

Storing information

60 minutes • A1.2.9, A1.2.10 • Chapter 7

Why four bases can store limitless information, and why one shared code points to a common ancestor

BY THE END, STUDENTS CAN

- ☐ Explain why DNA can store limitless information, and why one genetic code in all life points to a common ancestor
A1.2.9, A1.2.10

TIMING

0-8	8 min	Do now: How much DNA are you?	
8-20	12 min	Endless sequences	
20-30	10 min	One code, five readers	
30-45	15 min	The backbone question	
45-55	10 min	Exam question, timed	
55-60	5 min	Exit	
	60 min	One lesson	

STARTER

8
min**Do now: How much DNA are you?**

Pairs estimate the length of DNA in a human body (activity below).

ON THE BOARD, FROM THE GUIDE

Open the guide on the projector at each chapter (the links work in this PDF). Every figure plays from its own buttons, and the lesson's slides have the same figures, step by step, in the order of this plan.

07 Endless sequences, one code

CHAPTER 07 IN THE SLIDES

Slide the figure through Bases in the sequence 0, Bases in the sequence 1, Bases in the sequence 2, Bases in the sequence 3, Bases in the sequence 4, Bases in the sequence 5, Bases in the sequence 6 and Bases in the sequence 7, and have the class say what will change before each.

Switch the figure through Bacterium, Yeast, Wheat, Human cell and Human mitochondrion, and have the class say what will change before each.

Predict box: How many different sequences of three bases can DNA's four bases make? Hands up or mini whiteboards first.

Answer B: 64

THE LESSON

12
min**Endless sequences**

Chapter 7's slider. Predict the number of three-base sequences first, then slide to 10, 100 and 1000 bases.

10
min**One code, five readers**

Chapter 7's second figure. Why would an arbitrary code be shared by everything, unless it was inherited?

15

min

The backbone question

The written question below, then peer-marked against points the class agrees.

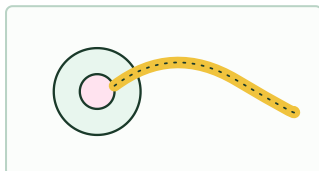
10

min

Exam question, timed

A short written question on A1.2 from the A1.2 exam maker (in Practise and revise, below), timed. For homework, [the Check step](#).

ACTIVITIES



ESTIMATE

How much DNA are you?

Pairs estimate the length of DNA in a human body. A cell with a nucleus holds about 2 m of DNA. A body has about 30 trillion cells, but most of them are red blood cells, which have no nucleus (about 25 trillion of the 30). So take a few trillion cells with a nucleus. A fair answer is around 10 billion km, which is 50 to 70 times the distance from Earth to the Sun (about 150 million km). The size of the answer matters more than the digits.

Needs: calculators.

WRITING

The backbone question

Exam style: "Explain how the strong covalent bonds in each strand and the weak hydrogen bonds between the strands allow (a) the strands to separate, (b) the base sequence to be kept in each copy, and (c) a rare copying mistake to be kept too." Peer-mark against points the class agrees. For (c): once a wrong base is joined into the new strand, the same strong backbone that keeps the right sequence keeps the mistake.

Needs: paper or exercise books.

PLENARY

5

min

Exit

One sentence answering each guiding question.

WHAT STUDENTS GET WRONG

The universal code means the same DNA in everything. Same code, different sequences.

4^n confused with n^4 , or with $4n$. Use the three-base predict box.

STRETCH AND SUPPORT

Support: cut the figures' captions into cards to put in order, use the dotted key terms as a glossary, and give a drawing frame with the pentagon corners marked for the IB drawings.

Stretch: the [Comparative Genome Viewer](#) at NCBI shows long stretches shared by the chromosomes of related species, such as human and mouse. What does that say about common ancestry, and about the diversity of genomes?

Stretch: make a Tarsia puzzle that is better than the site's own, from your own pairs, in the Tarsia builder.

Stretch: [Reading Frame](#), a codon game, looks ahead to D1.2.

IN THE GUIDE

- 7** [Endless sequences, one code](#)
- A1.1** [The whole guide, with the figures that play](#)
- PPTX** [This lesson's slides, in the order of this plan](#)

PRACTISE AND REVISE

BUILD FOR YOUR CLASS

- [Tarsia puzzle, dominoes and picture reveal](#) on A1.2, built from its key terms and ready to print
- A [pub quiz](#) with rounds on A1.2, to present or run with no projector
- An [escape room built from the question bank](#) on A1.2

ALREADY ON THE SITE FOR A1.2

- Lesson: [Nucleic Acids](#)
- Quiz: [Nucleic Acids \(HL\)](#)
- Quiz: [Nucleic Acids](#)
- Revision map: [A1.2 Nucleic acids](#), to fill in
- Exam questions: [A1.2 in the exam maker](#), a paper with its markscheme

CARD SETS ON SPLYCR

- Open a set to host it as a class game, or make a copy to edit.
- [A1.2 Nucleic Acids](#)

EXAM PRACTICE

Check yourself

Set it for homework: a fresh paper of exam-bank questions on A1.2 at standard level each time, marked as students go and saved to their Exam practice when they are signed in.

biologybybradford.com/exam-maker/sit?topics=A1.2&level=SL&paper=quiz&marks=15&src=ep



How this was made. The course structure, the activities and the teaching choices come from my own classroom, my presentations and my years of teaching IB and AP Biology. I use Claude, an AI, to help write and build the interactive guides, lesson plans, slides and practice questions, and to draw the diagrams and code the interactives. I direct the work and review it against the IB and AP specifications before it goes live.