

GENETICS OF BLOOD TYPES
(CO-DOMINANCE AND MULTIPLE ALLELES)

- ◆ **Co-Dominance** occurs when both _____ in the genotype are equally dominant.
- ◆ **Multiple Alleles** occurs when _____ than 2 genes/alleles determine a characteristic, such as in ABO blood groups.
- ◆ **Example of ABO Blood Types**
There are _____ different blood types – **A, B, AB and O**.

BLOOD TYPE OR PHENOTYPE	GENOTYPE	ANTIGEN PRESENT	ANTIBODY PRODUCED
A	AA or AO	A	Anti-B
B	BB or BO	B	Anti-A
AB	AB	A and B	none
O	OO	none	Anti-A and Anti-B

◆ **Example 1 – Blood Types**

Mum has blood type AB and Dad has blood type O. The possible blood types of the children are ...

	A	B
O	AO	BO
O	AO	BO

Possible genotypes = 1 AO : 1 BO

Possible phenotypes = 1 A : 1 B

½ the children will be _____ blood type, and the other 1/2 will be _____ blood type.

◆ **Example 2 – Blood Types**

Mum has A blood type and Dad has AB blood type. The possible children's blood types are ...

First Possibility

	A	A
A	AA	AA
B	AB	AB

Possible genotypes = 1 AA : 1 AB

Possible phenotypes = 1 A : 1 AB

½ the children will have blood type _____, and the other ½ will have blood type _____

Second Possibility

	A	O
A	AA	AO
B	AB	BO

Possible genotypes = 1AA:1AO:1AB:1BO

Possible phenotypes = 2 A : 1 AB: 1 B

½ will have blood type _____, ¼ will have blood type AB, and ¼ will have blood type _____

ANTIGENS AND ANTIBODIES IN ABO BLOOD TYPES

- ◆ The blood type is so-called because the blood contains particular _____ – A, B, both A and B, or neither A nor B.
- ◆ The body's immune system produces _____ to neutralise any particle (e.g. bacteria, dust, foreign blood in transfusions) that it recognises as foreign. For example, if blood type A contains Antigen A, then it will produce antibodies against B blood type (Anti-B Antibody), because B antigens are foreign. Similarly, if blood type O contains _____ antigens A nor B, then a person with blood type O would produce anti-A and _____ antibodies.
- ◆ **Agglutination or 'Clumping'** – If antigen-A came in contact with the antibody against it (Anti-A), then the blood would clump or _____. This could occur in an incorrect blood transfusion.
- ◆ **Universal Recipient** – This is a person with blood type _____ who can receive a blood transfusion from any of the other blood types.
- ◆ **Universal Donor** - This is a person with blood type _____ who can donate blood to any other blood type.

**COMPLETE DOMINANCE OR
DOMINANT-RECESSIVE INHERITANCE
(AN EXAMPLE OF RHESUS FACTOR IN ABO BLOOD TYPES)**

- ◆ The ABO blood types are sub-divided into positive and _____ types also, depending on whether that blood type does or does not contain the Rhesus Factor.
- ◆ If the Rhesus Factor is present, the genotype contains one or two R genes/alleles. If the Rhesus Factor is absent, the genotype is _____.

<i>Blood Type</i>	<i>ABO Antigens Present</i>	<i>Rhesus Antigens Present</i>	<i>ABO Genotype</i>	<i>Rhesus Genotype</i>
<i>A+</i>	A	yes	Aa or AO	RR or Rr
<i>A-</i>	A	no	AA or AO	rr
<i>B+</i>	B	yes	BB or BO	RR or Rr
<i>B-</i>	B	no	BB or BO	rr
<i>AB+</i>	A and B	yes	AB	RR or Rr
<i>AB-</i>	A and B	no	AB	rr
<i>O+</i>	none	yes	OO	RR or Rr
<i>O-</i>	none	no	OO	rr