

### C. Multiple Alleles

- In some instances, one trait can be controlled by more than two alleles in a population
- Usually an individual only carries 2 of the possible alleles

Ie. Human Blood Types The ABO System.

- Humans have three alleles located on one **locus** on the chromosome which control blood type:  $I^A$ ,  $I^B$ , and  $i$
- These three alleles are responsible for the four possible human blood types: A, B, AB, and O
  - $I^A$  causes blood factor A
  - $I^B$  causes blood factor B
  - $i$  causes neither to form
- $I^A$  and  $I^B$  are codominant but are both dominant to  $i$  ( $I^A = I^B > i$ )  
= which 2 of the 3 alleles a person has depends on which 2 of the 3 parents had

#### PHENOTYPE (Blood Type)

A  
B  
AB  
O

#### GENOTYPE

$I^A I^A$  or  $I^A i$   
 $I^B I^B$  or  $I^B i$   
 $I^A I^B$   
 $ii$

- Type O is known as the universal donor. People with this blood type, have no antigens so all other people can receive it.
- Type AB is known as the universal receptor. Their blood contains both types of antigens and therefore, they can accept any type of blood without rejection.

### Gene Interactions

#### Polygenic Traits

: are traits where there is more than one gene, perhaps 10 or 100 which affects a phenotypical characteristic

Ie. Human skin color is influenced by 2 pigments, and these pigments are influenced by 2 genes on separate chromosomes

:Types of polygenic traits

**pleiotropic genes**- genes that affect more than 1 characteristic

ie. Sickle cell gene

**epistatic genes**- mask the effect of other genes

ie. Freckles are masked by skin pigments

**complimentary interaction**- 2 genotypes interact to produce a phenotype neither could produce on their own

ie. Deaf-mutism

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$I^a$  causes \_\_\_\_\_

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$i$  causes \_\_\_\_\_

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**PHENOTYPE (Blood Type)**

**GENOTYPE**

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\_\_\_\_\_

B

\_\_\_\_\_

AB

\_\_\_\_\_

O

\_\_\_\_\_

- Type O is known as the \_\_\_\_\_. People with this blood type, have no antigens so all other people can receive it.
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ie. Freckles are masked by skin pigments

**complimentary interaction**- 2 genotypes \_\_\_\_\_ to produce a phenotype  
neither could produce on their own  
ie. Deaf-mutism

Read pp 589 -91 and define the following:  
pleiotropic genes-

epistatic genes-

complimentary interaction-