

The Heritage Computer Challenge
2006
Heritage High School
Newport News, Virginia
Visual Basic Division



Welcome

Welcome to the Heritage Computer Challenge for 2006! You are to be commended for taking the time and making the effort to be here today. Have a great time and may all your programming efforts be successful!

~Mr. Charles F. Monroe, Contest Director

Instructions

The problems for this contest appear on the following pages, listed in order of difficulty. The maximum number of points you can earn is indicated under the title to each problem.

Problems are designed in the format used by The Great Computer Challenge, held annually each Spring at Old Dominion University. Some of these problems were actually used at the Great Computer Challenge in previous years.

Because Great Computer Challenge Problems are designed for all versions of Basic, including those that are only text based, most or all of these problems will also follow that format. You will therefore be required to simulate a text-based environment even though Visual Basic is primarily graphical.

For problems that require user input, you may use any combination of Visual Basic controls, including but not limited to text boxes, input boxes, check boxes, radio buttons, and combo boxes.

Solutions should be saved as a project on your personal drive K **in a folder whose name is IDENTICAL to the project file name** (minus the extension **.vbp**). Form file names are up to you.

Problem List

Wind Chill	10 points
Three Sailors and a Monkey	10 points
Julian Dates	20 points
Drag and Release	30 points

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Wind Chill
(10 points)

In the winter time, when it's cold outside, the weather forecaster on television tells us the temperature outside in two ways. First, we get the actual temperature. Second, we get the "wind chill", which is a measure of how cold the air feels to human skin.

The National Weather Service currently uses a special formula to calculate wind chill. It is:

$$W = 35.74 + 0.6215T - 35.75V^{0.16} + 0.4275TV^{0.16}$$

where T is the actual temperature in Fahrenheit,

V is wind speed in miles per hour,

and W is the wind chill.

Write a Visual Basic program that allows the user to type the temperature and wind speed into two text boxes. When the user clicks a button labeled "Calculate Wind Chill", the wind chill is displayed below the button using a label.

People don't care about fractions of degrees, so your wind chill value should be rounded to the nearest whole number.

Here is some sample data so you can check your answers.

Temperature	Wind Speed	Wind Chill
32	15	22
45	25	36
25	20	11
0	5	-11

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Three Sailors and a Monkey
(10 points)

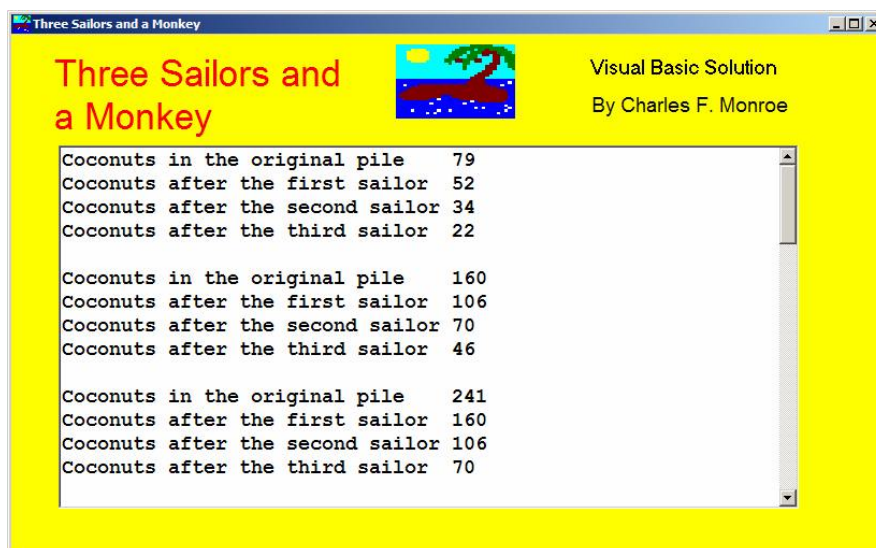
Save in folder named: Sailors

Three sailors, shipwrecked with a monkey on a desert island, have gathered on one day a pile of coconuts that are to be divided early the next day. Sometime during the night, one sailor arises, divides the pile into three equal parts, and finds one coconut left over, which he gives to the monkey. He then hides his share, and returns the remaining coconuts to a single pile. Later during the same night, each of the other two sailors arises separately and repeats the performance of the first sailor. In the morning all three sailors arise, divide the pile into three equal shares, and find one coconut left over, which they give to the monkey.

Write a program in BASIC that will compute how many coconuts were in the original pile. Since there is more than one correct answer, the program should consider all coconut piles in the range of 1 to 1000. The output should be displayed in a text box with scrollbars so we can scroll down and see all of your solutions, and consist of the following:

- The number of coconuts in the original pile.
- The number of coconuts after each sailor removes a third.

There is no input to this problem. Here is a sample showing the first three solutions. There are many more, of course.



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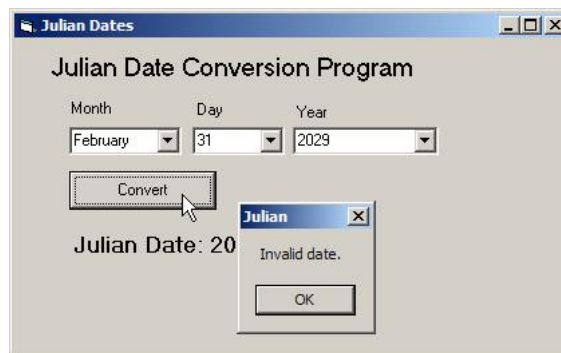
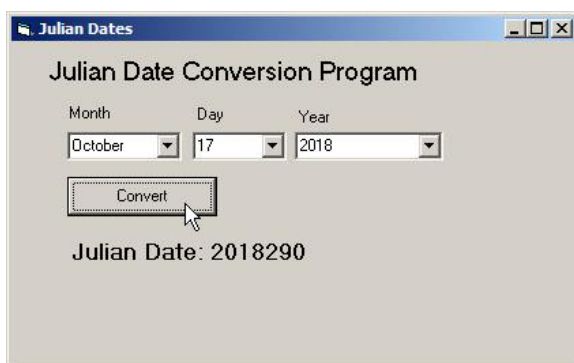
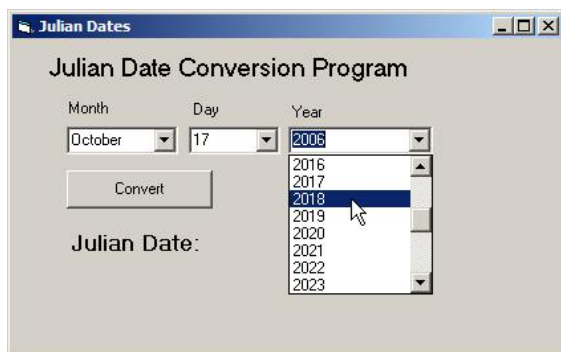
Julian Dates (20 points)

Save in folder named: Julian

Julian Dates are just another way of expressing the dates that we are all familiar with at Heritage High School. The only difference is the order and the fact that there are no months on the Julian calendar. Instead, days are simply numbered from 1 to 365 (or 366 if it is a leap year).

Design a program that allows the user to select a date (using combo boxes for the month, the day, and the year) for the years 2006 to 2036 and then displays the corresponding Julian Date in the format "YYYYnnn" where "YYYY" are the four digits of the year and "nnn" is the number of the day from 1 to 366 padded with zeroes if necessary to make three digits, for a total of 7 digits in the date.

Three different sample screen shots:



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Drag and Release
(30 points)

Save in folder named: DragRelease

Write a program that allows the user to select between two shapes—circle or rectangle--and five colors. (Use option buttons or combo boxes—your choice.)

Then when the user presses the left mouse button, drags the mouse, and releases the left mouse button the selected shape is drawn on the form in the selected color.

If the shape is a circle, the center of the circle should be the location where the left mouse button went down and the location where the left mouse button was released should be one of the points on the circle.

If the shape is a rectangle, the locations where the mouse button was pressed and then released should be opposite corners of the rectangle.

Sample run:

