Mitosis and chromosome continuity

Student activity • observation and reasoning

YEAR 11 / LESSON 90 / BIOLOGY + SCIENCE (DOUBLE AWARD)

The question

How does cell division preserve chromosome sets during growth?

Use the supplied examples, record your reasoning and correct it using evidence.

Equipment

- Student booklet, pencil and ruler
- Paper chromosome sets: two homologous pairs with duplicate sister-chromatid pieces

Paper, modelling and written reasoning only. No chemicals or biological samples are handled.

Course coverage: Shared Biology / Double Award: 3.28–3.29 and 3.32. Mitosis and chromosome numbers.

Plan, model or apparatus sketch

Draw and label the apparatus or biological model; identify one limitation.

Method and reasoning

Read the whole sequence before starting

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1. Model a diploid cell with two homologous chromosome pairs using labelled paper pieces.

2. Replicate the DNA before division and represent each chromosome as two sister chromatids.

3. Separate sister chromatids into two sets and form two daughter cells.

4. Compare chromosome sets before and after, explaining that DNA replication does not immediately double chromosome number under the usual centromere-counting convention.

5. Apply the model to growth, repair, cloning and asexual reproduction.

6. State human diploid and haploid numbers and distinguish mitosis from gamete-producing meiosis.

Cleanup

- Return models and keep the corrected work.

Record your evidence

Blank spaces are for your own work

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Reference and task data

Mitosis normally produces two daughter cells with the same chromosome set as the parent, apart from mutation. Human diploid cells have 46 chromosomes; gametes have 23. The paper model is simplified and does not reproduce all cellular machinery.

Example / trial	Observation / evidence	Explanation / limit
Evidence / comparison		
Explanation		
Limit / correction		

Show your calculations, labelled model or correction here.

Explain and evaluate

Use evidence and show calculation steps where relevant

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1. How many daughter cells result?

2. Are chromosome sets normally retained?

3. What happens before division?

4. Name two uses of mitosis.

5. What is the human diploid number?

6. What is the human haploid number?