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**NSF GK-12 Vibes and Waves in Action**  
**Honors and CP Physics**  
**Lesson 9: More R Review**

**Summary of Lesson**

Another R Review lesson was given to the students to further reinforce the basics of programming before moving onto more complex programming concepts. The students were first given a sample program that will calculate the tip on a bill. The students were asked to insert a comment before each line to explain what that line is doing. They were then asked to determine what they would expect for the output if the bill was \$100. A demo was shown to the class with a discussion of how that program worked. Next it was the student's turn to write their own practice program. The objective of this program was to calculate the final price of an item that is on sale at a discount. The round() command was introduced to help with this assignment.

## Honors and CP Physics Lesson Plan

**Text:** Conceptual Physics, Paul G. Hewitt

**Chapter:** NONE

**Objectives:** Practice and reinforce basic programming concepts in R

**Essential Question:** Why is it important to write the program in a logical and sequential way?

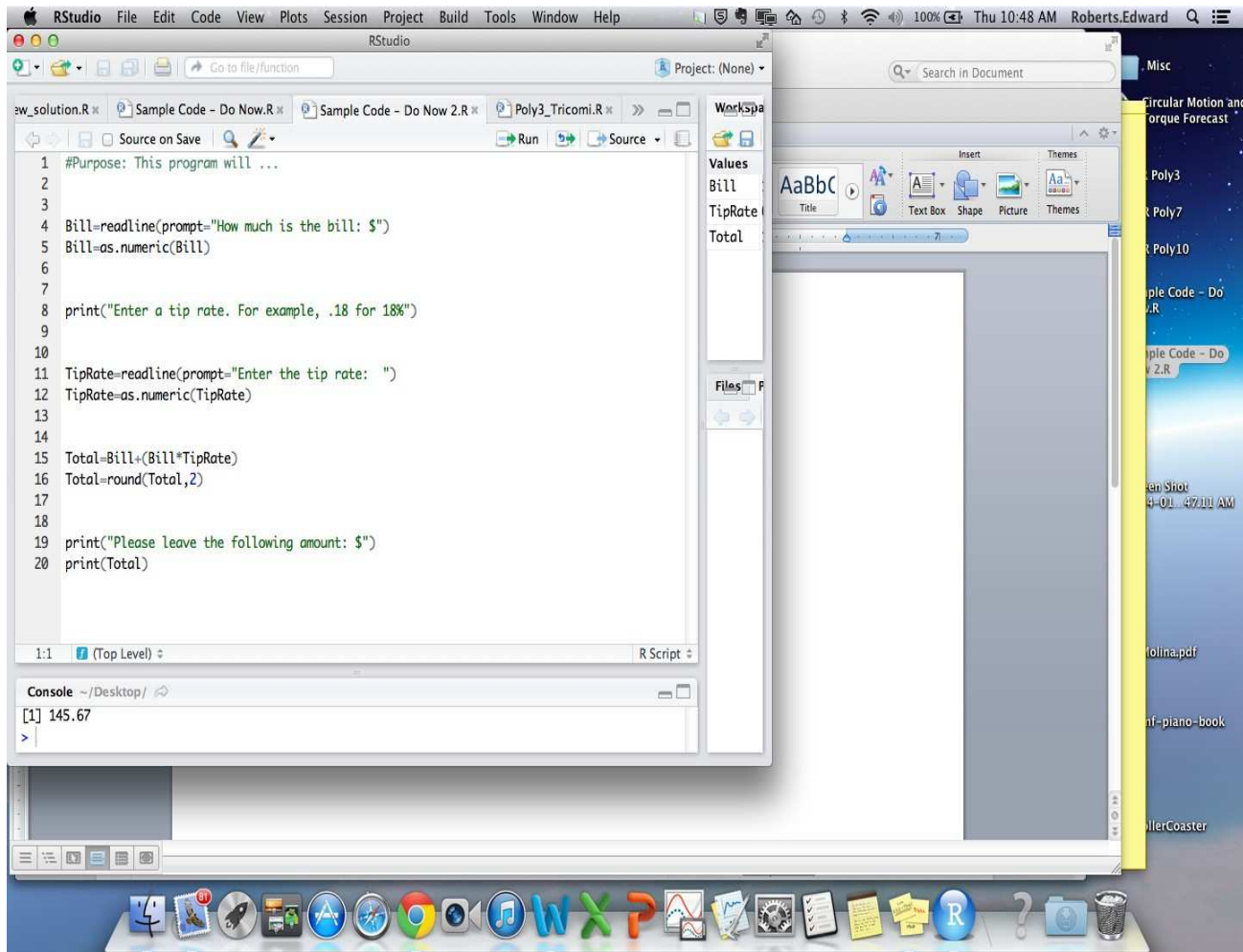
**Frameworks:** SIS1, SIS2, SIS3, SIS4

L-Side Activities: Teacher	R-Side Notes: Students
<p><b>At the Bell:</b> Analyze the given program by placing a comment above each line that explains the function of that line of code. Write the input and predict the output given that the input is based on a \$100 bill.</p> <p><b>Agenda:</b> 1. Review the At the Bell 2. On Sale! Activity 3. Explain round() command</p> <p><b>Working It Out:</b></p> <ol style="list-style-type: none"><li>1. Why is it important to write the program in a logical and sequential way?</li><li>2. How do you round numbers in R?</li></ol> <p><b>Class Activity:</b> Complete the On Sale! Activity to calculate the final price of an item that is on sale at a specified discount. The program must prompt the user to enter the original price of the item. The program must prompt the user to enter the amount of the discount. The program must display the final price of the item after the discount. The final price must be rounded to two decimal places.</p> <p><b>Homework:</b> Add comments to a given code snippet that explain what the program is doing</p>	

## R Practice

Name: \_\_\_\_\_

- 1) Read the following program.
- 2) Complete the #Purpose comment at the beginning.
- 3) Insert a comment (using #) before each section that provides an explanation of that section's purpose.



The screenshot shows the RStudio interface. The main editor window displays the following R code:

```
1 #Purpose: This program will ...
2
3
4 Bill=readline(prompt="How much is the bill: $")
5 Bill=as.numeric(Bill)
6
7
8 print("Enter a tip rate. For example, .18 for 18%")
9
10
11 TipRate=readline(prompt="Enter the tip rate: ")
12 TipRate=as.numeric(TipRate)
13
14
15 Total=Bill+(Bill*TipRate)
16 Total=round(Total,2)
17
18
19 print("Please leave the following amount: $")
20 print(Total)
```

The console window at the bottom shows the output of the script:

```
[1] 145.67
>
```

The environment pane on the right shows the following variables:

```
Bill
TipRate
Total
```

In the space below, show an example of the input and output. Show anything that the program displays or the user enters. Use \$100 as the amount of the bill.

## Objective #1: Use R to calculate the final price of an item that is on sale at a specified discount.

### Requirements:

- use comments in a minimum of three locations within the program (helpful and appropriate)
- the program must prompt the user to enter the original price of the item
- the program must prompt the user to enter the amount of the discount (e.g. 15%, 20%)  
NOTE: the user will enter only a number, not the percent symbol
- the program must display the final price of the item after the discount
- the final price must be rounded to two decimal places

### How do I round numbers?

#### Usage

variable = round(variable, # of decimal places)

#### Example

```
pi = round(pi, 4)           #rounds the value of pi to four decimal places
```

### Save the File

Save this file as **Sale\_lastname** and upload it to your Google Drive. From there, you can either share it with me or attach it to an email.

### Rubric

3 = exceeds standard	_____	A minimum of three comments is used within the code.
2 = meets standard	_____	Prompts user appropriately (both)
1 = falls short of standard	_____	Displays the correct final cost of the item after discount
0 = no evidence	_____	Final cost is rounded to two decimal places
	_____	/8