Math-in-CTE Lesson Plan

Technical Mathematics

Lesson Title:	Aligning Objects on a Graphical User Interface (GUI)	Lesson #1
Writers:	Susan Palis and Ryan Visser, Lockport Township High School	

Technical Area:	Business
CTE Concept:	Creating an Effective Graphical User Interface
Math Concepts:	Modeling and Symmetry

CCSS Math Practices and Standards:

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

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

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 to align objects** (labels, picture boxes, and buttons) **on a Visual Basic form.**
Supplies Needed:	**Visual Studio 2013** **Hotel Room Selection Walkthrough – Part 1**

THE "7 ELEMENTS"	**TEACHER NOTES** (Plus Answer Key)
1. Introduce the CTE lesson. a. Properly creating the user interface is important because it is what the user sees. Today we are going to be aligning the objects on the interface we created for the Hotel Room Selection program. b. Make sure your **form** is showing on the workspace. Now look at the **Format** menu. c. At this point, you will notice that none of the commands can be selected since they are used to format specific objects.	a. Quick review of the **key points to a successful user interface**. b. After locating the **Format** menu, notice the commands are displayed in submenus (i.e., Align, Make Same Size, and Center in Form). c. Now, select the Align submenu and point to each command starting with the first one. i. What is the first one? **Align lefts** ii. And the second? **Align centers** iii. Continue – **Rights, Tops, Middles, Bottoms, To Grid** d. Now, let's move to the second submenu, Make Same Size: **Width, Height, Both, Size to Grid** e. Let's go to the Center in Form submenu: **Horizontally** and **Vertically** f. Notice with Visual Studio, there is not a default alignment.

2. Assess students' *math awareness* as it relates to the CTE lesson. a. What do you know about alignment? b. Why is it important to properly align objects on a Visual Basic form? c. How might the alignment in Visual Basic be similar to what you have seen in programs, such as Microsoft Word? d. How might the alignment in Visual Basic be different from what you have seen in programs, such as Microsoft Word?	Alignment tells us that something is arranged in a straight line or in a relative position. Think of one object, such as a picture, can be even on the **left**, a second one can be even in the **center**, and a third one can be even on the **right**. Equal distance from a border is the term **symmetry** (balance) in math.
3. **Work through the math example *embedded* in the CTE lesson.** **Note:** The following steps are completed after students add several objects to the user interface, as stated previously in the Hotel Room Selection Walkthrough–Part 1. Make two objects the same size. a. After adding the second picture box from the previous step(s) in the walkthrough, notice that the picture boxes are different sizes. b. Click the first picture box, picStandardRoom, hold down the Ctrl key, and click on the second picture box, picDeluxeRoom. c. Go to Format → Make Same Size → Both	Walk around to make sure the students are selecting the correct objects and give feedback, as needed.
4. **Work through *related, contextual* math-in-CTE examples.** You will now make the five buttons the same size. a. Show the screenshot on the screen, and read and follow the directions as given in the walkthrough.	Provide a screenshot showing what the finished form should look like: • Click the button with the most text (Standard Room) • Expand the button so all of the text fits • While holding down the Ctrl key, select the other four buttons • Go to Format → Make Same Size → Both

5. **Work through the *traditional math* examples.** The Hotel Room Selection program should still be open. a. Click on the heading label and center the label **horizontally** on the form. b. Click on the instructions label and center the label **horizontally** on the form. c. Click on the confirmation label and center the label **horizontally** on the form. d. Click on the Exit Window button and center the button **horizontally** on the form. e. The students will be continuing with the walkthrough.	Walk around to make sure the students are selecting the correct objects and give feedback, as needed.
6. **Students *demonstrate* their understanding.** Students complete three of six programs from the Case Programming Assignments. a. Read and follow the given directions carefully.	Provide screen shots on the class Haiku page showing what two of the programs might look like.
7. **Formal assessment**. Due to the nature of this class, the formal assessment of creating an effective user interface takes place when the students complete the programming portion of the test. 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.	NOTE: Odd computers complete a program that allows the user to choose his/her favorite Chicago landmark from a list. Even computers complete a program that allows the user to choose his/her favorite Chicago sports team. Points within the rubric determine whether or not the students used symmetry to create an effective graphical user interface.