VCE Biology – Unlocking CRISPR

Your Mission: You are part of a global taskforce of genetic engineers investigating how CRISPR-Cas9 can reshape the future of human health. Your team's immediate focus is cystic fibrosis (CF)—a disease caused by mutations in the CFTR gene. With CRISPR at your disposal, you must weigh the scientific possibilities against the ethical dilemmas of gene editing.

Pre-Visit Activity

Video Intel	10 mins	Watch *Genome Editing and Beyond* HHMI video. **Task:** Summarise in 4 sentences: • What does CRISPR do? • Why is it revolutionary compared to older gene technologies?
CRISPR in Action	20 mins	Use HHMI's interactive. **Task:** • Map out the steps from gRNA design → Cas9 cutting → DNA repair. • Identify one medical and one agricultural application.
Locate the enemy gene	15 mins	Use GenBank to search for the CFTR gene. **Task:** Record in your lab journal: • Chromosome location of CFTR • Gene length (bp) • Common mutation types linked to CF

Post-Visit Activity

Video Intel Update	10 mins	Watch *CRISPR's Next Advance Is Bigger Than You Think* TED-style video. **Task:** Note down 2 future possibilities for CRISPR beyond curing disease.
Case Study: CRISPR vs. Cystic Fibrosis	40 mins	Draw on provided journal articles (Harris & Kittur 2025; Karimulla 2025). **Tasks:** 1. Explain how CRISPR-Cas9 could correct a specific CFTR mutation (G542X or ΔF508). 2. Evaluate gene therapy strategies (viral vs. non-viral vs. CRISPR). Which is most promising long-term? Why? 3. Create a flowchart: CRISPR delivery → CFTR gene correction → protein expression in lung cells.
Ethics Council Debate	45 mins	Form teams and prepare arguments around these dilemmas: • Should couples with CF mutations be allowed to use CRISPR on embryos? • Is access to CRISPR a universal right—or only for the wealthy? • Should germline editing be banned, even for severe diseases? • Should public money prioritise cures (CRISPR) over management (medications)? Deliver your stance in a **2-minute "council address"**, then reflect individually in a short opinion piece: *"Where should society draw the line between therapy and enhancement?"*
Future Tech Brainstorm	25 mins	Quickfire: In teams, design a poster titled *"CRISPR 2040"*. **Mission Task:** Predict one breakthrough, one ethical dilemma, and one social impact.