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| **Lesson 9: Infrared Remotes Goal:** Students will design, construct and understand Infrared transmitters and receivers  |
| **Objective:** | **Below (1)** | **Approaching (2)** | **Proficient (3)** | **Advanced (4)** |
| A. Describe the functions of a transmitter and a receiver in communication system  | No description | Awareness of need for transmitter and receiver, but unclear about the function of each one | Describe how the transmitter sends out a signal, which the receiver is able to detect | (3) + able to provide multiple examples of receiver/transmitter systems, and the type of signal used by each system |
| B. Create and test an Infrared transmitter  | No transmitter  | Transmitter does not have a switch and/or student did not test it | Transmitter is controlled a switch and student can demonstrate when it is on or off  | (3) + already making receiver |
| C. Create and test and Infrared receiver | No receiver | Receiver does not work reliably and/or no evidence of testing and troubleshooting | Receiver works reliably and student can demonstrate how to test it | (3) + able to help other students test and troubleshoot and/or finds multiple ways to test receiver |
| D. Test and troubleshoot transmitter/receiver pair | No pair | Transmitter or receiver does not function reliably  | Can demonstrate how to use transmitter to turn receiver on and off | (3) + student is performing experiments with transmitter/receiver pair to find out what materials will reflect or pass Infrared light |
| E. Writing and drawing for communication and reflection | No writing or drawing | Writing and/or drawing are unclear or incomplete, showing minimal understanding | Both writing and drawing showing parts, construction and both circuit diagrams accurately | (3) + descriptions of experiments that were performed and/or ideas for projects using remotes |