Learning Mathematics Concepts Through Context with Pictures and Technology

NCTM 2013

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Hinsdale Central HS (Retired)
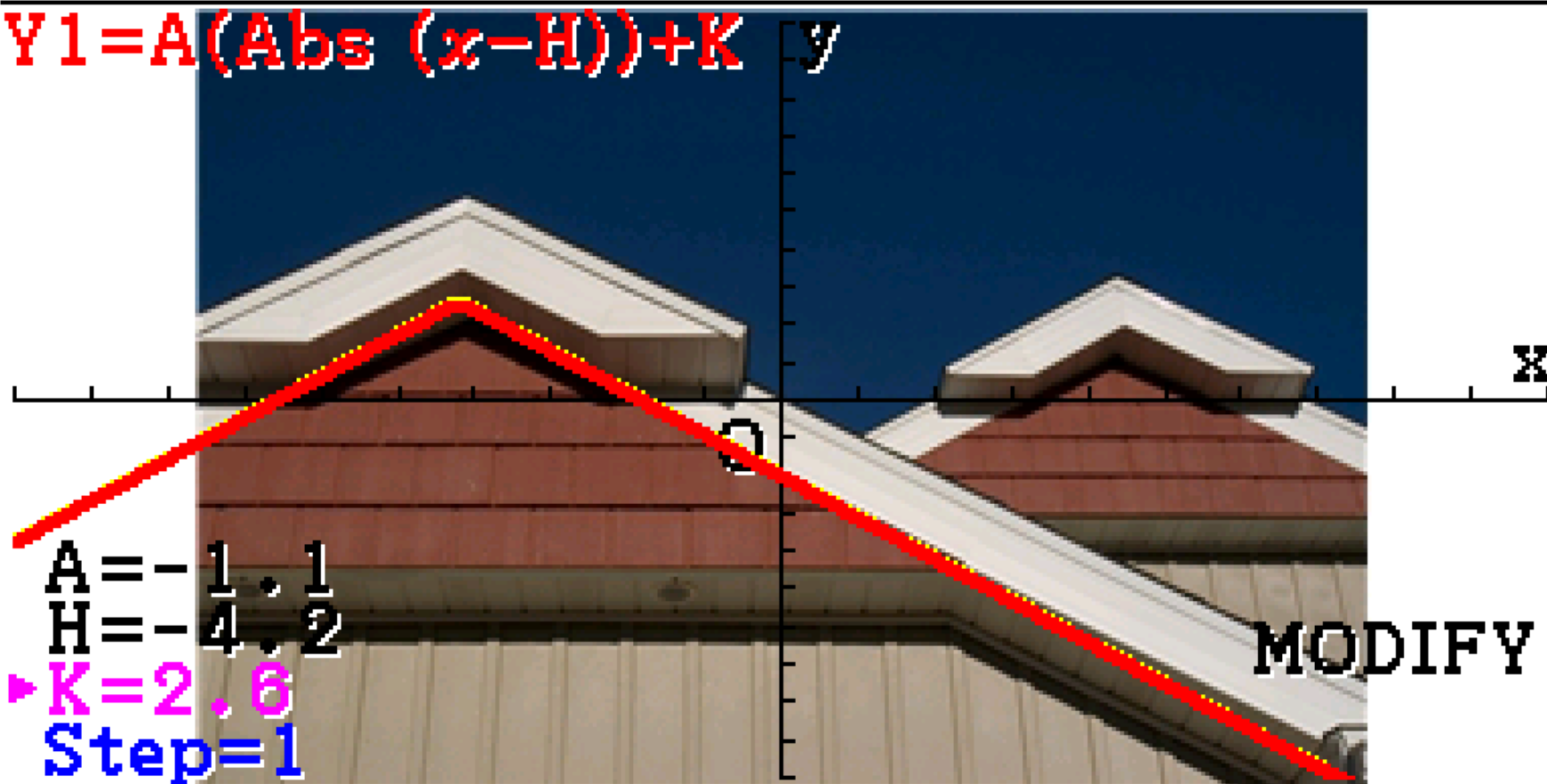
Use MODIFY y = A|x - H|+K

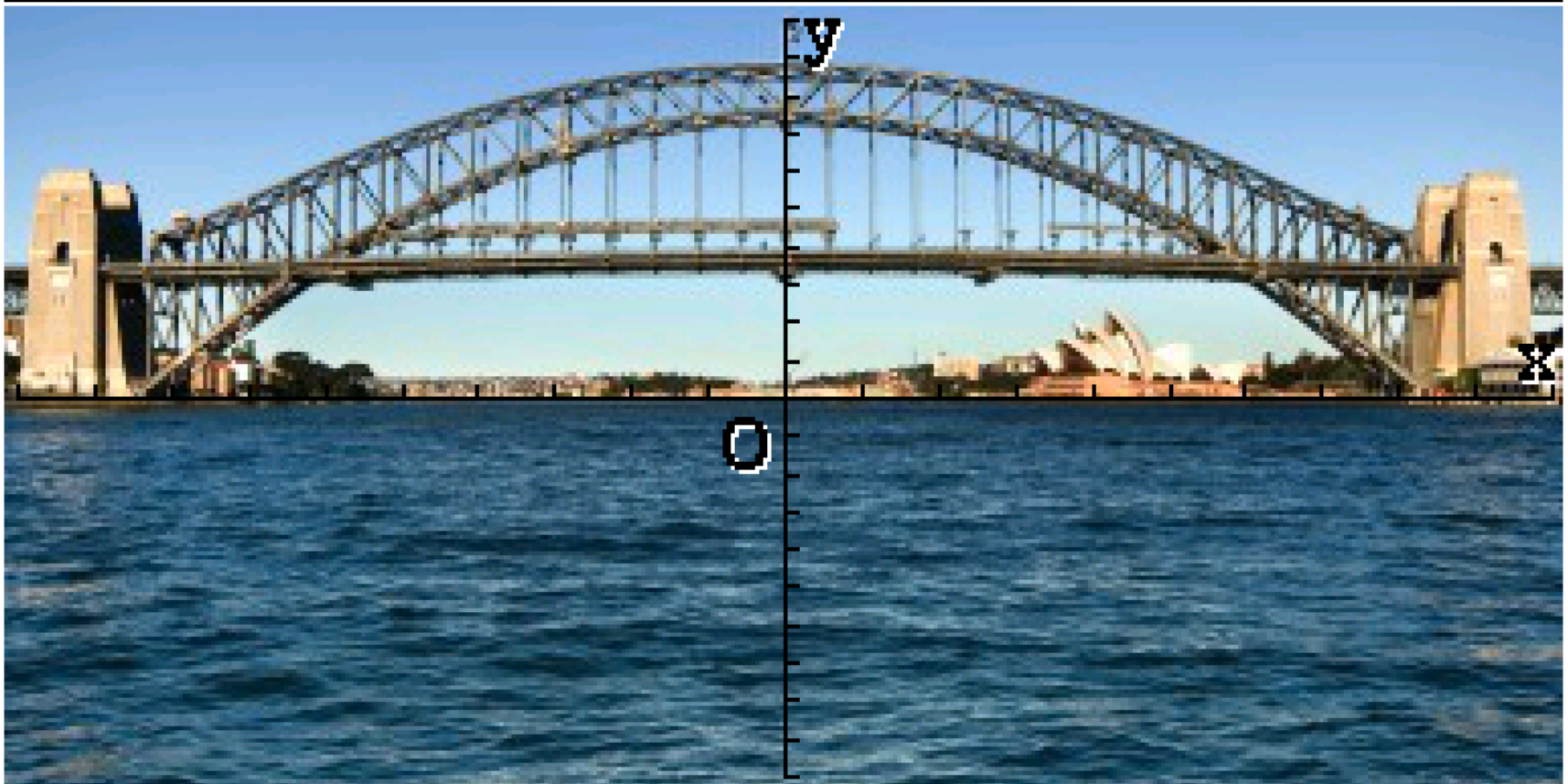# Create a Model by Using Key Points

Harbour Standard Window

Create a Model by Estimating the Vertex and One x-intercept

Graph Func   :Y=

$Y1 = -\dfrac{1}{8}x^2 + 8$ [—]

Y2:   [—]
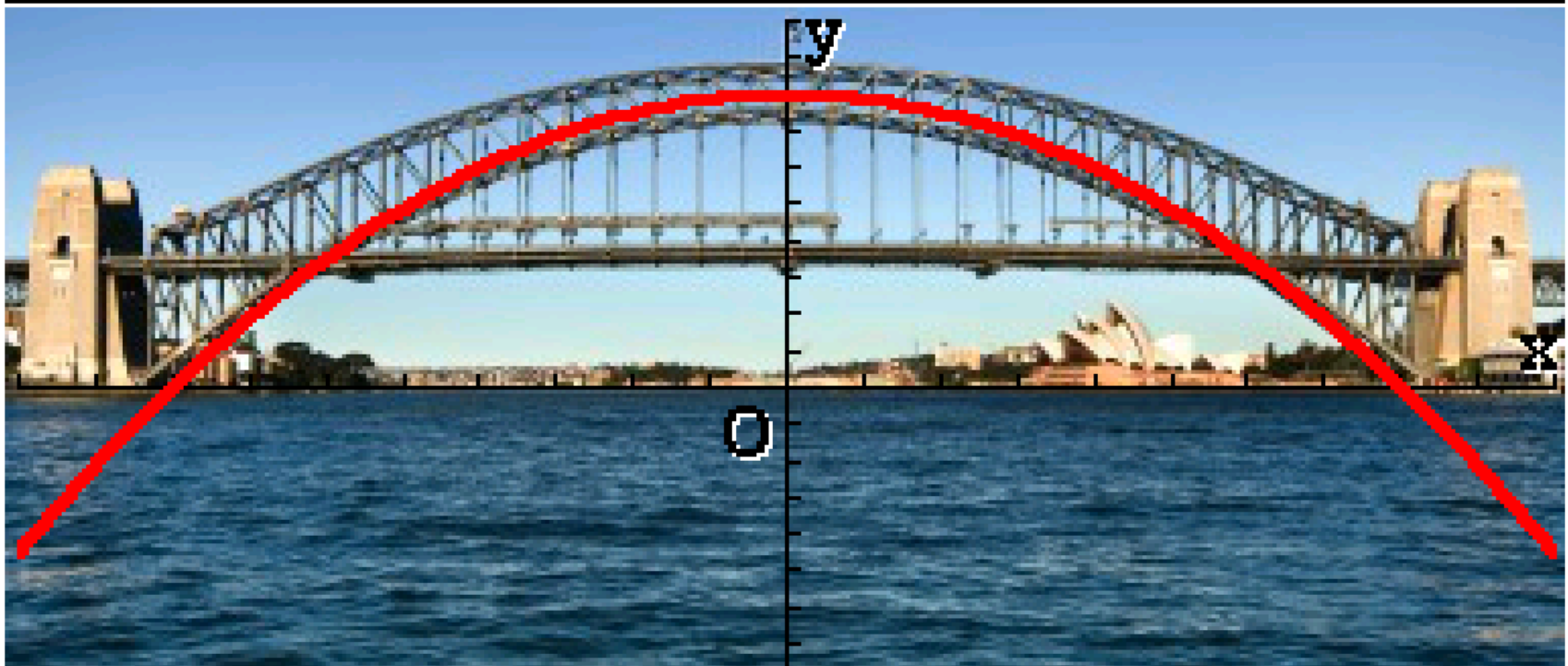Y3:   [—]
Y4:   [—]
Y5:   [—]

SELECT   DELETE   Y   STYLE   DRAW

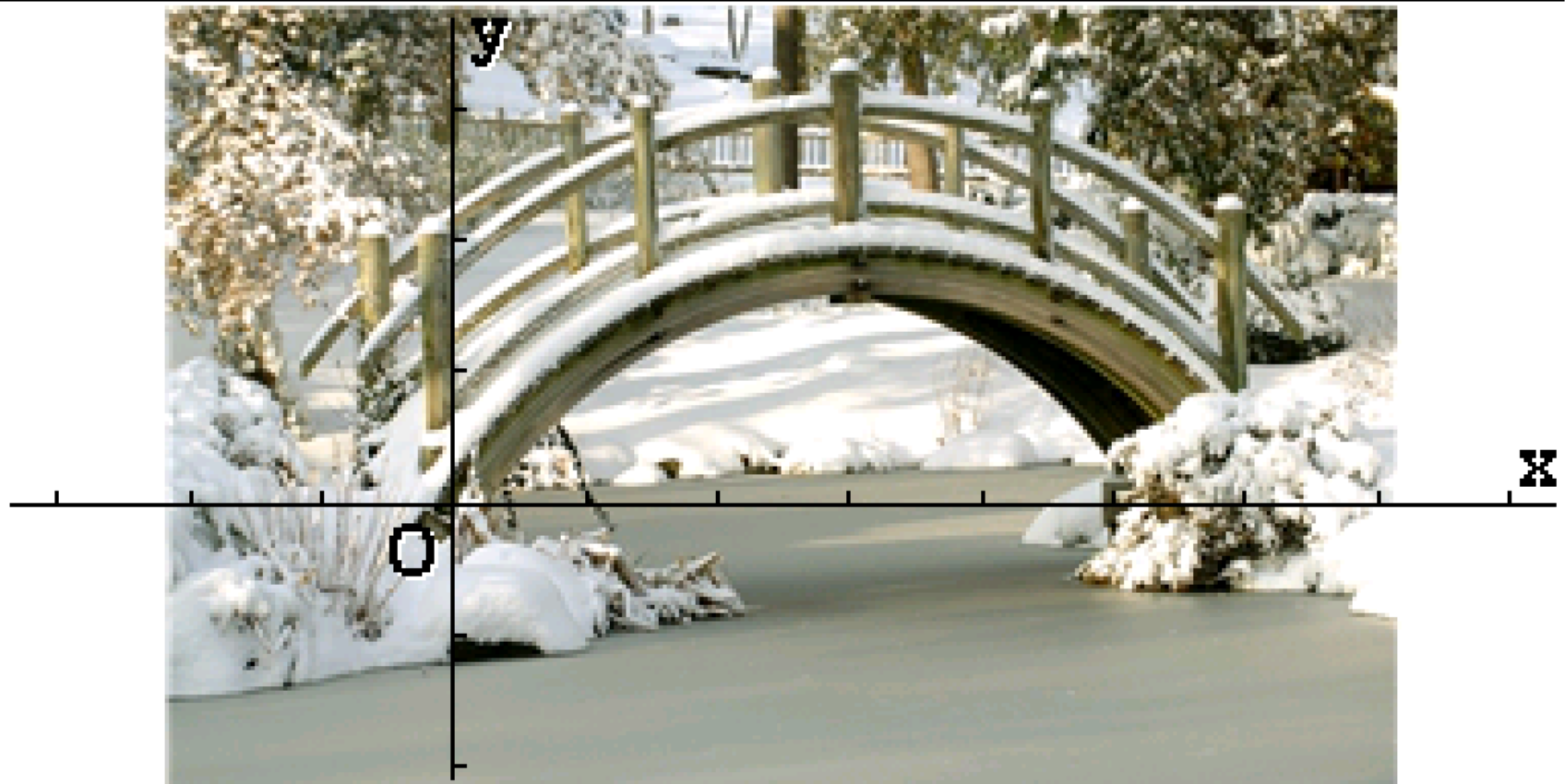# Create a Model by Estimating the Vertex and One x-intercept

Use Multiple Models

Footbridge [-3.3,8.3][-2.1,3.7]

A Cosine Function Model

Graph Func :Y=

$Y1 \blacksquare 1.5\sin\left(\dfrac{\pi}{6}x\right)$ [—]

$Y2 = |1.5\cos\left(\dfrac{\pi}{6}(x-3)\right)$

Y3: [—]

Y4: [—]

Y

A Sine Function Model
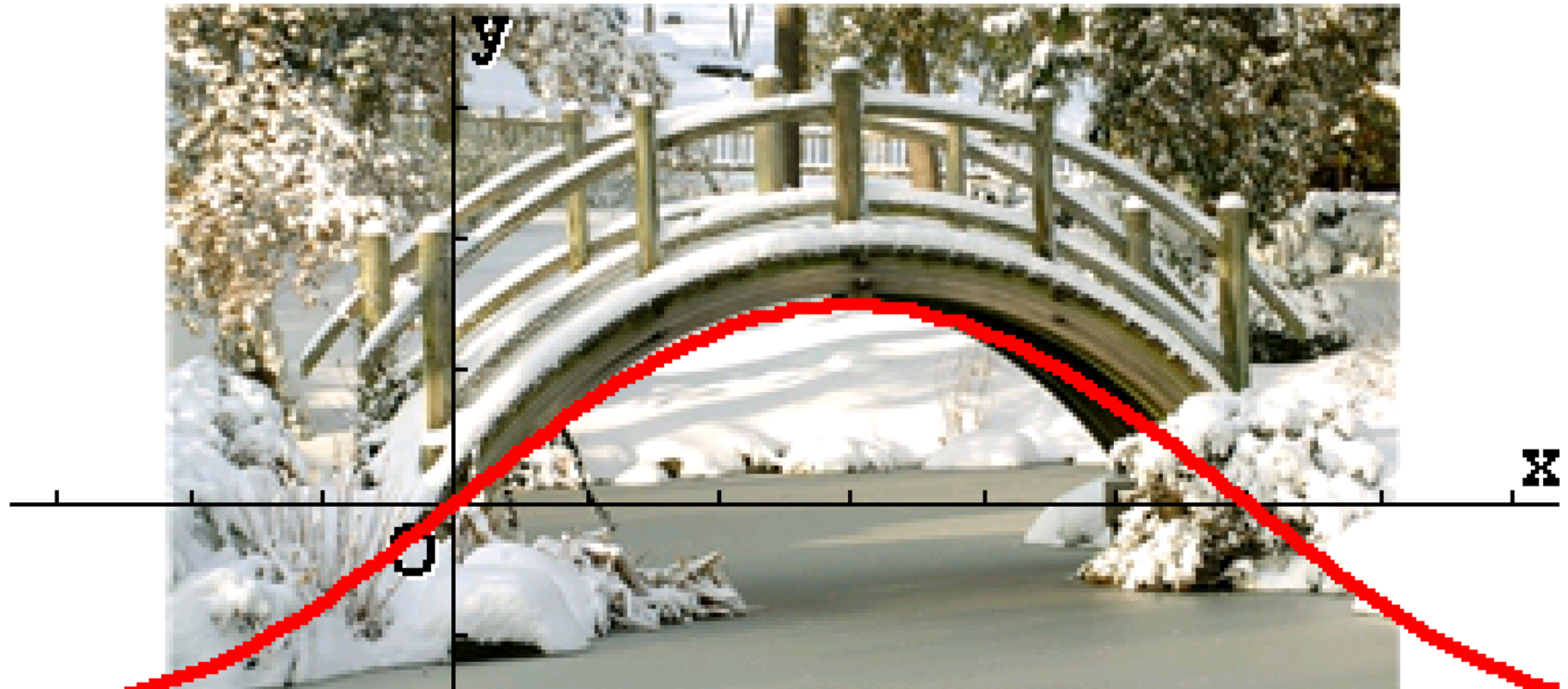
A Exponential Model by Regression

A Exponential Model by Regression

Compare by Computing the Area by Integration
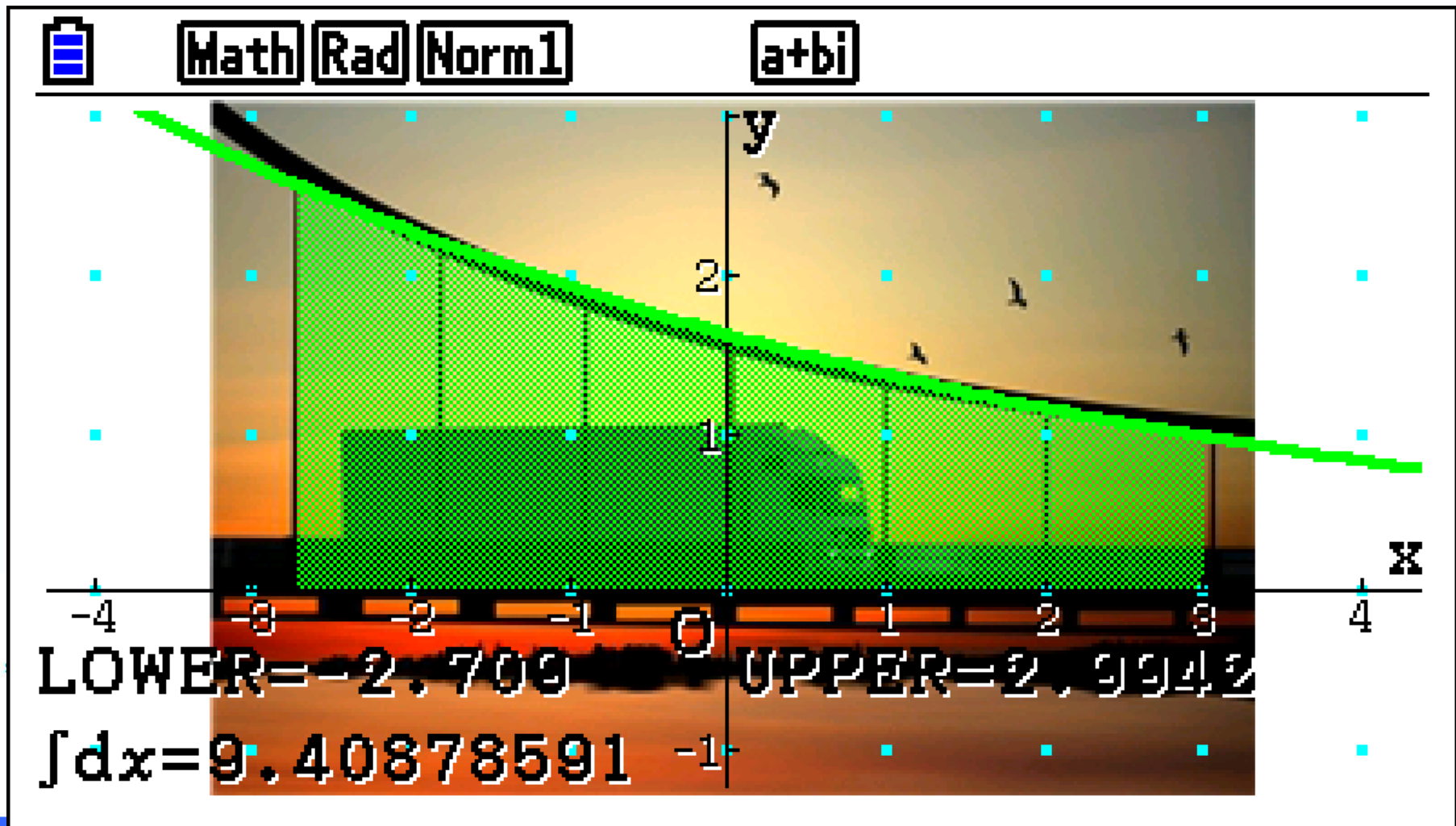
A Parametric Model

Fountain [-3.95,10.07][-1.30,5.60]
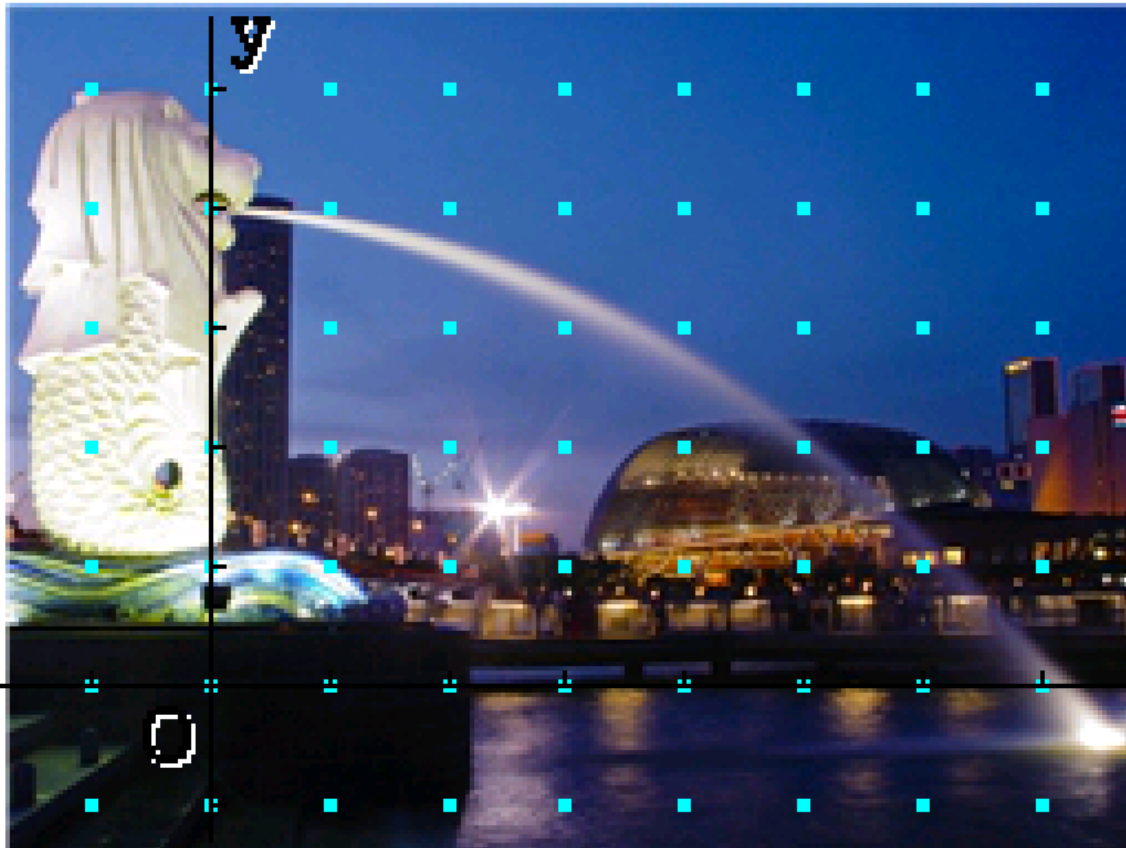
A Parametric Model

Graph Func :Param

$Xt1 = 14T$ [—]

$Yt1 = 4 - 16T^2$

$Xt2:$ [—]

$Yt2:$

$Xt3:$ [—]

$Yt3:$

SELECT DELETE TYPE TOOL MODIFY DRAW

A Parametric Model
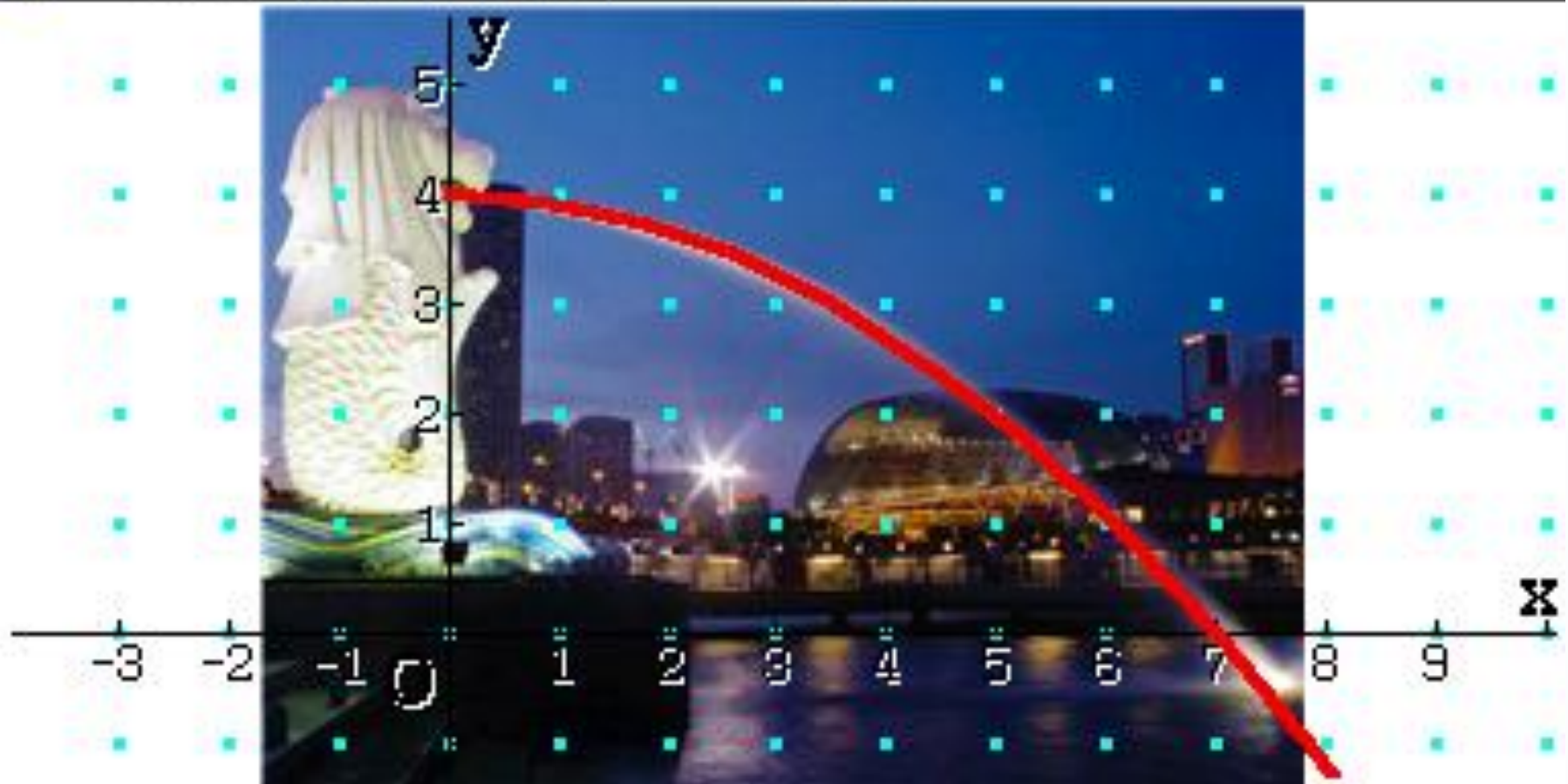
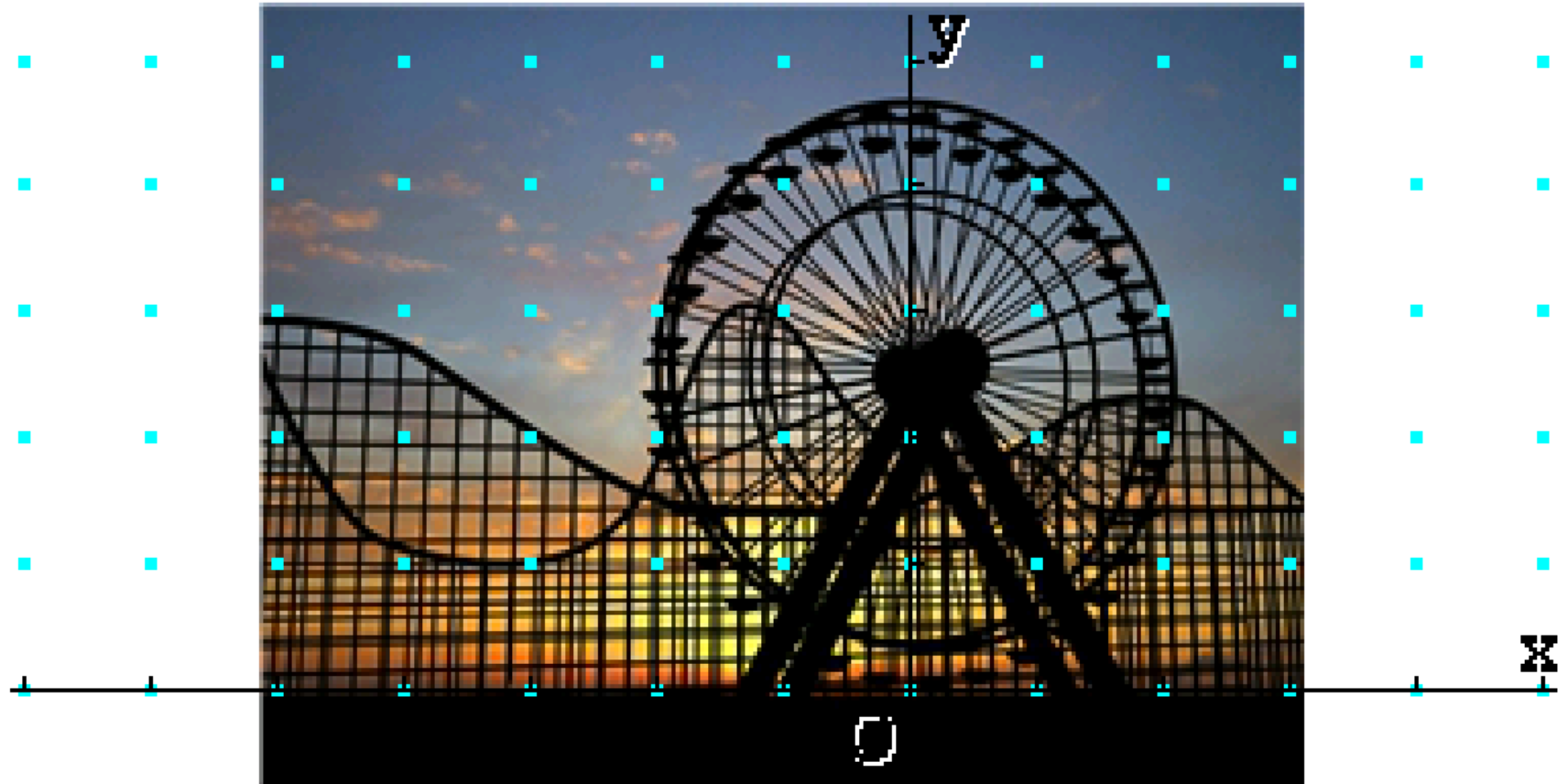# A Parametric Model for Circular Motion

Ferris [-7.1,5.1][-.66,5.34]

The Vertical Position

- Let's assume it takes 60 seconds for a revolution

- Also assume that you are at the minimum point at t=0

- The period is $\pi/30$

- To model vertical position by a sine function,

  the shift is 15

$$Y = 2.5 + 2.1 \sin (\pi/30(T - 15))$$

The Horizontal Position

- **The horizontal position is 0 at time 0, and reaches a max (furthest right) at time t = 15.**

$$Y = 2.1 \cos\left(\pi/30(T - 15)\right)$$

A Parametric Model for Circular Motion