

Reproduction · supported focus

Supported focus · SL

Supported scope

- Supported SL focus. First assessment 2025; current subject brief acquired; full Biology guide not acquired. Remaining guide, assessment and practical requirements retain their recorded holds.
- State model conditions and distinguish fictional data from measurements.

Reproduction · 1.1

Reasoning

Gametes normally contain one set of chromosomes, while fertilization joins two sets. Maintaining chromosome number across generations requires both processes. Start with a prediction. State the quantities or features you would compare, then decide what evidence could distinguish two explanations.

Reproduction · 2.1

Reasoning

Meiosis reduces chromosome number when producing haploid cells from a diploid starting cell. Homologous chromosomes separate in meiosis I, while sister chromatids separate in meiosis II. Fertilization combines haploid gamete nuclei to form a diploid zygote. Sexual reproduction can create new combinations of existing alleles.

haploid: Having one chromosome set in the stated life cycle; fertilization: Fusion of gamete nuclei to form a zygote.

Reproduction · 3.1

Reasoning

Distinguish homologous chromosomes from sister chromatids, and chromosome number from DNA quantity. Replication before meiosis copies DNA without doubling the number of chromosome sets. Crossing over and independent assortment contribute to genetic variation, while random fertilization further changes combinations. These processes do not make every offspring genetically distinct under every conceivable condition. Use a labelled model organism with a stated chromosome number. Track chromosome sets through replication, meiosis I, meiosis II and fertilization. Use anonymous model data rather than personal family or reproductive-health information. Compare organism life cycles carefully; flowering-plant and animal reproductive structures require their own additional teaching.

Reproduction · 4.1

Reasoning

State the known values and their units. Choose the relation because its assumptions fit this case, then rearrange before substitution. Known: a model organism has diploid chromosome number $2n=12$. A gamete has $n=6$. After fertilization, the zygote has 12 chromosomes. With six independently assorting chromosome pairs and ignoring crossing over, there are $2^6=64$ possible maternal/paternal chromosome combinations in a gamete. This is a model count, not a probability of an individual phenotype.

Reproduction · 4.2

Reasoning

A model organism has diploid chromosome number 20. How many chromosomes are normally in a gamete? Use the same sequence: known quantities $\rightarrow$ model $\rightarrow$ relation $\rightarrow$ substitution $\rightarrow$ unit and interpretation.

Reproduction · 5.1

Reasoning

A gamete is not made by halving the size of an ordinary cell. Independent assortment counts assume distinct homologous alternatives and do not include crossing-over outcomes. Human and plant reproduction cannot be fully replaced by a monohybrid Punnett grid. Return to the original observation. Explain what the result supports, which conditions it assumes, and one way to test a competing explanation.

Reproduction · 5.2

Reasoning

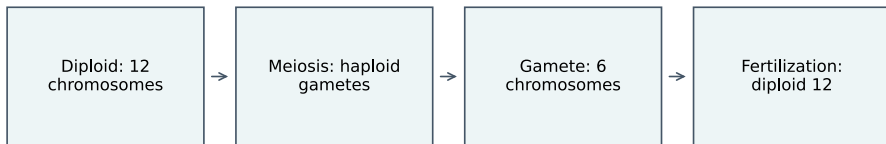
DNA replication alone changes a diploid cell into a tetraploid cell. This claim is false: A gamete is not made by halving the size of an ordinary cell. Independent assortment counts assume distinct homologous alternatives and do not include crossing-over outcomes. Human and plant reproduction cannot be fully replaced by a monohybrid Punnett grid.

Reproduction · 5.3

Reasoning

Sexual reproduction: meiosis and fertilization have different roles: Distinguish homologous chromosomes from sister chromatids, and chromosome number from DNA quantity. Replication before meiosis copies DNA without doubling the number of chromosome sets. Crossing over and independent assortment contribute to genetic variation, while random fertilization further changes combinations. These processes do not make every offspring genetically distinct under every conceivable condition.

Reproduction · diagram



- Original teaching diagram: Sexual reproduction: meiosis and fertilization have different roles
- Use the labels and the stated model together.

Reproduction · original transfer

Your turn

A model organism has $2n=8$. Ignoring crossing over, how many chromosome combinations can a gamete receive? Does this count predict a phenotype ratio?

Reproduction · transfer reasoning

Method and interpretation

Four pairs give $2^4=16$ combinations under independent assortment. Phenotype probabilities also need loci, dominance and linkage information; combinations are not phenotype categories.

Check yourself

- Explain fertilization using the stated model.
- Explain haploid using the stated model.
- Change one value in the original transfer; explain which assumption still matters.