

**Postmodern
DeConstruction
in
Mathematics Education**

**DeConstructing
PreCalculus**

*the MATH**e**CADEMY.net channel*

PreCalculus IS hard

- or is it?

*the MATH**e**CADEMY.net channel*

Post-modernism:

skepticism towards hidden
patronization in traditions

Post-modernity:

I T society

I T: Information Technology

MAthematics: MAny

Total	constant	
	<i>change</i>	constant
		<i>change</i>

PreCalculus: Constant change

Calculus: Changing change

Statistics: Unpredictable change

PreCalculus made easy

Three stories about how **f**ormulas

- predict
- change to equations and functions
- model real world problems

Constant change formulas

Saving at home:

$$b+a+a+a+\dots = b+a*x = y$$

Saving at a bank:

$$b*a*a*a*\dots = b*a^x = y$$

Formulas with unknowns

1 unknown: an equation

$120 = 30 + 5 * x$, to be solved

2 unknowns: a function

$y = 30 + 5 * x$, to be graphed

Formulas with IT (TI82)

Y1= left hand side, Y2= right hand side

Eq: $Y1 = 120$, $Y2 = 30 + 5 * x$

Solve $0 = Y1 - Y2$

Functions: $Y2 = 30 + 5 * x$

Graph Y2

Numbers are polynomials

$$T = 456$$

$$= 4 \quad *10*10$$

$$+ 5 \quad *10$$

$$+ 6 \quad *1$$

$$T = 4 *10^2 + 5 *10 + 6 *1$$

4 ways to add Numbers

Algebra: To re-unite in Arabic

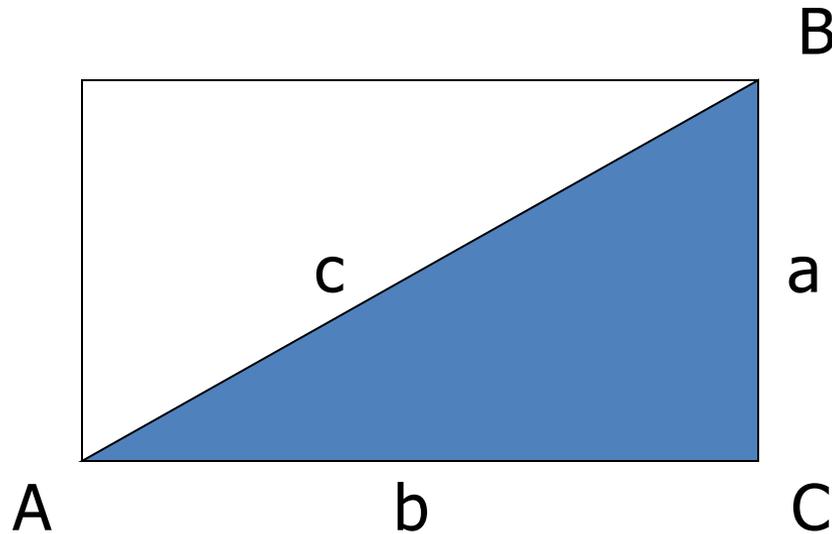
unlike

like

unit – numbers <i>m, s, \$, kg</i>	$T = a + n$ <i>Addition</i>	$T = a * n$ <i>Multiplication</i>
per – numbers <i>m/s, \$/kg, %</i>	$T = \Sigma a * \Delta n$ <i>Integration</i>	$T = a ^ n$ <i>Power</i>

Triangulation

Geometry: To measure earth in Greek



$$\sin A = a/c$$

$$\cos A = b/c$$

$$\tan A = a/b$$

Operations predict

$3+5$ predicts $3+1+1+1+1+1$

$3*5$ predicts $3+3+3+3+3$

3^5 predicts $3*3*3*3*3$

Reversed Calculation

Forwards: $2 + 3 = ?$

Back: $2 + ? = 5$

$2 + x = 5$

Opposite Side & Sign

$$2+x = 5$$

$$x = 5-2$$

Opposite Side & Sign

$$2^*x = 6$$

$$x = 6/2$$

$$x^3 = 8$$

$$x = \sqrt[3]{8}$$

$$2^x = 8$$

$$x = \log_2(8)$$

Hymn to Equations

Equations are the best we know.
They're solved by isolation.

But first the brackets must be placed
around multiplication.

We change the sign and take away
and only x itself will stay.

We just keep on moving, we never give up.
So feed us equations, we don't want to stop.

Formula Tables

Unknown	$c = ?$	$T = a + b * c$	Formula
Knowns	$a = 2$	$14 = 2 + (3 * c)$	<i>1. Brackets reduce multiple calculations to single calculations. 2. To opposite side with opposite sign</i>
	$b = 3$	$14 - 2 = 3 * c$	
	$T = 14$	$(14 - 2) / 3 = c$ $4 = c$	
<i>Testing if LHS = RHS</i>		$14 = 2 + 3 * 4$ $14 = 14$ 😊	<i>MATHSolver $0 = Y1 - Y2$, $Y1 = 14$, $Y2 = 2 + 3 * x$ gives $x = 4$ Or CALC Intersection $Y1 = Y2$</i>

Two Language-Houses

WORD-lang.
Describes

NUMBER-lang.
predicts

Grammar

Jo is a subject

y is a formula

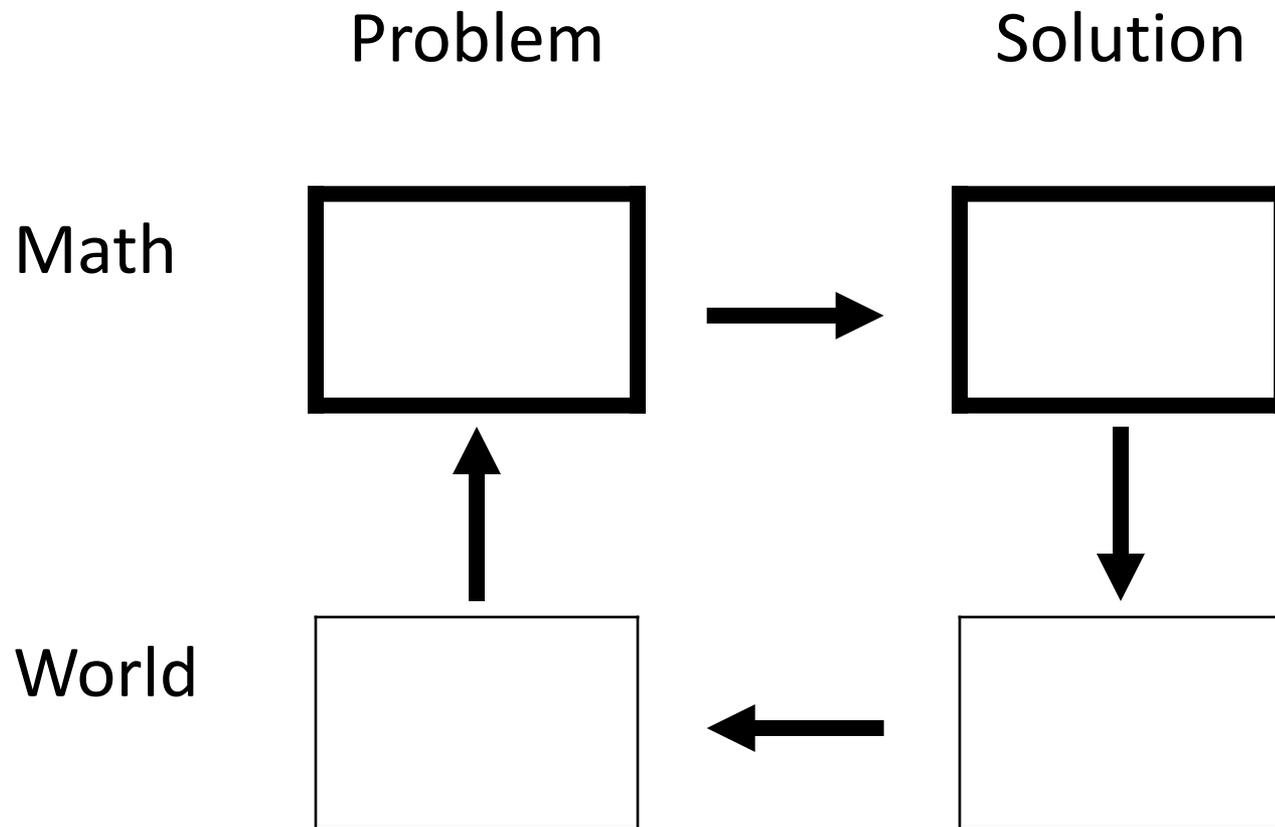
Language

Jo eats apples

$y = b + a * x$

World

Modeling has 4 steps



From table to graph

2-line table: 1 change

constant change-number or change-percent

3-line table: 2 changes

polynomial of degree 2

graphed as a bending line: a parabola

1 turning point found by technology

4-line table: 3 changes

polynomial of degree 3

graphed as a double parabola

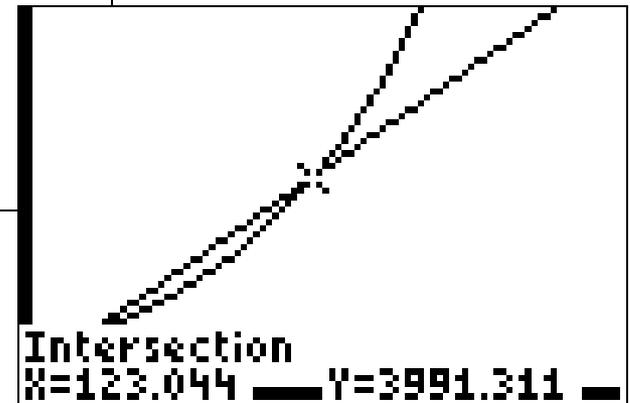
2 turning points found by technology

Food versus Population

L1	L2	L3	3
50 140 -----	1590 5300 -----	1800 4500 -----	
L3(3) =			

```

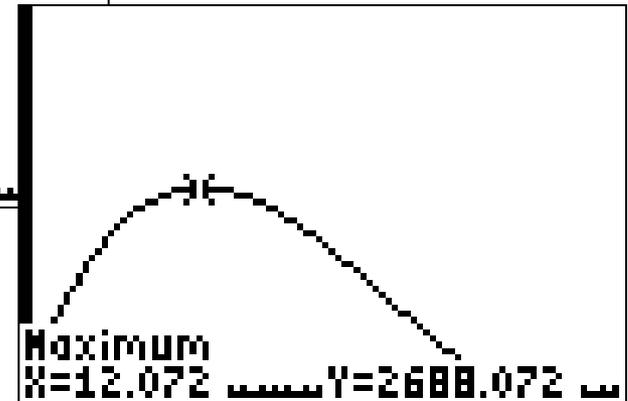
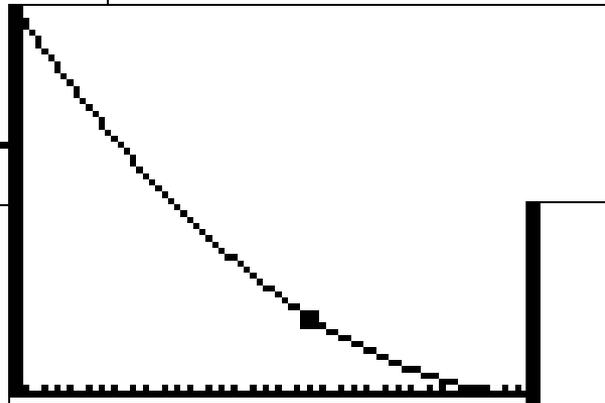
Plot1 Plot2 Plot3
\Y1 = 814.533*1.01
30X
\Y2 = 30X+300
\Y3 =
\Y4 =
\Y5 =
\Y6 =
    
```



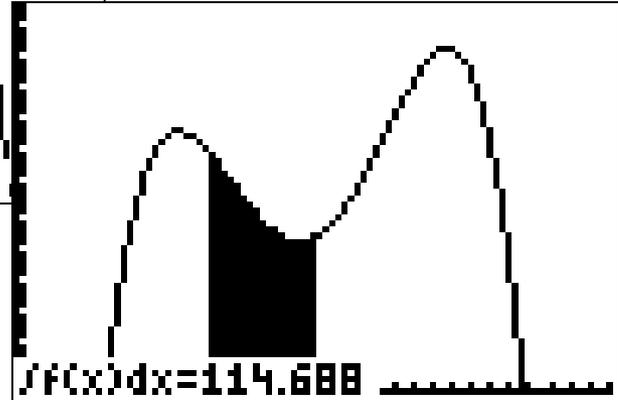
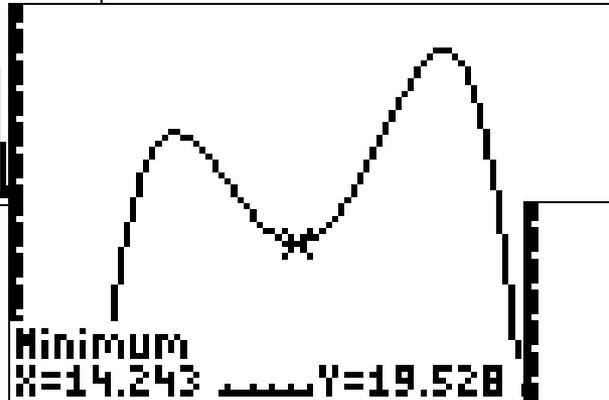
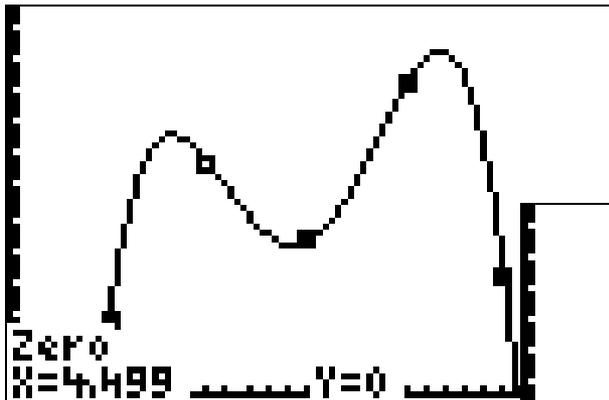
Fundraising

L1	L2	L3	Z
0.0000	500.00	-----	
20.000	100.00		
40.000	0.0000		
-----	████████		

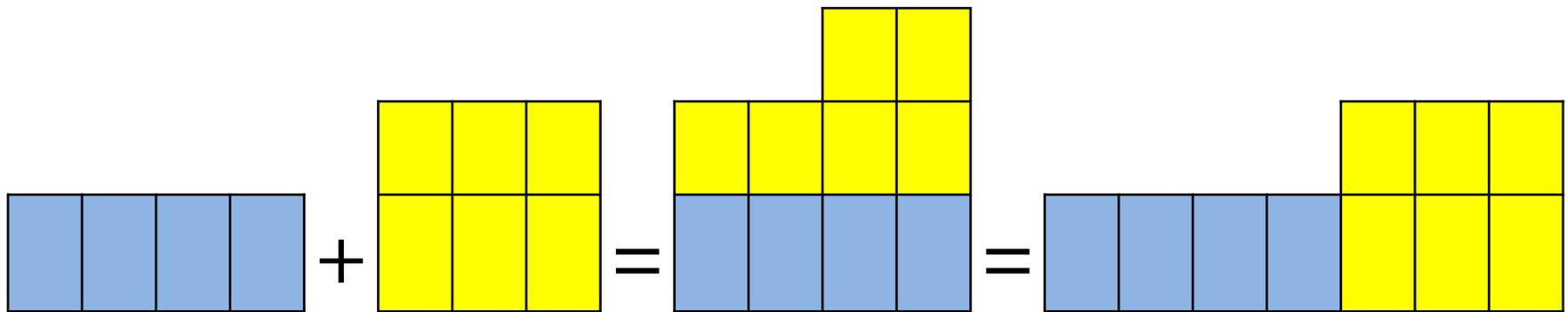
L2(4) =



Driving with Peter



Adding OnTop or NextTo



$$T = 1\ 4s + 2\ 3s = 2.2\ 4s = 1.3\ 7s$$

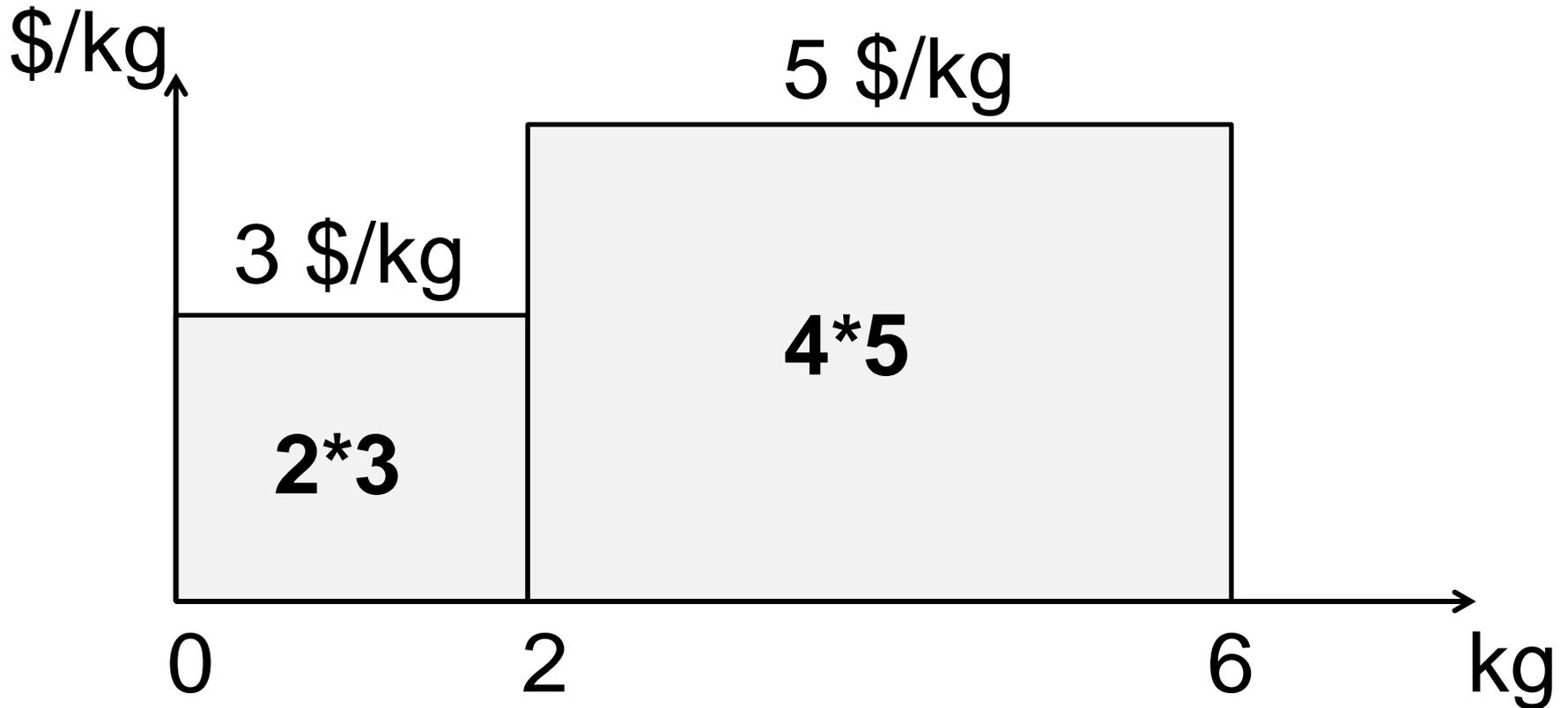
Adding per-numbers

T = 2 kg at 3 \$/kg

+ 4 kg at 5 \$/kg

= 6 kg at ? \$/kg

PerNumbers Add by Area



$$\begin{aligned} T &= 2 \text{ kg at } 3 \text{ \$/kg} + 4 \text{ kg at } 5 \text{ \$/kg} \\ &= 6 \text{ kg at } (2*3 + 4*5) \text{ \$ / } 6 \text{ kg} \end{aligned}$$

Quantitative Literature

Fact models

quantify and predict predictable quantities

‘What is the area of the walls in this room?’

Fiction models

quantify and predict unpredictable quantities

‘My debt will soon be paid off at this rate!’

Fiddle models

quantify and predict unpredictable qualities

‘Is the risk of this road so high as to cost a bridge?’

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