

# A Level Computer Science: Hit the Ground Running Work

## **TASK 1 – COMPONENTS OF A COMPUTER**

1. Make a presentation about Computer processors using the following headings
  - a. The CPU
  - b. The Control Unit
  - c. Buses
    - i. Control Bus
    - ii. Data Bus
    - iii. Address Bus
  - d. Arithmetic-Logic Unit
  - e. Registers
  - f. Fetch-Decode-Execute cycle
    - i. How the registers are used in the Fetch-Execute Cycle
2. Include diagrams / Images for each of the above to illustrate their function / purpose
3. Describe the factors affecting the performance of the CPU: clock speed, number of cores, cache
4. Explain the use of pipelining in a processor to improve efficiency
5. Explain how address and data bus size relates to assembly language programs

## TASK 2 – PROGRAMMING TECHNIQUES

### 1. Debugging

Rewrite and test the following code, making sure you remove all of the errors.

```
target = 12
guesses = 0
userChoice = input("Guess the number: ")
while userChoice == target
    guess = guess * 1
    if UserChoice > target:
        print("Guess higher!")
    else:
        print("Guess lower!")
print("It took you" , userChoice, "guesses")
```

### 2. Inputs & Outputs

Rewrite and test the following code, making sure you remove all of the errors.

```
worldRecord = False
lane = 1
athlete = input("Who is in lane" + lane + "? ")
country = input("Which country does" + athlete + "represent? ")
time = input("Enter the 100m time for" , athlete)

if time < 8.0 or time > 20.0:
    time = "invalid"
elif time < 9.58:
    worldRecord = True

print("Competitor: " , athlete)
print("Country: " + country)
print("Lane number: " + lane)
print("100m time: " + time)
print("New world record: " + worldRecord)
```

### 3. Arithmetic

Write a program for each of the following tasks:

- a. Ask the user for 2 numbers
  - calculate the **total** (add)
  - calculate the **difference** between the 1<sup>st</sup> and the 2<sup>nd</sup> (subtract)
  - calculate the **product** (multiply)
  - calculate the division of 1<sup>st</sup> ÷ 2<sup>nd</sup>
  - calculate the floor division (whole number when divided)
  - calculate the modulo (remainder when divided)
  
- b. Ask for the length, width and height of a cuboid
  - calculate the **volume** (length x width x height)
  
- c. Ask for 5 numbers
  - calculate the **total**
  - calculate the **mean average**
  
- d. Ask for the radius of a circle ( $\pi = 3.14$ )
  - calculate the **circumference** ( $2 \times \pi \times r$ )
  - calculate the **area** ( $\pi \times r^2$ )
  
- e. Ask for a number
  - calculate the square of that number ( $\text{num}^2$ )
  - calculate that number<sup>6</sup>
  - calculate the square root of that number

Test your program with the following data:

- a. 1<sup>st</sup> number = 13, 2<sup>nd</sup> number = 5
  - Total = 18, Difference = 8, Product = 65,  
Division = 2.6, Floor division = 2, Modulo = 3
  
- b. length = 10, width = 5, height = 8
  - Volume = 400
  
- c. numbers: 3, 7, 2, 15, 6
  - Total = 33, Average = 6.6
  
- d. radius = 6
  - Circumference = 37.68, Area = 113.04
  
- e. number = 4
  - Square = 16, Number<sup>6</sup> = 4096, Square Root = 2

#### **4. Extension**

Find a copy of some typical formulae you would need for maths (or physics).

You might have a reminder of the key formulae in your student planner, in a text book or in your exercise book. If you don't have one then try searching for "gcse maths formulae" online.

Create a program that will carry out calculations using a wide range of different formulae – making sure you can complete the formulae with whole numbers and with fractional numbers where necessary.

Create a menu system so that the user can choose which calculations to carry out.