Assessment Rubric for Popsicle Stick Car Design-build

Objective	Description		Basic	Proficient	Advanced
Identify	Apply geometric measurement to define shapes in TinkerCAD to match real world components.		Shapes look similar, but align to few if any measurable dimensions	shapes created appear dimensionally accurate to real world measurements.	Shapes created are aligned with measurements, and Student is able to identify relationships between the measured values and the images in the software, including inconsistencies between their measurements and the pre-existing standard popsicle stick.
Design	Arrange geometric shapes in TinkerCAD to create 5 parts which might be lasercut from popsicle sticks.		Some shapes were created, but designs do not align with intentions and/or cannot be cut accurately	Most shapes designed accurate, parts are grouped and SVG was exported, with minor discrepancies or inaccuracies.	SVG exported is indistinguishable from model, and can be explained with notes of how design features result in interlocking parts.
Build	Assemble the cart with provided wheels, motors, a cardboard body and electrical parts.		Build incomplete, parts broken or installed inaccurately	All components present and installed, car stands on its own, and does not appear to have anything loose enough to fall when the car rolls.	All joints locked in, cart appears ready to roll; student can explain how decisions have allowed for all necessary parts to be accommodated.
Program	Program the circuit to manipulate the cart along intentional paths.		Code written, but incomplete, or fails to compile, will not run	Program compiles without error, all variables and function names appear consistent.	Program compiles without error, code contains explanitory comments or student is able to explain why every line present is important to the process.
Test	Run the program with the cart, evaluate the result against the intention and adjust for deviations from intention.		Car appears to show signal lights, but is otherwise immobile, or does not follow predicted path.	Car moves mostly as expected; can arrive near the end of expected route.	Car executes apple proposed maneuvers, and is even able to demonstrate some novel maneuvering, with a programmer who can explain how choices in routine lead to movements completed.
Evaluate	Students will evaluate the results of the test, and collaborate to compare results and troubleshoot issues, communicating reasoning to peers.		Student can explain what went wrong, but cannot connect to component fix, nor propose any other solution approach.	Student is able to identify features, installations, or program components which do not support movement goals, and participates in peer discussions toward solutions.	Student is an active participant and even leader of group discussion, making connections between their own results and the observations of peers to strengthen connections to issues present, and clearly express those findings among the peer discussion.
Communicate	Students will describe the relationship between motor direction signals and physical car motion using cause and effect reasoning.		Student is able to Identify whether or not physical operation met expectations, but does not make any links to relevant causes.	Student traces path from code to component to limitations and can offer meaningful insight to what causes resulted in the car's motion and its limitation.	Student makes clear distinctions between multiple systems on the car, which ones worked well and which have not accomplished expected goals, what causes affected the outcomes, and how individual causes contributed to the larger picture of performance.
Iterate	Students will propose an iterative change to their assembly in order to address the structural needs they discover.		Student suggests that a fix might help, but doesn't identify any specific changes or possible future tests.	Student can identify at least one way to solve the structural limitation, and can chart a reasonable path to implementation.	Student can identify specific ways to improve car design with re-imagined or re-configured components, with clear expectations about how proposed improvements will affect the movements possible with the car.