Lesson 15: Rubric

Project Rubric

This rubric provides a space for you to record student progress and/or communicate feedback to students. This rubric does not attempt to predict all the possible ways students may show that they are still developing their understandings and use of practices, nor does it attempt to forecast all the possible ways students may show they have advanced understanding and/or especially deep use of practices. Instead, you may mark examples of evidence you see and jot notes about where specifically a student has shown proficiency, has room for improvement, or has demonstrated above-and-beyond understanding. You can then share this feedback with students (in writing or in a conversation).

Parts 1 & 2

15.A Engage in a design cycle to construct a solution that uses its physical subsystems and select inputs and outputs to measure and respond to changes in force in a selected application, within criteria and constraints.

Category		
Foundational Pieces	Linked Understanding	Organized Understanding
Students evaluate how their initial design meets agreed-upon criteria and constraints, but do not justify their design based on these evaluations.	Students evaluate how their initial design meets agreed-upon criteria and constraints and justify their design based on some of these evaluations.	Students evaluate how their initial design meets agreed-upon criteria and constraints and justify their design based on these evaluations.
Students develop a hardware or software subsystem.	Students develop a system that includes hardware and software subsystems that are unlikely to work together.	Students develop a system that includes hardware and software subsystems that should work together.
Students have inputs or outputs in their code.	Students intentionally select inputs or outputs in their code.	Students intentionally select inputs and outputs in their code.
Students' designs are able to measure or respond to changes in forces with modifications.	Students' designs are able to measure or respond to changes in forces.	Students' designs are able to measure and respond to changes in forces.
Optional: Assess Computer Science Standards		
Parts 1 and 2		
Design projects that focus on hardware or software components.	Design projects that combine hardware and software components to collect data but do not use that data.	**2-CS-02.** Design projects that combine hardware and software components to collect and exchange data.
Students minimally attend to criteria related to bias and accessibility.	Students attend to some criteria related to bias and accessibility.	**2-IC-21.** Discuss issues of bias and accessibility in the design of existing technologies.
Part 2 only		
Use flowcharts or other tools that minimally explain code.	Use flowcharts or other tools to explain parts of the code.	**2-AP-10.** Use flowcharts and/or pseudocode to address complex problems as algorithms.

Create clearly named variables, but they do not represent different data types and do not have operations performed on their values.	Create clearly named variables that represent different data types or perform operations on their values.	**2-AP-11.** Create clearly named variables that represent different data types and perform operations on their values.
Design and iteratively develop programs, but they do not combine or incorporate control structures such as nested loops or compound conditionals.	Design and iteratively develop programs that combine control structures, including nested loops or compound conditionals.	**2-AP-12.** Design and iteratively develop programs that combine control structures, including nested loops and compound conditionals.
Incorporate existing code, media, and libraries into highly derivative programs, but do not give attribution.	Incorporate existing code, media, and libraries into highly derivative programs and give attribution.	**2-AP-16.** Incorporate existing code, media, and libraries into original programs and give attribution.
Document small pieces of programs.	Document most of the programs in order to make them easier to follow, test, and debug.	**2-AP-19.** Document programs in order to make them easier to follow, test, and debug.
What to do: Encourage students' creative work. Frame concerns with designs as opportunities for iteration and clarifying ideas, rather than summative assessment moments. Offer the resources indicated on the Engineering Design Journal pages for this lesson to help students build upon what they have done earlier in the unit.		

Part 3

15.B Test a prototype, identifying the structures that are most successful in measuring changes in force.

Category		
Foundational Pieces	Linked Understanding	Organized Understanding
Students collect data about the prototype, but this data does not attend to how the prototype measures changes in forces or other defined aspects of performance.	Students collect data about the performance of the prototype. This data sometimes attends to how the prototype measures changes in forces.	Students collect data about the performance of the prototype. This data includes attention to how the prototype measures changes in forces.
Students iterate upon their designs but do not do so based on whether the physical structures or code are meeting their intended function.	Students attend to the physical structures or code that are meeting their intended function and iterate upon their designs accordingly.	Students attend to the physical structures and code that are meeting their intended function and iterate upon their designs accordingly.
Optional: Assess Computer Science Standards		
Identify or fix (without clear identification) problems with computing devices and their components.	Identify and fix problems with computing devices and their components.	**2-CS-03.** Systematically identify and fix problems with computing devices and their components.
Refine computational models with minimal attention to the data they have generated.	Refine computational models with some attention to the data they have generated.	**2-DA-09.** Refine computational models based on the data they have generated.
What to do: Although students do not have to have a perfectly functioning final design, attend to how they have iterated on their original design and celebrate how they make progress. Frame their work going forward as sharing and gleaning feedback on the best design they have *so far*.		

Example student design, targeted at high-speed wind measurement and response: