

Week 5 Exercise Sheet

Identifying Variables, IPO Charts, Flowcharts, and Pseudocode

For each problem, identify the variables and then create an IPO chart, a flowchart, and pseudocode.

What to do for each question

1. Identify variables
2. Write an IPO chart
3. Draw a flowchart
4. Write pseudocode

Reminder

Use proper decision symbols for comparisons and loops for repeated steps.

Question 1: Find if the user input year is a leap year or not.

Question 2: Find and display the largest of three input numbers A, B, and C. If any two numbers are equal, display 'Two numbers are equal' and if all three are equal, display 'All inputs are equal'.

Question 3: Calculate the area of a right-angled triangle using base and height.

Question 4: Calculate yearly tax for an employee. The standard non-taxed personal allowance per year is £12,570, then the 'Basic Rate' is 20% for yearly income band £12,571 to £50,270, the 'Higher Rate' is 40% for yearly income band £50,271 to £125,140 and the 'Additional Rate' is 45% for yearly income band above £125,140. The user inputs the yearly income and the name of their rate the program outputs their yearly tax payment.

Question 5: Same as question 4 but the user only inputs their yearly income amount and the program outputs yearly, monthly and weekly tax payments.

Question 6: Find and display whether a given number is positive, negative, or zero.

Question 7: A Fibonacci series is a sequence of numbers that generates its next number by adding its previous two numbers, so the first 5 digits in the series is 1, 1, 2, 3, 5. Your

program should take a user input N and output the N th Fibonacci series number, i.e., if $N = 6$ output should be 8 ($3 + 5$), if $N = 7$ output should be 13 ($5 + 8$), if $N = 8$ output should be 21 ($8 + 13$), so on and so forth.

Question 8: Find whether a transaction gives a profit, a loss, or neither. Use cost price (CP) and selling price (SP).

Question 9: A program that takes the English letters in your first name until you press 0 and then outputs an encrypted string of numbers such that 'A' or 'a' is represented by 1, 'B' or 'b' is represented by 2, 'C' or 'c' is represented by 3, ..., 'Z' or 'z' is represented by 26. So, if the input was 'F', 'a', 'h', 'a', 'd' then the output would be **6 1 8 1 4**.

Question 10: Input five test marks, then calculate and display the total and average.

Question 11: Display the multiplication table for a given number N from 1 to 12.

Question 12: Find and display the sum of the first 100 odd numbers.

Question 13: Display the grade for an input mark using the following ranges: A = 80 and above, B = 70-79, C = 60-69, D = 50-59, F = below 50.

Question 14: Output all the prime numbers between 1 and a user input N .

Question 15: Generate a random number from 1 to 10. Ask the user to guess the number and display whether the guess is too low, too high, or correct. Extension: keep counting the number of guesses until the correct answer is found or the user types 'exit'.