Genes, chromosomes, DNA and RNA

Student activity • observation and reasoning

YEAR 11 / LESSON 88 / BIOLOGY + SCIENCE (DOUBLE AWARD)

The question

How are genetic information and its molecular carriers organised?

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

Equipment

- Student booklet, pencil and ruler
- Labelled paper genome, chromosome and nucleotide models

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

Course coverage: Shared Biology / Double Award: 3.14–3.15. Biology-only extension: 3.16B–3.17B DNA/RNA structure.

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. Arrange genome, chromosome, DNA and gene in a labelled relationship diagram.

2. Explain that a gene is a DNA sequence with information for a functional product; use protein-coding genes for the course model.

3. Locate chromosomes in the nucleus in a typical eukaryotic cell and avoid generalising this to bacteria or every mature cell.

4. Biology extension: model DNA as two strands in a double helix with A–T and C–G pairing.

5. Biology extension: compare RNA as usually single-stranded and containing U instead of T.

6. Biology extension: for DNA template 3′-ACGTTA-5′, write the complementary DNA and RNA sequences in the 5′ to 3′ direction.

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

Shared content concerns genes, chromosomes and the genome. Detailed base pairing and RNA are Biology extensions. For DNA template 3′-ACGTTA-5′, complementary DNA is 5′-TGCAAT-3′ and complementary RNA is 5′-UGCAAU-3′.

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. What is a genome?

2. What is a gene in the course model?

3. Where are chromosomes in a typical eukaryotic cell?

4. Biology: what pairs with C?

5. Biology: what replaces T in RNA?

6. Biology: give the DNA complement of ACGTTA.