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**Topic:** ABO Blood Types Worksheet

**Summary:** Students will learn about multiple alleles and Codominance. Students will learn about the ABO blood types, blood transfusions, and blood antibodies.

**Goals & Objectives:** Students will be able to predict which blood type is inherited. Students will be able to explain how the immune system affects blood transfusions.

**Standards:** CA Biology 2g. Students know how to predict possible combinations of alleles in a zygote from the genetic makeup of the parents. 10b. Students know the role of antibodies in the body's response to infection.

Time Length: 20 minutes

**Prerequisite Knowledge:** Students know how to complete a Punnett square for a single trait. Students know vocabulary words like homozygous, heterozygous, dominant, recessive, genotype and phenotype. Students know the basics about blood cells and antibodies.

## **Materials:**

- Textbook for reference
- Handouts and pencils

#### **Procedures:**

1. Students work on the handout by themselves.

**Accommodations:** Students with an IEP can take the handout home if they need extra time, or they can do the even number questions and the Punnett square.

## **Evaluation:**

Each question is worth 1 point for a total of 12 points. A correctly completed Punnett square is worth 3 points. This assignment is worth a total of 15 points.

Name:		Row:
	Data	Dania d.

# ABO Blood Types

A blood type or blood group is a classification of blood based on antigens on the surface of red blood cells. There are two major blood type systems: ABO and Rhesus.

The ABO blood group system has an A antigen and B antigen that are inherited. Blood type A has the A antigen on the surface of the red blood cell. Blood type B has the B antigen on the surface of the red blood cell. Blood type AB has both of the antigens on the surface of the red blood cell. Blood type O does not have any antigens on the surface of the red blood cell.

1) What are the four different blood groups?

Blood transfusions make it necessary to understanding the different antigens found on red blood cells. A blood transfusion is the process of transferring blood from one person into another person's circulatory system. Blood transfusions are useful when the recipient loses a large amount of blood due to trauma or surgery. For blood transfusions to work, the donated blood must match that of the recipient. If the blood is not matched, then the immune system of the recipient will attack the donated blood.

After birth, the immune system makes antibodies against the antigens not found on the red blood cells. Antibodies are present on the B white blood cells. Below is a table containing information about antigens, antibodies and blood transfusions.

Blood	Red Blood	Antibodies	Receive Blood	Donate Blood
Type	Cell Antigen	in Blood	From	То
Α	A	anti-B	O, A	A, AB
В	В	anti-A	O, B	B, AB
AB	A, B	None	O, A, B, AB	AB
О	None	anti-A, anti-B	0	O, A, B, AB

For questions 2-7, use the data table above.

2) Which blood type would you have if antibodies A and B were made during your first
year of life?
3) Which blood type is the universal donor?
4) Which blood type is the universal recipient?
5) Which ABO blood type has two different antigens on the surface of red blood cells?
6) Which ABO blood type has the A antigens on the surface of red blood cells?

7) If the blood plasma attack?	had antibody	A, what type	e of blood wo	ould the immune system				
8) How are antibodies related to the type of blood a person can receive?								
A single gene controls the ABO blood type system with three alleles. Two of the alleles are dominant (I <sup>A</sup> , I <sup>B</sup> ) and the third allele (i) is recessive. The gene encodes an enzyme glycosyltransferase that modifies carbohydrates that make up the red blood cell antigens. Since there are two of the dominant alleles, I <sup>A</sup> I <sup>B</sup> genotype expresses codominance. The three genotypes result in four phenotypes, A, B, AB, and O. Fill in the Punnett square below and then answer its corresponding questions.								
	$I^{A}$	$I^{\mathrm{B}}$	i	-				
$\mathrm{I}^{\mathrm{A}}$								
$I_{\mathrm{B}}$								
i								
9) What genotypes would create the phenotype blood type A?								
<ul><li>10) What genotypes would create the phenotype blood type B?</li><li>11) What genotypes would create the phenotype blood type AB?</li></ul>								

12) What genotypes would create the phenotype blood type O? \_\_\_\_\_