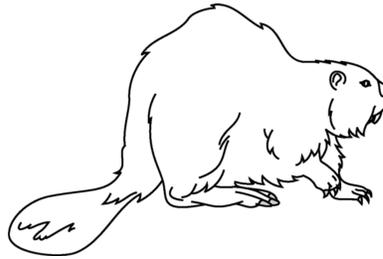


Mendelian Genetics Test Prep

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

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

1.



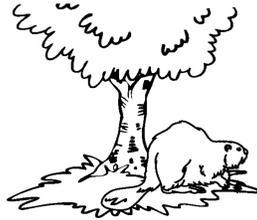
Which trait will the offspring get from the parent beaver?

A.



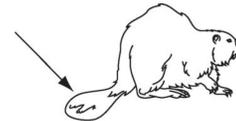
Eating bark from a tree

B.



Sitting under a tree

C.



Having a flat tail

2. Which of the following characteristics is a lion *least likely* to pass on to its offspring?

A. colors of its fur

B. length of its tail

C. scars on its leg

D. size of its body

3. 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

4. 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?
- They have the same genotype and phenotype.
  - They have different phenotypes and genotypes.
  - They have the same phenotype but different genotypes.
  - They have the same genotype but different phenotypes.

5. A partial Punnett square is shown below.

AA	AA
Aa	Aa

Which of the following statements describes the parental genotypes that would result in this Punnett square?

- Both parents are heterozygous.
  - Both parents are homozygous dominant.
  - One parent is homozygous recessive and the other parent is heterozygous.
  - One parent is homozygous dominant and the other parent is heterozygous.
6. In fish of the species *Perissodus microlepis*, some individuals have mouths that open to the right and some individuals have mouths that open to the left. The direction of the mouth opening is a genetic trait controlled by a single gene. The allele for a right-opening mouth (**R**) is dominant to the allele for a left-opening mouth (**r**).

If two fish heterozygous for the mouth trait are crossed, what is the expected ratio of phenotypes in the offspring?

- 1 right-opening mouth : 3 left-opening mouth
  - 2 right-opening mouth : 2 left-opening mouth
  - 3 right-opening mouth : 1 left-opening mouth
  - 4 right-opening mouth : 0 left-opening mouth
7. Fruit flies have hair-like bristles on the back side of their bodies. The bristles can be long or short. Flies with short bristles have two recessive alleles (**ss**) for the trait.

A fruit fly that is heterozygous for the bristle trait is crossed with a fruit fly that has short bristles. The cross produces 220 offspring.

How many of the offspring are expected to have short bristles?

- 0
- 55
- 110
- 220

8. Garden pea plants can have green or yellow pods. The green pod allele (**G**) is dominant to the yellow pod allele (**g**).
- Draw a Punnett square for the cross of a heterozygous plant with green pods and a plant with yellow pods.
  - Give the expected phenotype ratio of the offspring for the cross in the previous part.
  - In another cross, 449 offspring plants had green pods and 151 offspring plants had yellow pods. Identify the most likely genotypes of the parent pea plants *and* include a Punnett square to support your answer.
9. Which of the following *best* describes the number of chromosomes in a normal human liver cell?
- 23 pairs of chromosomes
  - 46 different types of chromosomes
  - 46 male chromosomes and 46 female chromosomes
  - 23 original chromosomes and 23 duplicate chromosomes
10. A dog gives birth to five puppies. What percentage of its chromosomes does each puppy share with the mother?
- 25%
  - 50%
  - 75%
  - 100%
11. 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

- cytoplasm of skin cells.
- membrane of every cell.
- mitochondria of hair cells.
- chromosomes of every cell.

12. A particular genetic disorder leads to very high levels of blood cholesterol. The gene linked to this trait has two alleles, **N** and **n**. The table below shows how the three different combinations of these alleles are expressed.

Genotype	Expressed Phenotype
<b>NN</b>	normal cholesterol levels
<b>Nn</b>	slightly elevated cholesterol levels
<b>nn</b>	greatly elevated cholesterol levels

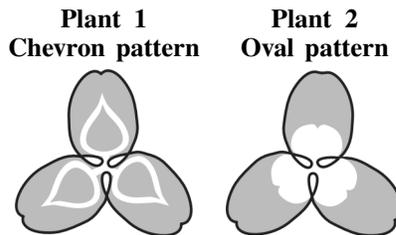
Which of the following statements describes the interaction of the **N** and **n** alleles for the gene?

- A. The **N** allele is recessive to the **n** allele.  
 B. The **N** allele is incompletely dominant to the **n** allele.  
 C. The **N** allele assort independently from the **n** allele.  
 D. The **N** allele completely masks the phenotype of the **n** allele.
13. Female cattle that have white coats are crossed with male cattle that have red coats. Both male and female offspring have roan coats, which are coats with both red hairs and white hairs.

Which of the following *best* describes the genetics of coat color in the cattle?

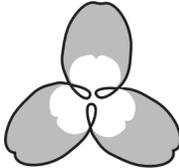
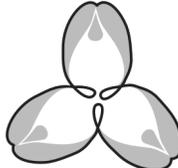
- A. The red and white alleles are sex-linked.                      B. The red and white alleles are codominant.  
 C. The red allele is recessive to the white allele.                D. The red allele is dominant to the white allele.

14. Leaves from two white clover plants, each with a different pattern, are shown below.



The leaf patterns are genetically determined by alleles of a single gene. Plant 1 is homozygous for the chevron allele. Plant 2 is homozygous for the oval allele. The chevron and oval alleles are codominant.

If plant 1 and plant 2 are crossed, the codominance of the alleles will *most likely* result in which of the following leaf patterns on the offspring plants?

- A.       B.       C.       D. 

15. Use the table below to answer the question.

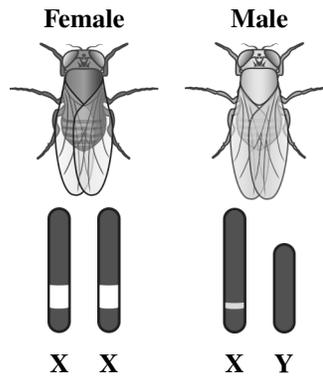
**Blood Types**

Genotype(s)	Phenotype
ii	O
$I^A I^A$ , $I^A i$	A
$I^B I^B$ , $I^B i$	B
$I^A I^B$	AB

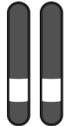
Blood type is inherited through multiple alleles, including  $I^A$ ,  $I^B$ , and  $i$ . A child has type A blood. If the father has type AB blood, what are all the possible phenotypes of the mother?

- A. phenotypes O or A  
 B. phenotypes A or AB  
 C. phenotypes A, B, AB  
 D. phenotypes O, A, B, AB

16. The diagram below shows the X chromosomes in a female fruit fly and the X and Y chromosomes in a male fruit fly.



The two fruit flies are crossed with each other. The female offspring of the fruit flies will receive which pair of chromosomes?

- A.      
 B.      
 C.      
 D. 

17. In red-green colorblindness, individuals cannot perceive the colors red and green in the same way as individuals with full color vision. Full color vision is coded by a dominant allele (**B**) on the X chromosome. Red-green colorblindness is caused by a recessive allele (**b**) on the X chromosome.

- Identify the phenotype of a female with the genotype  $X^B X^b$ .
- Identify the phenotype of a male with the genotype  $X^B Y$ .
- Draw a Punnett square for the cross  $X^B X^b \times X^B Y$ , and identify the following:
  - the percentage of offspring expected to be male and colorblind
  - the percentage of offspring expected to be female and colorblind
- Explain why red-green colorblindness occurs more frequently in males than in females.

18. Height is a polygenic trait in humans. Which of the following statements *best* explains the genetics of this trait?
- Height is controlled by more than one gene.
  - Height is controlled by a single dominant gene.
  - The gene for height is located on the X chromosome.
  - The gene for height is located on the Y chromosome.

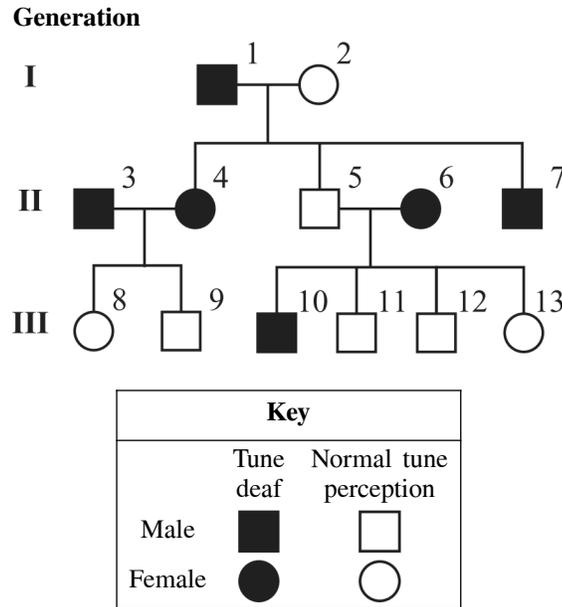
19. In tomato plants, the allele for red fruit color (**R**) is dominant to the allele for yellow fruit color (**r**). The allele for round-shaped fruit (**F**) is dominant to the allele for pear-shaped fruit (**f**).

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

	<b>RF</b>	<b>Rf</b>	<b>rF</b>	<b>rf</b>
<b>RF</b>	RRFF	RRFf	RrFF	RrFf
<b>Rf</b>	RRFf	RRff	RrFf	Rrff
<b>rF</b>	RrFF	RrFf	rrFF	rrFf
<b>rf</b>	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.
20. Two fruit flies, heterozygous for red eye color (**Rr**) and yellow body color (**Yy**), are crossed. What is the probability the offspring will be homozygous recessive for eye color and body color?
- 8/16
  - 4/16
  - 1/16
  - 0/16

21. People who are tune deaf are unable to follow a rhythm. Scientists have evidence that tune deafness can be genetic. The pedigree below traces the inheritance of tune deafness in a family. Individuals in the pedigree are numbered.



Scientists have analyzed the inheritance patterns for tune deafness and have concluded that tune deafness is caused by an autosomal dominant allele, **T**.

- Provide evidence from the pedigree that conclusively shows that the tune deafness allele is autosomal dominant, not autosomal recessive. Explain your reasoning.
- Identify the genotypes of individuals 5 and 6, and then draw the Punnett square for the cross of these two individuals.
- Compare the expected percentage of each phenotype of the offspring from the cross in the previous part with the actual percentage of each phenotype observed in the children of individuals 5 and 6.

1.  
Answer: C
2.  
Answer: C
3.  
Answer: D
4.  
Answer: C
5.  
Answer: D
6.  
Answer: C
7.  
Answer: C
8.  
Answer:
9.  
Answer: A
10.  
Answer: B
11.  
Answer: D
12.  
Answer: B
13.  
Answer: B
14.  
Answer: C
15.  
Answer: D
16.  
Answer: A
17.  
Answer:
18.  
Answer: A
19.  
Answer:
20.  
Answer:
21.  
Answer: