

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 CRISPR-Cas9 technology to disrupt the *lacZ* gene in *E. coli* and produce a phenotype that can be clearly seen through blue-white screening. Use the optional genotyping extension kit to confirm the genetic edit at the molecular level with multiplex PCR and gel electrophoresis. 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**
- **Genetic Engineering**
- **Bioinformatics**

SKILLS

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

Hands-On, True CRISPR Gene Editing

CRISPR gene editing is revolutionizing scientific research, and now your students can do real CRISPR-Cas9 gene editing in your classroom. Well-designed controls demonstrate the role of each component used in CRISPR-Cas9 gene editing to reinforce learning.

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!

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
- 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

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, master mix
 - PCR molecular weight ruler and Orange G loading dye
 - PCR tubes, microcentrifuge tubes, 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 µl, 20–200 µl, 100–1,000 µl)
- 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 (≥2,000 x g), thermal cycler, horizontal electrophoresis cell, power supply

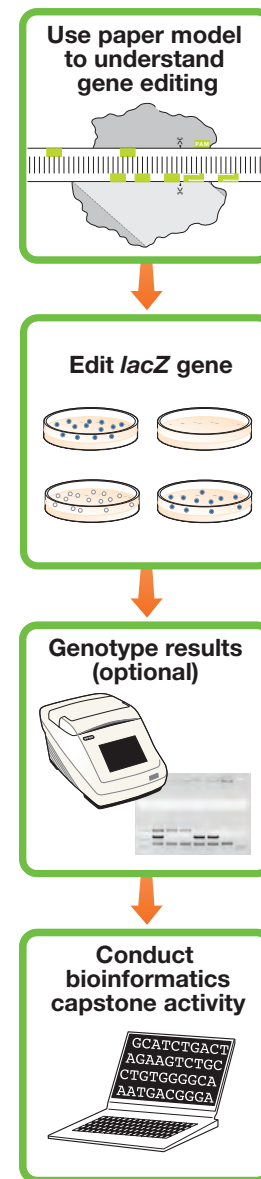
Timeline

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 Extension¹
12012608EDU	Out of the Blue CRISPR and Genotyping Extension Kits¹

¹ 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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