Quiz 3 - Inheritance of Traits (Mendel & the Gene)

Due Jan 29 at 11:59pm **Points** 6 **Questions** 6
Available Jan 23 at 9am - Feb 1 at 11:59pm **Time Limit** 60 Minutes
Allowed Attempts 2

Instructions

You have two attempts for this quiz (60 minutes for each attempt). The highest mark will be recorded.

This quiz primarily asks questions about Mendel's cross with peas (monohybrid and dihybrid crosses) - see textbook Ch 14., especially 14.2

This quiz is due on Sunday, January 29th @ 11:59 pm

Take the Quiz Again

Attempt History

	Attempt	Time	Score
LATEST	Attempt 1	28 minutes	6 out of 6

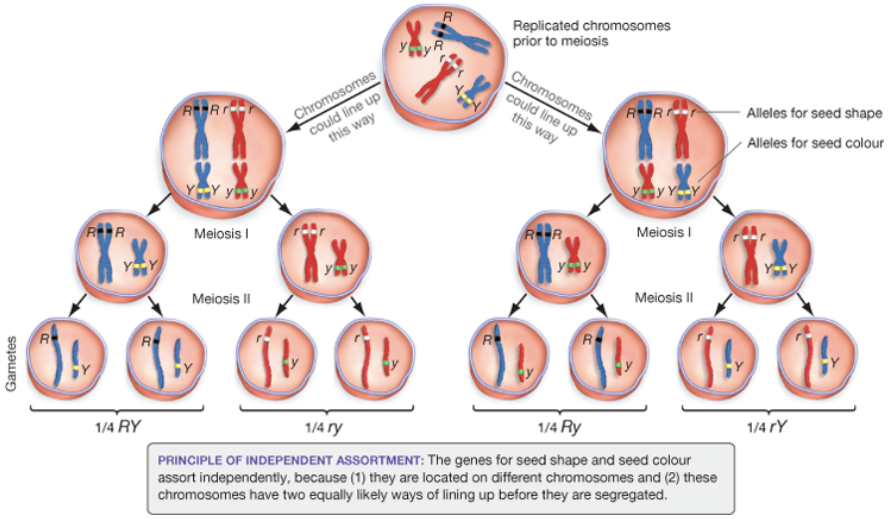
ⓘ Correct answers will be available Jan 30 at 12pm - Feb 7 at 9am.

Score for this attempt: **6** out of 6
Submitted Jan 28 at 10:14am
This attempt took 28 minutes.

Question 1 — 1 / 1 pts

If an individual had the genotype *Rr* for the seed shape gene, and *yy* for the seed colour gene, how many different types of gametes (i.e., different gametic genotypes) could that individual produce?

Looking at Figure 14.8 '*Meiosis is responsible for principle of independent assortment*' below may help.



- (•) 2
- ( ) 4
- ( ) 8
- ( ) 12

Correct! The seed shape gene (which has alleles *R* and *r*) and the seed colour gene (which has alleles *Y* and *y*) are on separate chromosomes – that means we should expect them to assort independently.

Because the individual in question has the genotype *yy* (i.e., he/she is homozygous) at the seed colour locus, all of his/her gametes will have the "*y*" allele for the seed colour gene.

In contrast, because the individual is heterozygous at the seed shape locus, half of his/her gametes will have the "*R*" allele, and half will have the "*r*" allele.

Therefore, half of the individual's gametes will have the genotype *Ry*, and the other half will have the genotype *ry* – there will be two types of gametes.

Question 2

1 / 1 pts

If an individual that is homozygous for one allele mates with an individual that is homozygous for a different allele, then their offspring will...

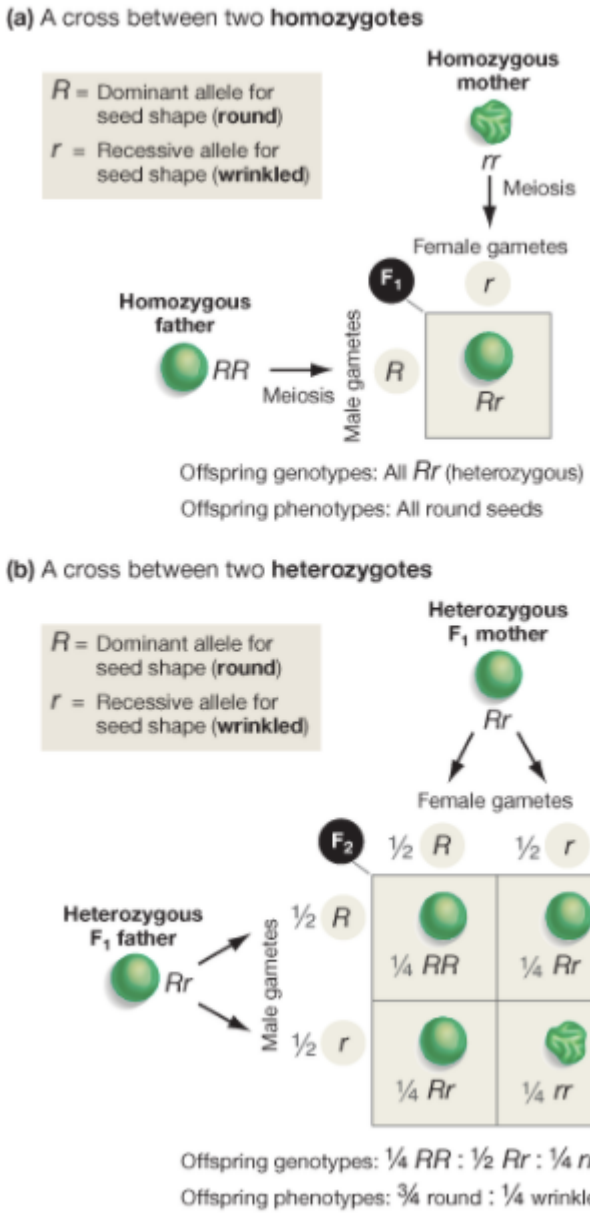
- ...Have a trait that is half-way between those of the two parents.
- ...Have the same trait as one of its parents.
- ...all be heterozygotes.
- ...all be heterozygotes, as long as one allele is dominant over the other.

Correct! When one homozygous individual (e.g., a1/a1) mates with an individual that is homozygous for a different allele (e.g., a2/a2), all of their offspring will be heterozygous at that genetic locus (e.g., a1/a2).

Question 3

1 / 1 pts

Consider textbook Figure 14.4 : *Mendel Analyzed the Offspring of a Monohybrid Cross.*



How do we know R is the "dominant allele", and r the "recessive allele"?

- We don't know for sure; it's possible that r is the dominant allele, and R is the recessive allele.
- We know R is dominant because it is represented by a capital letter, and r is recessive because it is represented by a lowercase letter.
- Because R is more frequent (i.e., there are more copies of the R allele in the population).
-

Because individuals with the genotype = *Rr* have the same trait (i.e., round seed shape) as individuals with the genotype = *RR*.

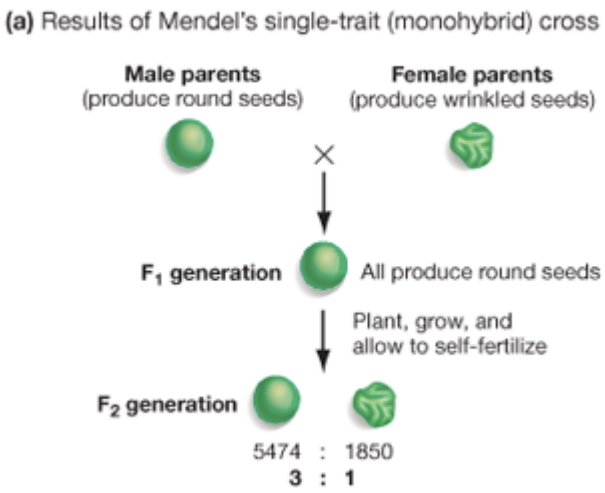
Correct! If heterozygotes (e.g., *Rr*) have the same trait as homozygotes (e.g., *RR*), we say that the trait is a dominant trait, and that the allele in the homozygotes (e.g., *R*) is the dominant allele.

But remember: there are many cases in which none of the alleles (or traits) can be considered dominant!

Question 4

1 / 1 pts

Consider textbook Figure 14.2a: *Mendel Performed a Monohybrid Cross.*



Assuming that the Male parents all have the genotype AA, and the Female parents all have the genotype aa, what would be the genotype of individuals in the F1 generation?

- AA
- aa
- Aa (same as "aA")

We don't have enough information to answer the question – it would depend on which individual in the F1 generation we were talking about.

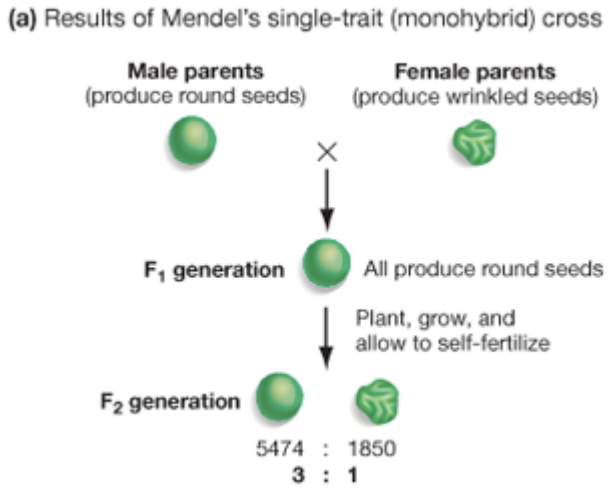
Correct! If the Male parent is "AA", all of his gametes (i.e., sperm) will have allele "A". If the Female parent is "aa", all of her gametes (i.e., eggs) will have allele "a".

That means all of the offspring in the F1 generation will all receive one "A" allele from their fathers and one "a" allele from their mothers, giving all offspring the genotype Aa.

Question 5

1 / 1 pts

Again consider textbook Figure 14.2a.



Assuming all the paternal grandparents (i.e., parents of the "Male parents") had the genotype AA, and all the maternal grandparents (i.e., the parents of the "Female parents") had the genotype aa, what would be the genotype of individuals in the F1 generation?

- AA
- aa

- (selected) Aa (same as "aA")
- We don't have enough information to answer the question – it would depend on which individual in the F1 generation we were talking about.

Correct! If all of the paternal grandparents were AA, all of the gametes will carry an "A" allele (assuming there are no mutations during meiosis). That means all of the male parents must be homozygous for the "A" alleles (i.e., their genotype is AA).

If all of the maternal grandparents were aa, all of the gametes will carry an "a" allele (assuming there are no mutations during meiosis). That means all of the female parents must be homozygous for the "a" alleles (i.e., their genotype is aa).

Because all of the male parents are AA and all of the female parents are aa, all of the F1 individuals must be Aa (i.e., each F1 individual got an "A" allele from his/her father, and an "a" allele from his/her mother).

Question 6

1 / 1 pts

When mating one heterozygote with another heterozygote, what ratio of offspring traits should you expect to see if one allele is dominant and the other one is recessive?

- (selected) 3:1 (Trait 1: Trait 2)
- 1:2:1 (Trait 1: Trait 2: Trait 3)
- 9:3:3:1 (Trait 1: Trait 2: Trait 3: Trait 4)
- 1:1 (Trait 1: Trait 2)

Correct. In the case of a dominant and a recessive allele, and when both parents are heterozygotes, we should expect three 1/4 of the offspring to show the dominant trait, and one 1/4 to show the recessive trait.

Note: If one allele or trait is not dominant over the other, there may be three possible traits, one for each of the possible allele combinations (e.g., a1/a1; a1/a2; a2/a2). In that case, on average we should expect to see 1:2:1 ratio (a1/a1:a1 /a2:a2/a2).

Quiz Score: **6** out of 6