RAMPED – Summer 2016

Paul Kasza – Raspberry Pi Lesson Plan

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[†]

Pretest Questions	1. What happens when you wear BLACK on a sunny day? Why? 2. What happens when you wear WHITE on a sunny day? Why?
Objectives	1. Understand that absorption of IR causes objects to become hot 2. Understand that different materials absorb different amounts of IR radiation
Catch	Talk about Eye Black (black grease that some athletes put under their eyes) and what it's used for, and does it work? Then hand out some Eye Black and let students apply it and see if they think it works. (Student behavior with this catch should be considered.)
Activity	1. Wrap a Raspberry Pi and Sense HAT in black paper. 2. Place the Raspberry Pi on a heat-proof mat and position a table lamp 30cm away from it. 3. Start the code and enter a suitable filename for the results. 4. Enter the number of results required and the interval between each measurement. 5. Switch on the table lamp and press Enter on the keyboard (or the button on the Sense HAT). 6. Once the results have been collected they will be written to a file which can be analyzed. 7. Replace the black paper with silver foil and repeat the steps above. 8. Load both .csv files in Excel, and plot both (on the same graph) with time in the X axis, temperature in the Y axis 9. Students write a paragraph summary as to the physical phenomena that is occurring. They should discusses absorption, reflection, what we see, what the material experiences, radiation, etc.
Review	1. Pull out a block of reflective silvery metal and a block of dark wood 2. Leave them in the sun (or under a lamp) while students are completing the assignment. 3. Have students predict what the relative temperatures will be of both, then measure the temperatures and discuss the results with the students. 4. Have them predict how both will feel (when held) compared to each other? Then pass out both and have students feel both, and discuss what they feel. This will lead into a future lesson regarding heat capacity and heat conductivity.

[†] http://ngss.nsta.org/CrosscuttingConceptsFull.aspx

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Assessments	Exit sheets – students should list 2 things that they learned (or concepts that we solidified) during today
Posttest Questions (same as pretest questions)	1. What happens when you wear BLACK on a sunny day? Why? 2. What happens when you wear WHITE on a sunny day? Why?
Standards	• WY 2008: SC11.1.13 • WY Proposed 2016: HS-PS4-1 and HS-PS4-5
Crosscutting Concepts from NGSS	• Systems can be designed to cause a desired effect. • Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects. • Energy and matter interact with each other