

EXERCISE-84 Karatsuba algorithm for multiplication

PROGRAM

```
def karatsuba(x, y):  
    if x < 10 or y < 10:  
        return x * y  
    n = max(len(str(x)), len(str(y)))  
    n2 = n // 2  
    high1, low1 = divmod(x, 10**n2)  
    high2, low2 = divmod(y, 10**n2)  
    z0 = karatsuba(low1, low2)  
    z1 = karatsuba((low1 + high1), (low2 + high2))  
    z2 = karatsuba(high1, high2)  
    return (z2 * 10**(2*n2)) + ((z1 - z2 - z0) * 10**n2) + z0  
  
x = 1234  
y = 5678  
result = karatsuba(x, y)  
print(result)
```

OUTPUT

```
7006652
```

TIME COMPLEXITY $O(n \log_2 3)$, OR $O(n^{1.585})$