

Cell and nuclear division · 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.

Division · 1.1

Reasoning

A root-tip image contains cells at different stages of mitosis. A snapshot can estimate the fraction of cells dividing, but it does not time one observed cell directly. Start with a prediction. State the quantities or features you would compare, then decide what evidence could distinguish two explanations.

Division · 2.1

Reasoning

DNA replication occurs before mitosis. Mitosis separates sister chromatids, preserving chromosome number in daughter nuclei. Meiosis includes homologous chromosome separation and normally halves the chromosome number while generating variation. mitotic index : Fraction of scored cells undergoing mitosis; chromatid: One copy of a replicated chromosome before separation.

Division · 3.1

Reasoning

Count chromosomes by centromeres under the stated convention. DNA amount and chromosome number are different quantities. Crossing over and independent assortment contribute to meiotic variation. Use a prepared root-tip slide or a labelled image. Define a counting rule and field selection before counting. Distinguish dividing cells from damaged or ambiguous cells and report exclusions.

Division · 4.1

Reasoning

State the known values and their units. Choose the relation because its assumptions fit this case, then rearrange before substitution. Known: 25 dividing cells among 200 scored cells. Mitotic index = $25/200 = 0.125$, or 12.5%. Estimating phase duration from this proportion requires assumptions about a steady, representative cell population.

Division · 4.2

Reasoning

18 of 120 scored cells are dividing. Calculate mitotic index as a percentage. Use the same sequence: known quantities → model → relation → substitution → unit and interpretation.

Division · 5.1

Reasoning

Replication doubles DNA amount without immediately doubling the chromosome count. Meiosis does not simply produce two identical diploid cells. Return to the original observation. Explain what the result supports, which conditions it assumes, and one way to test a competing explanation.

Division · 5.2

Reasoning

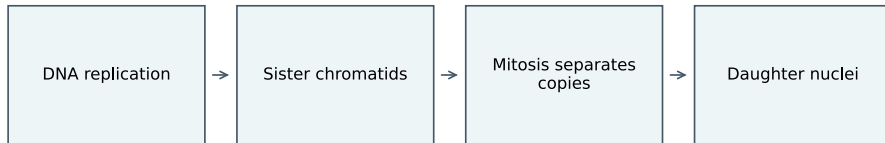
DNA replication immediately doubles chromosome number under the centromere convention. This claim is false: Replication doubles DNA amount without immediately doubling the chromosome count. Meiosis does not simply produce two identical diploid cells.

Division · 5.3

Reasoning

Cell division: count nuclei and chromosomes carefully: Count chromosomes by centromeres under the stated convention. DNA amount and chromosome number are different quantities. Crossing over and independent assortment contribute to meiotic variation.

Division · diagram



- Original teaching diagram: Cell division: count nuclei and chromosomes carefully
- Use the labels and the stated model together.

Division · original transfer

Your turn

In fictional snapshots, 30/200 cells and 18/120 cells are dividing. Does the smaller dividing count imply slower division? Could these observations establish phase duration?

Division · transfer reasoning

Method and interpretation

Both indices are 15%. Counts have different denominators. Duration inference additionally needs a representative asynchronous steady population and cycle information; a snapshot alone is insufficient.

Check yourself

- Explain chromatid using the stated model.
- Explain mitotic index using the stated model.
- Change one value in the original transfer; explain which assumption still matters.