

## VITAL INFORMATION

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<b>Subject(s):</b>	Careers, Computer Fundamentals 1-2
<b>Topic or Unit of Study:</b>	Software Development
<b>Grade/Level:</b>	9-12
<b>Objective:</b>	At the conclusion of this lesson students will be able to: <ol style="list-style-type: none"><li>1. Determine input and output for a program.</li><li>2. Independently name identifiers according to convention.</li><li>3. Assign input to variables.</li><li>4. Program a mathematical formula.</li><li>5. Declare variables used in parameter passing.</li><li>6. Use parameters for passing data into the formula.</li></ol>

**Summary:** Students create a special purpose calculator in Visual Basic. It solves an approved mathematical problem from their homework from another class (e.g., physics) or from home (e.g., utility bill estimation). It may involve more than two inputs and operations more complex than arithmetic. In any case it should be useful or significant to the student. In writing the program they separate the presentation layer from the model by having the click handler extract the data and a function perform the calculation.

## IMPLEMENTATION

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**Learning Context:** Students have completed several calculators all of which were specified by the teacher. They have succeeded in putting the computer to work, but now they need it to work for them. They have the opportunity to figure out input and output, generate their own variable names, and write the formula independently. Computer programming should be becoming a means of making tools that solve problems. It is a tool building tool.

**Procedure:** 0. Give students one or more days to check their textbooks, notes, or home for possible equations to program. Have them submit their equations for approval. They have already programmed an adder, for example, and shouldn't be allowed to repeat that. Some equations in calculus will be too difficult for them at present. Equations returning multiple values, involving summation, or incorporating decisions would require additional instruction which may be possible in the smallest classes. Use the textbooks on hand in the classroom for students who

forget to bring their equations.

1. Show students the example from the web page for the project. Make certain that they understand the positional parameters and why the formula might be written to be independent of the way that values are entered into the program. The web page has a short explanation of that.

2. Students should be able to work independently now, so allow them to do so. Evaluate their work when it is complete based on the rubric.

**Differentiated Instruction:**

Each student should have a different equation to program. It is my hope that the top students choose particularly difficult equations to implement and the struggling students choose equations that are equally on the edge of their grasp.

**Sample Student Products:**

I will keep a record of the equations that students pick. They will be useful if ever the lesson is repeated.

**Collaboration:**

Students will work individually.

**Time Allotment:**

1 class period. 55 Min. per class.

**Author's Comments & Reflections:**

Reflections will follow in a diary entry.

## MATERIALS AND RESOURCES

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**Instructional Materials:**

Class web site

**Attachments**

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| 1. <a href="#">Homework Calculator</a> |
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**Resources:**

- Technology resources:  
Visual Basic

## STANDARDS & ASSESSMENT

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**Standards:**

 **AZ- Career and Technical Education Programs**

- **Level** : Career Preparation (Grades 10 - 12)
- **Program** : Information Technology CIP No. 15.1200
- **Option** : Software Development - Option C
- **Competency** : \*3.0 DEVELOP APPROPRIATE WORK HABITS FOR SUCCESSFUL EMPLOYMENT IN INFORMATION TECHNOLOGY
  - **Indicator** : 3.3 Complete tasks accurately
  - **Indicator** : 3.4 Complete tasks with minimal supervision
- **Competency** : \*9.0 UTILIZE TECHNOLOGY REQUIRED IN AN INFORMATION TECHNOLOGY WORKPLACE
  - **Indicator** : 9.2 Demonstrate basic usage of computers such as input, storage, and output
- **Competency** : 16.0 PARTICIPATE IN INFORMATION TECHNOLOGY WORK-BASED LEARNING EXPERIENCES
  - **Indicator** : 16.1 Use technology appropriate for a job in information

technology

- **Competency** : 27.C DEMONSTRATE PROGRAM ANALYSIS AND DESIGN
  - **Indicator** : 27.4c Determine input and output
  - **Indicator** : 27.8c Write documentation
- **Competency** : 28.C USE SOFTWARE TO CREATE PROGRAMS
  - **Indicator** : 28.1c Enter and modify code using a program editor
  - **Indicator** : 28.2c Compile and execute programs
  - **Indicator** : 28.3c Correct syntax errors
  - **Indicator** : 28.5c Use recognized conventions for naming identifiers and formatting code
- **Competency** : 30.C WRITE CODE TO PERFORM ARITHMETIC CALCULATIONS
  - **Indicator** : 30.1c Identify and use arithmetic operators correctly applying the order of operations with respect to programming
  - **Indicator** : 30.2c Interpret and construct mathematical formulas
- **Competency** : 31.C EMPLOY MODULARITY IN WRITING PROGRAMS
  - **Indicator** : 31.1c Call standard library functions
  - **Indicator** : 31.2c Utilize parameters to pass data into program modules
  - **Indicator** : 31.4c Write and use modules that return values
  - **Indicator** : 31.3c Code modules based on a top-down design
  - **Indicator** : 31.5c Write cohesive units with minimal coupling
- **Competency** : 34.C USE SIMPLE DATA TYPES AND STRINGS
  - **Indicator** : 34.1c Declare numeric, Boolean, character and string variables
- **Competency** : 36.C IDENTIFY WAYS TO INPUT AND OUTPUT INFORMATION
  - **Indicator** : 36.3c Assign input to variables

**Assessment/Rubrics:**

**Rubrics**

1. <u>Homework Calculator</u>
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