PLAYING WITH NUMBERS

PYTHAGOREAN TRIPLET

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If the square of a number is equal to sum of square other two numbers then these three numbers are called Pythagorean triplets.

eg. 3, 4, 5 here $5^2 = 3^2 + 4^2$

Other Pythagorean triplets are (5, 12, 13), (7, 24, 25), (6, 8, 10), (8, 15, 17) etc.

For any natural number $m > 1$,

we have $(2m)^2 + (m^2 - 1)^2 = (m^2 + 1)^2$.

So, $2m$, $m^2 - 1$ and $m^2 + 1$ forms a Pythagorean triplet.

Ex.1 Write a Pythagorean triplet whose smallest member is 8.

Sol. We can get Pythagorean triplet by using general from $2m$, $m^2 - 1$, $m^2 + 1$.

Let us first take $m^2 - 1 = 8$

So, $m^2 = 8 + 1 = 9$

which gives $m = 3$

Therefore, $2m = 6$

and $m^2 + 1 = 10$

The triplet is thus 6, 8, 10. But 8 is not the smallest member of this.

So, let us try $2m = 8$

Then $m = 4$

We get $m^2 - 1 = 16 - 1 = 15$

and $m^2 + 1 = 16 + 1 = 17$

The triplet is 8, 15, 17 with 8 as the smallest member.

Ex.2 Find a Pythagorean triplet in which one member is 12.

Sol. If we take $m^2 - 1 = 12$

Then, $m^2 = 12 + 1 = 13$

Then the value of m will not be an integer.

So, we try to take $m^2 + 1 = 12$.

Again $m^2 = 11$ will not give an integer value for m.

So, let us try $2m = 12$

then $m = 6$

Thus, $m^2 - 1 = 36 - 1 = 35$

and $m^2 + 1 = 36 + 1 = 37$

Therefore, the required triplet is 12, 35, 37.