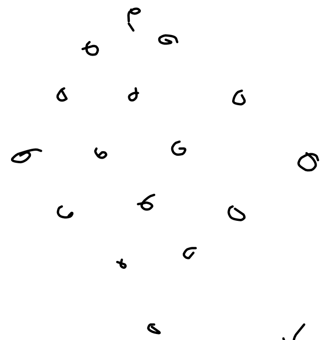
Use what you know about triangular numbers to find a formula for the "diamond" number:

eg D_4 = 

ans

$$\boxed{\underset{n}{D_4} = \underset{n}{T_4} + \underset{n-1}{T_3}}$$

+ simplify

your answer

and verify / geometrically

ans.

its just a square

Give the next two triangle-square numbers after 36.

what is ~~the~~ a rational point on the unit circle corresponding to (3, 4, 5)

(or vice versa)

2.7

$a=3$
$b=4$
$c=5$

$2(5)-2(3)=4$

$2(13)-2(5)=16$

$a=st \quad c=\dfrac{s^2+t^2}{2}$

$$\cancel{2}\left(\frac{s^2+t^2}{\cancel{2}}\right)-2(st)=s^2+t^2-2st$$
$$=s^2-2st+t^2$$
$$=(s-t)^2$$

2.5

$b = 4T_5 = 60$

$b = 4T_6 = 84$

$b = 4T_7 = 112$

(11, 60, 61)

(13, 84, 85)

(15, 112, 113)

$T_5 = 15$

$T_6 = 21$

$T_7 = 28$

$a = 2n+1$

$b = 4T_n$

$c = 4T_n + 1$

$a = 2n+1 \quad b = 4T_n \quad c = 4T_n + 1$

$T_n = \frac{n(n+1)}{2} = \frac{n^2+n}{2}$ ✓

When $t = 1$,

$a = s = 2n+1$

$b = \frac{s^2-1}{2} = \frac{(2n+1)^2-1}{2} = \frac{4(n^2+n)}{2} = 4T_n$ ✓

$c = \frac{s^2+1}{2} = \frac{(2n+1)^2+1}{2} = \frac{4n^2+4n+2}{2} = 4T_n+1$ ✓