**QOSF Task 2:**

The problem asks us to determine whether a rectangle can be formed using four positive integers A, B, C, and D as its sides. We need to check whether there exist two sides of the rectangle with the same length. To solve this problem, we need to check all possible pairs of sides. Specifically, we need to check whether A is equal to B or C or D, and whether B is equal to C or D, and whether C is equal to D. If any of these conditions is true, then a rectangle can be formed.

To check all possible pairs of sides, we can encode the four sides of the rectangle in the quantum state of four qubits. We can then use a controlled-NOT (CNOT) gate to check whether any two qubits are equal. If any two qubits are equal, then the output state will be in the |0011⟩ state.

To implement the above algorithm in Qiskit, we first create a quantum circuit with four qubits. We then apply a Hadamard gate (H) to each qubit to put them in a superposition of the |0⟩ and |1⟩ states. We then apply two CNOT gates to check whether the first two qubits are equal, and two more CNOT gates to check whether the last two qubits are equal. We then apply another Hadamard gate to each qubit to put them back into the |0⟩ or |1⟩ state and measure all four qubits. We execute the quantum circuit on a simulator using the Aer package in Qiskit. The output of the simulator is a set of measurement results, which we can interpret as the state of the qubits after the measurement. We can then use the Statevector class in Qiskit to convert this state to a counts dictionary, which tells us how many times each possible state was observed. If the counts dictionary contains the state {'0011': 1}, then a rectangle can be formed. If a rectangle can be formed, we return 1. Otherwise, we return 0.