✍️ Foundations of Biology / Intro Genetics

Write-to-Learn & Peer Review: Genetic Recombination (Revised Version)

Purpose of the Activity

This activity supports students in learning how to explain biological mechanisms clearly while practicing how to give and receive constructive peer feedback. Students apply their understanding of **meiotic recombination** to a novel scenario and use a structured peer-review process to improve the clarity, accuracy, and reasoning of their explanations. This models authentic scientific practice, where scientists iteratively revise work based on peer critique.

Learning Outcomes (Student-Friendly Language)

By the end of this activity, you will be able to:

- Explain how **crossing over** creates genetic variation.
- Apply recombination concepts to predict outcomes in a new biological context.
- Identify essential features of a clear scientific explanation (accuracy, mechanism, evidence).
- Give constructive feedback to a peer that helps strengthen their reasoning and clarity.
- Revise your own explanation using peer and instructor feedback.

Preparatory Work (Before Class)

Read:
A short introductory section on *meiotic recombination*.

Watch:
A 3–4 minute animation visualizing crossing over during meiosis I.

Guided Note Template (provided):
Students jot down:

1. One mechanism that is a part of the process of recombination.

2. One question they still have about recombination.

Rationale:
The short reading/video reduces cognitive load. Guided notes provide low-stakes structure for students still adjusting to scientific texts.

In-Class Steps

1. Think & Write (8–10 minutes)

Students respond to a focused Write-to-Learn prompt such as:

Prompt:
“In a population of flowering plants, a selectively neutral mutation arises on one homolog of chromosome 4. Explain the role meiotic recombination could play in passing the mutation to offspring. What factors will control which other alleles this allele is passed down alongside? Make sure to describe how the mechanisms of recombination effect this.

Students write in complete sentences, emphasizing mechanism + reasoning.

Instructor Tip:
Remind students that this is **thinking-focused writing**, not a polished essay. Scientific accuracy matters, not eloquence.

---

2. Pair & Swap (2 minutes)

Students exchange their written explanations with a partner.
Frame this as *collaboration*, not judgment.

---

3. Peer Review with Checklist (8–10 minutes)

Provide a **simple, targeted checklist** aligned with recombination learning goals.

✅ **Peer Review Checklist (Genetic Recombination Version)**

Mechanism of Recombination

- Did they mention **homologous chromosomes**?
- Did they correctly reference **crossing over** or **exchange of chromatids**?

- Did they describe *where* in meiosis recombination occurs (prophase I/synapsis)?
- Did they incorporate mapping concepts (e.g., recombination frequency, linkage)?

Accuracy & Reasoning

- Did they explain *how* recombination creates new allele combinations?
- Did they avoid common misconceptions (e.g., recombination between sister chromatids)?
- Did they connect recombination to **genetic variation**?

Clarity

- Was the explanation clear and logically ordered?
- Were key terms used correctly?

Instructor Tip:

Circulate during peer review. Students in STEM often struggle to critique conceptual reasoning unless explicit scaffolding is provided (Finkenstaedt-Quinn et al., 2024), so verbal reassurance helps: "You're looking at ideas, not grammar — help each other refine the science."

---

4. Share & Discuss (8–10 minutes)

Invite a volunteer to share (or anonymously project) a strong example.
Highlight:

- One example of clear mechanistic reasoning
- One common misconception to correct (e.g., recombination always occurs, recombination between sister chromatids)

This public modeling reinforces what high-quality explanations look like.

---

5. Revise & Reflect (5 minutes)

Students return to their original writing and add:

- **One revision based on peer feedback**, and

- **One revision based on class discussion**

This metacognitive step shows the value of peer review and supports deeper processing (supported by WTL research).

Instructor Notes

- **Time Management:** Short writing → short review → short revision keeps the activity manageable even in large classes.
- **Scaffolding:** Students new to peer review benefit from a demonstration using an instructor-created example first.
- **Evidence Base:** Research shows that giving peer feedback is often *more* beneficial for conceptual learning than receiving feedback alone (Finkenstaedt-Quinn et al., 2024).

References

Finkenstaedt-Quinn, S. A., Milne, S. L., Petterson, M. N., Chen, J., & Shultz, G. V. (2024). Student experiences with peer review and revision for writing-to-learn in a chemistry course context. *Written Communication*, *41*(4), 632-663.