
FLORIDA HIGH SCHOOLS COMPUTING COMPETITION '82

1.1 Write a program to play the following game: The computer picks a number to print the message "I am thinking of a number. What is the number?" The computer tells the user if the guess is too high or too low. Use numbers between 1 and 100 and allow the user 7 guesses.

1.2 Write a program to find all numbers less than 50 which can be written as the sum of two squares, i.e. $20 = 2^2 + 4^2$.

1.3 Write a program to determine the sum of all numbers between 100 and 1000 divisible by 14.

1.4 Write a program that will generate a random time (1-12, 0-60) for hours, minutes. Add to this another random time. Have the computer print both times using (:) to separate hours from minutes and the time that the clock would read when added together. (Use only a 12-hour clock).

1.5 Write a program to calculate the roots of a quadratic equation. The equation must be in the following form:
 $ax^2 + bx + c = 0$.

$$\text{roots} = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Have the computer print roots if the roots are real. Print only "complex" if not real. The user inputs the coefficients a, b, c.

1.6 Write a program that lists the prime factors of a positive integer ≤ 100 .

1.7 Write a program that calculates the future value of an investment (T) when interest is a factor, using the following formula:

$$T = P(1 + i/N)^{N \cdot y}$$

where T = total value after Years (Future value)
 P = initial investment
 i = nominal interest rate
 N = number of compounding periods per year
 y = number of years

1.8 Write a program to find three positive integers such that their sum is 43 and the sum of their cubes is 17299.

1.9 Write a program that prints any keyboard symbol on the screen for exactly 45 seconds.

1.10 Write a program to accept a user's terminating decimal input and print its equivalent fractional notation.

1.11 Write a program that prints an asterisk in the center of the screen. When the user types a U the star moves up, D down, R to the right, L to the left. Do not leave a sketched path, only one asterisk appears on the screen.

2.1 Write a program that calculates the day to the week that a given date falls upon for 1982. January 1 was a Friday. Let the user enter the date in numeric form in the order of the month and day. May 29 will be entered as 5, 29.

2.2 Write a program that calculates the area of a polygon, using the following formula:

$$\text{Area} = [(X_1 + X_2) * (Y_1 + Y_2) + (X_2 + X_3) * (Y_2 + Y_3) + \dots (X_n + X_1) * (Y_n + Y_1)] * 1/2$$

where n = the number of vertices. Let the user supply the x and y coordinates of all vertices. Have the computer ask for the number of vertices.

2.3 Write a program to find a five digit number which when multiplied by four has its digits reversed.

2.4 153 is an interesting number because $153 = 1^3 + 5^3 + 3^3$. Write a program to find three other three-digit numbers like 153.

2.5 Write a program to make a computer print the user's name in a zigzag pattern from one side of the screen to the other and back again (only one letter per line.)

2.6 Write a program to repeatedly print a stick figure. Make the figure wave his arm.

2.7 Write a program that will accept the user's letters. Have the program randomly scramble them until a word appears. (The user's letters will be able to make a word).

2.8 Write a program to drill typing skills. Have the computer print four random letters, numbers, or symbols. The computer is to wait for the user's response. If the user types all four correctly, print time that elapsed. If wrong, tell which keys were not typed correctly.

2.9 Write a program that asks the user for the price of an item and what denomination of money the user has. Have the computer print the change returned using the fewest coins and bills possible. (No half-dollars to be used).

2.10 Write a program that converts a measure given in anglo units to metric units. Make the following conversions available: inches to centimeters, feet to centimeters, feet to meters, yards to meters, miles to kilometers.

Note: 1 inch = 2.54 centimeters
1 foot = 12 inches
1 yard = 3 feet
1 meter = 100 centimeters
1 kilometer = 1000 meters
1 mile = 5280 feet

2.11 Write a program to find four integers A, B, C and D which satisfy

$$A^B \times C^D = ABCD$$

2.12 Write a program that calculates the number of days between two given dates in the same year. The program should assume there is one day between today and tomorrow, there are two days between May 1 and May 3.

2.13 Write a program to print a check. Let the user provide the date (using numbers for month, day and year), amount, and payee of the check. The program is to translate the date and amount to words and prints providing spacing within the check.

3.1 Write a program to play Mastermind where the user guesses the computers arrangement of six colors (red, white, blue, green, yellow, black).

3.2 Write a program to plot points on a set of coordinate axes. The user provides the x and y coordinates of all points to be plotted, the end points of the x- and y-axis, and the increment between points on each axis.

The axis are to be switched so that the x-axis runs horizontal. The axes do not necessarily intersect at zero. Where the axes meet is to be printed at the top of each graph.

INTERSECTION AT (50,50)

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*           + (52, 58)
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*      +
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*           +
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3.3 A magic square is an array of numbers with just as many rows as columns whereby the sum of any row, column or diagonal is always the same. No number may be used twice in constructing the array.

Write a program to generate magic squares up to 12 x 12. Let the user specify the size desired. The sum in question may be anything.

3.4 Write a program to add and multiply any two Roman numerals inputted. Perform both operations on the numbers and print both answers in Roman form. Have the computer type out the Arabic equivalent underneath each set of equations.

3.5 A 4 digit squumber is a number in which if you add the two left digits to the two right digits you get a number which when squared brings you back to the original number.

example: 2025
 $20 + 25 = 45$ and $(45)^2 = 2025$

Write a program to find all 4 digit squumbers!

3.6 Write a program to play NIM with a user.

3.7 Write a program that accepts a list of 16 numbers from the user. Have the computer ask the user for another number. Have the computer print between which two numbers in the list the last number falls.

3.8 BONUS

Write a program that guesses the state of the United States of America that the user has in mind. The computer asks yes or no questions.

3 points if guessed in 6 or less questions
2 points if guessed in 7-9 questions
1 point if guessed in 10-12 questions