The 8th Annual Newport News Computer Challenge

Wednesday, February 18, 2009

Team Packet

Visual Basic Problems

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Some Like It Hot! ~ 10 points

The Chinese Animal Zodiac
Year Problem ~ 20 points

Slot Machine ~ 20 points

Make A Face ~ 30 points

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Some Like It Hot! (10 points)

All you science whizzes out there are probably familiar with the Kelvin temperature scale, named after the British mathematician and engineer William Thomson Kelvin, who proposed it in 1848.

The Kelvin temperature scale starts with 0 degrees at "absolute zero", the temperature at which molecular energy is at a minimum and below which no temperature exists. Kelvin degrees are the same size as Celsius degrees and 0 degrees Kelvin corresponds to -273.15 degrees Celsius, so that water freezes at 273.15 degrees Kelvin (0 degrees Celsius) and water boils at 373.15 degrees Kelvin (100 degrees Celsius).

But are you familiar with the Rankine temperature scale (named after the Scottish engineer and physicist William John Macquorn Rankine, who proposed it in 1859)? ("Rankine" is pronounced "RANK-in".)

The Rankine temperature scale begins with 0 degrees at "absolute zero" just like the Kelvin temperature scale, except that its degrees are the same size as Fahrenheit degrees. So 0 degrees Rankine corresponds to -459.67 degrees Fahrenheit, water freezes at 491.67 degrees Rankine (32 degrees Fahrenheit), and water boils at 671.67 degrees Rankine (212 degrees Fahrenheit).

Design a Visual Basic program that allows the user to type a Rankine temperature into a text box. When a button is clicked, the equivalent temperatures in Fahrenheit, Celsius, and Kelvin are displayed using one or more labels placed on the form.

Use the equivalencies provided in this problem to create your conversion formulas.

All calculated temperatures should be displayed rounded to the nearest one hundredth of a degree.

Your program should reject invalid input.

Information source: answer.com

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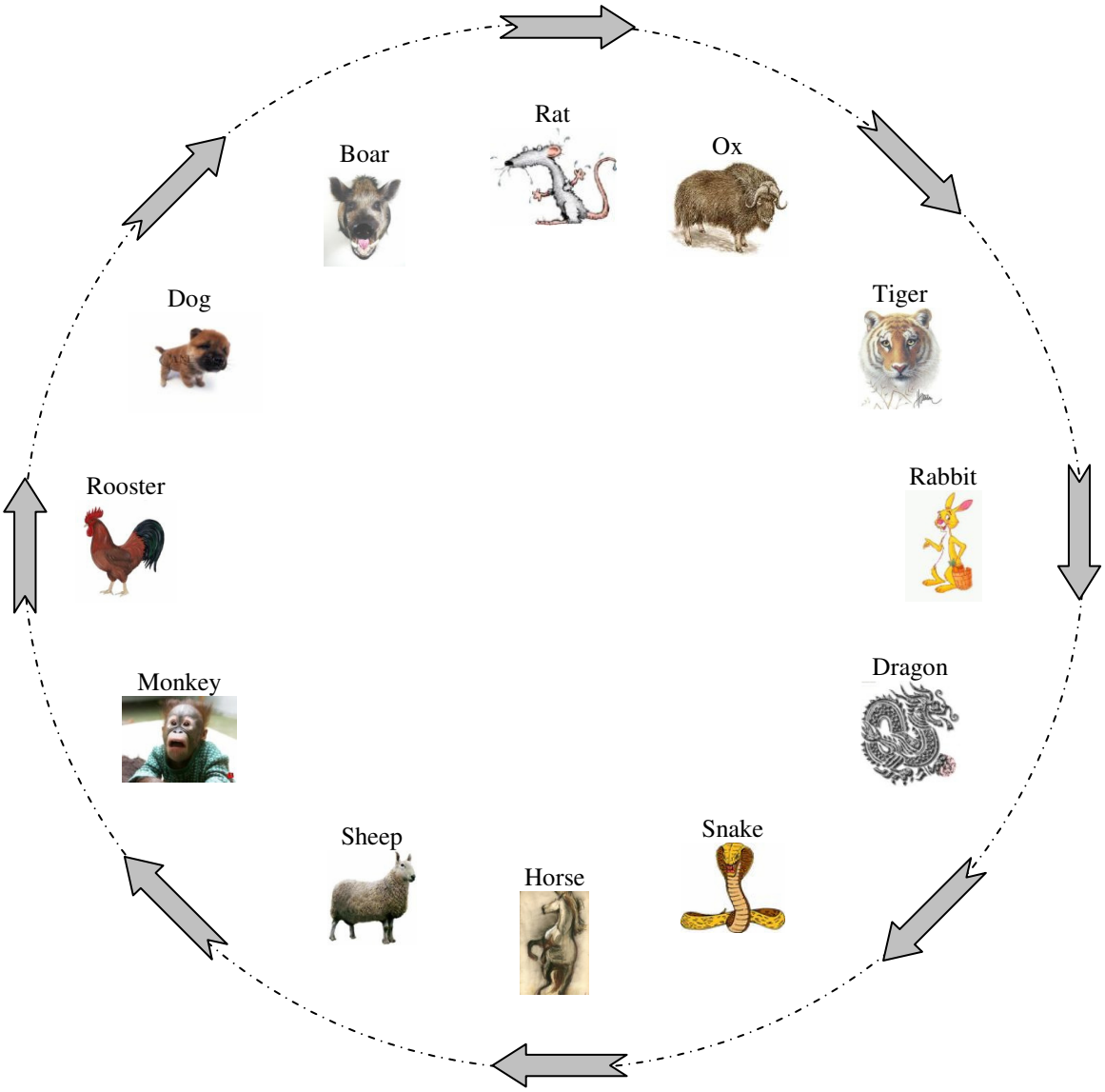
The Chinese Animal Zodiac Year Problem (20 points)

(15 points for the solution, 5 points for the images. See instructions for details.)

In the Chinese Animal Zodiac calendar, the years, for which we use numbers, are designated by twelve animals, beginning with the Rat:



Years are called "Year of the Rat", "Year of the Ox", etc.

When the "Year of the Boar" is reached, the next year is "Year of the Rat" again and the cycle repeats.

Although the Chinese New Year falls on different days yearly, somewhere between late January and early February based on the cycles of the moon, for the purposes of this problem, we will assume that Chinese Animal Zodiac years correspond exactly to years on our Western calendar (so years begin on January 1).

1996 was “The Year of the Rat”.

Design a Visual Basic program that allows the user to input a Western numerical year from 1500 to 2999 inclusive into a text box. When the user clicks a button labeled "Show Chinese Animal Zodiac Year", the appropriate Chinese Animal Zodiac Year is displayed in a label. If the year is out of range, display "Out of Range." Do not worry about other invalid input.

Samples

Western Year	*Chinese Animal Zodiac Year*
1500	The Year of the Monkey
2006	The Year of the Dog
2007	The Year of the Boar
2008	The Year of the Rat
2999	The Year of the Sheep
3000	Out of Range

To this point, if your program solves the problem correctly—correct design and layout, correct input of western year, correct calculation and display of Chinese Animal Zodiac year, and correct detection of out of range errors—you will receive up to 15 points.

If your program can correctly display the Chinese Animal Zodiac year given a western numerical year within the prescribed range, you are eligible for an additional 5 points (for a grand total of 20 points) by displaying the image of the appropriate animal next to your textual output. Twelve JPG images of the twelve animals of the Chinese Animal Zodiac have been placed in a folder named **nncc_zodiac_pics** under **My Documents** on your computer to be used for this purpose. To get the 5 points, all twelve animal images must be displayed correctly. No partial credit.

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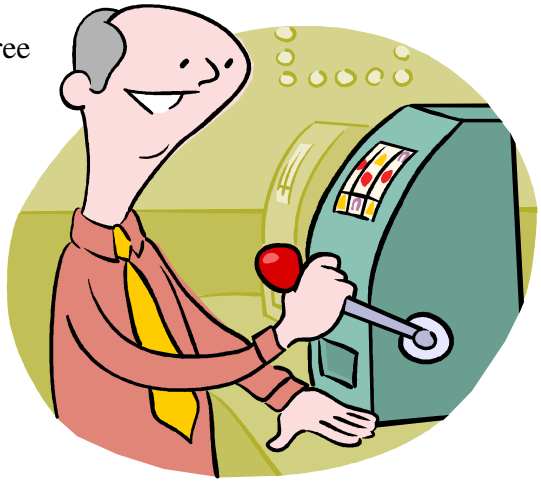
Slot Machine (20 points)



You are to design a slot machine. When the program starts, three blank images are displays. When the user clicks a button displaying the word "Roll", the program randomly selects and displays any combination of three images from a total of six images that you select*. A cumulative score is also displayed based on the rules below. Only selected images should be visible on your form.

One of the images (you decide) is the "loser". If that image appears, the player loses all money. (Be sure to indicate which image it is.)

Another of the images (you decide) is a "wild card". If that image appears, it can match with any other image except the "loser". (Be sure to indicate which image it is.)

Scoring is as follows:

```
loser is displayed - lose all money
2 matches - win $10 (unless loser is displayed)
3 matches - Jackpot! win $100 (can't be losers)
all else, roll again
```

* the six images have been placed in a folder named **nncc_slot_machine_pics** under **My Documents** on your computer to be used for this purpose. And additional image named "blank.jpg" is provided to be used when the program starts. The images (except the blank, which is invisible) look like this:

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Make A Face (30 points)

The form contains, at minimum, a slider (*called a **TrackBar** in Visual Basic 2005*) with values from 50 to 100 and a drop-down combo box listing at least six colors. Labels appear appropriately.

The user can select a value using the slider and a color using the drop-down combo box, then click anywhere on the form any number of times. Each time the user clicks, a round smiley face is drawn whose center is the place where the user clicked, whose radius in pixels is the value of the slider, and whose eye color is the color selected in the drop-down combo box. The face should have two circles for eyes (filled with the eye color) and a semicircle for a mouth.

We don't expect your faces to look nearly as good as the one pictured above.

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Visual Basic – Ruberic For Teams

Some Like It Hot! (10 points)

	Max Points
Title of problem and team's name are displayed.	1
Input:	
Text box to type a Rankine temperature is correctly labeled.	1
Output:	
Rejects invalid input (negative values).	1
Correct Fahrenheit temperature.	2
Correct Celsius temperature.	2
Correct Kelvin temperature.	2
All 3 calculated temperatures are displayed rounded to the nearest one hundredth of a degree (appending zeros if needed).	1
TOTAL	10

Chinese Animal Zodiac Year Problem (20 points)
Visual Basic - Ruberic

	Max Points
Program name and team name are displayed.	1
A text box to input Western numerical year is correctly labeled.	1
A button is labeled "Show Chinese Animal Zodiac Year".	1
The correct Chinese Animal Zodiac Year is displayed in a label.	10
If the input year is out of range, "Out of Range" is displayed (either in the label or in a message box).	2
If the correct Chinese Animal Zodiac Year is displayed (regardless of labeling or out of range detection), additional credit if the image of the appropriate animal is displayed next to the textual output. Must work for all 12 animals. No partial credit.	5
TOTAL	20

Slot Machine (20 points)

	Max Points
Program displays three blank images at startup.	1
Roll button picks 3 random images, which are correctly displayed	3
Uses 6 non-blank images	1
Wild card image: specified=1, works=2	2
Loser image: specified=1, works=2	2
Detects & displays message (+1 each) • 2 of a kind • 3 of a kind • Loser (& loses all) • all else roll again	4
Cumulative Score works (+1 each) • 2 of a kind • 3 of a kind • Loser (& loses all) • all else roll again	4
Scoring rules are displayed	1
Clever code logic: • uses functions (2 points) • uses nested ifs (1 point)	2
TOTAL	20

Make A Face (30 points)

	Max Points
Title of problem and team's name are displayed.	1
Form contains a slider.	1
Slider's min and max values are 50 and 200.	1
Combo box lists at least six colors.	1
Slider and combo box are labeled appropriately.	1
When user clicks on the form, a face, or part of a face (for partial credit) is drawn as follows:	
Outline of Face:	
• A circle (for the face) is drawn.	4
• Circle's center is click location.	4
• Circle's radius is value of slider.	4
Eyes (no credit if no face circle):	
• Two smaller circles for eyes, not intersecting each other, are drawn inside the face circle	3
• Both eye circles are filled with the eye color selected in the eye color combo box.	3
Mouth (no credit if no face circle):	
• A semicircle representing a smile (lower half of circle), not intersecting the eye circles, is drawn inside the face circle.	3
Eyes and Mouth are placed and sized proportionally to the size of the circle (works for large or small faces, no partial credit, no credit if no face circle).	4
TOTAL	30