JGI JAIN DEEMED-TO-BE UNIVERSITY | SCHOOL OF COMPUTER SCIENCE AND IT

DEPARTMENT OF MASTER OF

COMPUTER APPLICATION

Mathematical Foundation for Computer Applications

Activity - 1

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Question:

Find as many possible integers as you can that can be written as the sum of cubes of positive integers, in two different ways, sharing this property with 1729.

Explanation:

The code is to print the different numbers sum which are sharing the property of 1729(Magical Numbers). The given conditions to the variables a, b, c and d should not equal but range can be set by the Limit (User). And the condition is X==Y which stores the values in the number and the dictionary. Code runs in the for loop if a=0 then the remaining ranges of b, c, d are not equal.

Program/Solution:

```
# Python program for the above approach
# Function to find Ramanujan numbers
# Made up of cubes of numbers up to L
def ramanujan_On4(limit):
    dictionary = dict()

    # Generate all quadruples a, b, c, d
    # Of integers from the range [1, L]
    for a in range(0, limit):
        for b in range(0, limit):
            for c in range(0, limit):
                for d in range(0, limit):

                    # Condition # 2:
                    # a, b, c, d is not equal
                    if ((a != b) and (a != c) and (a != d)
                        and (b != c) and (b != d)
```

```
                and (c != d)):

            x = a ** 3 + b ** 3
            y = c ** 3 + d ** 3
            if (x) == (y):
                number = a ** 3 + b ** 3
                dictionary[number] = a, b, c, d

    # Return all the possible number
    return dictionary

# Driver Code
# Given range L
L = 40
ra1_dict = ramanujan_On4(L)

# Print all the generated numbers
for i in sorted(ra1_dict):
    print(f'{i}: {ra1_dict[i]}', end ='\n')
```

Output:

```
1729: (12, 1, 10, 9)
4104: (16, 2, 15, 9)
13832: (24, 2, 20, 18)
20683: (27, 10, 24, 19)
32832: (32, 4, 30, 18)
39312: (34, 2, 33, 15)
40033: (34, 9, 33, 16)
46683: (36, 3, 30, 27)
64232: (39, 17, 36, 26)
```