# Pythagoran Triplet $a^2 + b^2 = c^2$

m1
Form all pos triplets
TC: $O(n^3)$
SC: $O(1)$

m2:
Form all pos pairs
Store $c^2$ in map
$O(n^2)$
$O(n)$

m3 3 Sum
→ Store squares of ele in array
→ sort it
→ Apply 3Sum (Two ptr)
$O(N \log N + N^2) \simeq O(N^2)$
$O(1)$

3, 2, 4, 6, 5 → 9, 4, 16, 36, 25

$b^2 + c^2 = a^2$

while (a < b)
if (a+b == c) ret true
if (a+b < c) a++
else c--

M4 → Store squares of ele in frequency arr [max $(a[i])^2$]

→ Iterate with two loops

$O(N + max(a[i])^2)$
$O((max\ a[i])^2)$

3, 2, 4, 6, 5 → 9, 4, 16, 36, 25

max: 36

| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 |
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| 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |

i = 4, $a^2$ = 4, $b^2$ = 16, $a^2 + b^2$ = 41

```
for (i = 1; i <= max; i++)        → a²
    if (freq[i] == 0) skip
    for (j = 1; j <= max; j++)    → b²
        c² → O(1)
        if (freq[j] == 0) || (i == j && freq[j] == 1)
            skip.
        we have candidate for b², evaluate c²
        int c = (i+j);
            if (c > max) skip
            if (freq[c] > 0) ret true;
ret false;
```