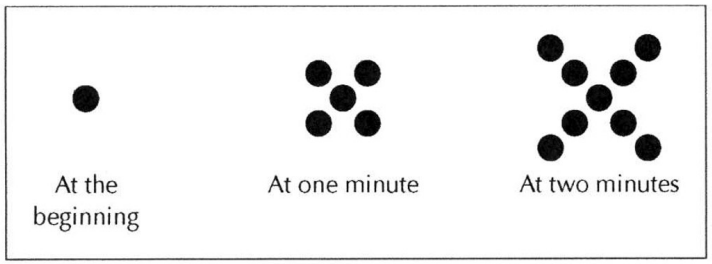
Lesson 1.2 Notes



Describe the pattern.	How many dots will there be at 3 minutes?	How many dots will there be at 100 minutes?	Recursive rule:	Explicit rule:
The pattern adds four dots each minute.	At the beginning = 1 At one minute = 5 At two minutes = 9 At three minutes = 13	Four dots per minute for 100 minutes = 400 dots We need to add in the dot from the beginning = 401 dots	$f(0) = 1$ (The number of dots at the beginning) $f(x)$ This term $= f(x-1)$ Previous term $+ 4$ The pattern	$f(x) = 4x + 1$ Four dots per minute for x minutes means $4x$, and we need to add in the one dot from the beginning

Other important notes from today:

Function notation is the way a function is written. It is meant to be a precise way of giving information about the function without a rather lengthy written explanation. The most popular function notation is $f(x)$ which is read "f of x". This is NOT the multiplication of f times x.

Recursive is defined as relating to or involving the repeated application of a rule, definition, or procedure to successive results. Recursive rules have 2 parts:

1) An initial condition that tells where the sequence starts. In our case, this will be $f(0)$ or how many dots were there at the beginning.
2) A recursion formula that tells how any term of the sequence relates to the preceding term. In our case, this will relate the number of dots in each minute to the number of dots in the previous minute.

An explicit formula is a formula we can use to find the nth term of a sequence. In the easiest definition, explicit means exact or definite. The formula is explicit because as long as it's applied correctly, the nth term can be determined. Explicit formulas, unlike recursive formulas, don't rely on the previous term.

If $f(x) = 3x + 7$ and $g(x) = x^2 - 2x$, find each value.

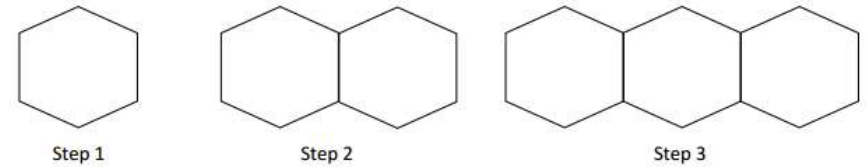
1) $f(3)$ $\quad f(3) = 3(3) + 7 \implies f(3) = 9 + 7 \implies f(3) = 16$
2) $f(-2)$ $\quad f(-2) = 3(-2) + 7 \implies f(3) = -6 + 7 \implies f(3) = 1$
3) $g(5)$ $\quad g(5) = (5)^2 - 2(5) \implies g(5) = 25 - 10 \implies g(5) = 15$
4) $g(0)$ $\quad g(0) = (0)^2 - 2(0) \implies g(0) = 0 - 0 \implies g(0) = 0$

Complete each table by looking for a pattern.

Term	**1st**	**2nd**	**3rd**	**4th**	**5th**	**6th**	**7th**	**8th**
Value	81	27	9	3	1	$\frac{1}{3}$	$\frac{1}{9}$	$\frac{1}{81}$
Term	**1st**	**2nd**	**3rd**	**4th**	**5th**	**6th**	**7th**	**8th**
Value	-15	-6	3	12	21	30	39	48
Term	**1st**	**2nd**	**3rd**	**4th**	**5th**	**6th**	**7th**	**8th**
Value	1	4	16	64	256	1024	4096	16,384
Term	**1st**	**2nd**	**3rd**	**4th**	**5th**	**6th**	**7th**	**8th**
Value	12	5	-2	-9	-16	-23	-30	-37

Match the description of the formula with the formula.

For the growing pattern below, each line segment is one unit in length.



Step 1 Step 2 Step 3

Every figure has hexagons that have four sides that always count toward the perimeter (two on the top and two on the bottom) and then at the end of the whole figure are two lines. → $4n + 2$

Every figure has hexagons that have six sides each. However, every time we add another figure past the first one we have to subtract two sides from each hexagon. → $6n - 2(n - 1)$

Write each expression using an exponent.

1) $8 \times 8 \times 8$ 8^3

2) $\frac{2}{3} \times \frac{2}{3} \times \frac{2}{3} \times \frac{2}{3}$ $\left(\frac{2}{3}\right)^4$ **a fraction must have parenthesis if it is raised to a power

3) -2×-2 $(-2)^2$ **a negative number raised to a power must have parenthesis

a) Write each expression in expanded form.
b) Then calculate the value of the expression.

1) 4^4 a) $4 \times 4 \times 4 \times 4$ b) 4,096

2) $\left(\frac{1}{4}\right)^2$ a) $\frac{1}{4} \times \frac{1}{4}$ b) $\frac{1}{16}$

3) $15(3^4)$ a) $15 \times 3 \times 3 \times 3 \times 3$ b) 1,215

4) $20(6)^3$ a) $20 \times 6 \times 6 \times 6$ b) 4,320