

84.Karatsuba algorithm for multiplication

Program:

```
def karatsuba(x, y):  
    if x < 10 or y < 10:  
        return x * y  
  
    m = max(len(str(x)), len(str(y)))  
    m2 = m // 2  
  
    high1, low1 = divmod(x, 10**m2)  
    high2, low2 = divmod(y, 10**m2)  
  
    z0 = karatsuba(low1, low2)  
    z1 = karatsuba((low1 + high1), (low2 + high2))  
    z2 = karatsuba(high1, high2)  
  
    return z2 * 10**(2*m2) + (z1 - z2 - z0) * 10**m2 + z0
```

Example Usage

```
result = karatsuba(1234, 5678)
```

```
print(result)
```

Ouput:

7006652

=== Code Execution Successful ===

Time complexity: $O(\log n)$