Answers pg 274 #1,2,3

11–3 Section Assessment

1. During gamete formation, pairs of alleles for different traits segregate, or separate, independently of each other.
2. Answers include descriptions for any two: incomplete dominance, codominance, multiple alleles, or polygenic traits.
3. In incomplete dominance, two alleles combine their effects to produce a single in-between phenotype, such as pink flowers from red and white parents. In codominance, each allele is expressed separately, as when erminette chickens have both black and white feathers.

Section 11–3 Exploring Mendelian Genetics (pages 270–274)

Independent Assortment (pages 270–271)

1. In a two-factor cross, Mendel followed ___two___ different genes as they passed from one generation to the next.
2. Write the genotypes of the true-breeding plants that Mendel used in his two-factor cross.

Phenotype	Genotype
a. round yellow peas	RRYY
b. wrinkled green peas	rryy

3. Circle the letter that best describes the F_1 offspring of Mendel's two-factor cross.
   a. Homozygous dominant with round yellow peas
   b. Homozygous recessive with wrinkled green peas
   c. Heterozygous dominant with round yellow peas
   d. Heterozygous recessive with wrinkled green peas
4. Is the following sentence true or false? The genotypes of the F_1 offspring indicated to Mendel that genes assort independently.
   ___false___
5. How did Mendel produce the F_2 offspring?
   He crossed F_1 plants with each other
6. Circle the letter of the phenotypes that Mendel would expect to see if genes segregated independently.
   a. round and yellow
   b. wrinkled and green
   c. round and green
   d. wrinkled and yellow
7. What did Mendel observe in the F_2 offspring that showed him that the alleles for seed shape segregate independently of those for seed color?
   he observed F_2 offspring that had combinations of phenotypes- and therefore combinations of alleles-not found in either parent
8. What were the phenotypes of the F_2 generation that Mendel observed?
   He observed seeds that were round and yellow, wrinkled and green, round and green, and wrinkled and yellow.
9. What was the ratio of Mendel's F_2 generation for the two-factor cross?
   9:3:3:1

10. MENDEL'S TWO-FACTOR CROSS

RrYy × RrYy

	RY	Ry	rY	ry
RY	RRYY	RRYy	RrYY	RrYy
Ry	RRYy	RRyy	RrYy	Rryy
rY	RrYY	RrYy	rrYY	rrYy
ry	RrYy	Rryy	rrYy	rryy

3:3:1

11. State Mendel's principle of independent assortment. Genes for different traits can segregate independently during the formation of gametes.

A Summary of Mendel's Principles (page 272)

12. Circle the letter of each sentence that is true about Mendel's principles.
   a. The inheritance of biological characteristics is determined by genes that are passed from parents to their offspring.
   b. Two or more forms of the gene for a single trait can never exist.
   c. The copies of genes are segregated from each other when gametes are formed.
   d. The alleles for different genes usually segregate independently of one another.

13. When two or more forms of the gene for a single trait exist, some forms of the gene may be dominant and others may be recessive.

Beyond Dominant and Recessive Alleles (pages 272–273)

14. Is the following sentence true or false? All genes show simple patterns of dominant and recessive alleles. false

PATTERNS OF INHERITANCE

Type	Description	Examples
incomplete dominance	One allele is not completely dominant over another. The heterozygous phenotype is somewhere in between the two homozygous phenotypes.	flower color in sweet peas or four o'clock plants
codominance	Both alleles contribute to the phenotype of the organism.	black and white feather color in certain varieties of chickens
multiple alleles	Genes have more than two alleles.	coat color in rabbits, blood type in humans, eye color in humans
polygenic traits	Two or more genes control a trait.	eye color in fruit flies, skin color in humans

16. List three criteria Thomas Hunt Morgan was looking for in a model organism for genetic studies.
   a. small in size
   b. easy to keep in the laboratory
   c. able to produce large numbers of offspring in a short time

17. Is the following sentence true or false? Mendel's principles apply not just to pea plants but to other organisms as well. true

Genetics and the Environment (page 274)

18. Characteristics are determined by interaction between genes and the environment.

Section Review 11-3

1. segregate **2.** multiple alleles, multiple genes **3.** b **4.** c **5.** d **6.** a

7.

FfJj

FFJj	*FJ*	*Fj*	*fJ*	*fj*
FJ	*FFJJ*	*FFJj*	*FfJJ*	*FfJj*
Fj	*FFJj*	*FFjj*	*FfJj*	*Ffjj*
FJ	*FFJJ*	*FFJj*	*FfJJ*	*FfJj*
Fj	*FFJj*	*FFjj*	*FfJj*	*Ffjj*

8. In incomplete dominance, the heterozygous phenotype is somewhere in between the two homozygous phenotypes. In codominance, the heterozygous phenotype shows both traits. **9.** Polygenic traits have more variation in phenotypes because different combinations of alleles for these genes produce many different phenotypes. **10.** Morgan chose fruit flies because fruit flies are easy to keep in the lab and they reproduce quickly, producing a great number of offspring.

Complete dominance =

one allele is dominant over the other and whenever it is present the recessive allele is not expressed.

Incomplete dominance =

both alleles are partially dominant so they blend or mix together in how they are expressed.

Codominance =

both alleles can be expressed at the same time.

Practice Problems

1. Snapdragons are incompletely dominant for color; they have phenotypes red, pink, or white. The red and white flowers are homozygous, and the pink flowers are heterozygous. Give the genotypes for each of the phenotypes, using the letters "R" and "W" for alleles:

a. Red snapdragon genotype: RR

b. Pink snapdragon genotype: RW

c. White snapdragon genotype: WW

2. Show genetic crosses between the following snapdragon parents, using the punnett squares provided, and record the genotypic and phenotypic ratios below:

a. pink x pink

	R	W
R	RR	RW
W	RW	WW

% Red 25
% Pink 50
% White 25

b. red x white

	R	R
W	RW	RW
W	RW	RW

% Red _____
% Pink 100
% White _____

c. pink x white

	R	W
W	RW	WW
W	RW	WW

% Red _____
% Pink 50
% White 50

3. In horses, some of the genes for hair color are incompletely dominant. Genotypes are as follows: brown horses are BB, white horses are WW and a BW genotype creates a yellow-tannish colored horse with a white mane and tail, which is called "palomino". Show the genetic crosses between the following horses and record the genotypic and phenotypic ratios:

a. brown x white

	B	B
W	BW	BW
W	BW	BW

% Brown _____
% Palomino 100
% White _____

b. brown x palomino

	B	B
B	BB	BB
W	BW	BW

% Brown _____
% Palomino _____
% White _____

c. palomino x palomino

	B	W
B	BB	BW
W	BW	WW

% Brown 25
% Palomino 50
% White 25

4. Can palominos be considered a purebred line of horses? Why or why not?

palomino is a color and not a breed and palomino does not always breed true because it is a blending of colors.

5. Which two colors of horse would you want to breed if you wanted to produce the maximum numbers of palominos in the shortest amount of time?

brown and white

6. In mice, there is a lethal mutation that causes embryos with the homozygous dominant genotype YY to die before birth. Baby mice with the genotype YG appear yellow, and GG mice are gray.

a. If 2 gray parent mice mate, what % of their offspring would be expected to die before birth?

0%

	G	G
G	GG	GG
G	GG	GG

b. If 1 gray mouse and 1 yellow mouse mate, what % of their offspring would be expected to die before birth?

0%

	G	G
Y	YG	YG
G	GG	GG

c. If 2 yellow parent mice mate, what percent of their offspring would be expected to die before birth?

25%

	Y	G
Y	YY	YG
G	YG	GG

Multiple Alleles (Blood types)

Human blood types are determined by genes with multiple alleles. Each person can have two of the four possible alleles. These alleles will specify if there is a type of molecule on the surface of blood cells (A, B, AB), or none (O).

Blood Type (Phenotype)	Genotype	Can donate blood to:	Can receive blood from:
O	I^OI^O	A,B,AB and O (universal donor)	O
AB	I^AI^B	O, AB	A,B,AB and O (universal receiver)
A	I^AI^A or I^AI^O	AB, A	O,A
B	I^BI^B or I^BI^O	AB,B	O,B

1. Write the genotype for each person based on the description:

a. Homozygous for the "B" allele — IBIB
b. Heterozygous for the "A" allele — IAIO
c. Type O — IOIO
d. Type "A" and had a type "O" parent — ~~IAIO~~
e. Type "AB" — IAIB
f. Blood can be donated to anybody — IOIO
g. Can only get blood from a type "O" donor — IOIO

2. Draw a Punnett square showing all the possible blood types for the offspring produced by a type "O" mother and an a Type "AB" father

	O	O
A	AO	AO
B	BO	BO

50% Type A

50% Type B

3. Two parents think their baby was switched at the hospital. It's 1968, so DNA fingerprinting technology does not exist yet. The mother has blood type "O," the father has blood type "AB," and the baby has blood type "B."

   a. Mother's genotype: OO
   b. Father's genotype: AB
   c. Baby's genotype: BB or BO
   d. Punnett square showing all possible genotypes for children produced by this couple:

	O	O
A	AO	AO
B	BO	BO

   e. Was the baby switched? No

4. Two other parents think their baby was switched at the hospital. The mother has blood type "A," the father has blood type "B," and the baby has blood type "AB."

   a. Mother's genotype: AA or AO
   b. Father's genotype: BB or BO
   c. Baby's genotype: AB
   d. Punnett square showing all possible genotypes for children produced by this couple:

   e. Was the baby switched? No

Attachments

Meiosis.wmv