

OVERVIEW

Aimed at **key stage 4** pupils.

In this activity, the class will draw simple models to represent the shape of a red blood cell in the different blood groups.

LEARNING OBJECTIVES

- To learn about the four main blood groups – A, B, AB, O, in terms of the shape of the red blood cells and the antigens present, as well as the antibodies present in the blood plasma
- To consider the importance of identifying blood groups prior to blood transfusions

CURRICULUM LINKS

- KS4: The ways in which organisms function are related to the genes in their cells
- KS4: Human health is affected by a range of environmental and inherited factors, by the use and misuse of drugs and by medical treatments


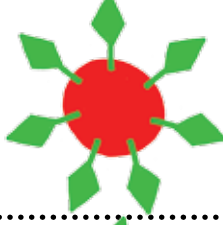


you will NEED

- Student worksheets

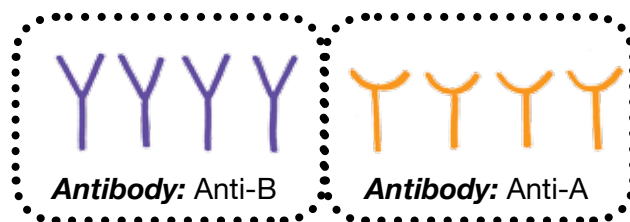
Activity

- Watch the film **Pamela's Story**
- Explain the importance of knowing blood groups when giving blood transfusions
- Students complete worksheet

ANSWERS

Blood Group	Appearance of red blood cells
Blood Group A	
Blood Group B	
Blood Group AB	
Blood Group O	

Write the label on these antibodies below (one is Anti-A and the other is Anti-B)



What would happen if blood group AB was given to someone with blood group A?

It would cause serious medical problems. It might even kill someone. The person with blood group A will have Anti-B antibodies, so if they were given blood group AB the Anti-B antibodies would attack the red blood cells with B antigens.

ANSWERS

		Donor			
		A	B	AB	O
Patient	A	✓	✗	✗	✓
	B	✗	✓	✗	✓
	AB	✓	✓	✓	✓
	O	✗	✗	✗	✓

1. People with blood group O are known as 'Universal Donors'. There are neither A or B antigens on these red blood cells, so it can be given to anyone. Blood group O will not react with Anti-A or Anti-B antibodies in the recipient's blood, so it won't be rejected by anyone.

2. People with blood group AB are known as 'Universal Recipients'. They do not have the Anti-A or Anti-B antibodies in their blood, so they will not reject any blood and can receive blood from anyone.

FURTHER information

The UK National Blood Service has a comprehensive website that gives more information about the composition of blood and how it can be used to save lives (like giving people with conditions like Sickle Cell Anaemia and Thalassaemia blood transfusions) www.blood.co.uk/about-blood

FOR MORE RESOURCES LIKE THESE AND TO SIGN UP FOR JEANS FOR GENES DAY, VISIT US AT WWW.JEANSFORGENES.ORG





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A Centre for Genetics in Healthcare

DRAWING BLOOD

Blood from different people can vary significantly. In total, there are 30 major blood groups, but the most important blood groups are: **A, B, AB and O**. If someone is given the wrong blood type, it can be life-threatening. Group A blood must never be given to someone with the B blood type – it could kill them!

Red blood cells have proteins on the surface of the cell, called **antigens**. These antigens determine which blood group you belong to.

Blood Group	Antigens on red blood cell
A	A
B	B
AB	A & B
O	Neither A or B

Blood Group	Appearance of red blood cells
Blood Group A	
Blood Group B	
Blood Group AB	
Blood Group O	

Use the pictures of antigen A and B below to draw antigens onto the red blood cells in the table on the left.

Antigen A



Antigen B



DRAWING BLOOD

Antibodies respond to **antigens**. Antibodies are found in the plasma of the blood and they are the body's natural defence against foreign antigens. Antibodies fit onto antigens like a jigsaw piece – they have to fit perfectly or they will not work. Antibodies to antigen A are called Anti-A. The table below shows which antigens and antibodies are carried in the different blood groups:

Blood Group	Antigens on red blood cell	Antibodies present
A	A	Anti-B
B	B	Anti-A
AB	A & B	Neither Anti-A or Anti-B
O	Neither A or B	Can make Anti-A + Anti-B

Your own antibodies have to be a different complementary shape to the antigens on the surface of your red blood cells otherwise they would attack and destroy your red blood cells. The pictures below show Anti-A and Anti-B antibodies to fit with the antigens you've just drawn.

Write the label on these antibodies below (one is Anti-A and the other is Anti-B)



Antibody _____



Antibody _____

In the **Pamela's Story** film, Pamela describes how she has blood transfusions to treat her Sickle Cell Anaemia. Blood transfusions involve receiving blood from another person (**a donor**). All blood transfusions have to be carefully managed to ensure the right blood type is given to the right person.

What would happen if blood group AB was given to someone with blood group A?

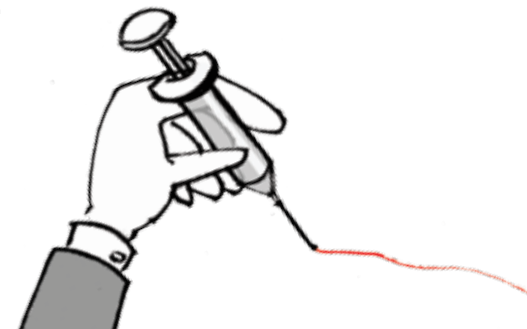
DRAWING BLOOD

Fill in the table below with ticks and crosses to show which blood groups can be used for which patients needing blood transfusions:

		Donor			
		A	B	AB	O
Patient	A				
	B				
	AB				
	O				

1 One of the blood groups is described as the 'Universal Donor'. Can you identify which blood type this is? Explain your reason.

2 One of the blood groups is described as the 'Universal Recipient'. Can you identify which blood type this is? Explain your reason.



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