

What is a Punnett Square?

Worksheet

A Punnett square is a grid that lines up one parent's possible gametes across the top and the other's down the side, so each box shows a possible offspring genotype and the overall probability of each outcome.

Questions

1. How many boxes are in a standard monohybrid Punnett square?
A) 2
B) 4
C) 9
D) 16
2. In an Aa Aa Punnett square, how many boxes show the genotype Aa?
A) 0
B) 1
C) 2
D) 4
3. A Punnett square for Aa aa produces which genotype ratio?
A) 1:1 (Aa:aa)
B) 3:1
C) 1:2:1
D) All Aa
4. What does each box in a Punnett square represent?
A) A gene
B) A chromosome
C) A possible offspring genotype
D) A phenotype ratio
5. Cross Aa Aa using a Punnett square. What fraction of offspring are homozygous recessive (aa)?
6. Cross Aa aa using a Punnett square. What genotype ratio results?
7. Using the multiplication rule, what is the probability that two Aa Aa parents produce a child that is homozygous recessive (aa)?
8. Define: What is a Punnett square?
9. Define: Who is the Punnett square named after?
10. Define: How many boxes does a monohybrid (single-gene) Punnett square have?

Answer Key

1. B) 4 - A single-gene cross uses a 2x2 grid = 4 boxes.
2. C) 2 - 2 of the 4 boxes are Aa (one from each parent's dominant/recessive combination).
3. A) 1:1 (Aa:aa) - Aa aa gives 2 Aa : 2 aa, simplified to 1:1.
4. C) A possible offspring genotype - Each box shows one possible combination of parental alleles, i.e., one possible offspring genotype.
5. Gametes from each parent: A, a. Grid boxes: AA, Aa, Aa, aa (4 total). aa appears in 1 of 4 boxes. Fraction homozygous recessive = $1/4 = 25\%$.
6. Parent 1 gametes: A, a. Parent 2 gametes: a, a. Grid boxes: Aa, Aa, aa, aa. Ratio = 2 Aa : 2 aa = 1:1.
7. $P(a \text{ from parent 1}) = 1/2 = 50\%$. $P(a \text{ from parent 2}) = 1/2 = 50\%$. $P(aa) = 0.5 \times 0.5 = 0.25 = 25\%$, matching the Punnett square result.
8. A grid diagram used to predict the possible genotype combinations and probabilities from a genetic cross.
9. British geneticist Reginald Punnett.
10. 4 boxes (2x2 grid).

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