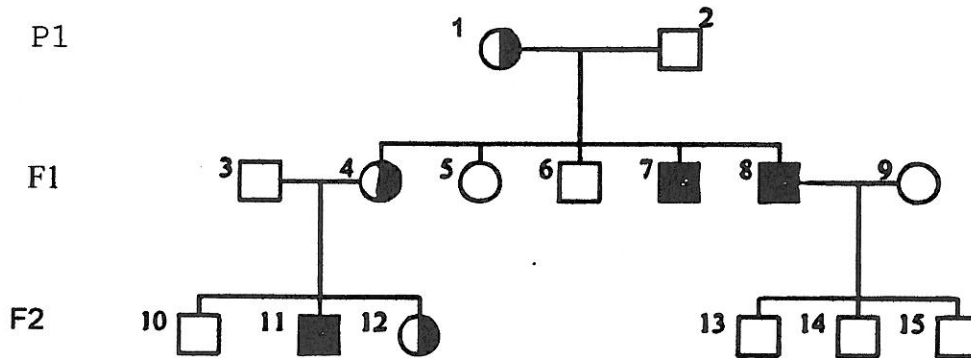


Human Heredity
Sex-linked Inheritance

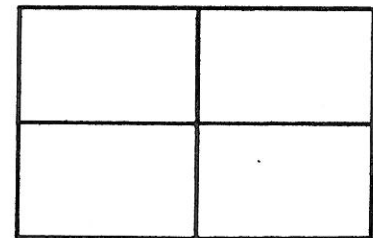
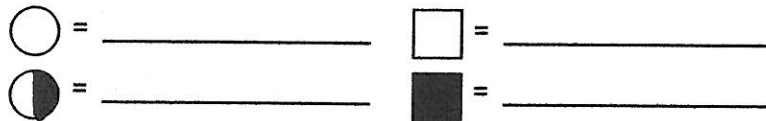
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Sex-linked traits are characteristics carried on the X chromosome. Because human females are XX and males are XY, certain recessive sex-linked traits are expressed more commonly in males than in females. A female would need to receive the recessive allele on both of her X chromosomes to show the trait. But a male who receives the recessive allele on his X chromosome will show the trait, because his Y cannot mask the expression of the recessive allele.

The pedigree below shows the inheritance of the recessive sex-linked trait of red-green color blindness through three generations. It depicts a cross between a female carrier [X^{G^+}, X^g] and a normal male [$X^{G^+}Y$] [g is the recessive allele for color blindness.] Use this information to answer the questions below.



What are the genotypes for the following:



Complete the Punnett Square at the right, which depicts the cross in the P1 generation.

What is the probability of the P1 female passing the allele for color blindness to her offspring?

Use the above pedigree to answer the following.

- a.) How many female children in the F1 generation received the allele for color blindness?
- b.) How many male F1 children received the allele? _____
- c.) How many F1 children have normal color vision? _____

Multiple Alleles – Answer the following questions using your knowledge of genetic principles.

Practice:

ii x I^BI^B

genotypic % –

phenotypic % –

Type AB x type AB

genotypic % –

phenotypic % –

- What are the genotypes for the following phenotypes?
 - homozygous type A _____
 - heterozygous type A _____
 - homozygous type B _____
 - heterozygous type B _____
 - type AB _____
 - type O _____
- Complete a punnett square and provide phenotypic percentages for the offspring.
 - I^Ai x ii
 - homozygous A x type AB
 - heterozygous B x type AB
 - type AB x type O
 - type O x heterozygous B
- If you have heterozygous group A blood, what type of blood does your husband or wife have in order for your offspring to have the following blood types: AB, A, B, and O.
- Suppose a woman accuses a man of being the father of her child. In the paternity suit it is brought out that he is of group AB and the woman is group B (I^Bi or I^BI^B). What blood type would the baby have to be to prove this man is not the father?
- A man that has blood type O marries a woman that has blood type A. The woman's father had blood type O. What are the chances that their children will belong to type O?
- What are two reasons why it would be important to know a persons blood type?

Name: _____ Date: _____ Period: _____

Advanced Biology Sex-linked Traits Practice

1. Colorblindness is a trait carried on the sex chromosomes. Let G be normal color vision and g be red-green colorblindness. What is the sex of each of these people?

a. Write either male or female in the blank below each.

$X^G X^G$

$X^G X^g$

$X^g X^g$

$X^G Y$
 ~~$X^R Y$~~

$X^g Y$
 ~~$X^r Y$~~

a. _____

b. _____

c. _____

d. _____

e. _____

b. Which are red-green colorblind? _____

c. Which have normal color vision? _____

d. Which has normal color vision even though she has the colorblind gene? _____

2. In fruit flies the inheritance of eye color is **sex-linked**. What type of phenotypes are possible in the offspring of the following parents? X^R = red X^r = white

a. $X^r X^r$ x $X^R Y$

Phenotypic %:

b. $X^R X^r$ x $X^R Y$

Phenotypic %:

3. In humans hemophilia is **sex-linked**. Predict the phenotypes of the offspring from the following crosses: X^H = normal blood clotting X^h = hemophilia

a. hemophiliac father and normal (homozygous) mother

Phenotypic %:

b. hemophiliac father and a carrier mother

Phenotypic %:

c. normal father and carrier mother

Phenotypic %:

4. What is meant by carrier females? _____

5. In humans, red-green colorblindness is **sex-linked**. Use N for normal vision and n for the colorblind gene. Cross the following and find the phenotype %'s of the offspring.

a. a colorblind woman and a normal male

_____ x _____

Phenotypic %:

b. a carrier woman and a colorblind male

Phenotypic %:

6. If two normal vision parents produce a colorblind son, what are the genotypes of the parents?

7. In cats certain coat colors are **sex-linked**. The genotype $X^Y X^Y$ results in a yellow cat, $X^B X^B$ results in a black cat, $X^B X^Y$ results in a calico cat. Cross the following parents and predict the possible phenotypes of their young.

a. a calico female x a black male

phenotypic %:

b. a calico female x a yellow male

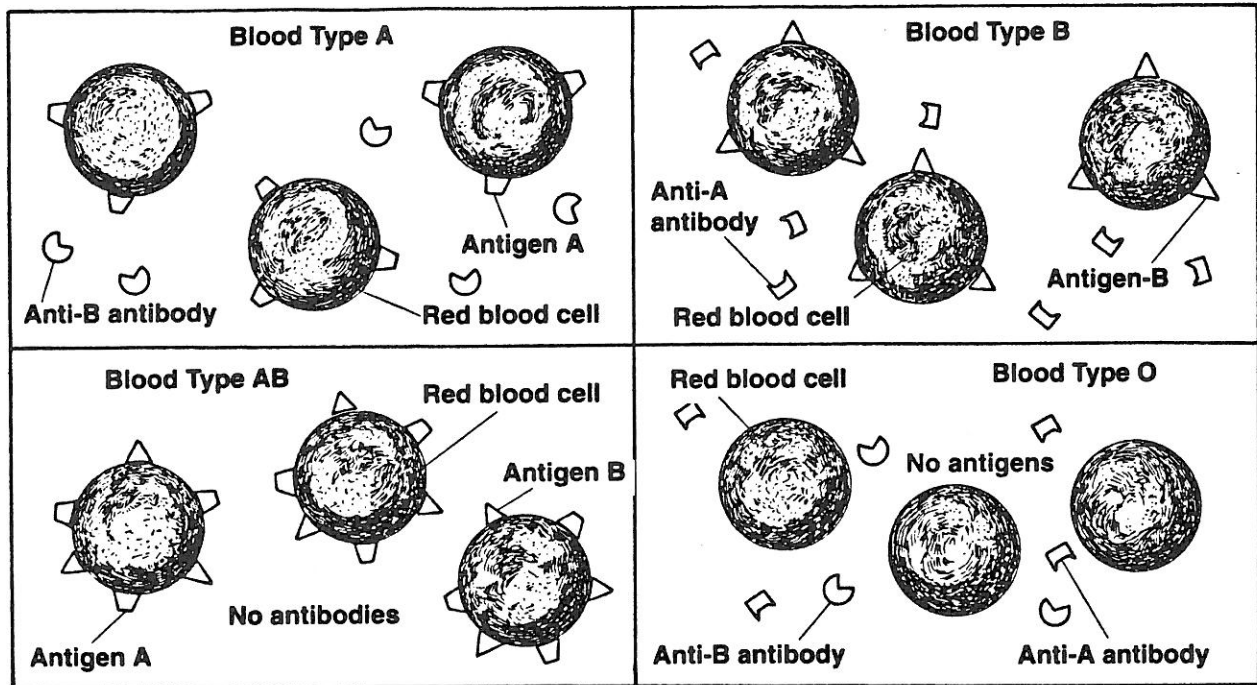
phenotypic %:

c. a yellow female x a black male

phenotypic %:

8. If a normal vision woman whose mother was colorblind married a colorblind man, what would be the genotypes of their children? Hint: Begin by finding the genotype of the mother.

BLOOD TYPE NOTES (continued)



if you have: Blood Type	then your red blood cells have these: Antigens	and your blood will contain these: Antibodies
A		
B		
AB		
O		

Importance of Receiving the Right Blood Type:

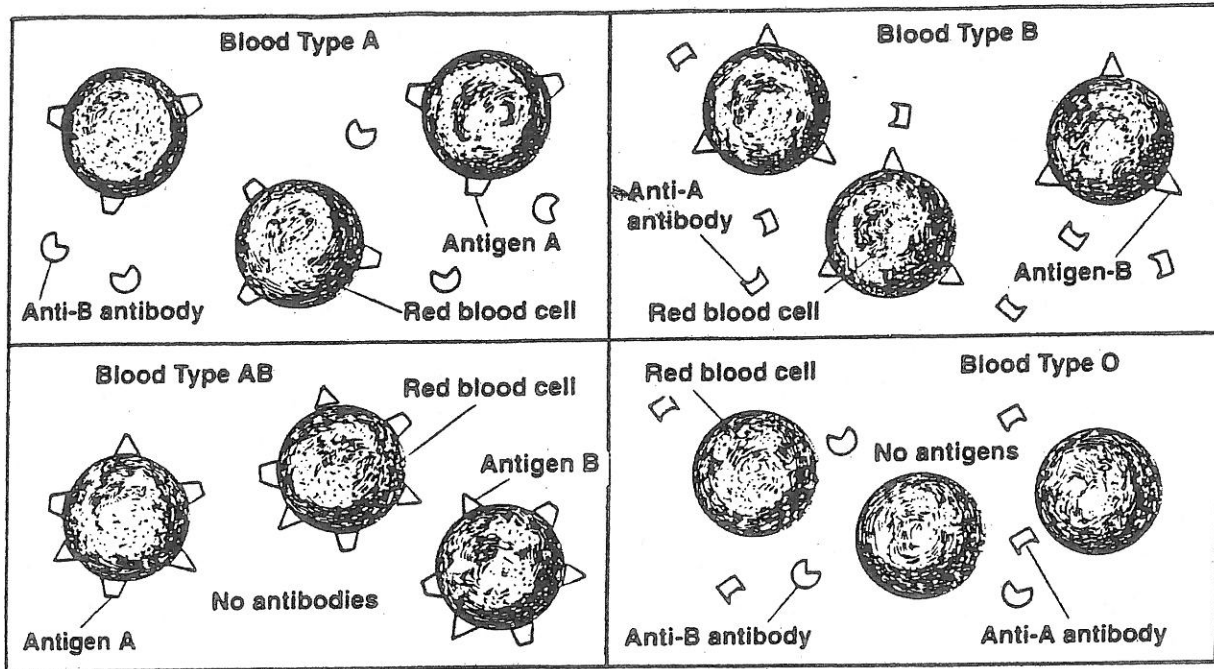
Example: If a person with Type A blood receives Type B blood while in the hospital his anti-B antibodies will "attack" the donated B blood and clump it up. This clumping, known as an **agglutination**, can cause serious problems or even death!!

People with type O blood are called **universal donors** because, in a pinch, type O blood can be put into anyone. This is because type O blood has no _____ on its surface. (nothing for antibodies to latch onto!)

People with type AB blood are called **universal recipients** because, in a pinch, they can receive any of the other blood types. This is because people with type AB blood have no _____ that would attack foreign blood.

Charles Drew--famous African-American doctor whose work with the storage of human blood saved many lives during WWII and set the modern guidelines for blood banks.

Blood Types



1. What is an antigen? _____

2. What is an antibody? _____

3. What determines the blood type of a person? _____

4. If you have type A blood, what kind of antigens and antibodies do you have in your blood? _____

5. If you have type A blood, why would it be dangerous to have a transfusion of type B blood? _____

6. Compare and contrast type AB blood and type O blood. _____

7. Why must a person with type O blood receive a transfusion only from a donor who also has type O blood?

8. Why is a person with type O blood called a universal donor and a person with type AB blood called a universal receiver?

