T P H

$n(n+1)/2 = n'(3n'-1)/2 = n^{h}(2n^{h}-1)$

+1	−2− 1	3− 3	4− 6	5− 10	15		
+3	−4− 1	5	— 7 — 12	— 10 —	22	— 13 —	35
+4	−5− 1	6	— 9 — 15	— 13 —	28		45

naive { start @ H_{144}
test if Pentagonal
test if T }

Prob 45

$P = n'(3n'-1)/2 = T$

$\frac{2T}{n'} = 3n' - 1$

$T(285) = P(165) = 40755 = H(143)$

40755

next int = n+1

T_{284} = 40470	285	+286	+287	+288 ...	T_d =
P_{164} = 40262	493	+497	+500	+503 ...	
H_{142} = 40186	569	+573	+577	+581 ...	

15 P(...) 4x2 n T 3n

$T_0 = P_0 = H_0 = \phi$

$\frac{2T}{n'} + 1 = 3n'$

$2T + n' = 3n'^2$

$T = \frac{3n'^2 - n'}{2}$

$2T = 3n'^2 - n'$

$2T = n'(3n'-1)$

maybe:
calc T until >
next P, calc
next P, repeat
if ==
calc next H
etc...

$T' = 1+n$

$P' = 4 + 3(n-1) = 1+3n$

$H' = 1+4n$

$\sum_{285}^{t} 1+i = \sum_{165}^{p} 1+3i = \sum_{143}^{h} 1+4i$

~~$285 + \sum_{285}^{t} i = 165 + \sum_{165}^{p} 3i = 143 + \sum_{143}^{h} 4i$~~

~~$285 + \sum_{285}^{t} i = 165 + 3\sum_{165}^{p} i = 143 + 4\sum_{143}^{h} i$~~

~~285 = 165 = 143 =~~

~~$285 + (t-285) = 165 + 3(p-165)$~~

$\sum_{285}^{t} 1 + \sum_{285}^{t} i = \sum_{165}^{p} 1 + 3\sum_{165}^{p} i = \sum_{143}^{h} 1 + 4\sum_{143}^{h} i$

$(t-285) + \sum_{285}^{t} i = (p-165) + 3\sum_{165}^{p} i = (h-143) + 4\sum_{143}^{h} i$

$$(t-285)+\frac{t(t+1)}{2}-\frac{285(285-1)}{2}=(p-165)+3\left(\frac{p(p+1)}{2}-\frac{165(165-1)}{2}\right)=(h-143)+4\left(\frac{h(h+1)}{2}-\frac{143(143-1)}{2}\right)$$

$$(t-285)+\frac{t(t+1)}{2}-40470=(p-165)+3\left(\frac{p(p+1)}{2}\right)-40590=(h-143)+4\left(\frac{h(h+1)}{2}\right)-40612$$

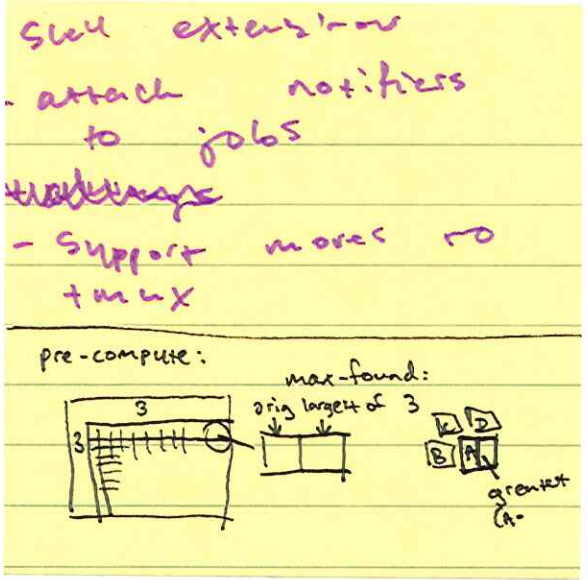
$$t+\frac{t(t+1)}{2}=40755 \quad =p+\frac{3p(p+1)}{2}-40755=h+\frac{2h(h+1)}{2}-40755 \geq 0$$

$$\frac{t^2+3t}{2}-40755=\frac{3p^2+5p}{2}-40755=2h^2+3h-40755$$

Sums

$$\begin{cases} \frac{1}{2}t^2+\frac{3}{2}t-40755=\phi \\ \frac{3}{2}p^2+\frac{5}{2}p-40755=\phi \\ 2h^2+3h-40755=\phi \end{cases}$$

$$\frac{1}{2}t^2+\frac{3}{2}t=40755$$



40755 + T_int
+ P_int
+ H_int

make a "sieve of Eratosthenes"

put next 10 Hex in a Set

pick P until P > H_max (memorize P_set)
if P in H_set, put P in P_set

pick T until T > H_max (memorize T_set)
if T in P, winner!

clear sets