Case 14, Challenge 3: Color Masterpiece

You have been give two female charcoal drakes of varied family history and a single male steel drake. You need to breed these drakes to reveal all the possible drake colors. Then submit to the Journal a final claim about how color is inherited in drakes.
- Each part of the claim must be supported by evidence and reasoning.
- The claim, evidence and reasoning must account for all drake colors.
- Include the genotype for each color.

<u>General Tips</u>
- Do some test breeding first with the parents provided. They are all dark in color, but you need to produce all drake colors.
- Solving this challenge will require multiple rounds of breeding, saving offspring, and breeding again.
- Use Punnett squares to help you predict the outcomes of a particular breeding experiment.
- There are only 10 spaces in the stable. Delete drakes you no longer need.

<u>Problem-solving Guide</u>

A skilled Journeyman in the Drake Breeder's Guild would <u>apply these guiding questions to each round of breeding</u> and keep a clear and complete record of her/his ideas and work. Look at student organizers from other cases for ideas.
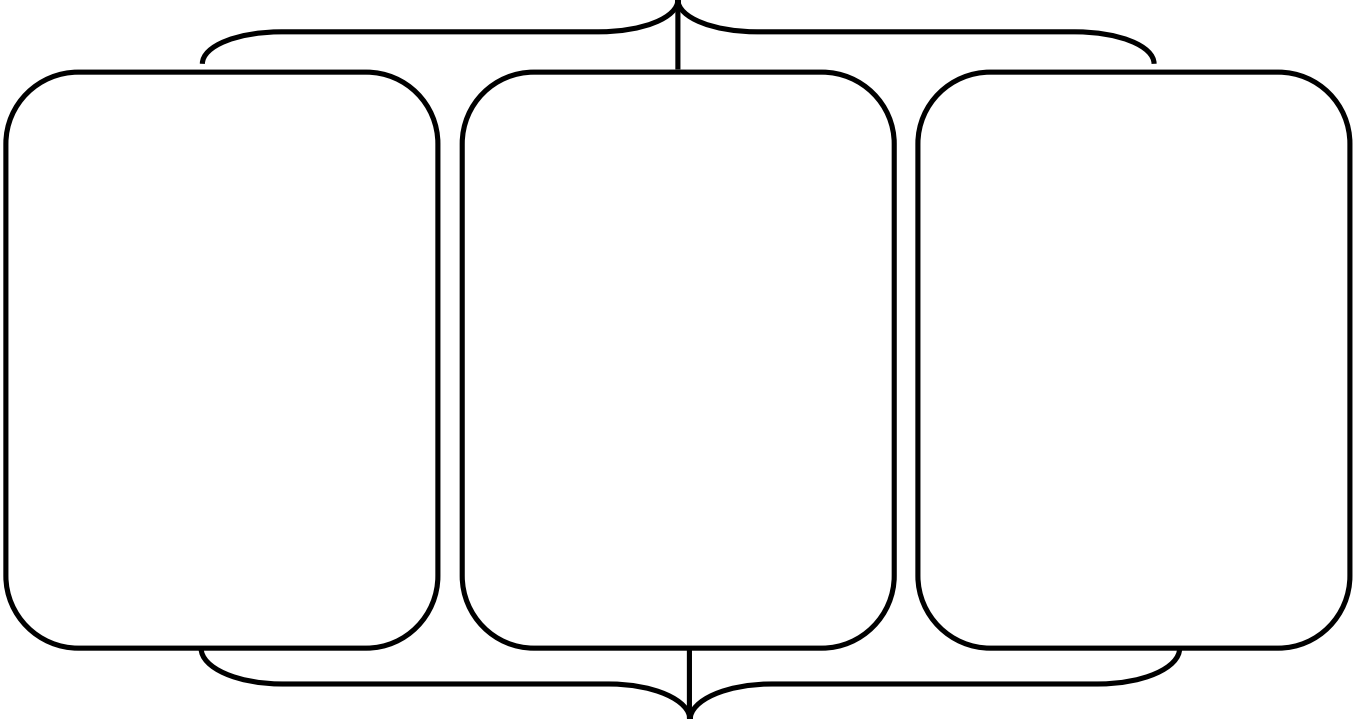
1. Which two drakes will you breed first and why?
2. What were the results of the breed? Did any new colors appear?
3. How do the results of this breed fit with your current understanding about color inheritance, based on the other color Challenges?
4. Which offspring of this pair of parents will you save and why?
5. Which two drakes will you breed next and why?
6. When you uncover a new color, how does its appearance fit with your understanding of color inheritance from the other color Challenges?

Use this sheet to organize your thinking about color inheritance.
Your claim will have multiple parts. If necessary, use more paper
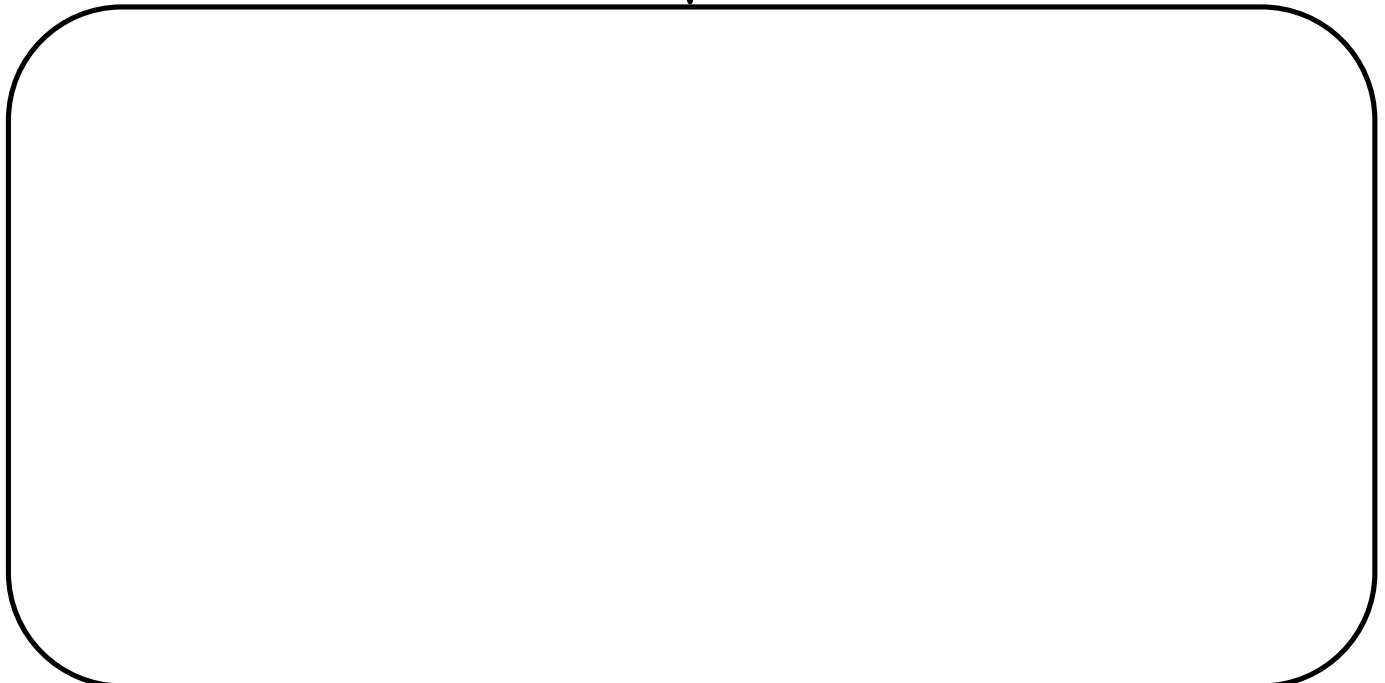to break it down into smaller parts before posting in the Journal.

Claim

Evidence

Reasoning

Sample Argumentation Framework

The definitions below are adapted from *Science as Inquiry in the Secondary Setting (Luft, Julie, Randy L. Bell, and Julie Gess-Newsome, editors. 2007. NSTA Press.).* The rubric is modified from *McNeil et. al. (2007)*.

- ***Claim:*** This is an assertion or conclusion addressing the original question or problem.
- ***Evidence:*** This is data or facts that support the claim. Data may come from student-completed investigations, observations, archived data or other data sets, or reading material. Data must be appropriate and relevant to the problem and sufficient to convince another of the claim. This often requires multiple pieces of data.
- ***Reasoning:*** Includes statements that link the evidence to the claim, showing why the data counts as evidence to support the claim. Reasoning often includes appropriate scientific principles.

	Level			
	0	**1**	**2**	**3**
Claim: An assertion that answers the original question.	Does not make a claim.	Makes an inaccurate or inappropriate claim.	Makes an appropriate but incomplete claim.	Makes an accurate and complete claim.
Evidence: Scientific data that supports the claim. Data need to be appropriate and sufficient.	Does not provide evidence.	Provides inappropriate evidence.	Provides appropriate but insufficient evidence.	Provides appropriate and sufficient evidence to support the claim.
Reasoning: A justification that links the claim and evidence, using appropriate and sufficient scientific principles.	Does not provide reasoning.	Reasoning does not link evidence to claim. Scientific principles are missing, vague, or inaccurate. May rely on informal / non-scientific principles.	Reasoning links some of the evidence to the claim. Includes some, but insufficient scientific principles.	Reasoning links multiple forms of evidence to claim. Includes appropriate and sufficient scientific principles.

Discourse is an important part of students developing argumentation skills. This rubric is meant to assist teachers in assessing the progress of their classes along a discourse continuum. Geniverse provides opportunities for students to share and evaluate their drake breeding strategies and to argue their claims using evidence from the software.

	Level			
	0	**1**	**2**	**3**
Discourse: Involves engaging students in talk about explanations.	Does not engage in discourse about explanations.	Explanations are shared or presented to others without evaluation of evidence or reasoning.	Occasional, teacher-led discourse that involves the evaluation of multiple competing explanations.	Frequent, student-initiated discourse that involves the evaluation and rebuttal of competing claims.

Scientific Argument Critique Guide

Case # & Title: _____

The question being answered is: _____

_____

The claim being made is: _____

_____

1. Did the claim answer the question? ☐ Yes ☐ No

2. Was evidence provided to support the claim? ☐ Yes ☐ No

3. Was the evidence appropriate for the claim? ☐ Yes ☐ No

4. Was there sufficient (enough) evidence? ☐ Yes ☐ No

5. Was reasoning provided to link the evidence to the claim? ☐ Yes ☐ No

6. Did the presentation convince you of the validity of the claim? ☐ Yes ☐ No ☐ Almost

7. List at least three questions you could ask this group about their claim, evidence and/or reasoning. Use the question starters on the back if you like.

8. List one strength of this argument.

9. List one thing that could make this argument stronger.

Questions & Question Starters

Question Starters:

1. Can you say more about…?
2. So, are you saying…?
3. What did you mean when you said…?
4. What if…?
5. Can you give an example of…?

Questions:

6. Can you tell us what you did to collect your data?
7. Does it always work that way (state the "way")?
8. How did you arrive at that conclusion (state the conclusion)?
9. Do you have any data that does not support your claim?

And if you really want to impress:

10. Ask a question that connects the current presentation to an earlier one.