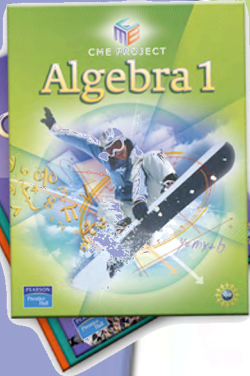# Computer Algebra Systems and High School Mathematics
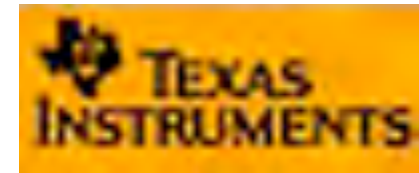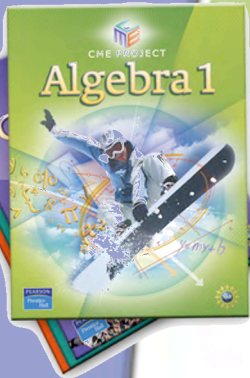
Ryota Matsuura   Sarah Sword

Education Development Center, Inc.

Colleagues

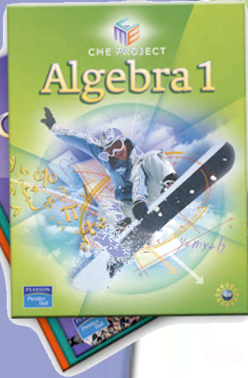| Input	Output
0	15
1	0
2	-9
3	-12
4	-9
5	0
6	15
7	36

Questions

- Is there a polynomial function that fits this table? If so, what? If not, why not?

- If so: how *many* polynomial functions fit this table? Can you describe them?
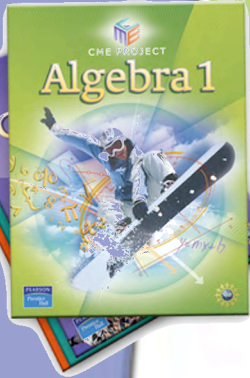
Looking at pages 2-3

What are some general stragtegies for solving problems like these?
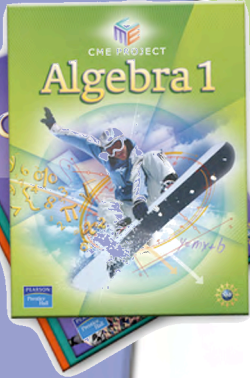
What if the outputs don't follow a simple pattern?

x	f(x)
1	20
3	12
6	60
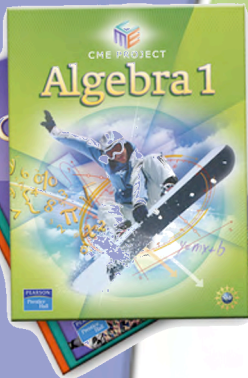
Find polynomial functions to fit these tables

x	g(x)
1	20
3	0
6	0

x	h(x)
1	0
3	12
6	0

x	k(x)
1	0
3	0
6	60
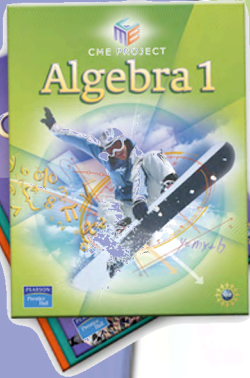
How can you use those here?

x	f(x)
1	20
3	12
6	60
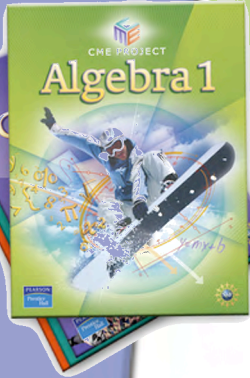
Defining a Function
On the TI-Nspire™ Handhelds

Menu > 1:Tools > 1:Define
or type **define** using the letter keys.

Give your function a name and an input variable:

Define $f(x) =$

Type in your definition and push **enter**.

EDC
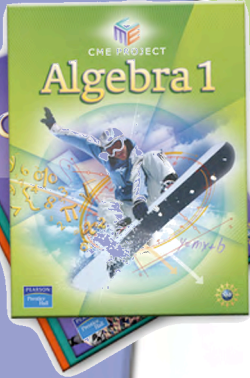
Another problem…

- A radio show offered a prize to the first caller who could predict the next term in this sequence:

$$\{1, 2, 4, 8, 16…\}$$

- What would you get if you used common sense?

- What would you get if you used Lagrange Interpolation?

(And can you imagine trying to do this without a CAS??!)
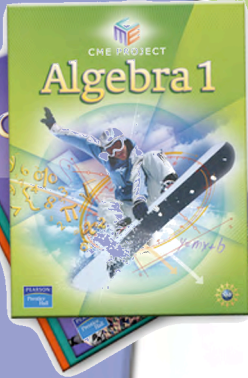
Back to our table…

x	f(x)
1	20
3	12
6	60

Are there other polynomial functions that fit this table?
Can we characterize them?

A teacher's view

"I didn't even really remember what Lagrange Interpolation was, so I didn't really want to bother…But I couldn't believe the connections my students made when they started working on it. I was floored – they made connections that they had never made before.
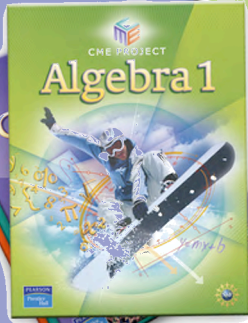
Light bulbs were going off everywhere….They understood how to add functions, and why you might want to. They understood that functions are things you *can* add. They saw some value to factoring, because they really understood the relationship between factors and roots. And what surprised me most of all was how much they loved solving the problems – because they were good at it."

Chris Martino, Arlington High School
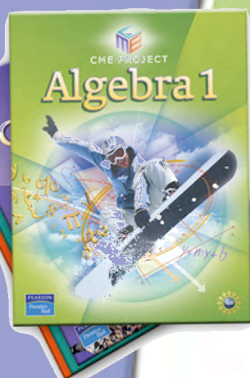
And…CMP2 Factor Game

Playing the Factor Game

1.1

Playing the Factor Game is a fun way to practice finding factors of whole numbers. If you pay close attention, you may learn some interesting things about numbers that you didn't know before! To play the game, you need a Factor Game Board and colored pens, pencils, or markers.

active math online

For: Factor Game Activity
Visit: PHSchool.com
Web Code: and-1101

The Factor Game

1	2	3	4	5
6	7	8	9	10
11	12	13	14	15
16	17	18	19	20
21	22	23	24	25
26	27	28	29	30
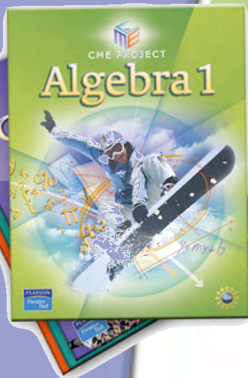
CME Project Factor Game

$x - 1$	$x^2 - 1$	$x^3 - 1$	$x^4 - 1$	$x^5 - 1$
$x^6 - 1$	$x^7 - 1$	$x^8 - 1$	$x^9 - 1$	$x^{10} - 1$
$x^{11} - 1$	$x^{12} - 1$	$x^{13} - 1$	$x^{14} - 1$	$x^{15} - 1$
$x^{16} - 1$	$x^{17} - 1$	$x^{18} - 1$	$x^{19} - 1$	$x^{20} - 1$
$x^{21} - 1$	$x^{22} - 1$	$x^{23} - 1$	$x^{24} - 1$	$x^{25} - 1$
$x^{26} - 1$	$x^{27} - 1$	$x^{28} - 1$	$x^{29} - 1$	$x^{30} - 1$