AP BIO INSTA-REVIEW

TOPIC 5.1

Meiosis

IST-1.F.1

Meiosis is a process that ensures the formation of haploid gamete cells in sexually reproducing diploid organisms–

a. Meiosis results in daughter cells with half the number of chromosomes of the parent cell.

b. Meiosis involves two rounds of a sequential series of steps (meiosis I and meiosis II).

AP BIO INSTA-REVIEW

TOPIC 5.1

Meiosis

IST-1.G.1

Mitosis and meiosis are similar in the way chromosomes segregate but differ in the number of cells produced and the genetic content of the daughter cells.

AP BIO INSTA-REVIEW

TOPIC

5.1

How many rounds of division in meiosis?

A. 0
B. 1
C. 2
D. 3

AP BIO INSTA-REVIEW

TOPIC 5.1

How many rounds of division in meiosis?

c. 2

The function of meiosis is to create FOUR HAPLOID daughter cells. In order to make FOUR cells, the parent cell must divide two times. The first division makes two cells, then the second division makes four cells.

AP BIO INSTA-REVIEW

TOPIC

5.1

How many rounds of DNA replication?

A. 0

B. 1

C. 2

D. 3

AP BIO INSTA-REVIEW

TOPIC 5.1

How many rounds of DNA replication?

B. 1

The function of meiosis is to create FOUR HAPLOID daughter cells. In order to make HAPLOID cells, the parent cell must replication ONCE but divide TWICE. The first division makes two HAPLOID (with two chromatid) cells, then the second division makes four HAPLOID (with one chromatid) cells.

AP BIO INSTA-REVIEW

TOPIC 5.1

What phase does the crossing over take place?

A. Prophase I

B. Prophase II

C. Metaphase I

D. Metaphase II

AP BIO INSTA-REVIEW

TOPIC 5.1

What phase does the crossing over take place?

A. Prophase I

Crossing over is the process where non-sister chromatids exchange genetic information. This takes place during prophase I. The chromatin condenses forming a tetrad (homologous chromosomes with two sister chromatids each). The nonsister chromatids will align and exchange genetic information.

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TOPIC 5.1

What phase does independent assortment take place?

A. Prophase I

B. Prophase II

C. Metaphase I

D. Metaphase II

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TOPIC 5.1

What phase does independent assortment take place?

C. Metaphase I

Independent assortment occurs when the homologous chromosomes align on the metaphase plate. This takes place during metaphase I. Recall the first round of division involves homologous chromosomes while the second round involves sister chromatids.

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TOPIC

5.1

What is crossing over?

AP BIO INSTA-REVIEW

TOPIC 5.1

What is crossing over?

During prophase I, when the homologous pairs of chromosomes (maternal set and paternal set of a chromosome) pair, the non-sister chromatids (inner two) will overlap. The bonds will break and reform allowing the genetic material to switch chromatids. This results in recombinant DNA.

AP BIO INSTA-REVIEW

TOPIC

5.1

What is independent assortment?

AP BIO INSTA-REVIEW

TOPIC 5.1

What is independent assortment?

During metaphase I, the homologous chromosomes align on the metaphase plate. The independent assortment involves that the pairs independently align to face a pole of the cell. This means there are 2^n different combinations that could result.

AP BIO INSTA-REVIEW

TOPIC

5.1

If parent cell is 2N, what is the ploidy of the daughter cell?

A. 0N
B. 1N
C. 2N
D. 3N

AP BIO INSTA-REVIEW

TOPIC 5.1

If parent cell is 2N, what is the ploidy of the daughter cell?

B. 1N

In meiosis, the parent cell is diploid (2N) and the daughter cell is haploid (1N). This is because the cell replicates its DNA ONCE but divides TWICE.

AP BIO INSTA-REVIEW

TOPIC 5.1

Comparing and Contrasting Mitosis and Meiosis

You should state the characteristics in mitosis AND meiosis.

Number of divisions

AP BIO INSTA-REVIEW

TOPIC 5.1

Comparing and Contrasting Mitosis and Meiosis

Number of divisions

Mitosis:
1 division

Meiosis:
2 divisions

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TOPIC 5.1

Comparing and Contrasting Mitosis and Meiosis

You should state the characteristics in mitosis AND meiosis.

Rounds of replication

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TOPIC 5.1

Comparing and Contrasting Mitosis and Meiosis

Rounds of replication

Both mitosis and meiosis have 1 round of DNA replication before their division processes

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TOPIC 5.1

Comparing and Contrasting Mitosis and Meiosis

You should state the characteristics in mitosis AND meiosis.

Parent cell vs. daughter cell

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TOPIC 5.1

Comparing and Contrasting Mitosis and Meiosis

Parent cell vs. daughter cell

Mitosis:

Parent – 2N

Daughter – 2N & genetically identical

Meiosis:

Parent – 2N

Daughter – N & genetically distinct

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TOPIC 5.1

Comparing and Contrasting Mitosis and Meiosis

You should state the characteristics in mitosis AND meiosis.

Number of daughter cells

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TOPIC 5.1

Comparing and Contrasting Mitosis and Meiosis

Number of daughter cells

Mitosis:
2 daughter cells

Meiosis:
4 daughter cells

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TOPIC 5.1

Comparing and Contrasting Mitosis and Meiosis

You should state the characteristics in mitosis AND meiosis.

Crossing over?

Independent assortment?

AP BIO INSTA-REVIEW

TOPIC 5.1

Comparing and Contrasting Mitosis and Meiosis

Crossing over?

Independent assortment?

Mitosis:

Crossing over – No

Independent assortment – No

Meiosis:

Crossing over – Yes

Independent Assortment - Yes

AP BIO INSTA-REVIEW

TOPIC 5.1

Comparing and Contrasting Mitosis and Meiosis

You should state the characteristics in mitosis AND meiosis.

Function of process?

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TOPIC 5.1

Comparing and Contrasting Mitosis and Meiosis

Function of process?

Mitosis:

Growth & Development

(responsible for organisms getting larger, replacing damaged cells, asexual reproduction, etc)

Meiosis:

Sexual reproduction

(forms gametes)

AP BIO INSTA-REVIEW

TOPIC 5.1

At the end of which round of meiosis is the cell haploid?

A. Meiosis I

B. Meiosis II

AP BIO INSTA-REVIEW

TOPIC 5.1

At the end of which round of meiosis is the cell haploid?

A. Meiosis I

The homologous chromsomes (one set from each parent) are separated during meiosis I. This leaves one SET of chromosomes in the daughter cells which is a HAPLOID cell.

AP BIO INSTA-REVIEW

TOPIC 5.1

When does DNA replication occur for meiosis?

A. Before meiosis during interphase
B. During prophase when the cell is preparing
C. During metaphase when chromosomes are in the middle
D. During telophase when the nuclear envelope is forming

AP BIO INSTA-REVIEW

TOPIC 5.1

When does DNA replication occur for meiosis?

A. Before meiosis during interphase

DNA replication takes place during the S phase of interphase. This process takes place prior to the nuclear division involved with meiosis.

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TOPIC

5.1

What phase of interphase does DNA replication occur?

A. G_1

B. G_2

C. S

D. It doesn't occur in interphase

AP BIO INSTA-REVIEW

TOPIC 5.1

What phase of interphase does DNA replication occur?

C. S

Interphase is the cell preparing to divide by growing and replicating the chromosomes. The DNA replication takes place during the S phase, similar to mitosis.

AP BIO INSTA-REVIEW

TOPIC

5.1

Compare and contrast number of DNA replications between mitosis & meiosis

A. Mitosis – 0, Meiosis – 1

B. Mitosis – 1, Meiosis – 1

C. Mitosis – 1, Meiosis – 2

D. Mitosis – 1, Meiosis – 0

AP BIO INSTA-REVIEW

TOPIC 5.1

Compare and contrast number of DNA replications between mitosis & meiosis

B. Mitosis – 1, Meiosis – 1

Both mitosis and meiosis will replicate the DNA once.

The difference results from the number of divisions after that single round of replication.

AP BIO INSTA-REVIEW

TOPIC

5.1

Compare and contrast number of divisions between mitosis & meiosis

A. Mitosis – 0, Meiosis – 1
B. Mitosis – 1, Meiosis – 1
C. Mitosis – 1, Meiosis – 2
D. Mitosis – 1, Meiosis – 0

AP BIO INSTA-REVIEW

TOPIC 5.1

Compare and contrast number of divisions between mitosis & meiosis

C. Mitosis – 1, Meiosis – 2

The resulting cells of mitosis are TWO DIPLOID daughter cells, while the resulting cells of meiosis are FOUR HAPLOID daughter cells. This results because mitosis divides ONCE while meiosis divides TWICE.

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TOPIC

5.1

Identify the phases of meiosis

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TOPIC 5.1

Identify the phases of meiosis

> Prophase I

> Metaphase I

> Anaphase I

> Telophase I

> Prophase II

> Metaphase II

> Anaphase II

> Telophase II

AP BIO INSTA-REVIEW

TOPIC 5.1

Describe the daughter cells in meiosis vs parent cell

The daughter cells are...

A. Identical & Diploid

B. Unique & Diploid

C. Identical & Haploid

D. Unique & Haploid

AP BIO INSTA-REVIEW

TOPIC 5.1

Describe the daughter cells in meiosis vs parent cell

The daughter cells are...
D. Unique & Haploid

The daughter cells in meiosis are haploid from one round of replication with two rounds of division. The cells are unique due to crossing over and independent assortment.

AP BIO INSTA-REVIEW

TOPIC 5.1

When does independent assortment take place?

A. Metaphase I

B. Metaphase II

C. Prophase I

D. Prophase II

AP BIO INSTA-REVIEW

TOPIC 5.1

When does independent assortment take place?

A. Metaphase I

Independent assortment takes place when the homologous chromosomes align on the metaphase plate. The alignment between the two sets of chromsomes in the homologous pair is independently positioned on the metaphase plate. Each set is facing an opposite pole to segregate during anaphase.

AP BIO INSTA-REVIEW

TOPIC 5.1

When does crossing over take place?

A. Metaphase I

B. Metaphase II

C. Prophase I

D. Prophase II

AP BIO INSTA-REVIEW

TOPIC 5.1

When does crossing over take place?

C. Prophase I

Crossing over takes place between non-sister chromatids during prophase I. This will take place while the homologous pairs condense and form the tetrad.

AP BIO INSTA-REVIEW

TOPIC 5.1

When does the cell go from diploid to haploid?

A. Meiosis I

B. Meiosis II

AP BIO INSTA-REVIEW

TOPIC 5.1

When does the cell go from diploid to haploid?

A. Meiosis I

Due to the two sets of chromosomes being separated into opposite cells at the end of meiosis I, then the cell is HAPLOID after meiosis I.

AP BIO INSTA-REVIEW

TOPIC 5.1

What goes through movements in Meiosis I?

A. Homologous chromosomes

B. Sister chromatids

AP BIO INSTA-REVIEW

TOPIC 5.1

What goes through movements in Meiosis I?

A. Homologous chromosomes

The steps of meiosis involve the homologous chromosomes. This is one maternal set of chromosomes and one paternal set of chromosomes. This set will segregate during anaphase I.

AP BIO INSTA-REVIEW

TOPIC 5.1

What goes through movements in meiosis II?

A. Homologous chromosomes

B. Sister chromatids

AP BIO INSTA-REVIEW

TOPIC 5.1

What goes through movements in meiosis II?

B. Sister chromatids

After meiosis I, the two sister chromatids remain together. The steps of meiosis II will involve the sister chromatids in the steps.

AP BIO INSTA-REVIEW

TOPIC 5.2

Meiosis and Genetic Diversity

IST-1.H.1

Separation of the homologous chromosomes in meiosis I ensures that each gamete receives a haploid (1n) set of chromosomes that comprises both maternal and paternal chromosomes.

AP BIO INSTA-REVIEW

TOPIC 5.2

Meiosis and Genetic Diversity

IST-1.H.2

During meiosis I, homologous chromatids exchange genetic material via a process called "crossing over" (recombination), which increases genetic diversity among the resultant gametes.

AP BIO INSTA-REVIEW

TOPIC 5.2

Meiosis and Genetic Diversity

IST-1.H.3

Sexual reproduction in eukaryotes involving gamete formation—including crossing over, the random assortment of chromosomes during meiosis, and subsequent fertilization of gametes—serves to increase variation.

AP BIO INSTA-REVIEW

TOPIC 5.2

What moves apart during anaphase I of meiosis I?

A. Homologous chromosomes

B. Sister chromatids

AP BIO INSTA-REVIEW

TOPIC 5.2

What moves apart during anaphase I of meiosis I?

A. Homologous chromosomes

Meiosis I involves homologous chromosomes. During anaphase I, the homologous chromosomes that aligned on the metaphase plate during metaphase I are segregating to opposite poles.

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TOPIC 5.2

What moves apart during anaphase II of meiosis II?

A. Homologous chromosomes

B. Sister chromatids

AP BIO INSTA-REVIEW

TOPIC 5.2

What moves apart during anaphase II of meiosis II?

B. Sister chromatids

Meiosis II involves sister chromatids. Anaphase II separates the sister chromatids that were aligned on the metaphase plate during metaphase II.

AP BIO INSTA-REVIEW

TOPIC 5.2

When does crossing over take place?

A. Metaphase I

B. Metaphase II

C. Prophase I

D. Prophase II

AP BIO INSTA-REVIEW

TOPIC 5.2

When does crossing over take place?

C. Prophase I

Crossing over involves non-sister chromatids exchanging genetic information. This occurs during prophase I when the homologous chromosomes pair up forming a tetrad and crossing over forms the chiasmata.

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TOPIC

5.2

How does crossing over affect linked traits?

AP BIO INSTA-REVIEW

TOPIC 5.2

How does crossing over affect linked traits?

Crossing over involves exchanging genetic material between nonsister chromatids.

During crossing over, the linked traits could be separated leading to being inherited independently.

AP BIO INSTA-REVIEW

TOPIC
5.2

What is the significance of crossing over?

A. Decreases amount of DNA
B. Decreases genetic variation
C. Increases amount of DNA
D. Increases genetic variation

AP BIO INSTA-REVIEW

TOPIC 5.2

What is the significance of crossing over?

D. Increases genetic variation

Crossing over involves exchanging genetic information between non-sister chromatids. The resulting chromosome is a new combination of genes from the homologous chromosomes called a recombinant chromosome.

AP BIO INSTA-REVIEW

TOPIC
5.2

What is the ploidy after homologous chromosomes separate?

A. Haploid

B. Diploid

C. Triploid

D. Tetraploid

AP BIO INSTA-REVIEW

TOPIC 5.2

What is the ploidy after homologous chromosomes separate?

A. Haploid

Since the homologous chromosomes are TWO sets of chromosomes (maternal and paternal set).

After anaphase I (when the homologous chromosomes separate), the cell is now HAPLOID.

AP BIO INSTA-REVIEW

TOPIC
5.2

Why is the cell haploid after homologous chromosomes separate?

AP BIO INSTA-REVIEW

TOPIC 5.2

Why is the cell haploid after homologous chromosomes separate?

Haploid involves having one set of chromosomes while diploid involves having two sets of chromosomes.

Homologous chromosomes are a set of maternal and a set of paternal chromosomes. So, if you separate the maternal and paternal set ... you only have one set.

AP BIO INSTA-REVIEW

TOPIC
5.2

What processes increases genetic variation?

AP BIO INSTA-REVIEW

TOPIC 5.2

What processes increases genetic variation?

> Mutations

> Independent Assortment

> Crossing over

> Random fertilization

AP BIO INSTA-REVIEW

TOPIC

5.2

What are homologous chromosomes?

AP BIO INSTA-REVIEW

TOPIC 5.2

What are homologous chromosomes?

Chromosome pairs that are the same length and similar banding patterns. One is maternally donated and the other is paternally donated.

AP BIO INSTA-REVIEW

TOPIC 5.2

What process caused the daughter cells to be haploid?

A. Anaphase I/Telophase I

B. Anaphase II/Telophase II

C. Crossing over

D. Independent assortment

AP BIO INSTA-REVIEW

TOPIC 5.2

What process caused the daughter cells to be haploid?

A. Anaphase I/Telophase I

During anaphase I, the homologous chromosomes are segregating to opposite poles. This results in ONE set of chromosomes, so the daughter cell is HAPLOID. Crossing over will jsut exchange genetic information and Independent Assortment involves the homologous chromosomes lining up on the metaphase plate. These increase genetic diversity but do not reduce the chromosome number.

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TOPIC

5.2

What is crossing over?

AP BIO INSTA-REVIEW

TOPIC 5.2

What is crossing over?

Nonsister chromatids exchange genetic materials during prophase I.

AP BIO INSTA-REVIEW

TOPIC 5.2

Which of the following does not lead to genetic variation?

A. Crossing over

B. Independent Assortment

C. Random fertilization

D. All of the above lead to genetic variation

AP BIO INSTA-REVIEW

TOPIC 5.2

Which of the following does not lead to genetic variation?

D. All of the above lead to genetic variation
(Crossing over, Independent Assortment, Random fertilization)

Crossing over exchanges genetic information between two chromosomes leading to a recombinant chromosome (new combination of genes on ONE chromosome)

Independent assortment leads to the gametes resulting in either maternal or paternal for each chromosome.

Random fertilization involves any sperm fusing with any egg which leads to variance.

AP BIO INSTA-REVIEW

TOPIC 5.3

Mendelian Genetics

EVO-2.A.1

DNA and RNA are carriers of genetic information.

EVO-2.A.2

Ribosomes are found in all forms of life.

EVO-2.A.3

Major features of the genetic code are shared by all modern living systems.

AP BIO INSTA-REVIEW

TOPIC 5.3

Mendelian Genetics

EVO-2.A.4

Core metabolic pathways are conserved across all currently recognized domains.

IST-1.I.1

Mendel's laws of segregation and independent assortment can be applied to genes that are on different chromosomes

RELEVANT EQUATION

Laws of Probability—

If A and B are mutually exclusive, then:

$P(A \text{ or } B) = P(A) + P(B)$

If A and B are independent, then:

$P(A \text{ and } B) = P(A) \times P(B)$

AP BIO INSTA-REVIEW

TOPIC 5.3

Mendelian Genetics

IST-1.I.2

Fertilization involves the fusion of two haploid gametes, restoring the diploid number of chromosomes and increasing genetic variation in populations by creating new combinations of alleles in the zygote–

a. Rules of probability can be applied to analyze passage of single-gene traits from parent to offspring.

AP BIO INSTA-REVIEW

TOPIC 5.3

Mendelian Genetics

IST-1.I.2

b. The pattern of inheritance (monohybrid, dihybrid, sex-linked, and genetically linked genes) can often be predicted from data, including pedigree, that give the parent genotype/phenotype and the offspring genotypes/phenotypes.

AP BIO INSTA-REVIEW

TOPIC 5.3

Which macromolecule carries the genetic code?

A. Carbohydrates

B. Lipids

C. Nucleic Acids

D. Proteins

AP BIO INSTA-REVIEW

TOPIC 5.3

Which macromolecule carries the genetic code?

C. Nucleic Acids

Nucleic acids are made up a sugar, nitrogenous base, and a phosphate group.

DNA has deoxyribose (sugar) and thymine (N base) while RNA has ribose (sugar) and uracil (N base).

AP BIO INSTA-REVIEW

TOPIC 5.3

All cells have ribosomes...

A. True

B. False

AP BIO INSTA-REVIEW

TOPIC 5.3

All cells have ribosomes...

A. True

All cells have ribosomes. Recall, prokaryotes do **NOT** have membrane bound organelles, but the ribosome is not membrane bound.

AP BIO INSTA-REVIEW

TOPIC

5.3

What is the ribosome's role in terms of gene expression?

AP BIO INSTA-REVIEW

TOPIC 5.3

What is the ribosome's role in terms of gene expression?

The ribosome is the site of protein synthesis. This is the site where the genotype is expressed as a phenotype (the genetic information is used to create proteins)

AP BIO INSTA-REVIEW

TOPIC 5.3

If you take one gene from one organism and insert in another organism, the organism can synthesize the same protein.

A. True

B. False

AP BIO INSTA-REVIEW

TOPIC 5.3

If you take one gene from one organism and insert in another organism, the organism can synthesize the same protein.

A. True

This demonstrates common descent. All organisms are related to a common ancestor where the genetic code emerged.

All cells have the same four nitrogenous bases and twenty or so amino acids. The genetic code is universal.

AP BIO INSTA-REVIEW

TOPIC 5.3

Evolutionarily, why are you able to insert one gene into another & get same product?

AP BIO INSTA-REVIEW

TOPIC 5.3

Evolutionarily, why are you able to insert one gene into another & get same product?

All organisms share the same genetic code. It emerged in the common ancestor and is an ancestral trait.

AP BIO INSTA-REVIEW

TOPIC 5.3

Mendel described anaphase I as the law of ...

A. Autosomes

B. Dominance

C. Independent Assortment

D. Segregation

AP BIO INSTA-REVIEW

TOPIC 5.3

Mendel described anaphase I as the law of ...

D. Segregation

Mendel describes this as the law of segregation as the homologous chromosomes SEGREGATE to opposite pôles
(and the maternal & paternal chromosomes separate)

AP BIO INSTA-REVIEW

TOPIC 5.3

Mendel described metaphase I as the law of ...

A. Autosomes

B. Dominance

C. Independent Assortment

D. Segregation

AP BIO INSTA-REVIEW

TOPIC 5.3

Mendel described metaphase I as the law of ...

C. Independent Assortment

When the homologous chromosomes align on the metaphase plate, the two chromosomes will align independent of one another on the metaphase plate. The variance that results is called "independent assortment".

AP BIO INSTA-REVIEW

TOPIC 5.3

What is the significance of gametes being haploid?

AP BIO INSTA-REVIEW

TOPIC 5.3

What is the significance of gametes being haploid?

When two gametes fuse (fertilization), the chromosome number is restored as diploid. If the cells were diploid, then after fertilization the zygote would be a tetraploid (too much genetic information)

AP BIO INSTA-REVIEW

TOPIC 5.3

The type of inheritance where the phenotype is intermediate

A. Codominance

B. Complete dominance

C. Incomplete dominance

AP BIO INSTA-REVIEW

TOPIC 5.3

The type of inheritance where the phenotype is intermediate

C. Incomplete dominance

Neither allele is completely dominant. This results in a blending between the two dominant alleles to result in a different phenotype.

Example: Red X White → Pink

AP BIO INSTA-REVIEW

TOPIC

5.3

For incomplete dominance, what phenotypic ratio do you expect in monohybrid cross?

Monohybrid by definition means two parents are heterozygous.

A. 1:1:1:1

B. 1:2:1

C. 3:1

D. 4:0

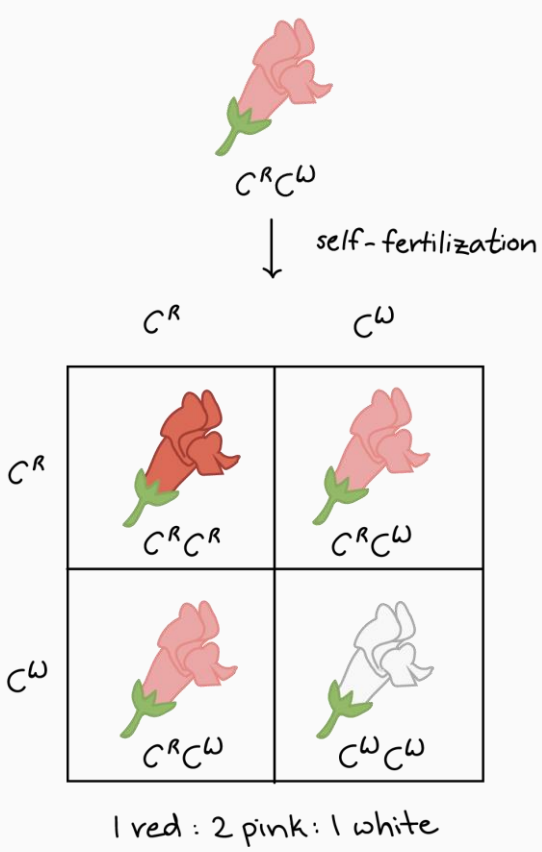
AP BIO INSTA-REVIEW

TOPIC 5.3

For incomplete dominance, what phenotypic ratio do you expect in monohybrid cross?

B. 1:2:1

As you see in the punnett square, there is 1 homozygous dominant (C^RC^R), 2 heterozgyous (C^RC^W), & 1 homozygous dominant (C^WC^W)



AP BIO INSTA-REVIEW

TOPIC 5.3

What type of inheritance has a 3:1 ratio in monohybrid cross?

A. Codominance

B. Complete dominance

C. Incomplete dominance

D. Pleiotropy

AP BIO INSTA-REVIEW

TOPIC 5.3

What type of inheritance has a 3:1 ratio in monohybrid cross?

B. Complete dominance

In complete dominance, the dominant will mask the recessive allele. The homozgyous dominant and heterozygous will have the same phenotype. Due to this, a monohybrid cross will result in 1 homozygous dominant (dominant phenotype), 2 heterozgyous (dominant phenotype), & 1 homozygous recessive (recessive phenotype)

AP BIO INSTA-REVIEW

TOPIC 5.3

Blood type phenotype can be A, B, AB, or O. This is an example of which type of dominance?

A. Codominance

B. Complete dominance

C. Incomplete dominance

AP BIO INSTA-REVIEW

TOPIC 5.3

Blood type phenotype can be A, B, AB, or O. This is an example of which type of dominance?

A. Codominance

Codominance results in exposure of BOTH dominant alleles at the same time. In the blood type example, the AB blood type has both the I^A and I^B allele leading to blood with both the A and B glycolipids on the membrane.

AP BIO INSTA-REVIEW

TOPIC

5.3

What does it mean if inheritance is autosomal vs sex-linked?

AP BIO INSTA-REVIEW

TOPIC 5.3

What does it mean if inheritance is autosomal vs sex-linked?

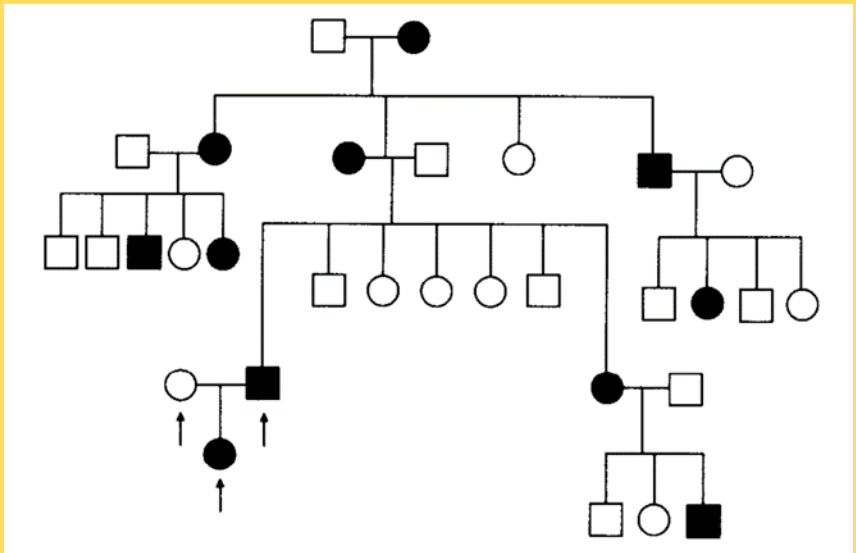
Autosomal – the allele is on an autosome

Autosomes are the 22 chromosomes that do not determine sex assigned at birth

Sex-linked – the allele is on a sex chromosome (now called an allosome)

AP BIO INSTA-REVIEW

TOPIC 5.3



What type of inheritance?

A. Autosomal Dominant

B. Autosomal Recessive

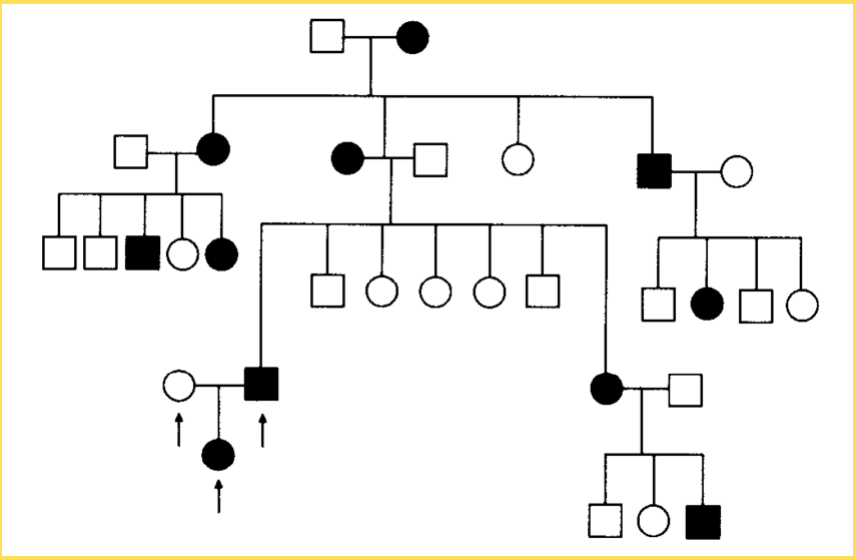
C. Sex-linked Dominant

D. Sex-linked Recessive

AP BIO INSTA-REVIEW

TOPIC 5.3

What type of inheritance?



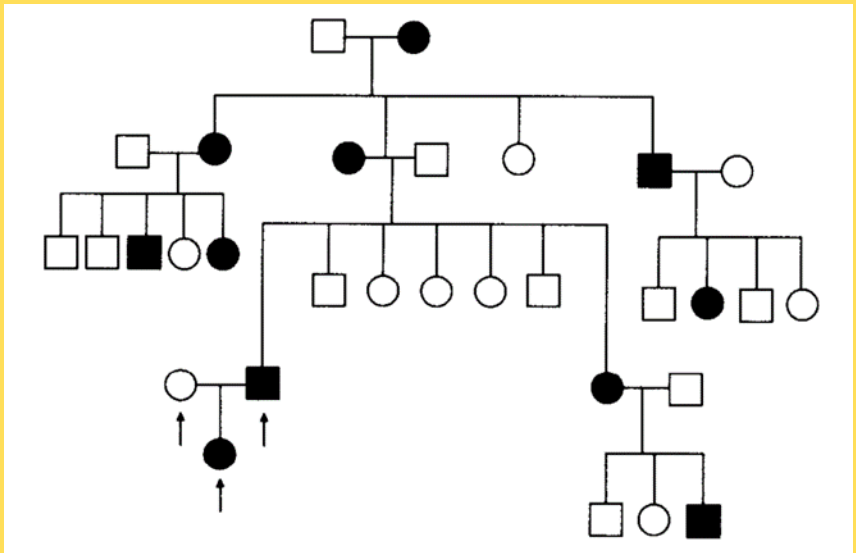
A. Autosomal Dominant

When I look at pedigrees, I look whether the affected are in each generation or if it is able to skip generations. This example shows an affected individual in each generation which tells me **DOMINANT.**

Then, look for characteristics of sex-linked. In this one, you have an affected father with unaffected daughters. That is not possible since the father passing on his only X to his daughters. This tells us that it is **AUTOSOMAL.**

AP BIO INSTA-REVIEW

TOPIC 5.3

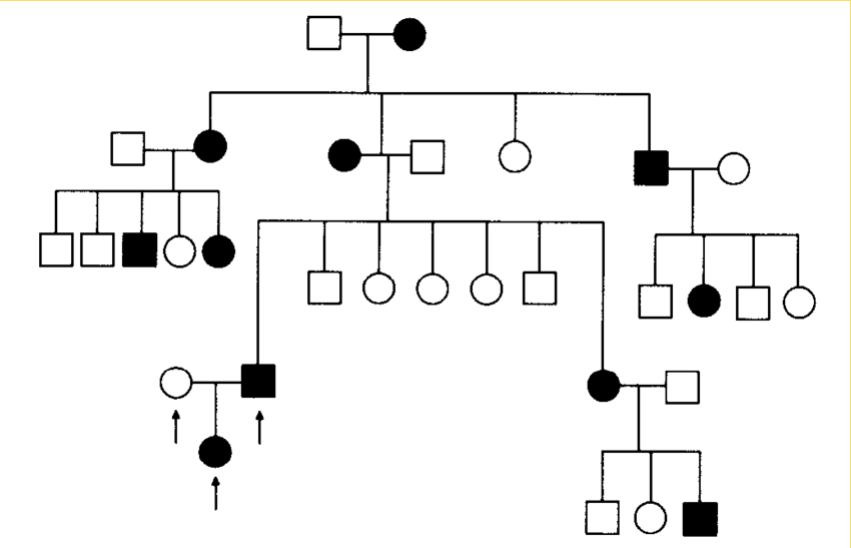


How do you know this is autosomal dominant?

AP BIO INSTA-REVIEW

TOPIC 5.3

How do you know this is autosomal dominant?



The trait does not skip generations. It is found in every generation. Every affected individual has an affected parent. (Dominant)

If it were x linked dominant, all females of affected father would be affected. The father only has an affected X chromosome, so the daughters would HAVE to inherit it and be affected

AP BIO INSTA-REVIEW

TOPIC 5.3

Mother has blood type O and Baby has blood type O

Which blood type could not be the father?

A. A

B. B

C. AB

D. O

AP BIO INSTA-REVIEW

TOPIC 5.3

Mother has blood type O and Baby has blood type O

Which blood type could not be the father?

C. AB

If the mother has blood type O, then her genotype is ii. The baby that results will have blood type O, so their genotype is also ii. All of the genotypes except AB have a "i" to donate. A = I^Ai, B = I^Bi, and O = ii while AB = I^AI^B

AP BIO INSTA-REVIEW

TOPIC

5.3

What is the phenotypic ratio of dihybrid complete dominance cross?

Dihybrid by definition is heterozygous for two alleles

A. 1:1:1:1

B. 1:2:1

C. 9:3:3:1

D. 9:6:1

AP BIO INSTA-REVIEW

TOPIC 5.3

What is the phenotypic ratio of dihybrid complete dominance cross?

Dihybrid by definition is heterozygous for two alleles

c. 9:3:3:1

- ✓ Y = dominant yellow allele
- ✓ y = recessive green allele
- ✓ R = dominant round allele
- ✓ r = recessive shriveled allele

YyRr X YyRr

	YR	Yr	yR	yr
YR	YYRR	YYRr	YyRR	YyRr
Yr	YYRr	YYrr	YyRr	Yyrr
yR	YyRR	YyRr	yyRR	yyRr
yr	YyRr	Yyrr	yyRr	yyrr

9 : 3 : 3 : 1

AP BIO INSTA-REVIEW

TOPIC 5.3

What is the phenotypic ratio of dihybrid complete dominance cross?

Dihybrid by definition is heterozygous for two alleles

c. 9:3:3:1

This is easiest done with monohyrbid crosses.

Let's do a specific example:

Green (G), yellow (g), Round (R), wrinkled (r)

	G	g
G	GG	Gg
g	Gg	gg

	R	r
R	RR	Rr
r	Rr	rr

Green & Round: ¾ x ¾ = 9/16

Green & wrinkled: ¾ x ¼ = 3/16

yellow & Round: ¼ x ¾ = 3/16

yellow & wrinkled: ¼ x ¼ = 1/16

AP BIO INSTA-REVIEW

TOPIC 5.3

Pink is incomplete dominance (heterozygous)

Axial is complete dominance

Solve for the ratio of pink and axial in a dihybrid cross.

AP BIO INSTA-REVIEW

TOPIC 5.3

Pink is incomplete dominance (heterozygous)
Axial is complete dominance

Solve for the ratio of pink and axial in a dihybrid cross.

	C^R	C^W
C^R	C^RC^R	C^RC^W
C^W	C^RC^W	C^WC^W

	A	a
A	AA	Aa
a	Aa	aa

P(pink) x P(axial)

½ x ¾

3/8

AP BIO INSTA-REVIEW

TOPIC 5.3

Remember:

If it's in the **SAME** Punnett square, you add...

probability of axial in a monohybrid cross is 3/4 because 1/4 AA and 2/4 Aa so P(axial) = 3/4

AP BIO INSTA-REVIEW

TOPIC 5.3

Remember:

If independent events or different Punnett squares, you multiply...

Probability of boy = 1/2

Probability of 2 boys = 1/2 x 1/2

Probability of 2 boys = 1/4

(Note: boy assigned at birth)

AP BIO INSTA-REVIEW

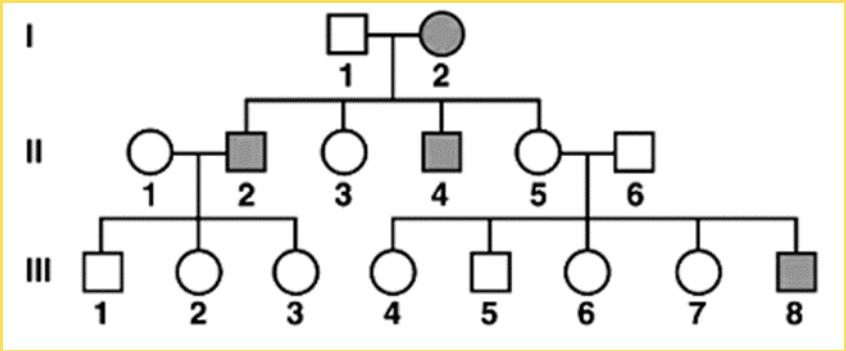
TOPIC 5.3

Recommendation:

If you have anything higher than one allele for your Punnett squares, I HIGHLY recommend that you do 2x2 squares then multiply for what you are looking for

AP BIO INSTA-REVIEW

TOPIC 5.3



What type of inheritance?

A. Autosomal dominant

B. Autosomal recessive

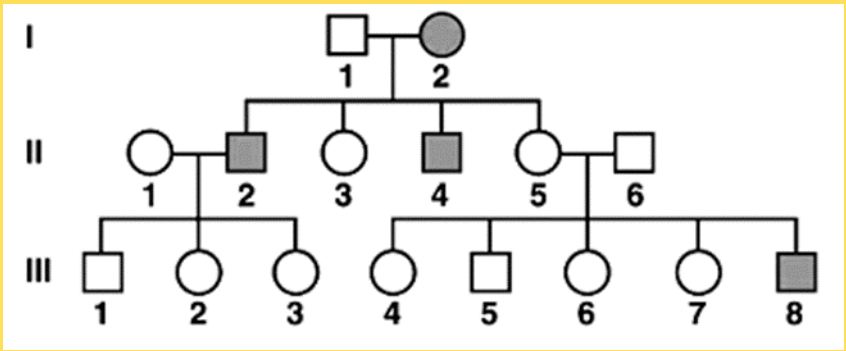
C. Sex-Linked dominant

D. Sex-Linked recessive

AP BIO INSTA-REVIEW

TOPIC 5.3

What type of inheritance?



D. Sex-Linked recessive

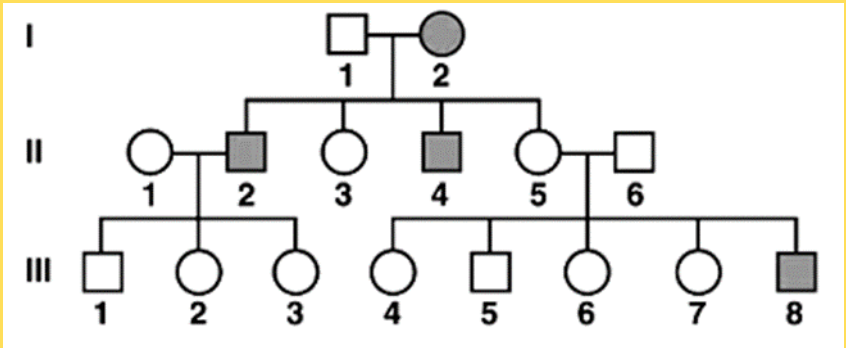
Look for whether the trait is found in every generation or skips generations, notice II-5 & II-6 are unaffected, but have an affected offspring. RECESSIVE

Look for sex-linked: You see an affected mother and ALL affected sons. SEX-LINKED

AP BIO INSTA-REVIEW

TOPIC

5.3

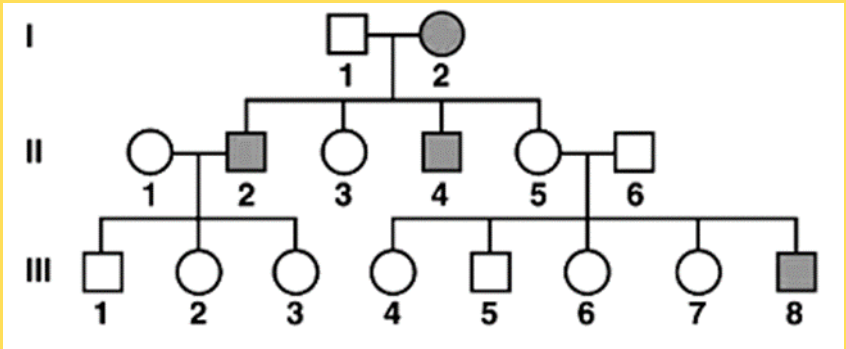


How do you know this is sex-linked recessive?

AP BIO INSTA-REVIEW

TOPIC 5.3

How do you know this is sex-linked recessive?



The trait skips the second generation (on the right). II-5 & II-6 are unaffected and then III-8 is affected (recessive)

Affected mother has affected songs (I-2, II-2, & II-4) sex-linked

Note: female/male assigned at birth

AP BIO INSTA-REVIEW

TOPIC
5.3

Which organisms have ribosomes?

A. Eukaryotes
B. Prokaryotes
C. Both

AP BIO INSTA-REVIEW

TOPIC 5.3

Which organisms have ribosomes?

C. Both

All organisms have ribosomes. This is an ancestral trait. It emerged in the common ancestor so the common ancestor to all of life had ribosomes.

AP BIO INSTA-REVIEW

TOPIC 5.3

You are able to insert genes between different organisms.

A. True

B. False

AP BIO INSTA-REVIEW

TOPIC 5.3

You are able to insert genes between different organisms.

A. True

The genetic code is universal. All organisms have the same four nitrogenous bases and twenty (or so) amino acids. The genetic code will code for the same amino acids to form the same protein in all organisms.

AP BIO INSTA-REVIEW

TOPIC 5.3

Which metabolic process do all organisms undergo?

A. Glycolysis

B. Krebs cycle

C. Oxidative phosphorylation

D. Photosynthesis

AP BIO INSTA-REVIEW

TOPIC 5.3

Which metabolic process do all organisms undergo?

A. Glycolysis

Glycolysis takes place in the cytosol. All organisms have a cytosol. This is another ancestral trait that emerged in the common ancestor to metabolize.

AP BIO INSTA-REVIEW

TOPIC 5.3

Which phase of meiosis represents the law of independent assortment?

A. Prophase I

B. Metaphase I

C. Anaphase I

D. Telophase I

AP BIO INSTA-REVIEW

TOPIC 5.3

Which phase of meiosis represents the law of independent assortment?

B. Metaphase I

The law of independent assortment refers to the homologous chromosomes aligning on the metaphase plate. Recall, the homologous chromosomes are only found during meiosis I, so this is metaphase I.

AP BIO INSTA-REVIEW

TOPIC 5.3

Which phase of meiosis represents law of segregation?

A. Prophase I

B. Metaphase I

C. Anaphase I

D. Telophase I

AP BIO INSTA-REVIEW

TOPIC 5.3

Which phase of meiosis represents law of segregation?

C. Anaphase I

The law of segregation refers to the homologous chromosomes segregating and moving apart to opposite poles. Recall, the homologous chromosomes are only found during meiosis I, so this is anaphase I.

AP BIO INSTA-REVIEW

TOPIC

5.3

What is a monohybrid or dihybrid cross?

AP BIO INSTA-REVIEW

TOPIC 5.3

What is a monohybrid or dihybrid cross?

A cross between two individuals that are heterozygous for the trait

Monohybrid –
heterozygous is ONE allele

Dihybrid –
heterozygous for TWO alleles

AP BIO INSTA-REVIEW

TOPIC

5.3

Assuming complete dominance, what are the parents if the offspring have a 1:1 ratio?

A. Homozygous recessive and heterozygous

B. Homozygous recessive and homozygous dominant

C. Heterozygous and homozygous dominant

D. Heterozygous and heterozygous

AP BIO INSTA-REVIEW

TOPIC 5.3

Assuming complete dominance, what are the parents if the offspring have a 1:1 ratio?

A. Homozygous recessive and heterozygous

The homozygous recessive parent is only able to donate a recessive allele. This means that the half and half must result in another parent having one dominant and one recessive allele (heterozygous).

AP BIO INSTA-REVIEW

TOPIC 5.3

What is the probability of AABBCC in a trihybrid cross?

A. 1/4
B. 1/16
C. 1/64
D. 1/256

AP BIO INSTA-REVIEW

TOPIC 5.3

What is the probability of AABBCC in a trihybrid cross?

c. 1/64

The P(AA) from Aa x Aa = ¼, the P(BB) from Bb x Bb = ¼, and the P(CC) from Cc x Cc = ¼. So, ¼ x ¼ x ¼ = 1/64

AP BIO INSTA-REVIEW

TOPIC 5.3

How does the phenotypic ratio differ between complete or incomplete dominance?

AP BIO INSTA-REVIEW

TOPIC 5.3

How does the phenotypic ratio differ between complete or incomplete dominance?

Complete dominance: homozygous dominant and heterozygous both show the dominant phenotype (3:1)

Incomplete dominance: heterozygous is a blend between two dominant traits example: red x white pink (1:2:1)

Codominance: heterozygous shows dominant traits independently together (3:1)

AP BIO INSTA-REVIEW

TOPIC 5.4

Non-Mendelian Genetics

IST-1.J.1

Patterns of inheritance of many traits do not follow ratios predicted by Mendel's laws and can be identified by quantitative analysis, where observed phenotypic ratios statistically differ from the predicted ratios–

a. Genes that are adjacent and close to one another on the same chromosome may appear to be genetically linked; the probability that genetically linked genes will segregate as a unit can be used to calculate the map distance between them.

AP BIO INSTA-REVIEW

TOPIC 5.4

Non-Mendelian Genetics

IST-1.J.2

Some traits are determined by genes on sex chromosomes and are known as sex-linked traits. The pattern of inheritance of sex-linked traits can often be predicted from data, including pedigree, indicating the parent genotype/phenotype and the offspring genotypes/phenotypes.

AP BIO INSTA-REVIEW

TOPIC 5.4

Non-Mendelian Genetics

IST-1.J.3

Many traits are the product of multiple genes and/or physiological processes acting in combination; these traits therefore do not segregate in Mendelian patterns.

AP BIO INSTA-REVIEW

TOPIC 5.4

Non-Mendelian Genetics

IST-1.J.4

Some traits result from non-nuclear inheritance–

a. Chloroplasts and mitochondria are randomly assorted to gametes and daughter cells; thus, traits determined by chloroplast and mitochondrial DNA do not follow simple Mendelian rules.

b. In animals, mitochondria are transmitted by the egg and not by sperm; as such, traits determined by the mitochondrial DNA are maternally inherited.

AP BIO INSTA-REVIEW

TOPIC 5.4

Non-Mendelian Genetics

IST-1.J.4

Some traits result from non-nuclear inheritance—c. In plants, mitochondria and chloroplasts are transmitted in the ovule and not in the pollen; as such, mitochondria-determined and chloroplast-determined traits are maternally inherited.

AP BIO INSTA-REVIEW

TOPIC 5.4

Cross between dihybrid and double recessive: what ratio do you expect?

A. 1:1:1:1

B. 1:2:1

C. 9:3:3:1

D. 12:3:1

AP BIO INSTA-REVIEW

TOPIC 5.4

Cross between dihybrid and double recessive: what ratio do you expect?

A. 1:1:1:1

	A	a
a	Aa	aa
a	Aa	aa

	B	b
b	Bb	bb
b	Bb	bb

AaBb = ½ x ½ = ¼

Aabb = ½ x ½ = ¼

aaBb = ½ x ½ = ¼

aabb = ½ x ½ = ¼

AP BIO INSTA-REVIEW

TOPIC

5.4

Parents:

Green, Smooth x Yellow, Wrinkled

Offspring:

Green, Smooth = 425

Green, Wrinkled = 50

Yellow, Smooth = 75

Yellow, Wrinkled = 450

How would you explain the offspring ratio differing from 1:1:1:1?

AP BIO INSTA-REVIEW

TOPIC 5.4

How would you explain the offspring ratio differing from 1:1:1:1?

The genes are linked (located on the same chromosome)

AP BIO INSTA-REVIEW

TOPIC

5.4

Parents:

Green, Smooth x Yellow, Wrinkled

Offspring:

Green, Smooth = 425

Green, Wrinkled = 50

Yellow, Smooth = 75

Yellow, Wrinkled = 450

What process explains the recombinants made?

A. Crossing over

B. Independent Assortment

C. Metabolism

D. Mitosis

AP BIO INSTA-REVIEW

TOPIC 5.4

What process explains the recombinants made?

A. Crossing over

Recall crossing over involves the non-sister chromatids exchanging genetic information. Green & Smooth is on one chromsome while Yellow & Wrinkled on the other chromosome. The two exchanged genetic information leading to the new combinations of these traits.

AP BIO INSTA-REVIEW

TOPIC

5.4

Parents:

Green, Smooth x Yellow, Wrinkled

Offspring:

Green, Smooth = 425

Green, Wrinkled = 50

Yellow, Smooth = 75

Yellow, Wrinkled = 450

Calculate the recombinant frequency

AP BIO INSTA-REVIEW

TOPIC 5.4

Parents:

Green, Smooth x Yellow, Wrinkled

Offspring:

Green, Smooth = 425

Green, Wrinkled = 50

Yellow, Smooth = 75

Yellow, Wrinkled = 450

Calculate the recombinant frequency

12.5%

Step 1:

add the recombinants

50 + 75 = 125

Step 2:

divide by the total

125/1000 = 0.125

Step 3:

multiply by 100 to get into percent

0.125 * 100 = 12.5%

AP BIO INSTA-REVIEW

TOPIC

5.4

What is the difference between linked genes and SEX linked genes?

AP BIO INSTA-REVIEW

TOPIC 5.4

What is the difference between linked genes and SEX linked genes?

Traditionally, the linked will be on an autosome (non-sex chromosome) while the sex-linked is on a sex chromosome.

There's two sex chromosomes (X & Y). The Y chromosome has the SRY gene which leads to "male characteristics". So, if the allele is on a sex chromosome we say it's sex linked.

AP BIO INSTA-REVIEW

TOPIC 5.4

A mutation in the mitochondrial DNA is from

A. Father

B. Mother

C. Both parents

D. Neither random occurrence

AP BIO INSTA-REVIEW

TOPIC 5.4

A mutation in the mitochondrial DNA is from

B. Mother

The egg has all of the organelles for the zygote. This includes the mitochondria. If the mitochondria has a genetic issue, then that issue will occur in all of the offspring.

AP BIO INSTA-REVIEW

TOPIC

5.4

How would you recognize mitochondrial genes on a pedigree?

AP BIO INSTA-REVIEW

TOPIC 5.4

How would you recognize mitochondrial genes on a pedigree?

Affected mother and ALL of the children are affected

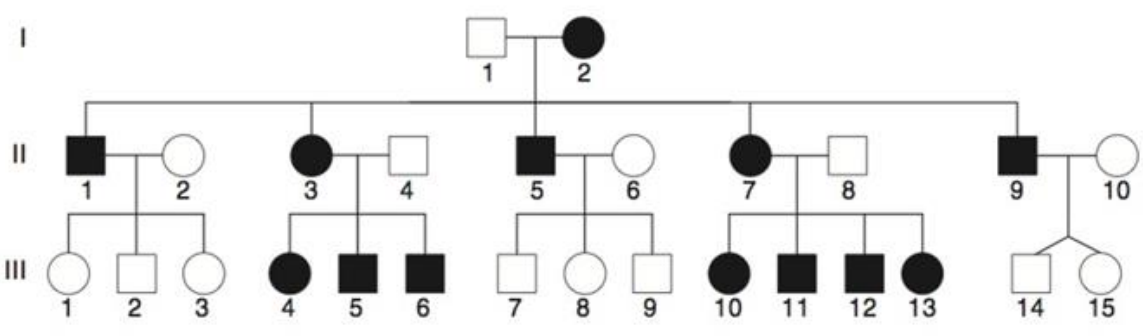


Figure 5.9 **Inheritance of mitochondrial genes.** Mothers pass mitochondrial genes to all offspring. Fathers do not transmit mitochondrial genes because sperm only very rarely contribute mitochondria to fertilized ova. If mitochondria from a male do enter, they are destroyed.

AP BIO INSTA-REVIEW

TOPIC

5.4

What is the expected ratio of dihybrid in a test cross?

A. 1:1:1:1

B. 1:2:1

C. 9:3:3:1

D. 9:3:4

AP BIO INSTA-REVIEW

TOPIC 5.4

What is the expected ratio of dihybrid in a test cross?

A. 1:1:1:1

	A	a
a	Aa	aa
a	Aa	aa

	B	b
b	Bb	bb
b	Bb	bb

AaBb = ½ x ½ = ¼

Aabb = ½ x ½ = ¼

aaBb = ½ x ½ = ¼

aabb = ½ x ½ = ¼

AP BIO INSTA-REVIEW

TOPIC

5.4

What does it mean if genes are linked?

AP BIO INSTA-REVIEW

TOPIC 5.4

What does it mean if genes are linked?

Two genes are located close together on the same chromosome

This will traditionally lead to the two traits being inherited together

AP BIO INSTA-REVIEW

TOPIC 5.4

If genes are linked, how would this affect the 1:1:1:1 ratio from testcross?

A. Linkage will not affect the predicted ratios

B. More parentals (>50%)

C. More recombinants (>50%)

D. Ratio follows 9:3:3:1

AP BIO INSTA-REVIEW

TOPIC 5.4

If genes are linked, how would this affect the 1:1:1:1 ratio from testcross?

B. More parentals (>50%)

If the two genes are linked, they are located on the same chromosome. This means that when the organism inherits one gene, they would also inherit the other gene. This means we would expect mostly parentals (trait combinations that are the same as the parent chromosome)

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TOPIC

5.4

How do you solve for the recombination frequency?

AP BIO INSTA-REVIEW

TOPIC 5.4

How do you solve for the recombination frequency?

$$\frac{Number\ of\ Recombinants}{Total\ Number}\ x\ 100$$

AP BIO INSTA-REVIEW

TOPIC 5.4

With linked genes, how do recombinants form?

A. Crossing over

B. Independent assortment

C. Random fertilization

D. Transformation

AP BIO INSTA-REVIEW

TOPIC 5.4

With linked genes, how do recombinants form?

A. Crossing over

The two traits are found on the same chromosome. Crossing over will allow for the chromosomes to exchange genetic infomration between non-sister chromatids.

AP BIO INSTA-REVIEW

TOPIC 5.4

If a male (AMAB) is affected by a sex-linked trait, which parent passed it on?

A. Father

B. Mother

AMAB – assigned male at birth

AP BIO INSTA-REVIEW

TOPIC 5.4

If a male (AMAB) is affected by a sex-linked trait, which parent passed it on?

B. Mother

The male would have inherited its Y from its father and its X from its mother. Thus, if the trait is sex-linked, the mother would pass it on to her sons.

AP BIO INSTA-REVIEW

TOPIC 5.4

Which organelle contains DNA?

A. Chloroplast

B. Mitochondria

C. Nucleus

D. All of the above

AP BIO INSTA-REVIEW

TOPIC 5.4

Which organelle contains DNA?

D. All of the above
(Chloroplast, Mitochondria & Nucleus)

The nucleus contains the DNA for the cell.

The mitochondria/chloroplast are prokaryotic cells with a single circular strand of DNA.

AP BIO INSTA-REVIEW

TOPIC

5.4

Mitochondrial inheritance follows the ____

A. Egg

B. Sperm

AP BIO INSTA-REVIEW

TOPIC 5.4

Mitochondrial inheritance follows the ____

A. Egg

The egg contains the organelles for the zygote. This means that mitochondrial inheritance follows the egg since the mitochondria is inherited from the mother.

AP BIO INSTA-REVIEW

TOPIC

5.4

In a pedigree and determining mode of inheritance...

A. A dominant trait is found in every generation

B. A dominant trait will skip generations

C. A dominant trait is only found in males

D. A dominant trait that is found in all offspring of affected females

AP BIO INSTA-REVIEW

TOPIC 5.4

In a pedigree and determining mode of inheritance...

A. A dominant trait is found in every generation

The dominant trait is unable to be masked by a recessive trait. This means that we will see if occur in every generation.

AP BIO INSTA-REVIEW

TOPIC

5.4

In a pedigree and determining mode of inheritance...

A. A recessive allele is found in every generation
B. A recessive trait can be seen with unaffected parents
C. A recessive trait is only found in females
D. A recessive trait is found in all offspring of affected father

AP BIO INSTA-REVIEW

TOPIC 5.4

In a pedigree and determining mode of inheritance...
B. A recessive trait can be seen with unaffected parents

Recessive traits are able to hide their expression. This means that it can be observed as two unaffected parents with an affected offspring.

AP BIO INSTA-REVIEW

TOPIC

5.4

Mitochondrial inheritance seen in pedigree as...

A. Affected male and all offspring are affected
B. Affected female and all offspring are affected
C. Affected mother only passing on to daughters
D. Affected mother only passing on to sons

AP BIO INSTA-REVIEW

TOPIC 5.4

Mitochondrial inheritance seen in pedigree as...

B. Affected female and all offspring are affected

Due to the mitochondria being inherited by the egg, this would be seen as an affected mother with ALL of their offspring also affected.

AP BIO INSTA-REVIEW

TOPIC 5.4

If males and females are equally likely to be affected

A. The trait is autosomal

B. The trait is sex-linked

AP BIO INSTA-REVIEW

TOPIC 5.4

If males and females are equally likely to be affected

A. The trait is autosomal

If males and females are equally affected, the trait is autosomal. Both organisms have two alleles so they have two opportunities to obtain a recessive allele.

AP BIO INSTA-REVIEW

TOPIC 5.5

Environmental Effects on Phenotype

SYI-3.B.1

Environmental factors influence gene expression and can lead to phenotypic plasticity. Phenotypic plasticity occurs when individuals with the same genotype exhibit different phenotypes in different environments

AP BIO INSTA-REVIEW

TOPIC

5.5

What is phenotypic plasticity?

AP BIO INSTA-REVIEW

TOPIC 5.5

What is phenotypic plasticity?

Phenotype changes based on environment

This can be behavioral, physical, or morphological changes.

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TOPIC 5.5

Example of Phenotype Plasticity

Hydrangeas

No matter what the genotype states, the flower could develop as a pink or blue flower depending on the alkalinity of the soil planted in.

AP BIO INSTA-REVIEW

TOPIC

5.5

Why would the snowshoe hare change to brown earlier?

AP BIO INSTA-REVIEW

TOPIC 5.5

Why would the snowshoe hare change to brown earlier?

As temperatures increase, the snowshoe hares will synthesize different proteins to change their white fur color to brown. This is a direct result of global climate change.

AP BIO INSTA-REVIEW

TOPIC

5.5

As temperatures increase, the caterpillar population will hatch earlier. Predict how the hatching of its predator is affected?

A. Hatched earlier

B. Hatched at same time

C. Hatched later

D. Hatching rate decreased

AP BIO INSTA-REVIEW

TOPIC 5.5

As temperatures increase, the caterpillar population will hatch earlier. Predict how the hatching of its predator is affected?

A. Hatched earlier

Due to the increase in temperature, the prey (caterpillar) will hatch earlier. In order for the predator to have food, it needs to start hatching earlier.

AP BIO INSTA-REVIEW

TOPIC

5.5

Identify why many animals undergo plasticity

A. Different genotypes
B. Different ancestors
C. Differential reproductive selection
D. Different species

AP BIO INSTA-REVIEW

TOPIC 5.5

Identify why many animals undergo plasticity

C. Differential reproductive selection

Plasticity involves a phenotypic change due to an environmental change. This process will allow individuals to have a higher fitness.

Example: The snowshoe hare is able to blend into the snowly environment during the winter then the muddy environment during summer.

AP BIO INSTA-REVIEW

TOPIC 5.6

Chromosomal Inheritance

SYI-3.C.1

Segregation, independent assortment of chromosomes, and fertilization result in genetic variation in populations.

SYI-3.C.2

The chromosomal basis of inheritance provides an understanding of the pattern of transmission of genes from parent to offspring.

AP BIO INSTA-REVIEW

TOPIC 5.6

Chromosomal Inheritance

SYI-3.C.3

Certain human genetic disorders can be attributed to the inheritance of a single affected or mutated allele or specific chromosomal changes, such as nondisjunction.

AP BIO INSTA-REVIEW

TOPIC
5.6

Which of these does not cause genetic variation?

A. Fertilization
B. Independent Assortment
C. Mitosis
D. Segregation

AP BIO INSTA-REVIEW

TOPIC 5.6

Which of these does not cause genetic variation?

C. Mitosis

Genetic variation involves NEW combinations. Fertilization brings two individuals together in one cell which is a new combination. Independent Assortment involves the homologous pairs independently lining up on the metaphase plate leads to unique gametes which is a new combination. Segregation involves the homologous chromosomes separating to opposite poles which is a new combination.

AP BIO INSTA-REVIEW

TOPIC

5.6

How does independent assortment cause genetic variation?

AP BIO INSTA-REVIEW

TOPIC 5.6

How does independent assortment cause genetic variation?

The homologous chromosomes align on the metaphase plate during metaphase I of meiosis I. These chromosomes align independent of each other. So, there's a 50% chance which pole the chromosomes will "face". If we are talking about 3 chromosomes, there's 8 different combinations that could result. If there's 4 chromosomes, there's 16 different combinations. If there's 5 chromosomes, there's 32 different combinations.

I hope you see where we are going with this.

AP BIO INSTA-REVIEW

TOPIC

5.6

How does segregation cause genetic variation?

AP BIO INSTA-REVIEW

TOPIC 5.6

How does segregation cause genetic variation?

After alignment during anaphase I, the homologous chromosomes will separate (segregate) to the two poles. This allows half of the genetic information to go to one cell while the other half goes to the second cell. The two cells are not the same because they each received a different chromosome from the homologous

AP BIO INSTA-REVIEW

TOPIC
5.6

How does fertilization increase genetic variation?

AP BIO INSTA-REVIEW

TOPIC 5.6

How does fertilization increase genetic variation?

The unique cells formed due to independent assortment, segregation, and crossing over are fused leads to new combinations of alleles.

Note: sexual reproduction is describing the sperm/egg fusion. This can occur within a **SINGLE** organism like a flower that has both pollen (sperm) and ovary (egg)

AP BIO INSTA-REVIEW

TOPIC

5.6

Which phase of meiosis involved independent assortment?

A. Anaphase I

B. Metaphase I

C. Prophase I

D. Telophase I

AP BIO INSTA-REVIEW

TOPIC 5.6

Which phase of meiosis involved independent assortment?

B. Metaphase I

Independent assortment involves the homologous pairs independently lining up on the metaphase plate during meiosis I. This leads to genetic diversity as the maternal and paternal of each chromosome will segregate into different cells leading to 2^{23} different outcomes.

AP BIO INSTA-REVIEW

TOPIC
5.6

Which phase of meiosis involved crossing over?

A. Anaphase I

B. Metaphase I

C. Prophase I

D. Telophase I

AP BIO INSTA-REVIEW

TOPIC 5.6

Which phase of meiosis involved crossing over?

C. Prophase I

Crossing over takes place when the homologous chromosomes pair up forming the tetrad. The nonsister chromatids will exchange genetic information leading to genetic variation as recombinant chromosomes are formed.

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TOPIC
5.6

Which phase of meiosis involved segregation?

A. Anaphase I
B. Metaphase I
C. Prophase I
D. Telophase I

AP BIO INSTA-REVIEW

TOPIC 5.6

Which phase of meiosis involved segregation?

A. Anaphase I

The homologous chromosomes are lined up during metaphase, but they are separated (law of segregation) during anaphase I. This is what leads to different chromosomes being in different cells.

AP BIO INSTA-REVIEW

TOPIC

5.6

There were two different theories about how traits were passed down from one generation to the next. How are traits inherited?

A. Blended Theory

B. Chromosomal Theory

AP BIO INSTA-REVIEW

TOPIC
5.6

There were two different theories about how traits were passed down from one generation to the next. How are traits inherited?

B. Chromosomal Theory

The chromosomal theory states that there is a discrete particle being passed down from parents to offspring. The blending theory makes me think of incomplete dominance. Overtime, the individuals would all look the same as their traits kept blending.

AP BIO INSTA-REVIEW

TOPIC

5.6

What is nondisjunction?

A. When genes move from one chromosome to another

B. When two sister chromatids are bound during prophase

C. When two cells do not undergo cytokinesis

D. When two chromosomes do not separate in anaphase

AP BIO INSTA-REVIEW

TOPIC 5.6

What is nondisjunction?

D. When two chromosomes do not separate in anaphase

Nondisjunction results in the sister chromatids or homologous chromosomes not separating during anaphase. This leads to daughter cells with additional or missing chromosomes.

Example: Trisomy 21

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TOPIC

5.6

Nondisjunction causes extra chromosomes to be inherited. On March 21, we celebrate National Downs Syndrome Awareness Day and Downs is caused by nondisjunction. But do you know which chromosome is involved?

A. Chromosome 8

B. Chromosome 15

C. Chromosome 18

D. Chromosome 21

AP BIO INSTA-REVIEW

TOPIC 5.6

Nondisjunction causes extra chromosomes to be inherited. On March 21, we celebrate National Downs Syndrome Awareness Day and Downs is caused by nondisjunction. But do you know which chromosome is involved?

D. Chromosome 21

Down syndrome involves an individual with an additional chromosome 21. This results from nondisjunction so the individual inherited an extra chromosome 21.

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TOPIC

5.6

Why doesn't the law of segregation apply to meiosis II?

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TOPIC 5.6

Why doesn't the law of segregation apply to meiosis II?

The chromosomes in meiosis are sister chromatids. They are "identical" so they will not demonstrate law of segregation.

AP BIO INSTA-REVIEW

TOPIC
5.6

What is the inheritance of the sickle cell gene?

A. Autosomal dominant
B. Autosomal recessive
C. Sex-linked dominant
D. Sex-linked recessive

AP BIO INSTA-REVIEW

TOPIC 5.6

What is the inheritance of the sickle cell gene?

B. Autosomal recessive

Sickle cell is an autosomal recessive trait. No, this is not required to know but it is a common example so your background knowledge could assist you to better answer the questions. You should understand that this can be observed in a pedigree by skipping generations and eqaul likihood with males and females.

AP BIO INSTA-REVIEW

TOPIC
5.6

What is the mode of inheritance of hemophilia?

A. Autosomal dominant
B. Autosomal recessive
C. Sex-linked dominant
D. Sex-linked recessive

AP BIO INSTA-REVIEW

TOPIC 5.6

What is the mode of inheritance of hemophilia?

D. Sex-linked recessive

Hemophilia is a sex-linked recessive trait. No, this is not required to know but it is a common example so your background knowledge could assist you to better answer the questions. You should understand that this can be observed in a pedigree by skipping generations and males being more likely to be affected than females.

AP BIO INSTA-REVIEW

TOPIC 5.6

What is the mode of inheritance of polydactyl?

A. Autosomal dominant

B. Autosomal recessive

C. Sex-linked dominant

D. Sex-linked recessive

AP BIO INSTA-REVIEW

TOPIC
5.6

What is the mode of inheritance of polydactyl?

A. Autosomal dominant

Polydactyl is an autosomal dominant trait. No, this is not required to know but it is a common example so your background knowledge could assist you to better answer the questions. You should understand that this can be observed in a pedigree by an individual in each generation will be affected and male and female are equally likely.

AP BIO INSTA-REVIEW

TOPIC

5.6

What is nondisjunction?

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TOPIC 5.6

What is nondisjunction?

Chromosomes will be unable to separate during meiosis I and II.

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TOPIC
5.6

Which checkpoint halts to ensure all chromosomes are attached to kinetochores?

A. G_1

B. S

C. G_2

D. M

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TOPIC 5.6

Which checkpoint halts to ensure all chromosomes are attached to kinetochores?

D. M

The M checkpoint involves determining that every chromosome is attached to a kinetochore. If the chromosomes are not bound to the microtubules, then there will be an unequal separation of the genetic information.