TEACHER AT-A-GLANCE: PEER REVIEW WORKSHEETS

Our Peer Review Worksheets help students organize their feedback on classmates' science-related work – such as lab reports, presentations (e.g., posters or videos), research papers, and science fair projects. We provide two types of worksheets:

- **Scientific Method Worksheet**: models the structure commonly used by scientists to give feedback on scientific reports intended for publication (e.g., journal articles). Designed for work based on the scientific method (introduction, hypothesis, methods, results, discussion, etc.)
- **Science Communication Worksheet**: supports giving structured feedback on science projects that may not include the scientific method (e.g., essays, presentations, videos, etc.)

In both worksheets, feedback is separated into four main categories: **Summary**, **Overall Reviewer Impressions, Scientific Changes** (the "what"), and **Presentation Changes** (the "how"). For both scientific and presentation changes, students are asked to prioritize their feedback as either **major** or **minor**. Since the goal of peer review is to give feedback while preserving the author's voice, students are encouraged to focus more on content and organization rather than on whether they like their peers' topic or communication style.

This lesson plan draws on resources and information provided by the organizations listed below:

- Emerging Investigators Preprint Server (eiRxiv) - eirxiv.org
- Journal of Emerging Investigators (JEI) - emerginginvestigators.org

The following guide was also referenced to create these worksheets:

- Foster, A., Hindle, S., Murphy, K. M., Saderi, D. (2021). Open Reviewers Reviewer Guide. *Zenodo*. https://doi.org/10.5281/zenodo.5484086 - Copyright 2021 PREreview (CC-BY 4.0)

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At eiRxiv and JEI, we are committed to providing the tools, mentorship, and community necessary for any middle or high school student to publish and share their research with other students and the broader scientific community. Visit us at eiRxiv.org and emerginginvestigators.org.

PEER REVIEW WORKSHEET: Scientific Method

REVIEWER'S SUMMARY	☐ For each of the following, write 1-2 sentences:
Have you ever received feedback from someone - like a classmate, coach, or judge - and thought, "Did they even pay attention?" To give constructive feedback, you need to thoughtfully engage with the work you are reviewing. Writing a summary not only shows that you read, listened to, or watched your classmate's work – it also helps you better understand the material. To write your summary, use the questions to the right as a guide. If you're unsure how to respond, revisit your classmate's work - did you miss or skip a section? Alternatively, did they not include this information, or is it unclear?	☐ Research question: what did your classmate want to know? ☐ Hypothesis: what did your classmate think would happen? ☐ Methods: what did your classmate do to test their research question? ☐ Results and conclusion: what did your classmate discover? Does the conclusion make sense based on their results?

STUDENT EXERCISE

REVIEWER'S OVERALL IMPRESSIONS Now that you are familiar with your classmate's work, share your main impressions: what did they do well? What could they do differently? *Student Example* *Strength: It's neat that you repeated your experiment and saw the same results both times!* *Suggestion: Were you more interested in the food that brine shrimp eat or the salinity (salt content) of their environment (the water tanks)? It wasn't always clear.*	☐ Share **<u>at least two</u>** overall strengths of your classmate's work (3-4 sentences): ☐ Give **<u>at least two</u>** overall suggestions to improve your classmate's work (3-4 sentences):

STUDENT EXERCISE

SCIENTIFIC CHANGES	MAJOR
This section is for feedback on the scientific content. For example, did your classmate state an incorrect fact? Did they label the wrong variable as dependent? Did they use appropriate controls? For this section, aim for **3** major and **5** minor comments. Major comments are those you think are the *most* important to change. While providing feedback, think about what changes are realistic - for example, your classmate might not be able to redo their experiment, but maybe they can analyze their data in a different way. *Student Example* *Major 1: You asked, "How do different salinity concentrations affect the size of brine shrimp?" However, you hypothesized that brine shrimp will have smaller hatching rates at lower salinity levels. Based on your data, I think your research question should be rewritten with hatching rate instead of size.* *Minor 1: What environment were the tanks placed in (light, temperature, etc.)?*	**1.** **2.** **3.** **MINOR** **1.** **2.** **3.** **4.** **5.**

STUDENT EXERCISE

COMMUNICATION CHANGES	MAJOR
Here, you will give feedback on how your classmate presented their ideas, rather than suggesting changes to the scientific content. For example, are there sections that need more detail? Are there too many colors in a visual (table or graph) that distracts from the main patterns? Constructive feedback doesn't just criticize how someone communicates. Instead, good feedback explains what's unclear and provides suggestions on what to change. Like the *Scientific Changes*, aim for **3** major comments and **5** minor comments. *Student Example* *Major 1: I liked that you used colors for the different salinity concentrations, but they weren't always the same. For example, you sometimes showed "Low Salinity" in blue and other times in green. Keeping the colors the same would be helpful.* *Minor 1: In your Conclusion, some sentences were really long, which made the main ideas get lost. You might want to break this text into smaller sentences.*	**1.** **2.** **3.** **MINOR** **1.** **2.** **3.** **4.** **5.**

SCIENTIFIC PEER REVIEW WORKSHEET: Scientific Communication

REVIEWER'S SUMMARY	☐ For each of the following, write 1-2 sentences:
Have you ever received feedback from someone - like a classmate, coach, or judge - and thought, "Did they even pay attention?" To give constructive feedback, you need to thoughtfully engage with the work you are reviewing. Writing a summary not only shows that you read, listened to, or watched your classmate's work – it also helps you better understand the material. To write your summary, use the questions to the right as a guide. If you're unsure how to respond, revisit your classmate's work - did you miss or skip a section? Alternatively, did they not include this information, or is it unclear?	☐ Topic: what was the main topic? Describe with detail. ☐ Format: describe how your classmate shared their ideas (essay, drawing, sculpture, song, video, etc.)? Did this format allow them to communicate their knowledge well? ☐ Purpose: what do you think was the main goal of the project? Was it to educate, create, critique, etc.? How did the symbols used (colors, sound, or text) communicate ideas? ☐ Audience: who is the intended audience? Is it for peers, a teacher, or the public?

STUDENT EXERCISE

REVIEWER'S OVERALL IMPRESSIONS Now that you are familiar with your classmate's work, share your main impressions: what did they do well? What could they do differently? *Student Example* *Strength: Your video about microplastics and how they're affecting fish health was interesting, and I learned a lot. Your video was very detailed. For example, I didn't know that microplastics can make some fish "full," so they don't eat as much.* *Suggestion: I had to rewind the video several times because you spoke too fast - for example, when you were describing what microplastics are, I couldn't hear some of your explanation. I think you should re-record your video and talk at a slower pace.*	☐ Share **at least two** strengths of your classmate's work (3-4 sentences): ☐ Give **at least two** overall suggestions to improve your classmate's work (3-4 sentences):

STUDENT EXERCISE

SCIENTIFIC CHANGES	MAJOR
This section is for feedback on the scientific content. For example, are the ideas accurate and factual? Is there enough background information for the audience to understand the topic? Is the content appropriate for the audience? For this section, aim for **3** major and **5** minor comments. Major comments are those you think are the *most* important to change. While providing feedback, think about what changes are realistic - for example, your classmate might not be able to research a new topic, but maybe they can describe it in a different way. *Student Example* *Major 1: In the beginning of your video, you said microplastics are metals, but they're not. They're just very small pieces of plastic.* *Minor 1: You said fish "felt sad" by the microplastics a few times. What do you mean by "sad?" Is their behavior different?*	**1.** **2.** **3.** **MINOR** **1.** **2.** **3.** **4.** **5.**

STUDENT EXERCISE

COMMUNICATION CHANGES	MAJOR
Here, you will give feedback on how your classmate presented their ideas, rather than suggesting changes to the scientific content. For example, how does the way they communicate relate to the audience; is it appropriate for the target audience? Are there too many visuals (colors, emojis, or images) that distract from the main ideas? Constructive feedback doesn't just criticize how someone communicates. Instead, good feedback explains what's unclear and provides suggestions on what to change. Like the *Scientific Changes*, aim for **3** major comments and **5** minor comments. *Student Example* *Major 1: I thought there were too many memes in your video, and some weren't related to your topic. They distracted me from the other images you had.* *Minor 1: You put an emoji of a cow next to the word fish. Maybe change the emoji to be a fish?*	**1.** **2.** **3.** **MINOR** **1.** **2.** **3.** **4.** **5.**