What TYPE of Blood is it ?

Name: _____ **Date:** _____

Back in the early part of the 1900's, it was discovered that the red blood cells in one human are not necessarily the same as the red blood cells in another human. Researchers found that three different types of protein-markers (also called agglutinogens) exist on the surface of red blood cells: **A**, **B**, and **Rh+**. Your blood type is determined by the protein-marker specific to your genetic structure. Therefore, if you required a blood transfusion, compatibility of blood types becomes an issue.

You can have either the A and B protein markers independently (type A or Type B), in combination with each other (type AB), or interestingly you may have neither (type O). In addition to the A and B protein markers, the Rh+ protein marker must be taken into account. If it is present, you are considered to be (+), and if you do not have this marker you are considered to be (-).

The chart below lists various blood types as well as which types of blood are compatible with each other. *Notice that the chart has is only partially completed - you are expected to complete the rest* !

Blood type	Compatible blood types	Incompatible blood types:
A+	A+, A -, O+, O -	B+, B -, AB+, AB -
A -	A -, O -	A+, O+, B+, B -, AB+, AB -
B+	_____	_____
B -	_____	_____
AB+	**AB+, AB -, A+, A -, B+, B -, O+, O -**	*none*
AB -	_____	_____
O+	O+, O -	AB+, AB -, A+, A -, B+, B -
O -	_____	_____

For forensic scientists, determining blood type of a sample recovered from a crime scene helps to narrow the field of suspects by either implicating suspects with the same blood type or eliminating any suspects that do not have the blood type identified.

Certain percentages of any given population have certain blood types. For example, in the United States, 42% have blood type A, about 46% have blood type O, 9% have blood type B, with blood type AB being the least common at 3%. Blood type identification does not by itself prove that a blood sample belongs to a particular suspect, as others may also have the same blood type. To further prove that a blood sample came from a particular individual would require DNA analysis of the blood sample in question.

Substances called 'anti-serums' have been developed to determine blood type. There are three types of anti-serums: anti-serum A, anti-serum B, anti-serum Rh. Each tests for one of the three basic protein-markers that exist on the surface of red blood cells (A, B, Rh+). If a small amount of anti-serum is added to a bloodsample and a agglutination reaction occurs (*precipitate forms causing cloudiness*), a positive test for the that protein-marker

marker is said to have occurred (eg. If anti-serum A and B both react with a blood sample but anti-serum Rh doesn't, then the blood sample in question is identified as AB-).

Related Queries:

1. One of the blood types from the chart you created is called a **universal donor**, while another type is referred to as a **universal recipient**. Identify these two distinct blood types & explain their significance.

2. Discuss how information about blood types is useful to **Forensic scientists** and outline both an advantage and disadvantage regarding this type of evidence.

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Related Case Study Exercise:

Police are called to a rooming house at 2300hrs on a Friday night. It's obvious from all the empty liquor bottles laying about that several people had been drinking in one of the suites on the top floor. When they arrive, patrol officers are informed by the caretaker that a fight has taken place upstairs, however, when they enter the room in question (Suite #1) they find only one person - a male who is laying dead on his bed, stabbed once through the heart, with several cuts on his right hand, which is still clutching a butcher knife. They also find blood spatter evidence on the floor leading to the bathroom, and small droplets of blood leading out the door of the rooming house suite. They find two distinct types of blood evidence on and near the victim in Suite #1: type **AB+** and type **B-**.

A further search of the rooming house reveals another pool of blood in an adjoining room (Suite #2). This blood proves to be type B-. In addition, there are blood droplets leading out of the room towards a fire escape. This blood proves to be type O-. It is also noted that there are blood droplets leading from Suite #2 to Suite #1 later identified as blood type B-.

Since the entire top floor of the rooming house (8 suites in total) is deserted, there are no witnesses to interview. It is obvious that at least two other people had been involved, as there were two different blood types collected from suite #2, and a third blood type collected in Suite #1.

A short time after officers arrive at the crime scene they receive word from medical staff at a nearby hospital, who called to report that two intoxicated males just arrived seeking emergency treatment for stab wounds.

Based on this story and your knowledge of blood type analysis, determine how many people were involved, the course of events that may have occurred, and the identity of the suspect who is presumed to have committed this murder. You should include a small diagram with your analysis of this scenario.
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