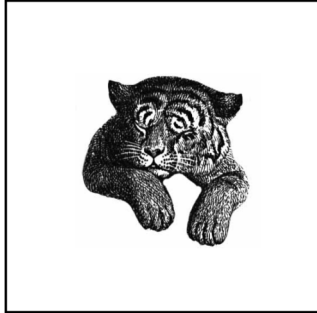


## Patterns of Inheritance

Name: \_\_\_\_\_

Date: \_\_\_\_\_

1. Use the picture below to answer the following question.



Which would most likely be this animal's parent?

A.



B.



C.



D.



2. Use the information and data table below to answer the question.

The students at Hoover Elementary did a survey of the eye colors of all the fourth graders at their school. The results are shown in the data table below.

Hoover Elementary School  
Fourth-Grade Eye Colors

	Blue	Brown	Green
Ms. Musso's class	9	7	1
Ms. Broussard's class	2	10	4

What does the chart show about Hoover Elementary School?

- A. Brown is the most common eye color in each fourth-grade class.
- B. Green is the least common eye color in both fourth-grade classes.
- C. Brown is the most common eye color in the fourth grade.
- D. Blue eyes are more common in boys than in girls in the fourth grade.

3. In humans, **B** is the allele for brown eyes and **b** is the allele for blue eyes. Two brothers both have brown eyes, but one of them has both the **B** and **b** alleles while the other only has **B** alleles. Which statement is true about the brothers?
- A. They have the same genotype and phenotype.
  - B. They have different phenotypes and genotypes.
  - C. They have the same phenotype but different genotypes.
  - D. They have the same genotype but different phenotypes.

4. Use this Punnett square to answer the question.

	<b>W</b>	<b>W</b>
<b>w</b>		
<b>w</b>		

In horses, the gene for white hair (**W**) is dominant to the gene for non-white hair (**w**). A horse with genotype (**WW**) was crossed with a horse with genotype (**ww**), as shown in the Punnett square.

What fraction of the offspring should be expected to have white hair?

- A. none
- B. one-half
- C. three-quarters
- D. all

5. Which of the following *best* describes the number of chromosomes in a normal human liver cell?
- A. 23 pairs of chromosomes
  - B. 46 different types of chromosomes
  - C. 46 male chromosomes and 46 female chromosomes
  - D. 23 original chromosomes and 23 duplicate chromosomes

6. The pictures below show two dogs of the same breed that have different coat colors.



The instructions that determine coat color are stored in the

- A. cytoplasm of skin cells.
- B. membrane of every cell.
- C. mitochondria of hair cells.
- D. chromosomes of every cell.

7. The table below shows the genotypes that result in four different blood types in humans.

Genotype	Blood Type
$I^A I^A, I^A i$	A
$I^B I^B, I^B i$	B
$I^A I^B$	AB
ii	O

Based on the information in the table, which of the following describes alleles  $I^A$  and  $I^B$ ?

- The  $I^A$  and  $I^B$  alleles show sex linkage.
- The  $I^A$  allele is recessive to the  $I^B$  allele.
- The  $I^A$  allele is dominant to the  $I^B$  allele.
- The  $I^A$  and  $I^B$  alleles show codominance.

8. In tomato plants, the allele for red fruit color ( $R$ ) is dominant to the allele for yellow fruit color ( $r$ ). The allele for round-shaped fruit ( $F$ ) is dominant to the allele for pear-shaped fruit ( $f$ ).

Two tomato plants, heterozygous for fruit color and fruit shape, are crossed. The Punnett square for this dihybrid cross is shown below.

	$RF$	$Rf$	$rF$	$rf$
$RF$	$RRFF$	$RRFf$	$RrFF$	$RrFf$
$Rf$	$RRFf$	$RRff$	$RrFf$	$Rrff$
$rF$	$RrFF$	$RrFf$	$rrFF$	$rrFf$
$rf$	$RrFf$	$Rrff$	$rrFf$	$rrff$

- For this cross, identify all the possible phenotypes of the offspring.
- Considering only fruit color, determine the ratio of offspring with red fruit to offspring with yellow fruit predicted by the Punnett square.
- Considering only fruit shape, determine the ratio of offspring with round-shaped fruit to offspring with pear-shaped fruit predicted by the Punnett square.
- Explain what is meant by independent assortment *and* describe one way in which your answers to the previous parts support the conclusion that the genes for fruit color and fruit shape sort independently.

9. In garden pea plants, the tall allele (**T**) is dominant to the short allele (**t**), and the round seed allele (**R**) is dominant to the wrinkled seed allele (**r**).

Which of the following crosses could produce short pea plants with wrinkled seeds?

- A. **TtRr** × **TTRR**      B. **TTRr** × **TTRr**  
 C. **TtRr** × **Ttrr**      D. **TtRR** × **ttRR**

10. In snapdragons, the allele for red flower color (**C<sup>R</sup>**) is incompletely dominant to the allele for white flower color (**C<sup>W</sup>**). Snapdragons that are heterozygous for flower color have a pink phenotype.

Which of the following crosses could yield all three flower color phenotypes (red, white, and pink) among the offspring?

- A. **C<sup>R</sup>C<sup>R</sup>** × **C<sup>W</sup>C<sup>W</sup>**      B. **C<sup>R</sup>C<sup>R</sup>** × **C<sup>R</sup>C<sup>W</sup>**  
 C. **C<sup>R</sup>C<sup>W</sup>** × **C<sup>R</sup>C<sup>W</sup>**      D. **C<sup>R</sup>C<sup>W</sup>** × **C<sup>W</sup>C<sup>W</sup>**

11. Polycystic kidney disease (PKD) can result in kidney failure. In most cases, PKD is caused by a dominant allele.

What is the chance that a child will have PKD if the father is unaffected and the mother is heterozygous for PKD?

- A. 0%      B. 25%      C. 50%      D. 75%

12. Use the information and the Punnett square below to answer the question(s).

In guinea pigs, the allele for black fur (**B**) is dominant. The allele for brown fur (**b**) is recessive. Two guinea pigs were crossed as shown in the Punnett square below.

	<b>B</b>	<b>b</b>
<b>B</b>	<b>BB</b>	<b>Bb</b>
<b>B</b>	<b>BB</b>	<b>Bb</b>

Which of these describes the phenotypes of the parent guinea pigs?

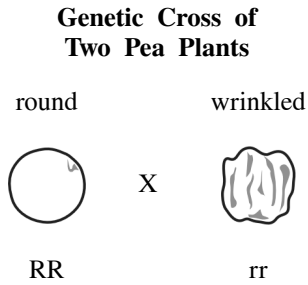
- A. Both parents have black fur.  
 B. Both parents have brown fur.  
 C. One parent has black fur, and the other has brown fur.

13. What is the probability that an offspring from this cross would have brown fur?

- A. 50%      B. 25%      C. 0%



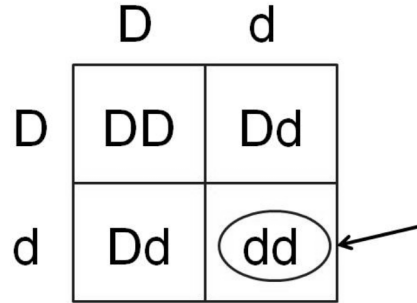
18. A pea plant with genes that are homozygous for round seeds is crossed with a pea plant that is homozygous for wrinkled seeds.



Which statement correctly predicts the results of this genetic cross?

- A. The offspring will have the genotype Rr.
- B. The offspring will have the genotype RR.
- C. Round seeds will be recessive to wrinkled seeds.
- D. Wrinkled seeds will be observed in half of the offspring.

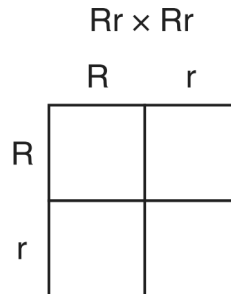
19. The figure below shows a Punnet Square for an inherited trait.



The arrow is pointing to a circled genotype in the square. What genotype does the circled “dd” represent?

- A. the genotype in the mother’s egg
- B. the genotype that only the girls will inherit
- C. the genotype that any of the children could inherit
- D. the genotype that exactly  $\frac{1}{4}$  of the children will inherit

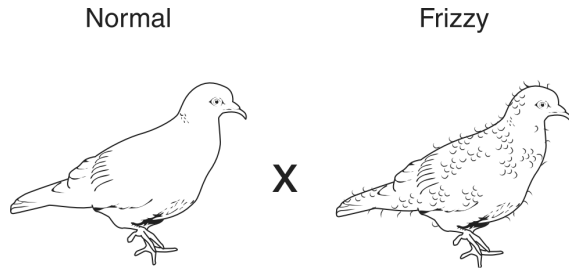
20. The diagram below represents a cross between two pea plants.



In pea plants, the allele for round seeds (R) is dominant to the allele for oval seeds (r). In a cross between the two plants above, what percentage of the offspring will have round seeds?

- A. 100%
- B. 75%
- C. 50%
- D. 25%

21. In pigeons, the allele for normal feathers (F) is dominant to the allele for frizzy feathers (f).



If a purebred, normal-feathered bird (FF) is crossed with a frizzy-feathered bird (ff), how many different feather phenotypes are possible in the offspring?

- A. 1      B. 2      C. 3      D. 4

22. In humans, the allele for unattached earlobes (L) is dominant to the allele for attached earlobes (l).

**Punnett Square**

	L	l
L	1	2
l	3	4

Based on the diagram above, an offspring with attached earlobes is indicated in

- A. box 1.                      B. box 4.  
 C. boxes 2 and 3.        D. boxes 1, 2, and 3.

23. If a corn plant has a genotype of Ttyy, what are the possible genetic combinations that could be present in a single grain of pollen from this plant?

- A. Ty, ty                      B. TY, ty  
 C. TY, Ty, ty                D. Ty, ty, tY, TY

24. In fruit flies, the gene for red eyes (R) is dominant and the gene for sepia eyes (r) is recessive. What are the possible combinations of genes in the offspring of two red-eyed heterozygous flies (Rr)?

- A. RR only  
 B. rr only  
 C. Rr and rr only  
 D. RR, Rr, and rr only

25. In certain breeds of dogs, deafness is due to a recessive allele (d) of a particular gene, and normal hearing is due to its dominant allele (D). What percentage of the offspring of a normal heterozygous (Dd) dog and a deaf dog (dd) would be expected to have normal hearing?

- A. 0%      B. 25%      C. 50%      D. 100%

26. Fur color in cats is controlled by an autosomal gene that can occur in the dominant form, (B), or the recessive form, (b). The length of the cat's fur is controlled by another autosomal gene that occurs in the dominant form, (S), or the recessive form, (s). The table below shows the traits for these allele codes.

Gene	Trait
<i>B</i>	black fur
<i>b</i>	white fur
<i>S</i>	short-haired fur
<i>s</i>	long-haired fur

The following genotypes were found in a male cat and a female cat.

BbSs (male) bbSS (female)

Which one of the following choices is true of the phenotype of offspring from these parents?

- A. All offspring will have black fur.
- B. All offspring will have white fur.
- C. All offspring will have long-haired fur.
- D. All offspring will have short-haired fur.

27. In fruit flies, gray body color (G) is dominant over black body color (g). What kind of offspring would you expect from parents who are both heterozygous for body color (Gg × Gg)?

	G	g
G		
g		

- A. 0% gray, 100% black
- B. 25% gray, 75% black
- C. 75% gray, 25% black
- D. 100% gray, 0% black

28. In human beings, earlobes can be free or attached. Some people can roll their tongues while others cannot.

The genotype and phenotype of two parents are shown below.

	Male	Female
Genotype	FFTt	Fftt
Phenotype	Free earlobes, Can roll tongue	Free earlobes, Cannot roll tongue

**KEY:**  
 F = Free earlobe  
 f = Attached earlobe  
 T = Can roll tongue  
 t = Cannot roll tongue

Which trait *cannot* be transferred by this mother?

- A. Free earlobes
- B. Attached earlobes
- C. Cannot roll tongue
- D. Can roll tongue



29. Which trait will all of the offspring of the cross shown above exhibit?

- A. Can roll tongue      B. Cannot roll tongue
- C. Attached earlobes      D. Free earlobes

30. Children would *not* be able to roll their tongues if they inherited a \_\_\_\_\_.

- A. t allele from both parents
- B. T allele from both parents
- C. T allele from the mother and the t allele from the father
- D. t allele from the mother and the T from the father

31. John and Mary have three daughters. What are the chances that their fourth child will be a boy?

- A. 1 out of 8 (12.5%)      B. 1 out of 4 (25%)
- C. 1 out of 2 (50%)      D. 3 out of 4 (75%)

32. Which of the following traits could be passed down (inherited) from parents?

- A. Having blue eyes
- B. Knowing how to ride a bicycle
- C. Knowing how to read
- D. Having short fingernails

33. In pea plants, the allele for purple flowers (F) is dominant to the allele for white flowers (f) A cross between two plants produces 306 offspring with purple flowers and 95 offspring with white flowers

What are the genotypes of the parent plants?

- A. FF and ff      B. FF and Ff
- C. Ff and ff      D. Ff and Ff

34. In pea plants, the allele for red flowers (R) is dominant, and the allele for white flowers (r) is recessive. The Punnett square below shows the cross of two pea plants, each with red flowers.

	<b>R</b>	<b>r</b>
<b>R</b>		
<b>r</b>		

According to the Punnett square, what percent of the offspring resulting from this cross will have red flowers?

- A. 25%    B. 50%    C. 75%    D. 100%

35. In Andalusian chickens, feather color is inherited by incomplete dominance. If one parent with black feathers (BB) is crossed with a white-feathered parent (WW), all the offspring will have blue feathers (BW).

What is the percent chance of producing blue-feathered offspring when crossing a blue-feathered hen with a white-feathered rooster?

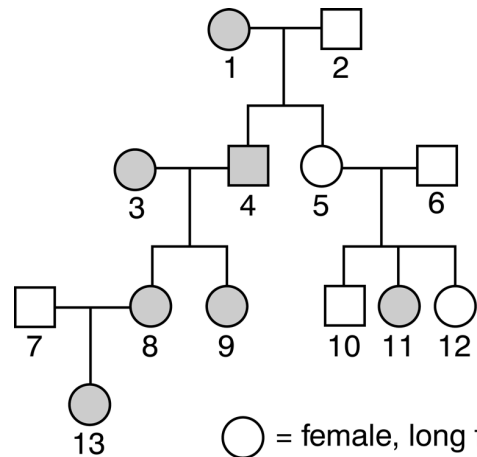
- A. 25%    B. 50%    C. 75%    D. 100%

36.    C = normal color vision    XX = female  
       c = colorblind            XY = male

Which pairing could result in a colorblind female (XcXc)?

- A. XcXc × XCY            B. XCXc × XCY  
 C. XCXc × XcY            D. XCXC × XcY

37. Use the pedigree below to answer the following question.



- = female, long fingers  
 □ = male, long fingers  
 ● = female, short fingers  
 ■ = male, short fingers

Which cross provides conclusive evidence that short fingers are recessive to long fingers?

- A. the cross between individuals 1 and 2  
 B. the cross between individuals 3 and 4  
 C. the cross between individuals 5 and 6  
 D. the cross between individuals 7 and 8

38. Which of the following is *not* an inherited trait of humans?

- A. eye color
- B. hair color
- C. favorite food
- D. height

39. Genetic information for a breed of chicken is shown below.



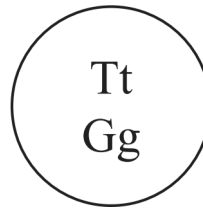
Frizzle Fowl

Types of Chickens with Different Feathers	
Genotype	Phenotype
FF	Normal (Normal feathers)
Ff	Frizzle fowl (Curly feathers)
ff	Feather shedder (Loses feathers easily)

Which of the following crosses of chickens will produce *only* Frizzle fowl offspring?

- A. Normal × Frizzle fowl
- B. Frizzle fowl × Frizzle fowl
- C. Normal × Feather shedder
- D. Feather shedder × Feather shedder

40. The diagram below represents a cell. The letters in the diagram represent alleles for two different genetic traits.



According to Mendel's law of independent assortment, which of the following shows all of the allele combinations expected in gametes produced by this cell?

- A.
- B.
- C.
- D.

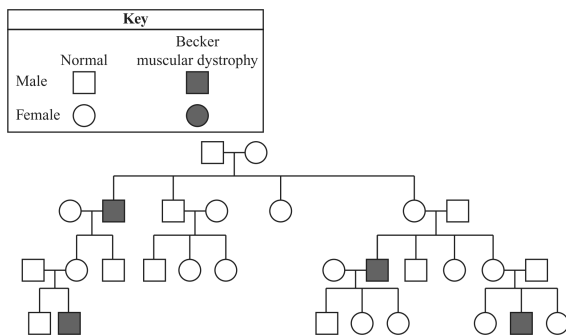
41. Within an individual mouse, four different mutations occurred in different genes, located on separate chromosomes and in different cells, as shown in the table below.

Cell Type	Chromosome	Trait	Normal Phenotype	Mutated Phenotype
skin	chromosome 4	fur color	black fur	white fur
gamete	chromosome 3	eye color	brown eyes	blue eyes
muscle	chromosome 2	fur thickness	thick fur	thin fur
nerve	chromosome 1	tail length	long tail	short tail

Which of these mutations could be passed on to the mouse's offspring?

- A. white fur                      B. blue eyes  
C. thin fur                        D. short tail

42. The pedigree below shows the occurrence of Becker muscular dystrophy in a family. Becker muscular dystrophy causes muscle weakness.



Based on this pedigree, it is *most* reasonable to conclude that Becker muscular dystrophy is which of the following?

- A. a polygenic trait  
B. a codominant trait  
C. a sex-linked recessive trait  
D. an autosomal dominant trait

43. In pigeons, the allele *B* produces ash-red feathers. The allele *b* produces blue feathers. The *B* allele is dominant to the *b* allele.

A pigeon with genotype *Bb* is crossed with a pigeon with genotype *bb*. What percent of the offspring are expected to have ash-red feathers?

- A. 0%      B. 25%      C. 50%      D. 100%

44. In sheep, the allele for white wool (**W**) is dominant, and the allele for black wool (**w**) is recessive. A farmer has mated two Suffolk sheep for a few years. These matings have resulted in six offspring, four with white wool and two with black wool. One parent has white wool and the other has black wool.

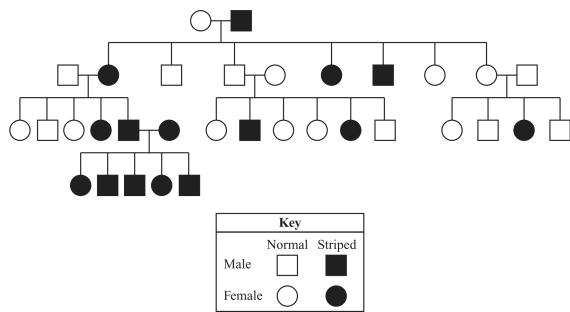
Which of the following could be the genotypes of the parent sheep?

- A. **WW** and **Ww**                      B. **WW** and **ww**  
C. **Ww** and **Ww**                      D. **Ww** and **ww**

45. In mussels, brown (**B**) coloring is dominant, and blue (**b**) coloring is recessive. If a blue mussel has two brown parents, what percentage of the total offspring of these brown parents are expected to be blue?

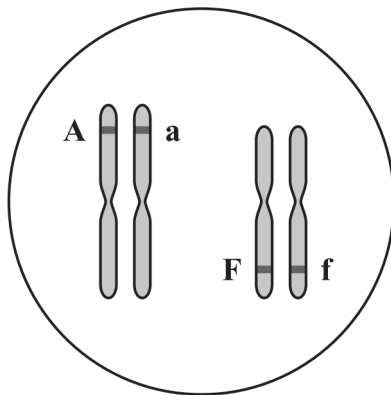
- A. 100%      B. 75%      C. 50%      D. 25%

46. A pedigree showing the inheritance of a gold dorsal stripe pattern in ball pythons is shown below.



According to the pedigree, what type of trait is this stripe pattern in ball pythons?

- A. codominant                      B. polygenic  
C. recessive                          D. sex-linked
47. Two chromosome pairs from a diploid organism are shown below.



Assuming meiosis and fertilization occur normally, which of the following pairs of alleles can an offspring receive from this parent?

- A. **A and A**                      B. **A and a**  
C. **A and f**                      D. **F and F**

48. In cats, the allele for short hair (**H**) is dominant to the allele for long hair (**h**). If a heterozygous short-hair cat is crossed with a long-hair cat, what percentage of the offspring is expected to be heterozygous for hair length?

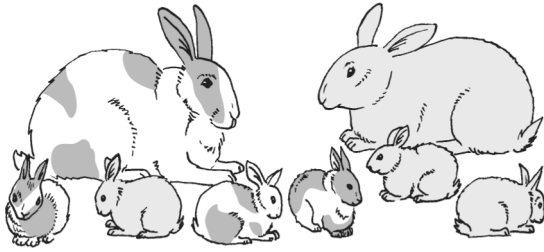
- A. 0%      B. 25%      C. 50%      D. 75%

49. In fruit flies, the gene for eye color is located on the X chromosome, and the red eye allele (**R**) is dominant to the white eye allele (**r**). A female fly with genotype  $X^R X^r$  is mated with a male fly with genotype  $X^r Y$ .

Which of the following statements best describes the expected outcome of the cross?

- A. The chance of an offspring having red eyes is 75%.  
B. The chance of an offspring having white eyes is 50%.  
C. The chance that a male offspring will have white eyes is 0%.  
D. The chance that a female offspring will have red eyes is 100%.

50. The illustration below shows two adult rabbits and their offspring.



In rabbits, the allele for spots (**R**) is dominant to the allele for solid color (**r**). What is the *most likely* genotype of the parent rabbits in the illustration?

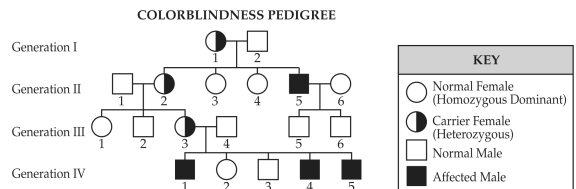
- A. **rr** × **rr**                      B. **Rr** × **rr**  
 C. **Rr** × **Rr**                      D. **RR** × **rr**
51. In pea plants, the allele for purple flowers (**P**) is dominant to the allele for white flowers (**p**).
- A plant that is heterozygous for purple flowers is crossed with a plant with white flowers. What percentage of the offspring plants are expected to have purple flowers?
- A. 25%    B. 50%    C. 75%    D. 100%
52. A genetics study was conducted that crossed two red-flowered plants. The next generation was a mixture of red-flowered and white-flowered offspring. Which of these genotypes represents those of the parent generation?

- A. **rr** and **rr**                      B. **Rr** and **Rr**  
 C. **RR** and **rr**                      D. **RR** and **RR**

53. In field mice, the allele for brown fur (**B**) is dominant over the allele for tan fur (**b**). A tan mouse is crossed with a brown mouse, and they produce 16 brown mice and 14 tan mice. What are the *most likely* genotypes of the two parents?

- A. **bb** and **bb**                      B. **bb** and **Bb**  
 C. **Bb** and **Bb**                      D. **BB** and **bb**

54. The pedigree below shows the occurrence of red-green colorblindness in four generations of a family. Use the information in the pedigree to answer the following question(s).



Which of these *best* explains the pattern of inheritance for the colorblindness trait?

- A. The allele for colorblindness is not sex-linked.  
 B. The allele for colorblindness is carried on the X-chromosome.  
 C. The allele for colorblindness is dominant to the allele for normal vision.  
 D. The allele for colorblindness occurred in Generation II as a new random mutation.

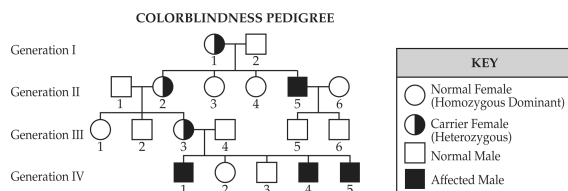
55. Hemophilia A, a blood disorder, is inherited in a similar way to red-green colorblindness. Therefore, hemophilia *most often* results when the affected gene is passed from

- A. father to son                      B. father to daughter  
C. mother to son                      D. mother to daughter

56. In *Pisum sativum*, a pea plant, the allele for yellow seed color (Y) is dominant over the allele for green seed color (y). Two plants were crossed; three-fourths of the offspring plants had yellow seeds, and one-fourth of the offspring plants had green seeds. Based on these results, what were the genotypes of the parent plants?

- A. Yy, yy                                  B. Yy, Yy  
C. YY, yy                                  D. YY, Yy

57. The pedigree below shows the occurrence of red-green colorblindness in four generations of a family. Use the information in the pedigree to answer the following question(s).



How many individuals have red-green colorblindness in the four generations shown in the pedigree?

- A. 3                      B. 4                      C. 7                      D. 12

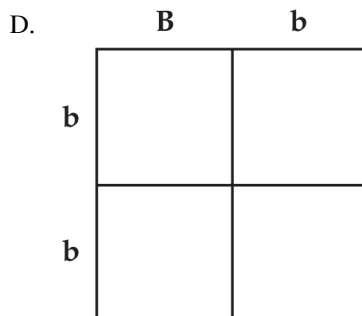
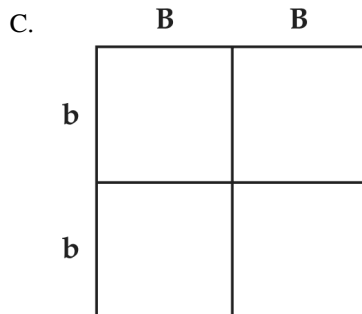
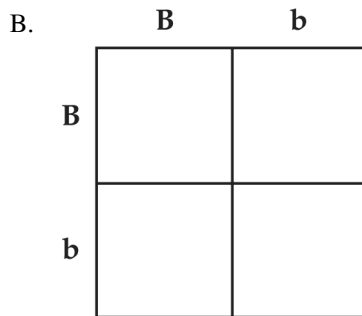
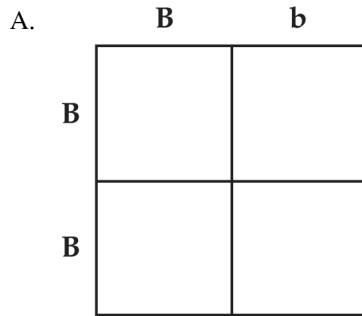
58. In generation IV, individual 5 married someone who is *not* a carrier of red-green colorblindness. If they have a female child, what is the chance that she will be born with red-green colorblindness?

- A. 0%                      B. 25%                      C. 50%                      D. 100%

59. A common mutation in cats is polydactyly, the presence of extra toes. Cats with the dominant allele (P) have extra toes on the front feet. Cats with the genotype pp have the normal number of toes. What is the probability that the offspring of two cats, one with the normal number of toes and one that is heterozygous, will display polydactyly?

- A. 25%                      B. 50%                      C. 75%                      D. 100%

60. In dogs, brown fur (B) is dominant to white fur (b). A dog has a litter of 12 puppies of which 6 are brown and 6 are white. Which of these Punnett squares shows the cross that occurred?



61. Use the information and the table below to answer the following question(s).

A group of students wanted to determine how the ability to taste PTC, a nontoxic chemical, is passed from one generation to the next. The students decided to test families in their community for this ability. The students gave each family member a paper strip coated with a small amount of PTC. Those who experienced the bitter taste of PTC when they touched the paper strips to their tongues were called “tasters”; those who could not taste the PTC were called “nontasters.”

The results of the experiment are shown in the table below.

ABILITY TO TASTE PTC IN CHILDREN OF THREE GROUPS OF PARENTS

Parent Group	Children of Each Parent Group	
	Percent Tasters	Percent Nontasters
Both parents tasters	85	15
One parent taster, one parent nontaster	62	38
Both parents nontasters	0	100

Which of these explains how two taster parents could produce a nontaster child?

- A. Both parents are heterozygous and produce a homozygous recessive child.
- B. Both parents are homozygous recessive and produce a homozygous dominant child.
- C. Both parents are heterozygous and produce a heterozygous child.
- D. Both parents are homozygous dominant and produce a homozygous recessive child.
62. Based on the data the students collected, the allele for tasting PTC is *most likely*
- A. dominant                      B. heterozygous
- C. recessive                      D. sex-linked



63. In humans, the allele for unattached earlobes (E) is dominant. The allele for attached earlobes (e) is recessive. A woman who is heterozygous for this trait marries a man who has attached earlobes. What is the probability that this couple's child will have unattached earlobes?

- A. 25%    B. 50%    C. 75%    D. 100%

64. The presence or absence of freckles is determined by one gene. The allele for freckles (F) is dominant and the allele for the absence of freckles (f) is recessive.

A couple has several children. All of the children have freckles because their parent's genotypes can only produce children with freckles.

Which of these are *most likely* the genotypes of the two parents?

- A. Ff and ff                      B. FF and ff  
 C. Ff and Ff                      D. ff and ff

65. In humans, the allele for long eyelashes is dominant (L) and the allele for short eyelashes is recessive (l). A female who is heterozygous for long eyelashes and a male with short eyelashes have a child.

What is the probability that their offspring will have short eyelashes?

- A. 0%    B. 25%    C. 50%    D. 75%

66. Use the information below to answer the following question(s).

In a species of fly, the allele for red eyes (R) is dominant to the allele for brown eyes (r). Red eye color in the flies is not sex-linked. Students crossed male and female flies that had red eyes and recorded the eye color of their offspring. Their data are shown below.

**FLY OFFSPRING**

Eye Color	Number of Offspring
Red	77
Brown	27

What are the *most likely* genotypes of the parent flies?

- A. RR and rr                      B. Rr and Rr  
 C. rr and rr                      D. RR and Rr

67. Using the data in the table, what is the approximate ratio of red eyed offspring to brown eyed offspring?

- A. 1:1    B. 2:1    C. 3:1    D. 4:1

68. The allele for attached earlobes (e) is recessive to the allele for unattached earlobes (E). A woman with the genotype (Ee) and a man with the genotype (ee) have a child.

What is the probability that the child is heterozygous for attached earlobes?

- A. 0%    B. 25%    C. 50%    D. 75%

69. Use the information and the Punnett square below to answer the following question(s).

In guinea pigs, the allele for black fur (B) is dominant. The allele for brown fur (b) is recessive. Two guinea pigs were crossed as shown in the Punnett square below. Numbers 1, 2, 3, and 4 represent the types of offspring produced from the cross.

	B	b
B	1	2
B	3	4

What is the probability that an offspring from this cross would have brown fur?

- A. 0%    B. 25%    C. 50%    D. 75%

70. Which of these describes the phenotypes of the parent guinea pigs?

- A. Both parents have black fur.  
B. Both parents have brown fur.  
C. One parent has black fur, and the other has brown fur.  
D. One parent has a mixture of black and brown fur, and the other has black fur.

71. Use the information below to answer the following question(s).

A pair of laboratory mice are crossed to obtain offspring. Three alleles found in the female gamete are ABC. Three alleles found in the male gamete are Abc.

Which of these is a possible combination of alleles for the offspring produced by these mice?

- A. AaBbCc                      B. AABBCC  
C. aabbcc                      D. AABbCc

72. One parent is homozygous dominant for brown hair (BB). The other parent is heterozygous for brown hair (Bb).

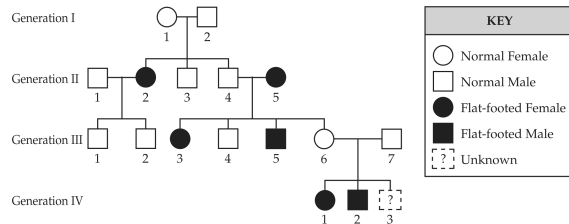
What is the probability that the offspring will have brown hair?

- A. 100%    B. 75%    C. 50%    D. 25%

73. Use the information and the pedigree below to answer the following question(s).

In humans, the allele for having feet with normal arches is dominant (A). The allele for flat feet is recessive (a). The pedigree below shows the occurrence of normal arches and flat feet in four generations of a family. In the pedigree, individuals are identified by the generation and individual numbers. For example, Individual 2 in Generation I is identified as I-2.

**PEDIGREE FOR INHERITANCE OF NORMAL ARCHES**



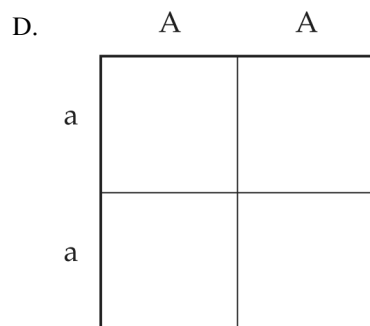
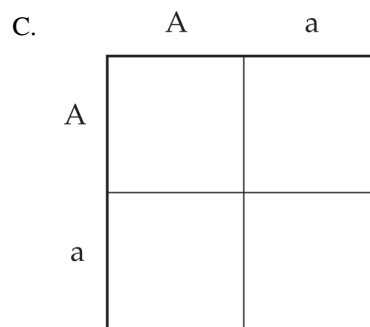
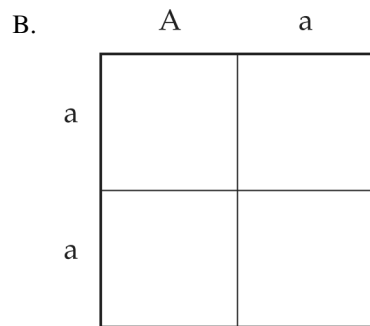
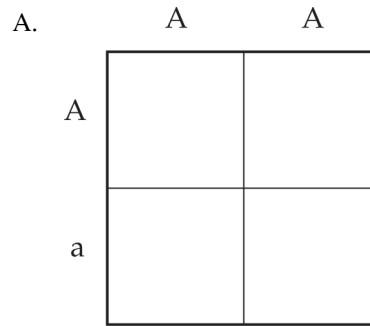
Which of these individuals in the pedigree is a male with the genotype aa?

- A. Individual I-1      B. Individual II-2  
C. Individual III-2    D. Individual III-5

74. Individuals III-6 and III-7 have two children and are expecting a third child. Their two children have flat feet. What is the chance that the third child will have normal arches?

- A. 25%    B. 50%    C. 75%    D. 100%

75. Which of these Punnett squares shows the cross between Individual II-4 and Individual II-5?



76. Which of these *best* describes the correct sequence in the expression of a trait?

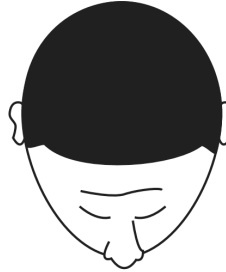
- A. trait → gene → enzyme
- B. gene → protein → trait
- C. protein → gene → trait
- D. gene → trait → DNA

77. In humans the trait of having freckles (F) is dominant to not having freckles (f).

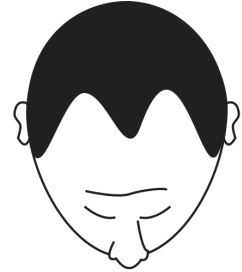
Which genotype and phenotype are correctly paired?

- A. FF-no freckles
- B. Ff-no freckles
- C. Ff-freckles
- D. ff-freckles

78. The pictures below show two people with different hairlines.



Straight hairline



Widow's peak hairline

Mr. Robinson has a straight hairline.

Mrs. Robinson has a widow's peak hairline. Their son has a straight hairline. Which sentence *best* explains why their son has a straight hairline?

- A. He brushes his hair the same way his father brushes his hair.
- B. He cuts his hair the same way his mother cuts her hair.
- C. He inherited the hairline from his parents.
- D. His hairline straightened as he grew older.

79. In a certain insect, round wings (R) are dominant to pointed wings (r). Which cross will produce the greatest number of genotypic and phenotypic variations?

- A.  $rr \times rr$
- B.  $Rr \times Rr$
- C.  $Rr \times RR$
- D.  $RR \times RR$

80. Look at the Punnett square below.

		Mother's Genes	
		F	?
Father's Genes	F	FF	
	?		ff

Which of the following can be concluded about the genes for each parent?

- A. Both parents are heterozygous.
- B. Both parents are homozygous recessive.
- C. Both parents are homozygous dominant.
- D. One parent is heterozygous and one is homozygous.

81. Look at the Punnett square below.

		D	d
d			
d			

One parent has dimples, which is a dominant trait. The other parent has no dimples, which is a recessive trait. What can be predicted about their offspring's chances of having dimples?

- A. 0% will have dimples.
- B. 25% will have dimples.
- C. 50% will have dimples.
- D. 75% will have dimples.

82. In peas, the color yellow (Y) is dominant to the color green (y).

		Y	y
Y			
y			

What percentage of the offspring of the two heterozygous yellow pea plants shown in this Punnett square will *most likely* be homozygous green plants?

- A. 0%
- B. 25%
- C. 50%
- D. 75%

83. The following Punnett square, in which (Y) are yellow flowers and (y) are purple flowers, is incomplete.

	Y	y
Y	YY	?
y	Yy	yy

Which genotype should replace the question mark?

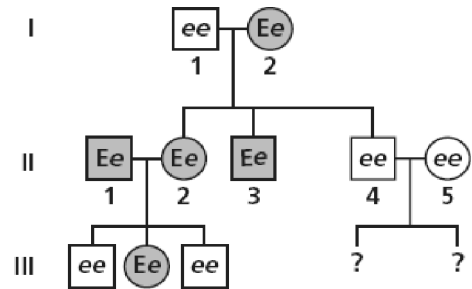
- A. Y      B. YY      C. Yy      D. yy

84. In humans, earlobe size can be considered attached or unattached. The following describes earlobe type:

- Attached earlobe: bottom portion of earlobe is attached directly to head
- Unattached earlobe: bottom portion of earlobe slopes upward before attaching to head

Unattached earlobe (E) are dominant to attached earlobe (e). The following family pedigree shows which individuals have unattached or attached earlobes.

**Family Pedigree Showing Earlobe Trait**



Key	
□	= male
○	= female

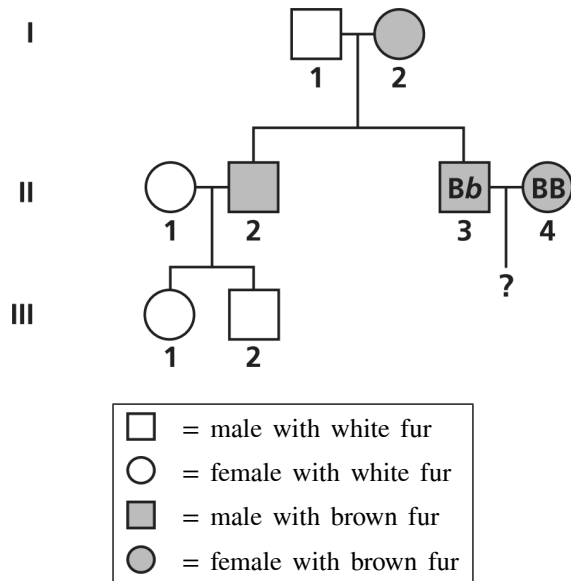
Family members 4 and 5 in Generation II are expecting twins.

Which of these summarizes gender and earlobe appearance of these two offspring?

- A. The offspring both will be male with attached earlobes.
- B. The offspring both will be female with unattached earlobes.
- C. The gender of the offspring is unknown, and both will have attached earlobes.
- D. The gender of the offspring is unknown; one will have attached earlobes, and the other will have unattached earlobes.

85. The following diagram shows the dominant trait of brown fur in deer, B.

Pedigree of Brown Fur in Deer Family



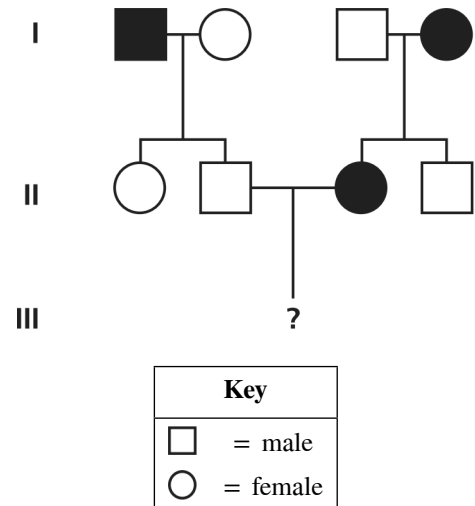
Family members with two recessive genes will have white fur trait, *bb*.

Which of these is an accurate prediction for any offspring from Individuals 3 and 4 in Generation II?

- Their offspring will have brown fur with white patches.
- Their offspring have a fifty percent chance of having white fur.
- All of their offspring will have brown fur but will be carriers for the white fur trait.
- All of their offspring will have brown fur and might be carriers for the white fur trait.

86. The following pedigree shows the inheritance of a trait in two generations of a family.

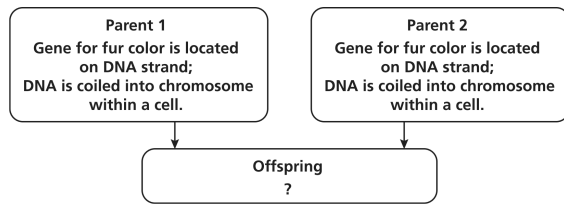
Family Pedigree



Which statement describes Generation III in this family?

- All the children will display the trait because it is dominant, and one parent in the second generation displays the trait.
- None of the children will display the trait because it is recessive, and one parent in the second generation displays the trait.
- The pedigree does not indicate whether the trait is dominant or recessive; therefore, an accurate prediction cannot be made.
- The children have a fifty percent chance of displaying the trait because it is dominant, and one parent in the second generation displays the trait.

87. Lisa notices that her pet rabbits have similar fur color to their parents. Lisa draws the following diagram to show how fur color passes from the parents to the offspring.

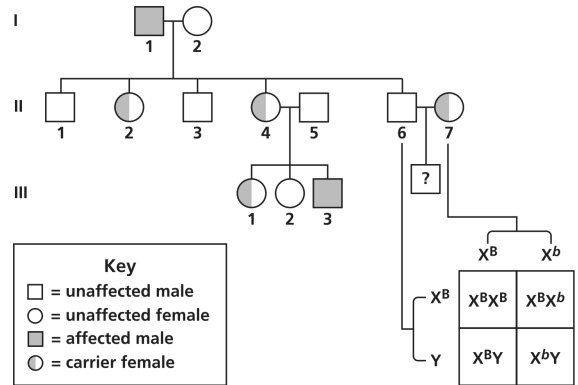


Which offspring description will complete the diagram?

- A. • Offspring receives two DNA strands from each parent.
- DNA strands contain chromosomes.
  - Chromosomes from Parent 1 determine appearance of fur.
- B. • Offspring receives half of DNA strand from each parent.
- Each half of DNA strand connects to form chromosome.
  - One chromosome determines appearance of fur.
- C. • Offspring receives a set of two chromosomes, one from each parent.
- Chromosomes contain DNA strands.
  - DNA strands contain genes.
  - A pair of genes determines appearance of fur.
- D. • Offspring receives a set of two chromosomes, one from each parent.
- Chromosomes contain genes.
  - Genes contain DNA strands.
  - Two sets of DNA strands determine appearance of fur.

88. Some people are unable to see red and green colors. This condition, colorblindness, is a recessive trait carried on the X chromosome,  $X^b$ . The following pedigree shows a family in which some individuals are affected by colorblindness.

**Family Pedigree Showing Colorblindness Trait**



Family members 6 and 7 in Generation II are expecting a son. The father's genotype is  $X^B Y$ , while the mother's is  $X^B X^b$ , as shown in the Punnett square.

Which of the following describes the possibility of this son being colorblind?

- A. Zero percent, because the father is not colorblind
- B. Twenty-five percent, because in the Punnett square, only one box out of four shows an affected male
- C. Fifty percent, because only one of the two males in the Punnett square has the genotype for being affected
- D. One hundred percent, because the mother will pass the colorblindness trait to all offspring through her X chromosome



89. Assume that brown eyes (B) are dominant over tan eyes (b) in guinea pigs. When a brown-eyed male is mated with a tan-eyed female, 50% of the litter has brown eyes and 50% has tan eyes. What is the genotype of the female guinea pig?

- A. BB    B. Bb    C. bB    D. bb

90. A dominant gene that codes for white hair is represented by the symbol W. If a parent with the genotype WW is crossed with a parent of genotype Ww, what percent of their offspring will have white hair?

- A. 25%    B. 50%    C. 75%    D. 100%

91. A woman who is colorblind ( $X^cX^c$ ) can expect—

- A. 100% of her female offspring to be colorblind.  
 B. 100% of her male offspring to be colorblind.  
 C. 50% of her female offspring to be colorblind.  
 D. 50% of her male offspring to be colorblind.

92. In people, the trait for colorblindness  $X^b$  is a recessive sex linked trait and normal vision  $X^B$  is dominant. If a female who is heterozygous for colorblindness has children with a man who has normal vision, what percent of their male children would be expected to be color blind?

- A. 0%    B. 25%    C. 50%    D. 100%

93.

	$I^B$	$i$
$I^A$	$I^A I^B$	$I^A i$
$I^B$	$I^B I^B$	$I^B i$

Genotype	Blood Type
$I^A i$	A
$I^A I^A$	A
$I^B I^B$	B
$I^B i$	B
$I^A I^B$	AB
$i i$	O

A woman with Type AB blood marries a man with Type B blood. According to the Punnett square, their children could have each of these blood types *except*—

- A. Type A.                      B. Type B.  
 C. Type AB.                    D. Type O.



The trait for flower color in the plants shown above is controlled by incomplete dominance. What percent of the offspring will have pink flowers?

- A. 0%    B. 25%    C. 50%    D. 100%

95. In guinea pigs, the trait for ruffled fur is dominant over the trait for smooth fur. If a heterozygous male is crossed with a homozygous recessive female, what percent of the offspring would be expected to have ruffled fur?

- A. 25%    B. 50%    C. 75%    D. 100%

96. Assume that in humans there is a 50/50 chance that a child will be a boy. If a certain mother and father have four sons, what are the chances that their fifth child will be a daughter?

- A. 1/2    B. 1/5    C. 1/16    D. 1/25

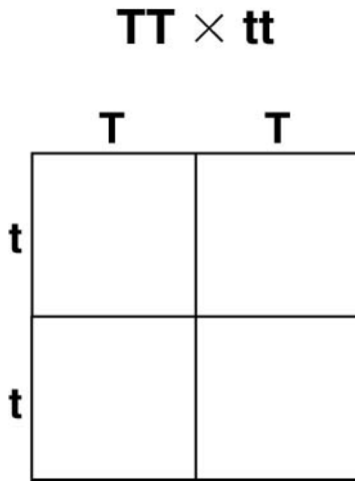
97. Huntington's disease is a genetic disorder in humans which is controlled by a dominant gene. If one parent is heterozygous for the trait and the other has normal alleles, what are their chances of having an offspring with the disease?

- A. 25%    B. 50%    C. 75%    D. 100%

98. Sickle cell anemia is a disease that occurs when an individual receives a recessive allele for sickle cell from each parent. Assume that a woman who is a carrier for sickle cell marries a man who is free of disease. What are the chances of this couple having a child with sickle cell anemia?

- A. 0%    B. 25%    C. 50%    D. 100%

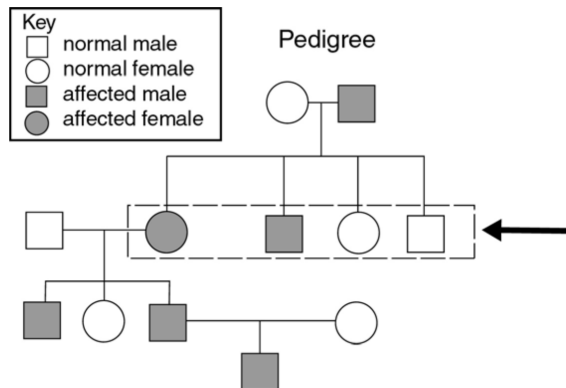
99.



In pea plants, the trait for being tall (T) is dominant over the trait for being short (t). What is the expected phenotypic outcome of the F<sub>1</sub> generation in the cross shown above?

- A. 100% short                      B. 50% tall  
 C. 75% short                        D. 100% tall

100.



The diagram above shows a genetic pedigree. The offspring indicated by the arrow are what generation?

- A. P<sub>1</sub>      B. P<sub>2</sub>      C. F<sub>1</sub>      D. F<sub>2</sub>

101. In fruit flies, the gene for red eye color (R) is dominant to the gene for white eye color (r). The trait is sex-linked. What would be the genotype of a white-eyed female?

- A. X<sup>R</sup>X<sup>r</sup>    B. X<sup>r</sup>X<sup>r</sup>    C. X<sup>R</sup>y    D. X<sup>r</sup>y

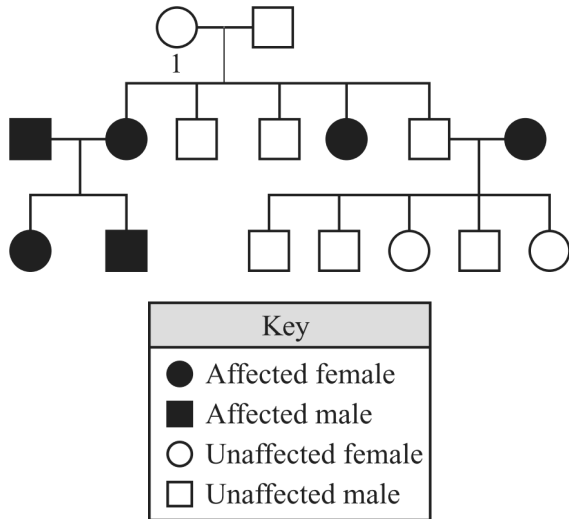
102. If a breeder wanted to figure out whether a black rabbit was homozygous (BB) or heterozygous (Bb) for coat color, which of the following rabbit genotypes would be crossed with the black rabbit?

- A. BB      B. Bb      C. bb      D. BbBb

103. In guinea pigs, rough coat (R) is dominant to smooth coat (r). What is the expected percentage of smooth-coated guinea pigs when a heterozygous rough-coated guinea pig is crossed with a smooth-coated guinea pig?

- A. 0%      B. 25%      C. 50%      D. 75%

104. A condition is autosomal recessive. The pedigree shows the inheritance of this condition in a family.



Which of the following is the likely genotype of individual 1?

- A.  $ee$     B.  $Ee$     C.  $X^eY$     D.  $X^E X^E$

105. The table lists the traits for fruit color where allele  $R$  exhibits incomplete dominance over allele  $R'$ .

Genotype	Phenotype
$RR$	Red
$R'R'$	Yellow
$RR'$	Orange

Heterozygous fruit have orange phenotypes. What percent of offspring are expected to have an orange phenotype if the parent plants are orange ( $RR'$ ) and yellow ( $R'R'$ )?

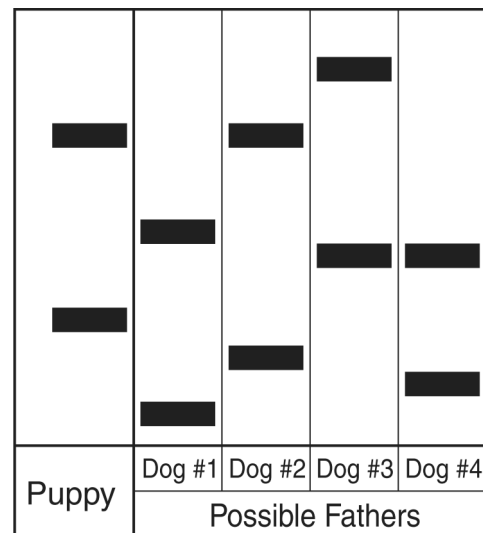
- A. 25%    B. 50%    C. 75%    D. 100%

106. In fruit flies the presence of wings ( $W$ ) is dominant to the absence of wings ( $w$ ), and red eyes ( $R$ ) are dominant to brown eyes ( $r$ ). A wingless fly that is heterozygous for eye color is crossed with a fly that is heterozygous for wings and has brown eyes. What is the probability that the offspring would be homozygous recessive for wings and eye color?

- A. 100%    B. 75%    C. 50%    D. 25%

107. The DNA fingerprint results from four dogs and a puppy are shown.

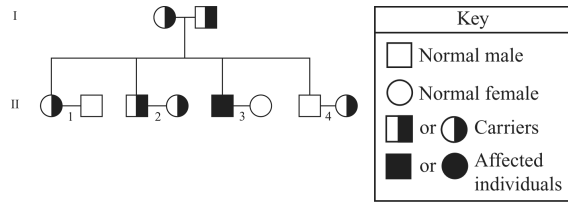
**DNA Fingerprint Results**



If the puppy is to be registered, the father must be known. Which of the following dogs would be identified as the father of the puppy?

- A. Dog #1    B. Dog #2  
C. Dog #3    D. Dog #4

108. The pedigree shows the inheritance of a genetic condition in a family over two generations.



Which set of numbered individuals has the greatest chance of producing a child that is affected by this genetic condition?

- A. 1      B. 2      C. 3      D. 4

109. What are the expected genotypic ratios of the offspring resulting from the cross of a hybrid plant with green pods (Gg) and a purebred plant with yellow pods (gg)?

- A.  $\frac{1}{4}$  Gg and  $\frac{3}{4}$  gg      B.  $\frac{3}{4}$  Gg and  $\frac{1}{4}$  gg  
 C.  $\frac{1}{2}$  Gg and  $\frac{1}{2}$  gg      D.  $\frac{1}{3}$  Gg and  $\frac{2}{3}$  gg

110. Colorblindness ( $X^c$ ) is a sex-linked recessive trait in humans.

If a colorblind daughter is born to a couple, which Punnett square represents the probable genotypes of the parents?

A.  $X^C X^c$   $X^C X^c$

$X^C$		
$X^c$		
Y		

B.  $X^C X^c$   $X^C X^c$

$X^c$		
$X^C$		
Y		

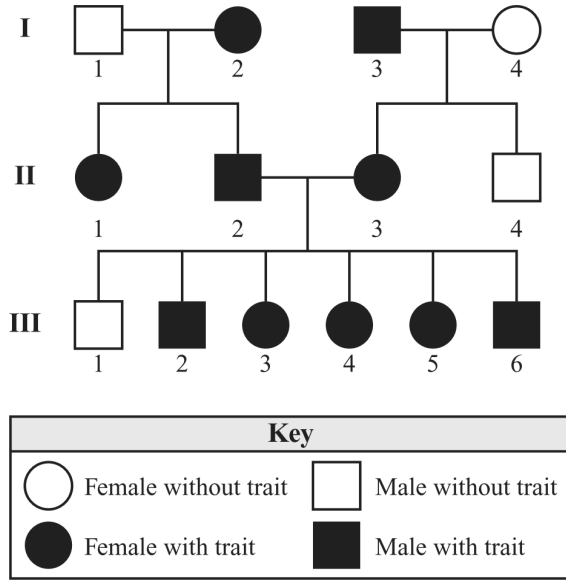
C.  $X^c X^c$   $X^c X^c$

$X^C$		
$X^c$		
Y		

D.  $X^C X^C$   $X^C X^C$

$X^c$		
$X^C$		
Y		

111. The pedigree shows the inheritance of a specific trait.



What are the genotypes of individuals II-2 and II-3?

- A. Both are heterozygous.
- B. Both are homozygous dominant.
- C. Individual II-2 is heterozygous, and II-3 is homozygous dominant.
- D. Individual II-2 is homozygous dominant, and II-3 is heterozygous.

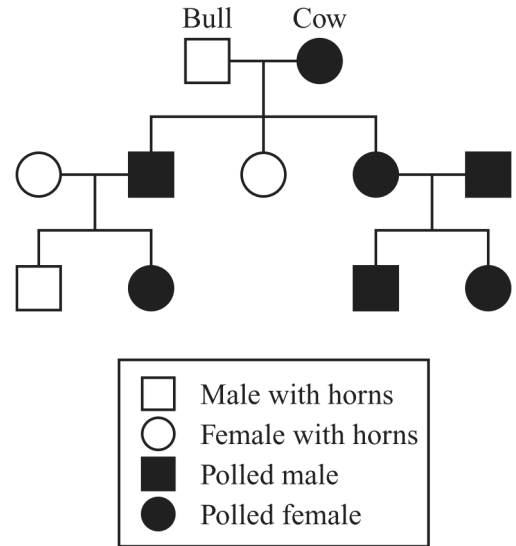
112. In tomatoes, red fruit (R) is dominant to yellow fruit (r), and tall plants (T) are dominant to short plants (t).

What percentage of the offspring from a  $RRTT \times rrtt$  cross are expected to be  $RrTt$ ?

- A. 0%
- B. 50%
- C. 75%
- D. 100%

113. In cattle, the polled allele is dominant over the horned allele. Cattle with the polled allele do not have horns. The pedigree below shows the inheritance of the polled trait in Hereford cattle.

**Polled Hereford Pedigree**

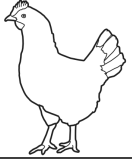
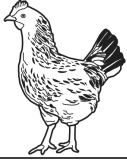



What are the genotypes of the generation I bull and cow?

- A. The bull is  $nn$  and the cow is  $Nn$ .
- B. The bull is  $nn$  and the cow is  $NN$ .
- C. The bull is  $Nn$  and the cow is  $Nn$ .
- D. The bull is  $NN$  and the cow is  $NN$ .

114. The phenotypes and genotypes for feather color in a certain chicken species are shown in the chart below.

**Feather Color  
Phenotypes and Genotypes**

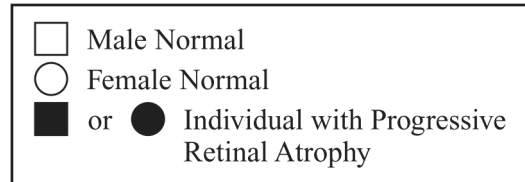
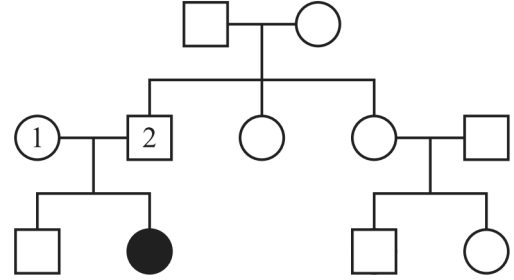
			
<b>Phenotype</b>	White Feathers	Speckled Feathers	Black Feathers
<b>Genotype</b>	WW	BW	BB

What are the possible phenotypes of offspring produced when a rooster with black feathers is crossed with a hen that has speckled feathers?

- A. Only black
- B. Only speckled
- C. Black and speckled
- D. Black, white, and speckled

115. Blue heelers are a breed of dog. A pedigree of blue heelers kept by a breeder is shown below.

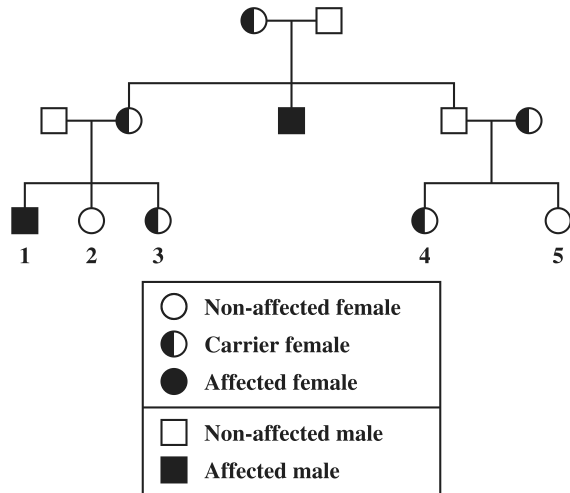
**Blue Heeler Pedigree**



One of the dogs has progressive retinal atrophy, a condition that damages the retina. What are the genotypes of dog 1 and dog 2?

- A. Dog 1 is aa and dog 2 is aa.
- B. Dog 1 is aa and dog 2 is Aa.
- C. Dog 1 is Aa and dog 2 is Aa.
- D. Dog 1 is AA and dog 2 is Aa.

116. The pedigree below shows the transmission of a disorder within a family.



Which statement describes the offspring that would result if individual 1 has children with a woman that does not carry the allele for this disorder?

- A. None of the daughters will inherit the allele for the disorder.
- B. All of the sons will inherit the allele for the disorder.
- C. All of the daughters will be affected by the disorder.
- D. None of the sons will be affected by the disorder.

117. A student is studying the inheritance of human blood types. Types A and B are codominant and O is recessive to both.

If a woman with blood type A and a man with blood type B would have children, what would be the largest expected percentage for offspring with blood type O?

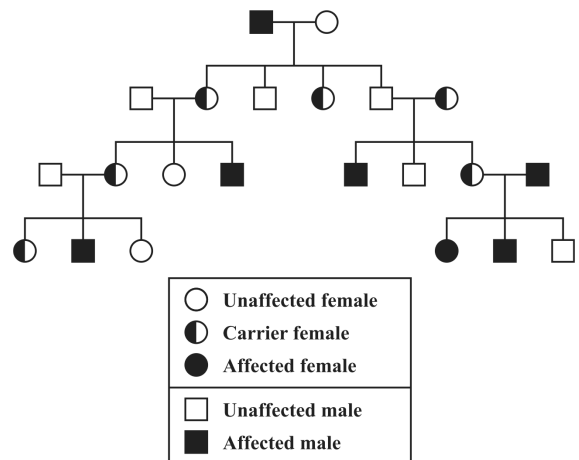
- A. 0%    B. 25%    C. 50%    D. 100%

118. Colorblindness in humans is a mutation carried on the X chromosome. A man and woman with normal vision have a colorblind son.

What are the chances their next child will be a colorblind daughter?

- A. 100%    B. 75%    C. 50%    D. 0%

119. The transmission of a genetic disorder is represented in the pedigree below.



What is the mode of inheritance shown in the pedigree?

- A. Autosomal dominant
- B. Autosomal recessive
- C. Sex-linked carried on the X chromosome
- D. Sex-linked carried on the Y chromosome



120. In the Dalmatian breed of dogs, the allele for black colored spots (B) is dominant to the allele for brown colored spots (b). Two dogs with black spots mate and produce puppies with brown spots. What are the genotypes of the parent dogs?

- A. BB and BB                      B. BB and Bb  
C. bb and BB                      D. Bb and Bb

121. Several matings between the same male black guinea pig and female brown guinea pig produce a total of 12 brown and 14 black guinea pigs. If black is dominant and brown is recessive, what are the genotypes of the parents?

- A. BB × bb                      B. Bb × bb  
C. BB × Bb                      D. Bb × Bb

122. Huntington's disease is a dominant trait. What are the chances that a child will develop Huntington's disease if one parent is heterozygous and the other is normal?

- A. 0 out of 4                      B. 1 out of 4  
C. 2 out of 4                      D. 3 out of 4

123. Some flowers show incomplete dominance. If RR = white and R'R' = red, which phenotypic ratio would be expected in the offspring of two pink flowers?

- A. 1 red : 2 pink : 1 white  
B. 0 red : 4 pink : 0 white  
C. 3 red : 0 pink : 1 white  
D. 4 red : 0 pink : 0 white

124. A couple has five children, all with blood type A. The mother's blood type is O, and the father's blood type is A. Based on this information, which describes the *most probable* genotype of the father?

- A. diploid                      B. haploid  
C. heterozygous                      D. homozygous

125. Four o'clock flowers inherit flower color by incomplete dominance. If **R** represents the gene for red flowers, and **R'** represents the gene for white flowers, then what flower color phenotype would be the result of an **RR'** × **RR'** cross?

- A. 25% red, 50% pink, 25% white  
B. 50% red, 25% pink, 25% white  
C. 25% red, 25% pink, 50% white  
D. 50% red, 50% white

126. Color blindness is a sex-linked recessive trait. A mother with normal color vision and a color blind father have a color blind daughter. Which of the following statements is correct?

- A. All of their daughters will be color blind.
- B. The mother is a carrier of the color blindness gene.
- C. All of their sons will have normal color vision.
- D. All of their sons will be color blind.

127. Which set of parents can *most likely* produce a child with type O blood?

- A. one parent with type AB blood, and the other parent with type A blood
- B. one parent with type AB blood, and the other parent with type O blood
- C. one parent with heterozygous type A blood, and the other parent with type O blood
- D. one parent with homozygous type A blood, and the other parent with homozygous type B blood

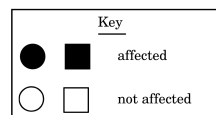
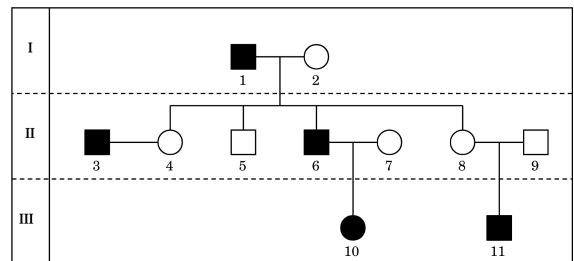
128. One of the parents of a child has phenylketonuria (PKU), which is caused by recessive alleles. The other parent does not have the PKU alleles. What is the chance that the couple will have a child with phenylketonuria?

- A. 0%
- B. 50%
- C. 75%
- D. 100%

129. Hitchhiker's thumb (H) is dominant to no hitchhiker's thumb (h). A woman who does not have hitchhiker's thumb marries a man who is heterozygous for hitchhiker's thumb. What is the probable genotypic ratio of their children?

- A. 0% Hh : 100% hh
- B. 50% Hh : 50% hh
- C. 75% Hh : 25% hh
- D. 100% Hh : 0% hh

130. This diagram shows a pedigree for a recessive genetic disorder.



What is the genotype of individual 6?

- A.  $X^H X^H$
- B.  $X^H X^h$
- C.  $X^H Y$
- D.  $X^h Y$

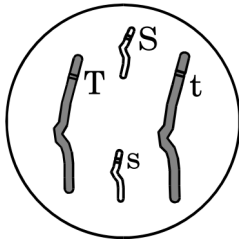
131. This chart shows the results of several crosses with white-feathered chickens and dark-feathered chickens.

Cross	Parental Feather Colors	Offspring Feather Colors
1	White × White	100% White
2	White × White	75% White, 25% Dark
3	White × Dark	50% White, 50% Dark
4	Dark × Dark	100% Dark

Which cross would be represented as  $Aa \times aa$ , where (A) represents a dominant allele and (a) represents a recessive allele?

- A. Cross 1                      B. Cross 2  
C. Cross 3                      D. Cross 4

132. This diagram shows a diploid cell with two pairs of homologous chromosomes.



Due to independent assortment, what is the possible genetic make-up of gametes produced by this organism?

- A.  $SsTt$                       B.  $Ss, Tt$   
C.  $S, s, T, t$                 D.  $ST, St, sT, st$

133. In an experiment, fruit flies with normal wings were allowed to breed inside two different containers. The table below shows the wing types of the offspring.

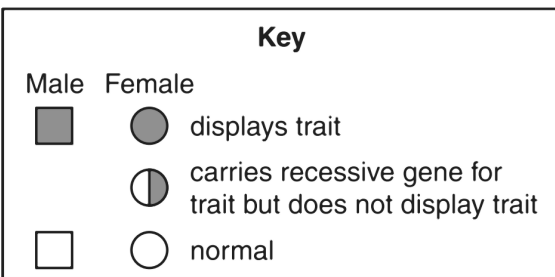
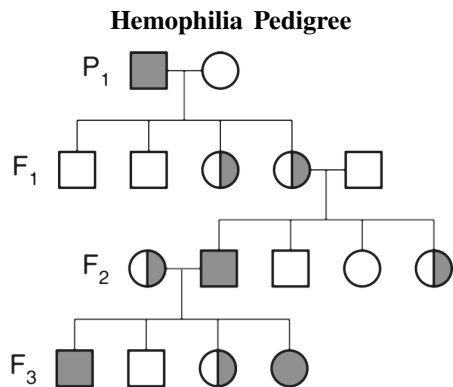
**Wing Types of Offspring**

Container	Normal Wings	Tiny Wings
W	223	61
X	211	90

Which statement is *best* supported by the data in the table?

- A. Fruit flies have only one kind of wing type.  
B. Both parent fruit flies passed on the tiny wing characteristic.  
C. Parent fruit flies with normal wings always have offspring with normal wings.  
D. Just one parent fruit fly determined the wing type the offspring have.

134. The diagram below shows the pedigree of an individual with hemophilia, a sex-linked recessive condition. The diagram also shows how hemophilia is passed to offspring on an X chromosome.



Which statement explains why few females in the family have the condition?

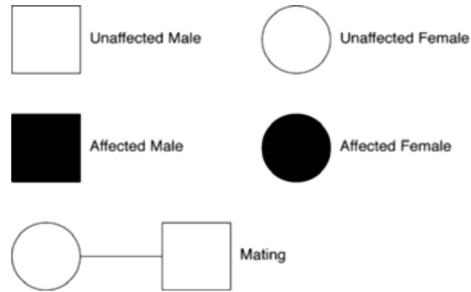
- A. Males have two X chromosomes.
- B. Females have two X chromosomes.
- C. Females have a Y chromosome.
- D. Males have a dominant Y chromosome.

135. Queen Victoria of England lived from 1819 to 1901. Which statement supports the idea that she was a carrier of the disease hemophilia?

- A. The word “hemophilia” was first used in 1828.
- B. Hemophilia is called the “royal disease.”
- C. Queen Victoria’s husband died at an early age.
- D. Queen Victoria’s grandsons had hemophilia.

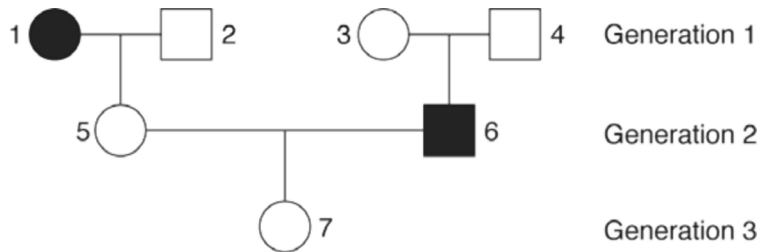
## PEDIGREE ANALYSIS FOR A GENETIC DISORDER

A pedigree is a diagram that shows how a genetically determined trait is transmitted from generation to generation. In a pedigree, symbols are used to represent the gender of a family member and to tell whether or not the family member expresses the trait under study. The following symbols will be used:



The genotypes of individuals may also be shown on the pedigree. (A genotype is the gene pair [allele combination] for the trait under study. In this exercise, “A” represents the dominant gene and “a” represents the recessive gene.)

*Note that the genetics of the following pedigree follow basic Mendelian laws of inheritance.*



136. Which of the following terms best describes the genetic disorder?

- A. Dominant
- B. Incomplete dominance
- C. Recessive
- D. Sex-linked

137. Which is the genotype of individual 7?

- A. Aaa    B. Aa    C. aaa    D. AA

138. Which example is a physical feature that is passed on to offspring?

- A. talking
- B. walking
- C. sharp beak
- D. loose tooth

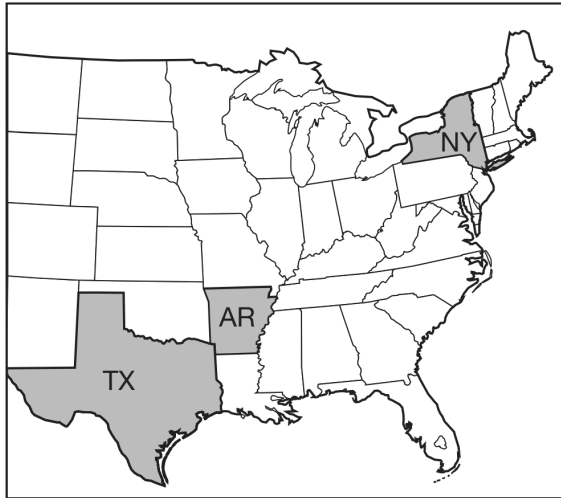
139. Which statement describes the pattern of inheritance that produces 100% red-flowered first-generation offspring?

- A. Red flowers are dominant and white flowers are recessive.
- B. Red flowers are recessive and white flowers are dominant.
- C. Both red flowers and white flowers are recessive.
- D. Both red flowers and white flowers are dominant.

140. Which statement *best* describes a dominant gene?

- A. It is the gene that produces mutations.
- B. It is the gene that produces desirable traits.
- C. It is the gene that masks a recessive gene.
- D. It is the gene that is masked by a recessive gene.

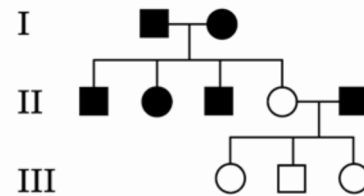
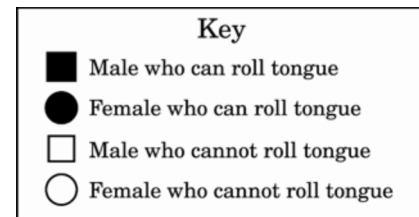
141. Use the the map below to answer the following question.



An agricultural scientist selectively bred blackberry plants adapted to conditions in southern Texas with plants adapted to conditions in western New York. This cross produced plants that were adapted for conditions in Arkansas. The plants' suitability for conditions in Arkansas was the result of which characteristic of the offspring plants?

- A. having some genetic material from each of the parent plants
- B. having all of the characteristics of each of the parent plants
- C. having inherited behavioral adaptations for both northern and southern climates
- D. having equal suitability to climates found throughout the United States

142. The pedigree below shows the occurrence of tongue rolling in three generations of a family ( $T$  = the ability to roll the tongue;  $t$  is the inability to roll the tongue):



What are the most likely genotypes of the parents in the *second (II)* generation?

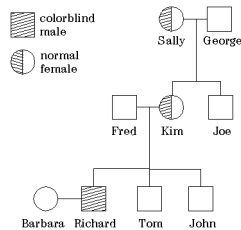
- A. mother  $tt$ , father  $Tt$
- B. mother  $tt$ , father  $TT$
- C. mother  $Tt$ , father  $tt$
- D. mother  $TT$ , father  $tt$

143. In pea plants, the gene for tallness ( $T$ ) is dominant over the gene for shortness ( $t$ ). If 100% of the  $F_1$  generation offspring are heterozygous tall, what were the most probable genotypes of the parent plants?

- A.  $Tt \times Tt$
- B.  $Tt \times tt$
- C.  $TT \times Tt$
- D.  $TT \times tt$

144. In a certain species of meadowmouse, dark coat color is dominant over cream coat color. If heterozygous dark-coated male mice are mated with cream-coated female mice, what would be the expected percentage of phenotypes in their offspring?
- A. 25% dark coated, 75% cream coated
  - B. 50% dark coated, 50% cream coated
  - C. 75% dark coated, 25% cream coated
  - D. 100% dark coated

145. Shown is a pedigree chart. The chart shows that Sally is a carrier for red-green color blindness.



What is the probability that Barbara, who has no genes for color blindness, will have a colorblind daughter?

- A. 0%
- B. 25%
- C. 50%
- D. 100%

146. Which statement best describes Sally?
- A. She has no genes for color blindness.
  - B. She has one gene for color blindness located on an X-chromosome.
  - C. She has one gene for color blindness located on a Y-chromosome.
  - D. She has two genes for color blindness.

147. Richard is colorblind because he inherited the trait from his

- A. father, Fred
- B. grandfather, George
- C. mother, Kim
- D. uncle, Joe

148. In cabbage butterflies, white color ( $W$ ) is dominant and yellow color ( $w$ ) is recessive. If a pure white cabbage butterfly mates with a yellow cabbage butterfly, all the resulting ( $F_1$ ) butterflies are heterozygous white. Which cross represents the genotypes of the parent generation?

- A.  $Ww \times ww$
- B.  $WW \times Ww$
- C.  $WW \times ww$
- D.  $WW \times WW$



149. When a mouse with black fur is crossed with a mouse with white fur, all  $F_1$  generation offspring have grey fur. Which phenotypic results can be expected in the  $F_2$  generation?

- A. 100% grey
- B. 25% black, 75% white
- C. 50% black, 50% white
- D. 25% black, 50% grey, 25% white

150. Traits controlled by genes on the X-chromosome are said to be

- A. sex-linked
- B. incompletely dominant
- C. homozygous
- D. mutagenic

151. A cross between two tall garden pea plants produced 314 tall plants and 98 short plants. The genotypes of the tall parent plants were most likely

- A.  $TT$  and  $tt$
- B.  $TT$  and  $Tt$
- C.  $Tt$  and  $Tt$
- D.  $TT$  and  $TT$

152. If two roan cattle are crossed, what percent of the offspring are expected to show the parental phenotype for coat color?

- A. 25%
- B. 50%
- C. 75%
- D. 100%

153. A man who has blood type AB marries a woman who has blood type B. This couple would *not* normally have a child with which genotype?

- A.  $I^A i$
- B.  $I^B I^B$
- C.  $I^A I^B$
- D.  $ii$

154. Occasionally during meiosis, a single homologous chromosome pair may fail to separate. A human gamete produced by such a nondisjunction would have a chromosome number of

- A. 23
- B. 24
- C. 25
- D. 26

155. In a fruit fly in which the diploid number of chromosomes is 8, the chromosome number in each gamete is normally

- A. 16
- B. 2
- C. 8
- D. 4

156. In pea plants, the allele for tallness is dominant over the allele for shortness. Tall pea plants are crossed with short pea plants, and the cross results in 271 tall plants and 268 short plants. Based on this cross the genotype of the parental tall pea plants can be correctly described as

- A. homozygous                      B. heterozygous  
C. pure recessive                  D. pure dominant

157. What percent of the male offspring produced by a father with normal vision and a colorblind mother are expected to be colorblind?

- A. 0%      B. 33%      C. 75%      D. 100%

158. When red coat cattle ( $C^R C^R$ ) are crossed with white coat cattle ( $C^W C^W$ ), all the offspring are roan coat. How many different genotypes can be produced when these roan coat cattle are crossed with white coat cattle?

- A. 1              B. 2              C. 3              D. 4

159. In cats, the gene for short hair ( $A$ ) is dominant over the gene for long hair ( $a$ ). A short-haired male cat is mated with a long-haired female, and four kittens are produced, two short-haired and two-longhaired. The genotypes of the parent cats are most probably

- A.  $Aa \times aa$                               B.  $AA \times Aa$   
C.  $Aa \times Aa$                               D.  $AA \times aa$

160. Which factor tends to keep the gene pool constant in a population?

- A. migration                              B. mutation  
C. random mating                        D. changes in climate

161. If there are 40 chromosomes in each body cell of an organism, what is the total number of chromosomes normally present in a gamete produced by that organism?

- A. 10              B. 20              C. 40              D. 80

162. In cattle, black color is dominant over red color. Which statement describes the offspring produced when a homozygous black bull is mated with several red cows?

- A. 100% of the offspring will be red.
- B. 100% of the offspring will be black.
- C. 75% of the offspring will be black and 25% will be red.
- D. 50% of the offspring will be black and 50% will be red.

163. The letters in the following crosses represent parental blood types. Which cross could produce offspring that represent all four blood types of the ABO blood group?

- A.  $I^A I^A \times I^A I^B$
- B.  $ii \times I^A i$
- C.  $I^A I^B \times I^A I^B$
- D.  $I^A i \times I^B i$

164. Two mice with black fur were crossed and produced offspring with brown fur and offspring with black fur. If  $B$  represents the dominant allele for black fur, which would represent the most probable genotypes of the parental mice?

- A.  $BB \times Bb$
- B.  $BB \times BB$
- C.  $Bb \times Bb$
- D.  $BB \times bb$

165. The chances of a  $YY$  chromosome combination occurring in humans as a result of normal meiotic division and normal gametic fusion is

- A. 0%
- B. 25%
- C. 50%
- D. 100%

166. A woman carrying the gene for hemophilia marries a man who is a hemophiliac. What percentage of their children can be expected to have hemophilia?

- A. 0%
- B. 50%
- C. 75%
- D. 100%

167. When a radish plant with smooth leaf margins was crossed with a plant with toothed leaf margins, all the  $F_1$  offspring had wavy leaf margins. The  $F_1$  plants were crossed. Out of 100  $F_2$  plants, how many could be expected to have toothed leaf margins?

- A. 25
- B. 50
- C. 75
- D. 100

168. When two organisms that are heterozygous for a trait are crossed, the percentage of offspring expected to show the recessive trait would most likely be

- A. 100%
- B. 75%
- C. 50%
- D. 25%

169. In guinea pigs, black coat color ( $B$ ) is dominant over white coat color ( $b$ ). When two black guinea pigs were mated, the ratio of black-coated offspring to white-coated offspring was 3:1. In this cross, the parental genotypes were most likely

- A.  $Bb \times Bb$                       B.  $BB \times bb$   
 C.  $Bb \times bb$                         D.  $BB \times Bb$

170. In a certain species of mice, brown fur is dominant over white fur and long tails are dominant over short tails. Both of these traits are inherited independently of each other. With respect to only these traits how many different phenotypes would be present in a large population of mice?

- A. 1            B. 2            C. 3            D. 4

171. A person with type O blood marries a person with type AB blood. Possible blood genotypes of their children are

- A.  $I^A i$  and  $I^B I^B$                       B.  $I^B I^B$  and  $I^A I^A$   
 C.  $I^A i$  and  $I^B i$                         D.  $I^A I^B$  and  $ii$

172. Which represents the genotype of a homozygous condition?

- A.  $Bb$         B.  $BC$         C.  $bb$         D.  $bc$

173. What percentages can be expected in the offspring of a cross between a female carrier for color blindness and a male with normal color vision?

- A. 25% normal males, 25% colorblind males, 25% normal females, 25% carrier females  
 B. 25% normal males, 25% colorblind males, 25% carrier females, 25% colorblind females  
 C. 75% normal males, 25% carrier females  
 D. 50% colorblind males, 50% colorblind females

174. The diagram represents the nucleus in a zygote of a particular species. How many chromosomes are normally found in an egg cell produced by this species?

- A. 8                      B. 2  
 C. 23                    D. 4



175. In guinea pigs, black coat color ( $B$ ) is dominant over white ( $b$ ). Two black guinea pigs are mated. Most of the offspring are black but some are white.

The genotypes for coat color of the parent guinea pigs are probably

- A.  $BB$  and  $BB$                       B.  $bb$  and  $bb$   
 C.  $BB$  and  $Bb$                         D.  $Bb$  and  $Bb$

176. Color blindness is a sex-linked trait carried on the X-chromosome. If a colorblind woman marries a man with normal vision, which will most probably be true of their children?

- A. All of their sons will be colorblind and all of their daughters will have normal vision.
- B. All of the sons and daughters will be colorblind.
- C. About half of their sons and half of their daughters will be colorblind.
- D. All of their daughters will be colorblind and all of their sons will have normal vision.

177. A woman with blood genotype  $I^A i$  marries a man with blood genotype  $I^B i$ . What is the probability that they will have a child with type O blood?

- A. 1/1    B. 1/2    C. 1/3    D. 1/4

178. What is the normal number of chromosomes in a human zygote?

- A. 23    B. 24    C. 46    D. 48

179. Which sequence represents the process of meiosis?

- A.  $n \rightarrow n$                       B.  $2n \rightarrow n$   
C.  $n \rightarrow 2n$                       D.  $2n \rightarrow 2n$

180. If heterozygous black guinea pigs are mated with each other, what percentage of the offspring will be expected to have the same genotype for coat color as their parents

- A. 100%    B. 75%    C. 50%    D. 0%

181. A couple had four children. Each child had a different blood type in the ABO group. The genotypes of the parents were most probably

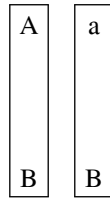
- A.  $I^A I^B \times I^A I^B$                       B.  $I^A I^B \times I^A i$   
C.  $I^A i \times ii$                               D.  $I^A i \times I^B i$

182. The formation of a tetrad during meiosis occurs as a result of

- A. nondisjunction
- B. synapsis
- C. chromosomal alterations
- D. cell plate formation

183. The diagram shown represents a pair of homologous chromosomes. Which allelic combination represents the heterozygous condition for a trait?

- A.  $Aa$             B.  $BB$   
 C.  $AB$             D.  $aB$



184. In poultry, feather shank ( $F$ ) is dominant over clean shank ( $f$ ). If the hen's genotype is represented by  $ff$  and the rooster's genotype is  $Ff$ , what percentage of their offspring would be expected to have feathered shanks?

- A. 0%    B. 50%    C. 75%    D. 100%

185. A man with normal color vision married a woman with normal color vision whose father was colorblind. Their chance of having a colorblind daughter is

- A. 0%    B. 25%    C. 75%    D. 100%

186. In sheep, the allele for white wool is dominant over that for black wool. If a heterozygous white ram is mated to a black ewe, what will be the most likely distribution of color in their offspring?

- A. 50% white, 50% black  
 B. 75% white, 25% black  
 C. 100% black  
 D. 100% white

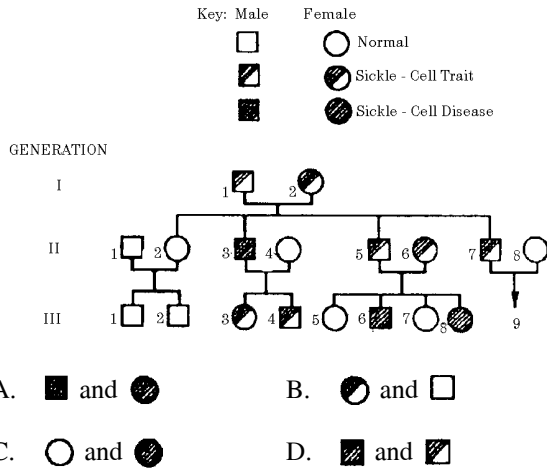
187. In summer squash, white-colored fruit is dominant over yellow-colored fruit. If homozygous yellow-fruited plants are crossed with heterozygous white-fruited plants, what is the expected percentage of fruit color produced in the offspring?

- A. 100% yellow  
 B. 100% white  
 C. 50% yellow, 50% white  
 D. 25% yellow, 75% white

188. In rats, black coat color is dominant over white coat color. If some of the offspring of a cross between a black rat and a white rat are white, the black rat must have been

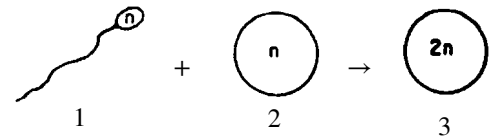
- A. a polyploid            B. homozygous  
 C. heterozygous        D. a mutation

189. The pedigree chart shown represents the inheritance of sickle-cell anemia through three generations. Which symbols could be used to represent individual 9 in generation III?



190. In the diagram shown, in which structure would homologous pairs of chromosomes normally be present?

- A. 1, only  
 B. 2, only  
 C. 3, only  
 D. either 1 or 2

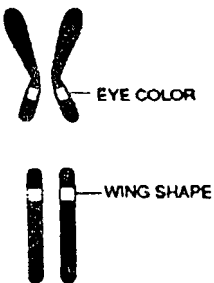


191. The chart shown indicates a method of representing traits in pea plants. Some offspring of a cross in pea plants were tall and green. According to the chart, these plants could be represented by

- A. TTYy
- B. Ttyy
- C. ttYy
- D. TtYy

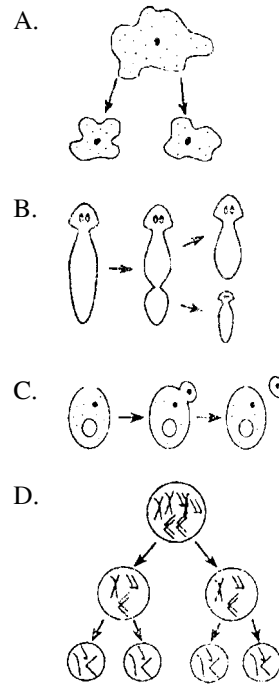
Symbol for Gene	Trait Represented
<i>T</i>	tall
<i>t</i>	short
<i>Y</i>	yellow
<i>y</i>	green

192. The diagrams shown represent two pairs of homologous chromosomes present in the diploid cells of a fruit fly. The locations of the alleles for eye color and wing shape are indicated. According to this information, eye color is



- A. dominant over wing shape
- B. linked to wing shape
- C. recessive to wing shape
- D. independent of wing shape

193. Which illustration represents a process that results in the production of gametes?



194. In chickens, rose comb (*R*) is dominant over single comb (*r*). When a heterozygous rose-combed rooster is mated with several single-combed hens, what is the expected phenotypic ratio of the offspring?

- A. 100% rose-combed
- B. 100% single-combed
- C. 75% rose-combed and 25% single-combed
- D. 50% rose-combed and 50% single-combed



195. Genes for two different traits that are located next to each other on the same chromosome would most likely be

- A. inherited separately    B. codominant  
C. recombined                D. inherited together

196. A person has type A blood. Which possible genotype could this person have?

- A.  $I^A i$  or  $I^B i$                 B.  $I^A I^A$  or  $I^A i$   
C.  $I^A I^A$  or  $ii$                  D.  $I^A I^B$  or  $I^A I^A$

197. In raccoons, a dark face mask is dominant over a bleached face mask. Several crosses were made between raccoons that were heterozygous for dark face mask and raccoons that were homozygous for bleached face mask. What percentage of the offspring would be expected to have a dark face mask?

- A. 0%    B. 50%    C. 75%    D. 100%

198. In minks, the gene for brown fur ( $B$ ) is dominant over the gene for silver fur ( $b$ ). Which set of genotypes represents a cross that could produce offspring with silver fur from parents that both have brown fur?

- A.  $Bb \times Bb$                     B.  $BB \times bb$   
C.  $BB \times Bb$                     D.  $Bb \times bb$

199. The punnett square shows the cross between two squash plants. Which genetic principle is best illustrated by the phenotype of the offspring?

	D	D
d	Dd	Dd
d	Dd	Dd

KEY	
DD	= Disc-shaped squash
Dd	= Disc-shaped squash
dd	= Round squash

- A. codominance  
B. intermediate inheritance  
C. independent assortment  
D. dominance

200. Which blood type would *not* appear in the offspring of parents who had genotypes  $I^A I^B$  and  $I^A i$ ?

- A. A    B. B    C. AB    D. O

Patterns of Inheritance 4/25/2019

- |         |   |         |   |
|---------|---|---------|---|
| 1.      |   | 21.     |   |
| Answer: | D | Answer: | A |
| 2.      |   | 22.     |   |
| Answer: | C | Answer: | B |
| 3.      |   | 23.     |   |
| Answer: | C | Answer: | A |
| 4.      |   | 24.     |   |
| Answer: | D | Answer: | D |
| 5.      |   | 25.     |   |
| Answer: | A | Answer: | C |
| 6.      |   | 26.     |   |
| Answer: | D | Answer: | D |
| 7.      |   | 27.     |   |
| Answer: | D | Answer: | C |
| 8.      |   | 28.     |   |
| Answer: |   | Answer: | D |
| 9.      |   | 29.     |   |
| Answer: | C | Answer: | D |
| 10.     |   | 30.     |   |
| Answer: | C | Answer: | A |
| 11.     |   | 31.     |   |
| Answer: | C | Answer: | C |
| 12.     |   | 32.     |   |
| Answer: | A | Answer: | A |
| 13.     |   | 33.     |   |
| Answer: | C | Answer: | D |
| 14.     |   | 34.     |   |
| Answer: | B | Answer: | C |
| 15.     |   | 35.     |   |
| Answer: | B | Answer: | B |
| 16.     |   | 36.     |   |
| Answer: | C | Answer: | C |
| 17.     |   | 37.     |   |
| Answer: | D | Answer: | C |
| 18.     |   | 38.     |   |
| Answer: | A | Answer: | C |
| 19.     |   | 39.     |   |
| Answer: | C | Answer: | C |
| 20.     |   | 40.     |   |
| Answer: | B | Answer: | C |

41.  
Answer: B  
Objective: B.06E

42.  
Answer: C

43.  
Answer: C

44.  
Answer: D

45.  
Answer: D

46.  
Answer: C

47.  
Answer: C

48.  
Answer: C

49.  
Answer: B

50.  
Answer: B

51.  
Answer: B

52.  
Answer:

53.  
Answer:

54.  
Answer:

55.  
Answer:

56.  
Answer:

57.  
Answer:

58.  
Answer:

59.  
Answer:

60.  
Answer:

61.  
Answer: A

62.  
Answer: A

63.  
Answer: B

64.  
Answer: B

65.  
Answer: C

66.  
Answer: B

67.  
Answer: C

68.  
Answer: C

69.  
Answer: A

70.  
Answer: A

71.  
Answer: D

72.  
Answer: A

73.  
Answer: D

74.  
Answer: C

75.  
Answer: B

76.  
Answer: B

77.  
Answer: C

78.  
Answer: C

79.  
Answer: B

80.  
Answer: A

81.  
Answer: C

82.  
Answer: B

83.  
Answer: C

84.  
Answer: C

85.  
Answer: D

86.		109.	
Answer:	C	Answer:	C
87.		110.	
Answer:	C	Answer:	B
88.		111.	
Answer:	C	Answer:	A
89.		112.	
Answer:	D	Answer:	D
90.		113.	
Answer:	D	Answer:	A
91.		114.	
Answer:	B	Answer:	C
92.		115.	
Answer:	C	Answer:	C
93.		116.	
Answer:	D	Answer:	D
94.		117.	
Answer:	D	Answer:	B
95.		118.	
Answer:	B	Answer:	D
96.		119.	
Answer:	A	Answer:	C
97.		120.	
Answer:	B	Answer:	D
98.		121.	
Answer:	A	Answer:	B
99.		Objective:	B.06F
Answer:	D	122.	
100.		Answer:	C
Answer:	C	123.	
101.		Answer:	A
Answer:	B	124.	
102.		Answer:	D
Answer:	C	125.	
103.		Answer:	A
Answer:	C	126.	
104.		Answer:	B
Answer:	B	127.	
105.		Answer:	C
Answer:	B	128.	
106.		Answer:	A
Answer:	D	Objective:	B.06F
107.		129.	
Answer:	B	Answer:	B
108.		Objective:	B.06F
Answer:	B		

130.  
Answer: D

131.  
Answer: C  
Objective: B.06F

132.  
Answer: D

133.  
Answer: B

134.  
Answer: B

135.  
Answer: D

136.  
Answer: C

137.  
Answer: B

138.  
Answer: C

139.  
Answer: A

140.  
Answer: C

141.  
Answer: A

142.  
Answer: A

143.  
Answer: D

144.  
Answer: B

145.  
Answer: A

146.  
Answer: B

147.  
Answer: C

148.  
Answer: C

149.  
Answer: D

150.  
Answer: A

151.  
Answer: C

152.  
Answer: B

153.  
Answer: D

154.  
Answer: B

155.  
Answer: D

156.  
Answer: B

157.  
Answer: D

158.  
Answer: B

159.  
Answer: A

160.  
Answer: C

161.  
Answer: B

162.  
Answer: B

163.  
Answer: D

164.  
Answer: C

165.  
Answer: A

166.  
Answer: B

167.  
Answer: A

168.  
Answer: D

169.  
Answer: A

170.  
Answer: D

171.  
Answer: C

172.  
Answer: C

173.  
Answer: A

174.  
Answer: B

175.  
Answer: D

176.  
Answer: A

177.  
Answer: D

178.  
Answer: C

179.  
Answer: B

180.  
Answer: C

181.  
Answer: D

182.  
Answer: B

183.  
Answer: A

184.  
Answer: B

185.  
Answer: A

186.  
Answer: A

187.  
Answer: C

188.  
Answer: C

189.  
Answer: B

190.  
Answer: C

191.  
Answer: B

192.  
Answer: D

193.  
Answer: D

194.  
Answer: D

195.  
Answer: D

196.  
Answer: B

197.  
Answer: B

198.  
Answer: A

199.  
Answer: D

200.  
Answer: D