

EOC Review Part 5

Patterns of Inheritance (Genetics)

What does it mean when a trait is dominant?

The trait is expressed even when the organism is heterozygous

What does it mean when a trait is recessive?

The trait is not expressed if the dominant trait is present

What does it mean if a trait is codominant?

Both alleles are expressed fully (red x white = red and white)

What does it mean if a trait is incompletely dominant?

There is a melding of the traits (red x white = pink)

What does "polygenic" mean? (and give some examples)

Multiple genes are responsible for the trait (height, skin color, hair color, etc)

What are the sex chromosomes in males? **XY** In Females? **XX**

In the Punnett square to the right, **T** = tall and **t** = short. Give the genotype of the parents.

Tt

What are all the possible genotypes and phenotypes of the offspring?

TT - tall, Tt - tall, tt - short

	T	t
T	TT	Tt
t	Tt	tt

What is the genotypic ratio of the possible offspring?

1 TT : 2 Tt : 1 tt

What is the phenotypic ratio of the possible offspring?

3 tall : 1 short

What environmental factors might affect the expression of these for height?

Nutrition, exercise, diet

In the Punnett square to the right, do a cross of a trait showing intermediate characteristics: cross a pure-breeding red flower (RR) with a pure breeding white flower (WW) and give the genotypes and phenotypes of possible offspring

RR x WW = all RW; red parent x white parent = all pink offspring

If a woman with type A blood has a child with a man with type B blood and their first child has type O blood, give the genotypes of the woman and the man and show the cross. (Remember, alleles for blood are **I^A**, **I^B**, and **i**)

Parents are I^Ai and I^Bi because that's the only way they could have a child with ii (type O).

What are the odds that they will have a child with type A blood?

25%

What are the odds that they will have a child with type AB blood?

25%

A blood test is done to see if one of three men is the father of a child. The child has type O blood, the mother has type A blood. Man #1 has type AB blood, Man #2 has type A blood, Man #3 has type O blood. Are there any men that can be ruled out as the father? Explain.

It can't be Man #1 with AB blood (child needs to get an "i" allele from each parent).

Hemophilia and colorblindness are examples of sex-linked disorders. What chromosome are these genes found on?

X

Cross a female who is a carrier for hemophilia and a normal male. What are the odds that they will have a child with hemophilia?

25%

What are the odds that they will have a daughter with hemophilia?

0%

What are the odds that they will have a daughter who is a carrier for hemophilia?

25%

Why are males more likely to have an X-linked disorder? Who (mother/father) is likely to give them the bad gene? Males only have one copy of the X chromosome so if a gene is mutated, it will be expressed. Males inherit their X chromosome from their mother because they must inherit the Y chromosome from their father. If the father passes on his X chromosome, the child will be female.

Describe the test cross that a farmer would use to determine the genotype of an animal that shows a dominant trait. Use a Punnett square and the letters A and a to explain your answer. Cross the animal with an animal expressing the recessive phenotype. If the unknown animal is AA, all of offspring will have dominant trait. If Aa, 50% of offspring will have dominant trait and 50% will have recessive trait.

Explain Mendel's Law of Segregation.

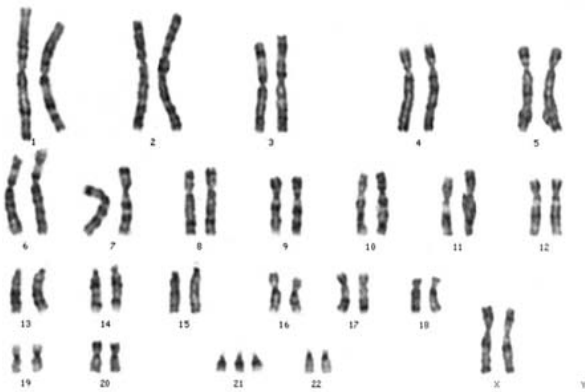
Parents only pass on one allele for each gene to each of their offspring.

Explain Mendel's Law of Independent Assortment.

Chromosomes are inherited separately from one another.

How does meiosis lead to segregation and independent assortment?

In meiosis during first division, the alleles separate with one allele of each pair going to one cell and the other one to other cell. Each chromosome assorts independently from others.



What is the gender of the person whose karyotype is shown to the left?

Female

What is the disorder that this person has?

Down Syndrome (Trisomy 21)

What is the inheritance pattern (autosomal v. sex-linked, dominant v. recessive) shown by this pedigree to the right? How do you know?

Autosomal recessive, ♀ and ♂ have it, skips generations.

Using the letters "A" and "a," what is the genotype of individual II4?

aa

What is the genotype of person I3?

Aa

