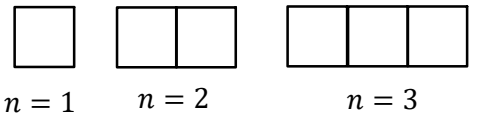
M9 - 6.0 - Find Equation Toothpick Notes

The following diagrams are made out of toothpicks. Create a Table of Values.



$n = 1$ $n = 2$ $n = 3$ ...

n	t
1	4
2	7
3	10

Let Statements

Let $n =$ the diagram number
Let $t =$ the number of toothpicks

$t \neq +$

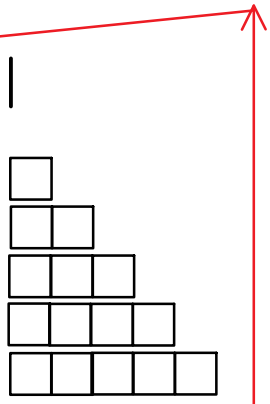
Words Problems
0) Diagram
1) Let Statements
2) Table of Values
3) Equation (Logic)
4) Substitute
5) Solve (Algebra)
6) Answer in English!
7) Check Answer!

Find the number of toothpicks of the 4th and 5th diagram. ($n = 4, 5$) Then $n = 0$.

0	1
n	t
1	4
2	7
3	10
4	13
5	16

+1 +1 +1 +1

−3 +3 +3 +3 +3



$t = \frac{3}{1}n + 1$ $t = 1, n = 0$

Find the Equation of the Table (TOV)

$t = n + 3$ Try for $n = 1$

~~$t = n + 3$~~

~~$t = 4n$~~ See if pattern works for $n = 2,3$ ...

~~$t = 2n + 2$~~ If not cross it off

$t = 3n + 1$ Repeat until works for all n.

How many toothpicks in the 10th diagram?

$n = 10$

$t = 3n + 1$
$t = 3(10) + 1$
$t = 30 + 1$

Start with Equation
Substitute
Solve

$t = 31$

The 10th diagram has 31 toothpicks.

Which diagram has 37 toothpicks?

$t = 37$

$t = 3n + 1$
$(37) = 3n + 1$
$-1 \quad -1$
$36 = 3n$
$\frac{36}{3} = \frac{3n}{3}$
$12 = n$

Start with Equation
Substitute
Solve

$n = 12$

The 12th diagram has 37 toothpicks.