

Name \_\_\_\_\_

## “Whodunnit” Blood Typing Lab

### Prelab

1. What are the four different kinds of human blood? \_\_\_\_\_
2. The blood type is determined by antigens (A or B) that are present or absent on the surface of red blood cells. Humans normally produce antibodies against those antigens that are NOT on their red blood cells. REMEMBER that blood type is based on **antigens**, not the antibodies, that a person possesses.
  - a. If someone has A antigens, what blood type are they? \_\_\_\_
    - i. What antibody will they have? \_\_\_\_
  - b. If someone has B antigens, what blood type are they? \_\_\_\_
    - i. What antibody will they have? \_\_\_\_
  - c. If someone has neither A nor B antigens, what blood type are they? \_\_\_\_
    - i. What antibody will they have? \_\_\_\_
  - d. If someone has both A and B antigens, what blood type are they? \_\_\_\_
    - i. What antibody will they have? \_\_\_\_

There's actually another group of antigens on the surface of red blood cells that makes a person a Rh- or Rh+ blood type.

Blood Type	Antigens (Agglutinogens)	Antibodies in Plasma (Agglutinins)	Can Give Blood To	Can Receive Blood From
A	A	Antibody B	A, AB	O, A
B	B	Antibody A	B, AB	O, B
AB	A and B	Neither Anti-A or Anti-B	AB	O, A, B, AB
O	Neither A nor B	Both Anti-A and Anti-B	O, A, B, AB	O

### Agglutination (“Clumping”)

We are going to use a simple test to determine blood type, performed with a serum that will be added to separate samples of blood.

- If agglutination (CLUMPING) occurs only in the drops to which the anti-A serum was added, what blood type is it? \_\_\_\_
- If agglutination (CLUMPING) occurs only in the drops to which the anti-B serum was added, what blood type is it? \_\_\_\_
- If agglutination (CLUMPING) in both samples, what blood type is it? \_\_\_\_
- The absence of agglutination (CLUMPING) indicates that the blood type is \_\_\_\_

Reaction to Antibody A Serum	Reaction to Antibody B Serum	Blood Type
Agglutination	No agglutination	A
No agglutination	Agglutination	B
Agglutination	Agglutination	AB
No agglutination	No gglutination	O

## Scenario

Crime investigators were called to the scene of a robbery. Mr. Smith had come home, only to find someone robbing his apartment. As the criminal rushed to leave the apartment, he ran into a glass door, cutting his arm and tearing his shirt. The crime investigators were able to remove small drops of blood from glass bits. The blood samples from the crime scene, along with the victim's blood, were sent to the forensic lab to be analyzed. The crime investigators reviewed the available evidence and apprehended 3 suspects. The last remaining piece of evidence needed to solve the crime is to match the blood type found at the scene of the crime to one of the suspects. You, along with your classmates, have been chosen to provide this last piece of evidence and determine which of the suspects is the burglar.

## Materials

- 5 Blood typing trays
- Toothpicks
- Paper towel to clean the toothpicks between stirs
- Vials of: Victim's blood
  - Crime scene blood
- Suspect 1's blood
- Suspect 2's blood
- Suspect 3's blood
- Anti-A serum
- Anti-B serum
- Anti-Rh serum

## Procedure

1. Label the 5 blood typing trays by placing each tray on a piece of paper that each reads as one of the following: Crime scene, Victim, Suspect #1, Suspect #2, and Suspect #3.
2. To determine the type of blood found at the crime scene, put 3 drops of the blood found at the crime scene in each of the A, B, and Rh wells of the blood typing tray labeled "Crime Scene."
3. Place 3 drops of the simulated anti-A serum on the blood in the A well of the tray.
4. Place 3 drops of the simulated anti-B serum on the blood in the B well of the tray.
5. Place 3 drops of the simulated anti-Rh serum on the blood in the Rh tray.
6. With a toothpick, stir each sample of the anti-serum and blood. **MAKE SURE THAT YOU CLEAN OFF THE TOOTHPICK BETWEEN STIRRING THE SAMPLES** so that contamination doesn't occur and so you don't send the wrong suspect to jail!
7. Observe the slide and record your observations in Table 2 of the Analysis section. To confirm agglutination (**CLUMPING**), try reading text through a mixed sample. If you cannot read the text, assume you have a positive agglutination reaction.
8. For the Anti-Rh Serum, agglutination (**CLUMPING**) signifies Rh+, no agglutination (**CLUMPING**) means Rh-.

Once you have determined the type of blood found at the scene of the crime, you will then type the blood of the victim and three suspects.

9. Place 3 drops of the victim's blood in each of the A, B, Rh wells of the victim, and repeat for suspect #1, #2, and #3.
10. Place 3 drops of the simulated anti-A serum in each of the A wells on the four trays.
11. Place 3 drops of the simulated anti-B serum in each of the B wells on the four trays.
12. Place 3 drops of the simulated Rh serum in each of the Rh wells on the four trays.
13. Stir each sample with a clean toothpick (REMEMBER, YOU CLEAN IT BETWEEN STIRS!)
14. Observe the slide and record your observation in Table 2. To confirm agglutination, try reading text through the mixed sample. If you cannot read the text, assume you have a positive agglutination reaction.

Blood Source	Anti-A Serum	Anti-B Serum	Anti-Rh Serum	Blood Type
Crime Scene				
Victim				
Suspect 1				
Suspect 2				
Suspect 3				

Table 1

### Questions

1. As a forensics technician, the courts have asked you to summarize your findings to the jury. Explain what you would say in the space below. (Remember, it is your job to report the facts, not decide who is guilty.)
2. Why is it necessary to type the victim's blood?
3. Look at Suspect #3, using the information from Figure 1 (p.1) and the data from your blood type analysis:
  - a. What ABO antigens are present on the suspect's red blood cells? \_\_\_\_\_
  - b. What ABO antibodies are found in the suspect's blood plasma? \_\_\_\_\_
  - c. What is the suspect's blood type? \_\_\_\_\_



If the suspect has the blood type A+, you would expect that at the locus 796 they would have the nucleotide C/C, at 261 G/del or G/G (depending on whether they are AA or AO), at 802 is would be likely that they would have the nucleotide G.