

Inheritance · supported focus

International Baccalaureate · IB Diploma · Biology · HL

Scope and prerequisites

Supported HL focus. First assessment 2025; current subject brief acquired; full Biology guide not acquired. Remaining guide, assessment and practical requirements retain their recorded holds.

Prerequisites: read the stated quantities and units, use arithmetic and the model conditions below. Each lesson develops its own method before independent transfer.

These are original or explicitly fictional teaching examples, not actual measurements or completed assessed learner investigations.

Inheritance, variation and probability

■ What would explain this observation?

- Two parents can carry a recessive **allele** without expressing the associated phenotype. Their children do not have to match the parents phenotypically.
- Start with a prediction. State the quantities or features you would compare, then decide what evidence could distinguish two explanations.

■ Build the model

- An allele is a variant of a gene. A **genotype** lists alleles; a phenotype is the expressed characteristic, influenced by genotype and sometimes environment. Dominant and recessive describe the relationship between alleles, not how common they are.
- allele: A variant of a gene; genotype: The alleles an organism carries.

Constructed Aa × aa cross

	A	a	
a	Aa	aa	One allele from each parent
a	Aa	aa	

Equal-probability model combinations

Boxes show possible outcomes, not a fixed sequence of births.

■ Choose evidence that can test it

- In a simple monohybrid cross $Aa \times Aa$, gametes carry A or a. Combining independent gametes gives AA, Aa, Aa and aa. The predicted probabilities describe many possible fertilizations, not a fixed order of children.
- Write parental genotypes and gametes before making the grid. State the inheritance model and phenotype key. Use a pedigree to check consistency with a model; do not infer certainty from a small family alone.

■ Work from known quantities

- State the known values and their units. Choose the relation because its assumptions fit this case, then rearrange before substitution.
- Known: $Aa \times Aa$ with complete dominance. Probability of aa = $1/4 = 25\%$. Probability of the dominant phenotype = $3/4 = 75\%$. If four children are born, there is no guarantee that exactly one has the recessive phenotype.

Example:

In $Aa \times aa$, what percentage of offspring are predicted to be aa? Use the same sequence: known quantities $\rightarrow$ model $\rightarrow$ relation $\rightarrow$ substitution $\rightarrow$ unit and interpretation.

■ Check the conclusion and its limits

- A dominant allele can be rare. Mutation is a source of new variation; selection changes the relative success of existing variants rather than directing mutations toward a goal.
- Return to the original observation. Explain what the result supports, which conditions it assumes, and one way to test a competing explanation.

Warn:

A dominant allele must be the most common allele in a population. This claim is false: A dominant allele can be rare. Mutation is a source of new variation; selection changes the relative success of existing variants rather than directing mutations toward a goal.

Key:

Inheritance, variation and probability: In a simple monohybrid cross $Aa \times Aa$, gametes carry A or a. Combining independent gametes gives AA, Aa, Aa and aa. The predicted probabilities describe many possible fertilizations, not a fixed order of children.