Karatsuba algorithm

1.What is the Karatsuba algorithm used for?

- Sorting arrays
- Matrix multiplication
- Exponentiation
- **Fast integer multiplication**

Ans: Fast integer multiplication

2. Who developed the Karatsuba algorithm?

- John von Neumann
- Donald Knuth
- **Anatolii Alexeevitch Karatsuba**
- Edsger Dijkstra

Ans: Anatolii Alexeevitch Karatsuba

3. Which mathematical operation does the Karatsuba algorithm optimize?

- Addition
- Subtraction
- **Multiplication**
- Division

Ans: Multiplication

4. In the Karatsuba algorithm, how are large numbers divided?

- Into individual digits
- **Into binary digits**
- Into blocks of equal size
- Into prime factors

Ans: Into binary digits

5. What is the key idea behind the Karatsuba algorithm?

- **Divide and conquer**
- Dynamic programming
- Randomized algorithms
- Bit manipulation

Ans: Divide and conquer

6. Which step of the Karatsuba algorithm involves recursive calls?

- Addition of partial products
- Multiplication of the high-order halves
- **Multiplication of the low-order halves**
- Combination of the partial results

Ans: Multiplication of the low-order halves

7. Which of the following is NOT a benefit of the Karatsuba algorithm?

- Improved speed for large numbers
- Reduced number of multiplications
- Reduced memory usage
- **Improved accuracy**

Ans: Improved accuracy

8. Which of the following is NOT a requirement for using the Karatsuba algorithm?

- The numbers must be positive
- The numbers must have the same number of digits
- **The numbers must be in binary representation**
- The numbers must be of equal length or differ by at most one digit

Ans: The numbers must be in binary representation

9. Which of the following algorithms is commonly used as an improvement over the Karatsuba algorithm?

- **Toom-Cook multiplication**
- Quicksort
- Dijkstra's algorithm
- Merge sort

Ans: Toom-Cook multiplication

10.In which scenario would the Karatsuba algorithm be most beneficial?

- Multiplying small numbers
- Multiplying large prime numbers
- **Multiplying numbers with highly varying lengths**
- Multiplying numbers with many trailing zeros

Ans: Multiplying numbers with highly varying lengths