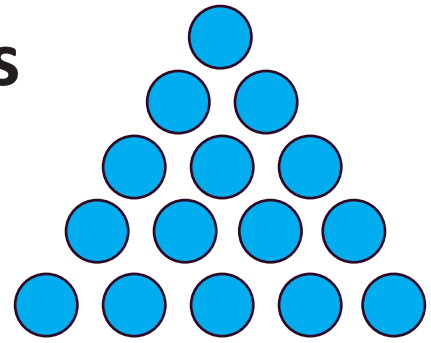


Triangular number links

Mary knows that the 5th triangular number is 15 because it needs 15 counters to make the triangle.



But she doesn't know which of these expressions is **equal to** the n th triangular number, $T(n)$.

Which are and which aren't and why?

(1) $T(n) = 1 + 2 + 3 + 4 + \dots + (n - 3) + (n - 2) + (n - 1) + n$

(2) $T(n) = \frac{1}{2}n(n + 1)$

(3) $T(n) = 1 + 3 + 5 + \dots + (2n - 5) + (2n - 3) + (2n - 1)$

(4) $T(n) = n^2 - (n - 1)^2 + (n - 2)^2 - (n - 3)^2 + \dots + 4^2 - 3^2 + 2^2 - 1^2$

(5) $T(n) = [(n + 1)^2 + n^2 + (n - 1)^2 + \dots + 1^2] - [(n^2 + 2) + ((n - 1)^2 + 2) + ((n - 2)^2 + 2) + \dots + (1^2 + 2)]$

(6) $T(n) = T(n - 1) + n$ and $T(1) = 1$