RAMPED – Summer 2016

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Easy Lesson Plan Template[1]

P = Pretest (think essential questions)
O = Objectives (measurable - see Bloom's taxonomy)
C = Catch (hook, anticipatory set, etc... use different senses, not a question)
A = Activity (procedure of what the students should do)
R = Review (how will students go over what they've learned?)
A = Assessment (formative and/or summative)
P = Posttest (same as pretest for comparison purposes)
S = Standards (Wyoming, NGSS, etc...) showcasing crosscutting concepts[2]

Pretest Questions	What is an arduino Describe a loop function?
Objectives	Problem solving with the arduino and a programmable robot. Writing code to perform a function.
Catch	Have several arduino kits out and several robot kits out on the tables with the message "what can you do with this???"
Activity	Start with the build sequence and create a circuit and several circuit projects with arduino so and sketches. Then progress to the point of a small robot build using the makebot robot from Amazon (75$). The task is to make the robot move in a simple pattern like a circle.
Review	The review will be whether the program makes the robot move or not. The troubleshooting will create the review of the ones that do not work and those that are successful can progress.
Assessments	The assessment will be a demonstration of what they have completed.
Posttest Questions (same as pretest questions)	What is an arduino? How does the arduino make the robot move? What other applications could there be for arduinos?
Standards	Students who demonstrate understanding can: **HS-ETS1-4.** **Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.**

[1] Please add/attach any handouts for this activity to the end of this template
[2] http://ngss.nsta.org/CrosscuttingConceptsFull.aspx

The performance expectation above was developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Using Mathematics and Computational Thinking Mathematical and computational thinking in 9-12 builds on K-8 experiences and progresses to using algebraic thinking and analysis, a range of linear and nonlinear functions including trigonometric functions, exponentials and logarithms, and computational tools for statistical analysis to analyze, represent, and model data. Simple computational simulations are created and used based on mathematical models of basic assumptions. ● Use mathematical models and/or computer simulations to predict the effects of a design solution on systems and/or the interactions between systems.	**ETS1.B: Developing Possible Solutions** ● Both physical models and computers can be used in various ways to aid in the engineering design process. Computers are useful for a variety of purposes, such as running simulations to test different ways of solving a problem or to see which one is most efficient or economical; and in making a persuasive presentation to a client about how a given design will meet his or her needs.	**Systems and System Models** ● Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions—including energy, matter, and information flows—within and between systems at different scales.

Connections to HS-ETS1.B: Developing Possible Solutions Problems include:
Earth and Space Science: HS-ESS3-2, HS-ESS3-4 **Life Science:** HS-LS2-7, HS-LS4-6

Articulation of DCIs across grade-levels:
MS.ETS1.A ; **MS.ETS1.B** ; **MS.ETS1.C**

Common Core State Standards Connections:
Mathematics -

MP.2	Reason abstractly and quantitatively.	*(HS-ETS1-4)*
MP.4	Model with mathematics.	(HS-ETS1-4)

Crosscutting Concepts from NGSS	See above.