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Square and Square Roots

An '**Identity**' is a term in maths where the left hand side and the right hand side of that specific equation are always the same irrespective of what values you use to verify it.

These two **identities** are $(a + b)^2 = a^2 + 2ab + b^2$ and

$$(a - b)^2 = a^2 - 2ab + b^2.$$

You can use any of these formulae to **find the square**.

Find the Square of 35

Solution We know, $(a + b)^2 = a^2 + 2ab + b^2$

$$\begin{aligned}
35 &= (30 + 5)^2 \\
&= (30)^2 + 5^2 + 2(30)(5) \\
&= 900 + 25 + 300 \\
&= 1225
\end{aligned}$$

Answer Square of 35 = 1225

Find the Square of 95

Solution We know, $(a - b)^2 = a^2 - 2ab + b^2$

$$\begin{aligned}
95 &= (100 - 5)^2 \\
&= (100)^2 + 5^2 - 2(100)(5) \\
&= 10000 + 25 - 1000 \\
&= 9025
\end{aligned}$$

Answer Square of 95 = 9025

Find the square of the number 986 using diagonal method.

Using diagonal method, we have

From above, we have 6-digit square number which is obtained as below:

	8	9	6
8	6 4	7 2	4 8
9	7 2	8 1	5 4
6	4 8	5 4	3 6

6th digit = 6

5th digit = 4 + 3 + 4 = 11 (1 carry forward)

4th digit = 8 + 5 + 1 + 5 + 8 + 1 = 28 (2 carry forward)

3rd digit = 4 + 2 + 8 + 2 + 4 + 2 = 22 (2 carry forward)

2nd digit = 7 + 4 + 7 + 2 = 20 (2 carry forward)

1st digit = 6 + 2 = 8

Hence, the required number is 802816.

Find the square of the number 98 using column method.

Number is 98

$a = 9$ and $b = 8$

Thus, we have

Column I a^2	Column II $2 \times a \times b$	Column III b^2
81 <u>+15</u> 96	144 <u>+ 6</u> 150	64
96	0	4

→

Hence, $(98)^2 = 9604$

Pythagorean triplets

A collection of 3 numbers such that the sum of the square of the smaller 2 numbers is equal to the square of the third number.

Let us take an example: 3, 4, 5

$$3^2 + 4^2 = 5^2$$

$$9 + 16 = 25$$

$$25 = 25$$

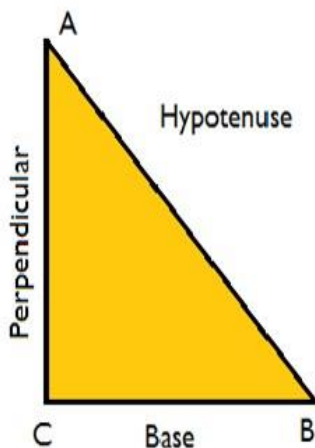
According to the Pythagorean Theorem,

In a right-angled triangle, the square of hypotenuse is equal to the sum of the squares of the perpendicular and the base.

$$h^2 = p^2 + b^2$$

How to find the members of Pythagorean triplet for a given odd number?

- Step 1: find the square of the number
- Step 2: divide it by 2
- Step 3: the numbers between which the answer lies are members of the triplet.



Another example, We are given a number 5.

- Step 1: $5^2 = 25$
- Step 2: $25 / 2 = 12.5$
- Step 3: 12.5 lies between 12 and 13. So, the Pythagorean triplet with 5 is 5, 12, 13.

How to find the members of Pythagorean triplet for a given even number?

- Step 1: divide given number by 2
- Step 2: find its square
- Step 3: the numbers between which the answer lies are members of the triplet.

Example : We are given a number 6

Solution:

- Step 1: $6 / 2 = 3$
- Step 2: $3^2 = 9$
- Step 3: 9 lies between 8 and 10. So the triplet with 6 is 6, 8, 10.
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Note:

In a Pythagorean triplet where the smallest number is odd, the difference between the other 2 numbers is 1.

In a Pythagorean triplet where the smallest number is even, the difference between the other 2 numbers is 2.

Multiples of Pythagorean triplet are also Pythagorean triplets.

3, 4, 5

*2 = 6, 8, 10

*3 = 9, 12, 15

DO YOUR SELF

Find Pythagorean triplet

(1) 17

(2) 23

(3) 25

(4) 28

(5) 30