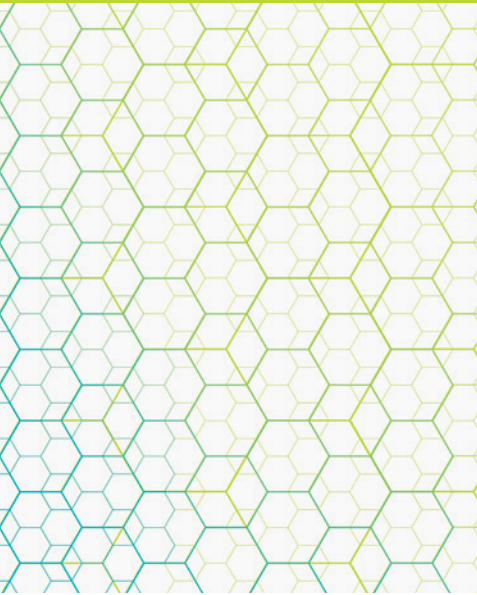


Out of the Blue CRISPR and Genotyping Extension Kits



Perform real CRISPR gene editing in your classroom

Propel your students to the cutting edge of life science! With the Out of the Blue CRISPR Kit, students use real clustered regularly interspaced short palindromic repeats with associated protein 9 (CRISPR-Cas9) technology to engineer a stop codon into the chromosomal *lacZ* gene of *Escherichia coli*. The results are clearly visible through blue-white screening and can be confirmed at the molecular level with the optional genotyping extension kit. Armed with their hands-on CRISPR gene editing experience, your students then use bioinformatics to explore the power and the limitations of this new technology and to debate the ethics of its use.

CONCEPTS

- CRISPR-Cas9 Gene Editing
- DNA Repair Mechanisms
- Genetic Engineering
- Bioinformatics

SKILLS

- Bacterial Transformation
- Multiplex PCR
- DNA Gel Electrophoresis
- Data Collection and Analysis
- Argumentation Using Evidence

Safe and Accessible

Designed for use in the classroom, these activities can be completed in 50-minute class periods and use familiar and safe reagents, techniques, and organisms. If you can perform a pGLO bacterial transformation in your classroom, you can do CRISPR gene editing!

More Than a Cut, a Real Genomic Edit

Students use a carefully designed bacterial strain and plasmids to see that CRISPR gene editing requires more than a precise DNA cut — it also requires the cell's DNA repair machinery to make desired and transformative genetic edits.

Comprehensive Instructional Support

Supportive instructional activities include a paper model to illustrate how CRISPR-Cas9 gene editing works and the science and math behind its accuracy and flexibility. A guided bioinformatics activity challenges students to design Cas9 target sites and determine risk for off-target effects.

Activities include

- Pre-lab activity — use a paper model to understand CRISPR-Cas9 components and specificity (free download is available online)
- Lab activities:
 - Use CRISPR-Cas9 to edit the *lacZ* gene in *E. coli*
 - Analyze results
 - Optional: Use PCR and gel electrophoresis to confirm the edit in transformants
- Post-lab activity — design Cas9 target sites for treating human disease and determine risk for off-target effects (free download is available online)

Kit content supports 32 students

- Out of the Blue CRISPR Kit:
 - *E. coli* HB101-pBRKan, lyophilized
 - Donor template DNA (pLZDonor) and donor template DNA and guide RNA (pLZDonorGuide)
 - Reagents and plastics required for transformation and cell culture
 - Instructor answer guide and quick start guide (instructor and student manuals are available online)
- Out of the Blue Genotyping Extension:
 - InstaGene Matrix
 - Primer mix (50x), positive control DNA, and master mix
 - PCR molecular weight ruler and Orange G Loading Dye
 - PCR tubes, microcentrifuge tubes, and conical tubes
 - Instructor answer guide (instructor and student manuals are available online)

Required accessories not included in kit

- Adjustable-volume micropipets and tips (2–20, 20–200, and 100–1,000 μ l)
- Balance with a range of 1–10 g
- Autoclave or microwave oven
- Temperature-controlled dry bath or water bath
- For the Out of the Blue Genotyping Extension only: microcentrifuge ($\geq 2,000 \times g$), thermal cycler, horizontal electrophoresis cell, and power supply

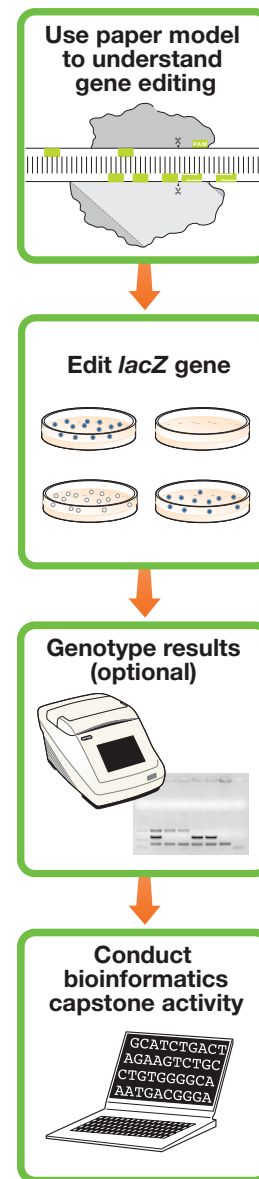
Timeline

Finish all activities in three or four 50-minute class periods

Ordering Information

Catalog #	Description
12012608EDU	Out of the Blue CRISPR Kit
12012607EDU	Out of the Blue Genotyping Extension*
17006081EDU	Out of the Blue CRISPR and Genotyping Extension Kits*

* Reagents for electrophoresis are included in other kit configurations available at bio-rad.com/outoftheblue.



Call **1-800-4BIORAD** (1-800-424-6723) or visit bio-rad.com/outoftheblue for more information and classroom supports.

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