AND BLOOD TYPES

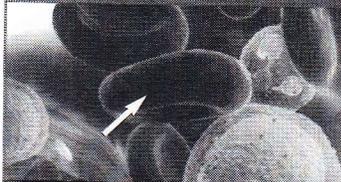
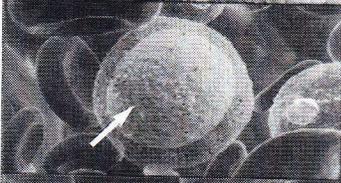
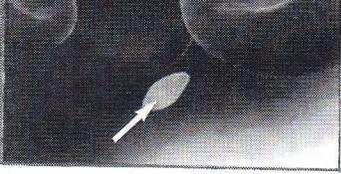
Complete this concept review handout and keep it as a record of what you have learned.

BLOOD CONSTITUENTS

Liquid element (55 % of blood volume)

Name	Water composition	Dissolved substances	Functions
<u>Plasma</u>	<u>90%</u>	<ul style="list-style-type: none"> • <u>Nutrients</u> • <u>Hormones</u> • <u>Antibodies</u> • <u>Waste</u> 	<ul style="list-style-type: none"> • <u>Transports nutrients to cells</u> • <u>Transports waste products from cellular activity to excretory organs</u> • <u>Transports hormones, antibodies, proteins and several other substances</u>

Formed elements (45 % of blood volume)

Illustration	Name	Functions
	<u>Red blood cell</u>	<ul style="list-style-type: none"> • <u>Transports oxygen with the help of a protein called "hemoglobin"</u> • <u>Transports CO₂</u>
	<u>White blood cell</u>	<ul style="list-style-type: none"> • <u>Defends against disease</u>
	<u>Platelet</u>	<ul style="list-style-type: none"> • <u>Helps in blood-clotting process</u>

BLOOD TYPES

Blood type	Substance(s) present on the membrane of red blood cells		
A ⁺	<input checked="" type="checkbox"/> Substance A	<input type="checkbox"/> Substance B	<input checked="" type="checkbox"/> Rh factor
A ⁻	<input checked="" type="checkbox"/> Substance A	<input type="checkbox"/> Substance B	<input type="checkbox"/> Rh factor
B ⁺	<input type="checkbox"/> Substance A	<input checked="" type="checkbox"/> Substance B	<input checked="" type="checkbox"/> Rh factor
B ⁻	<input type="checkbox"/> Substance A	<input checked="" type="checkbox"/> Substance B	<input type="checkbox"/> Rh factor
AB ⁺	<input checked="" type="checkbox"/> Substance A	<input checked="" type="checkbox"/> Substance B	<input checked="" type="checkbox"/> Rh factor
AB ⁻	<input checked="" type="checkbox"/> Substance A	<input checked="" type="checkbox"/> Substance B	<input type="checkbox"/> Rh factor
O ⁺	<input type="checkbox"/> Substance A	<input type="checkbox"/> Substance B	<input checked="" type="checkbox"/> Rh factor
O ⁻	<input type="checkbox"/> Substance A	<input type="checkbox"/> Substance B	<input type="checkbox"/> Rh factor



BLOOD TRANSFUSIONS

Definitions

- A blood transfusion is the injection of blood into a person.
- A blood donor is a person who gives blood for the purpose of a transfusion.
- A blood recipient is a person who receives blood from a transfusion.

The primary rule governing blood transfusions The donor's red blood cell membranes must not carry substances that differ from those on the red blood cell membranes of the recipient.

BLOOD COMPATIBILITY

Definitions

- Blood compatibility means that one person can receive blood from another person.
- A universal donor is a person with O- blood who can donate blood to anybody, regardless of blood type.
- A universal recipient is a person with AB+ blood who can receive blood from anybody, regardless of blood type.

Blood type	Can donate blood to	Can receive blood from
A ⁺	A ⁺ , AB ⁺	A ⁺ , A ⁻ , O ⁺ , O ⁻
A ⁻	A ⁺ , A ⁻ , AB ⁺ , AB ⁻	A ⁻ , O ⁻
B ⁺	B ⁺ , AB ⁺	B ⁺ , B ⁻ , O ⁺ , O ⁻
B ⁻	B ⁺ , B ⁻ , AB ⁺ , AB ⁻	B ⁻ , O ⁻
AB ⁺	AB ⁺	A ⁺ , A ⁻ , B ⁺ , B ⁻ , AB ⁺ , AB ⁻ , O ⁺ , O ⁻
AB ⁻	AB ⁺ , AB ⁻	A ⁻ , B ⁻ , AB ⁻ , O ⁻
O ⁺	A ⁺ , B ⁺ , AB ⁺ , O ⁺	O ⁺ , O ⁻
O ⁻	A ⁺ , A ⁻ , B ⁺ , B ⁻ , AB ⁺ , AB ⁻ , O ⁺ , O ⁻	O ⁻



30 INTEGRATION QUESTIONS • BLOOD AND BLOOD TYPES



1. When blood undergoes centrifugation it separates into two parts.

- a) What is the clear yellow liquid that rises to the top of the test tube called? Plasma.
- b) What is the main component of this part. Water.
- c) Name four substances that can be dissolved in this liquid.
Nutrients, antibodies, hormones, waste.
- d) What percentage of the volume of the contents of the test tube does the yellowish liquid form? 55%
- e) What makes up the other part of the test tube?
Formed elements: red blood cells, white blood cells and platelets.

2. What do you call the protein in red blood cells that transports oxygen?

Hemoglobin.

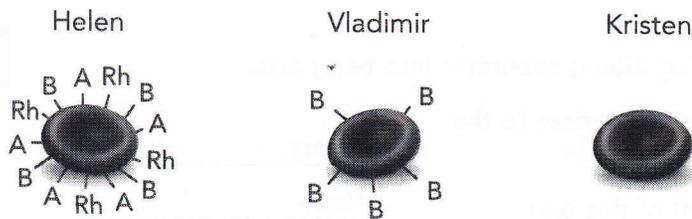
3. In the table below, specify which blood constituent carries out the function described.

Function	Blood constituent
a) Transports oxygen	Red blood cells
b) Defends the body	White blood cells
c) Makes blood fluid and transports wastes, hormones and waste products	Plasma
d) Helps in the blood-clotting process	Platelets

4. Complete the following statements.

- a) A blood transfusion entails injection of blood into a person.
- b) When an individual called the recipient can receive blood from an individual called the donor, we say there is blood compatibility.
- c) For a blood transfusion to be possible, the membrane of the donor's red blood cells must not carry substances that are different from the recipient's red blood cells.

5. The illustrations below show the appearance of red blood cells from three people.



a) Indicate the blood group of each person.

Helen: AB⁺

Vladimir: B⁻

Kristen: O⁻

b) Which friends can each person give blood to and from which friends can each receive blood if necessary?

	Can give blood to...	Can receive blood from...
Helen	No one	Vladimir and Kristen
Vladimir	Helen	Kristen
Kristen	Vladimir and Helen	No one

c) Which person is a universal donor?

Kristen.

d) Which person is a universal recipient?

Helen.

6. Naomi is blood group A⁻ and Vivian is A⁺

a) Can Vivian receive blood from Naomi? Explain your answer.

Yes, because Naomi's red blood cell membrane does not carry substances that are different from those on Vivian's red blood cell membrane.

b) Can Vivian give blood to Naomi? Explain your answer.

No, because her red blood cell membrane carries a substance (Rh factor) that is not found on Naomi's red blood cell membrane.

c) Vivian can give blood to people in which blood group?

To people with A⁺ and AB⁺ blood types.

