Science Lesson Plan
Summary of Lesson: M-files

This was the second lesson on Matlab for the students with the goal of writing basic script files to solve an equation. The equation that was used was the range equation because it was an equation that the students have already worked with in class.

$$Range = \frac{V_0{}^2 Sin(2\theta)}{g}$$

They were also given the following parameters.

$$V_0 = \frac{25m}{s}$$

$$\theta = 45^o$$

$$g = 9.8\frac{m}{s^2}$$

For this lesson they worked only with scalars and not vectors. Vectors will be covered in the next lesson.

The students worked on the code by themselves for a minute or two and then we came back together as a group and went over it. Once we had it working, there were a couple of points that I made sure they understood:

1. After a line will not "print out" that code in the command window. This comes important when there is a long code and all you want to see is the answer.

2. "clc" and "clear all" at the top of the code will clear the command window and workspace respectively. This is a preference of mine when I code because it clears out the command window so you can see only what you just ran as well as clears out any variables that mine be stored in the workspace.

3. COMMENTS! Students need to understand the need for comments. If they were to give the code to someone else they need to be able to understand your

methodology. Each student needs a header on the top of the code and have constants and equations defines with units

Teacher: Molly Clay
Period: **Class: Honors Physics Lowell High School**
Date(s):   October 2011

SETTING THE STAGE	
Essential Question	Why use Matlab?
Content Objective(s) (Student-friendly)	Write a basic code in an M-File to solve the range equation
Connection to previous or future lessons	The previous lesson the students worked in the Command Window were you cannot save data. During this lesson we worked on how to write and save a code, especially a long code in an M-File. The students will work only with scalars for this code and the next lesson learn how to create 1-D arrays (vectors)
Critical Thinking Questions	
Key Vocabulary	Command window Workspace Variable Command History syntax
Materials Needed/Safety	Laptops Notebooks Pencil
ACTIVE INSTRUCTION	
• Launch (Engage)	The students will get the laptop outs…working with laptops directly in the classroom will grab the students attention
• Investigation (Explore)	The students will write a basic Matlab M-File to solve the range equation. The students will be given the equation with the constants and asked to set-up the problem on their own. After a couple of minutes we will come back as a group and go over what the code should look like. After they have it working we will discuss the importance of commenting the code.
TIME FOR REFLECTION	
• Summarization (Explain & Extend)	We will discuss as a group how to save and write basic M-Files as well as why we would need to comment/add explanation to it.
• Assessment (Evaluate)	NONE

• Homework	NONE

MATLAB
Lesson 2: M-Files

Molly Clay
GK-12 Fellow
Vibes and Waves in Action
NSF Award #0841392
Physics – Lowell High School
October 20, 2011

Goals for Today

1. Saving M-Files

2. Writing a basic code to solve the Range equation

Create M-File

‣ Save set of commands in a file and run then all at once

‣ Long code that requires more than a couple of commands
  ◦ You can save it! (filename.m)

New M-File:
  ◦ File → New → M-File (opens blank page)→ Save
Old M-File:
  ◦ File → Open → Select a desired M-File → Click Open→File → Save as new M-file

Saving M-Files

‣ We are going to be organized this year!

‣ Create folders:
  Matlab →Project Name→M-Files

‣ **RULES:**
  ◦ Must begin with a letter
  ◦ Can include digits & underscores
  ◦ NO SPACES!! Use an underscore_

P#_PROJECTNAME_lastname_ firstinitial_YYMMDD

M-Files
Molly Clay
Lowell High School
October 20, 2011

```matlab
%Molly Clay
%October 20, 2011
%Honors Physics 6
%Range 1

%Starting M-File:
clc;
clear all;

%Givens (Constants)
Vo = 25;
%Initial Velocity (m/s)

Theta = 45;
%Angle (Degrees)

g = 9.8;
%Gravity (m/s^2)

%Solve Range Equation
R = (Vo^2*sind(2*Theta))/g
```