

Use the following information to answer the next ^{two} three questions.

Gregor Mendel examined the inheritance of two traits in pea plants: seed coat texture and colour. Seed coat texture can be represented as *S*–smooth and *s*–wrinkled, and seed coat colour can be represented as *Y*–yellow and *y*–green. *SSYY* plants were crossed with *ssyy* plants to yield F_1 pea seeds that were all smooth and all yellow. By crossing plants grown from these F_1 seeds, Mendel obtained four different phenotypes of F_2 seeds:

- smooth and green seeds
- wrinkled and green seeds
- smooth and yellow seeds
- wrinkled and yellow seeds

1. If the traits for seed coat texture and seed coat colour had been located close together on the same chromosome, Mendel might **not** have conceptualized

- A. gene pairs
- B. dominance
- C. the Law of Segregation
- D. the Law of Independent Assortment

Numerical Response

2. The F_2 seed phenotype ratio that Mendel obtained upon crossing two heterozygous smooth and yellow F_1 individuals would have been _____.

(Record your **four-digit answer** in the numerical-response section of the answer sheet.)

Answer: _____ : _____ : _____ : _____
smooth and green wrinkled and green smooth and yellow wrinkled and yellow

Use the following information to answer the next two questions.

Four babies were born in a hospital on the same day. Due to a mix-up at the hospital, there was some confusion as to the identity of the babies.

	Mother	Father
Parents 1	Type A	Type O
Parents 2	Type AB	Type B
Parents 3	Type AB	Type O
Parents 4	Type O	Type B

3. Which of the above parents could have a baby with blood type O?

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

4. The predicted phenotypic ratio for the children of **parents 3** is

- A. $\frac{1}{2}$ type A and $\frac{1}{2}$ type B
- B. $\frac{1}{2}$ type AB and $\frac{1}{2}$ type O
- C. $\frac{1}{4}$ type A, $\frac{1}{2}$ type O, and $\frac{1}{4}$ type B
- D. $\frac{1}{4}$ type A, $\frac{1}{4}$ type B, $\frac{1}{4}$ type AB, and $\frac{1}{4}$ type O

Use the following information to answer the next two questions.

Assume that there are two gene pairs involved in determining eye colour: one codes for pigment in the front of the iris and the other codes for pigment in the back of the iris.

If the genotype is	then the eye colour is
<i>AABB</i>	black-brown
<i>AABb</i>	dark brown
<i>AAbb</i>	brown
<i>AaBB</i>	brown-green flecked
<i>AaBb</i>	light brown
<i>Aabb</i>	grey-blue
<i>aaBB</i>	green
<i>aaBb</i>	dark blue
<i>aabb</i>	light blue

—from *Audesirk, 1996*

5. A man has grey-blue eyes and a woman has green eyes. Which eye colour phenotypes would be possible for children born to this man and woman?

- A. Grey-blue and green
- B. Dark blue and brown
- C. Light brown and dark blue
- D. Brown-green flecked and light blue

Numerical Response

6. If one parent has light brown eyes and the other has dark brown eyes, what is the probability that they would have an offspring with grey-blue eyes?

(Record your **answer as a percentage to three digits** in the numerical-response section of the answer sheet.)

Answer: _____%

7. In humans, curly hair is dominant over straight hair. If a straight haired man marries a curly-haired woman, what are the possible genotypes and phenotypes of their children?
8. If a man with type O blood, has parents who both have type B blood, marries a woman with type AB blood, what will be the theoretical percentage of their children with type B blood?
9. In rabbits black fur (B) is dominant to brown fur (b). A test cross is performed on a black rabbit. Black and brown offspring are observed. What is the genotype of the black rabbit?

10. In guinea pigs, black coat colour (B) is dominant to white (b). and short hair length (S) is dominant to long (s). Indicate the phenotypes of if a homozygous for black and long hair is crossed with a heterozygous black and short-hair guinea pig. (show punnett square)

11. In dogs, yellow is produced by a C^y gene. Black is produced by a C gene. When both alleles are present together a mixed colour called 'surprise' is produced. Another gene, W, located on a different chromosome allows pigment to occur. The recessive gene, w, does not allow pigment to occur and results in albino dogs in its homozygous condition. Indicate the **phenotypes of the parents** and **provide the phenotypic ratios of the F1 generation** from the following cross. (Show the punnett square)

$$WwC^yC^b \times WwCC^b$$