Math-in-CTE Lesson Plan

Technical Mathematics

Lesson Title:	Setting Constants within Visual Basic Code	Lesson #2
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Technical Area:	Business
CTE Concept:	Using Constants in Code
Math Concept:	Fixed Values

CCSS Math Practices and Standards:

CC.K-12.MP.4 Model with mathematics

CC.K-12.MP.5 Use appropriate tools strategically

CC.9-12.NQ.1 Use units as a way to understand problems and to guide the solution of multi-step problems.

Lockport Township High School College and Career Application's Department Student Goal and Standard:

Goal: Apply problem-solving techniques.

Standard: Apply math and reading principles to problem-solving.

Lesson Objective:	**Demonstrate how constant variables can be used within a program's code.**
Supplies Needed:	**Visual Studio 2013** **Wood Cabinet Estimate Walkthrough – Part 2**

THE "7 ELEMENTS"	**TEACHER NOTES** (Plus Answer Key)
1. **Introduce the CTE lesson.** a. Today we are going to be declaring constant variables within the code for the Wood Cabinet Estimate program. b. Make sure your **code** is showing on the workspace. c. After typing the introductory comments, notice that it is indicated how much each type of wood costs. These prices will become constant variables within our code, which means they will not change regardless of what the user enters in the interface.	a. Quick review of the importance of **putting comments within the code**. b. Review the location of the **(General) list box** and the **(Declarations) list box**.

2. Assess students' *math awareness* as it relates to the CTE lesson. a. What do you know about constants? b. Why is it important to use constants within programming code? c. What other programs have we done in which constants have been used?	When the value in a program will remain the same throughout the program's execution, a constant variable should be used. Constants are important because the user cannot change the value of specific variables, such as the cost of each type of wood in this program. A constant was used in the Digital Downloads program, where the cost per download was $0.99.
3. **Work through the math example *embedded* in the CTE lesson.** Declare variables and constants within a program. a. Position the insertion point inside the Click event handler by clicking between Private Sub btnCalculateCost_Click… and End Sub. b. Write the event handler comment, as indicated in the walkthrough. c. Press Enter twice after the comment to leave a blank space between the comment and the first line of code. d. Declare the following variables: i. Dim decFeet As Decimal ii. Dim decCostPerFoot As Decimal iii. Dim decCostEstimate As Decimal **Note:** These are variables because the value can change	Walk around to make sure the students are writing the correct code and give feedback, as needed.
4. **Work through *related, contextual* Math-in-CTE examples.** Declare the following constants using the assigned values given in Step 14 of the walkthrough. a. decPineCost b. decOakCost c. decCherryCost	After a few minutes, go over what the code should look like: • Dim decPineCost As Decimal = 150D • Dim decOakCost As Decimal = 200D • Dim decCherryCost As Decimal = 350D

5. Work through the ***traditional math*** examples. The Wood Cabinet Estimate program should still be open. **Note:** The following steps will be completed after a portion of the code is set up to determine if the user is entering a numeric value and if the value for feet is greater than zero. Additionally, these are given to the students in the walkthrough. a. Using the If…Then…ElseIf structure, write the statements to identify the checked radio button and place the appropriate cost in the decCostPerFoot variable by entering the following code: ' Determine the cost per foot of wood If radPine.Checked Then decCostPerFoot = decPineCost ElseIf radOak.Checked Then decCostPerFoot = decOakCost ElseIf radCherry.Checked Then decCostPerFoot = decCherryCost Note: There should be three End If statements after this block of code b. Press Enter twice after the first End If statement c. Write the statements to calculate and display the cost estimate in currency format by entering the following code: ' Calculate and display the cost estimate decCostEstimate = decFeet * decCostPerFoot lblCostEstimate.Text = decCostEstimate.ToString() d. The students will be continuing with the walkthrough.	Walk around to make sure the students are following the directions and give feedback, as needed.
6. Students **demonstrate** their understanding. Students will be completing Cow's Coffee Supply program. a. Read and follow the given directions carefully.	Provide a screen shot within the directions of what the program is to look like. Additionally, walk around to make sure students are working and help them, as needed.

7. **Formal assessment**. A(n) _____ represents a location in computer memory that can change values as the code executes. a. expression b. argument c. constant d. variable A(n) _____ represents a location in computer memory, but its value cannot change during execution. a. expression b. argument c. constant d. variable Additional formal assessments of using constants and variables will take place with the following programs: Kim's Candies, Maggie and Lucie's Dog Clinic, and the Case Programming Assignments – Unit 2, Part 2. Source of Formal Assessment Items: Sample release and retired items from ACT, ACT COMPASS (including Joliet Junior College (JJC) Sample Release Items), ACT Explore, ACT WorkKeys, Illustrative Mathematics, Career Cruising, National Assessment of Educational Progress (NAEP), Partnership for Assessment of Readiness for College and Careers (PARCC), Trends in International Mathematics and Science Study (TIMSS), and teacher-constructed test items.	**Answers:** **d. variable** **c. constant** Note: Specific points within the rubrics for the programs will determine whether or not the students have used variables and constants correctly within their code by testing the program with random data, as chosen by the teacher.