Public Screen

Faye was babysitting her two year old brother Frank. When Faye wasn't watching, Frank had taken the aquarium and tipped it on its side, so the water level was as shown. When Faye found him, she quickly grabbed the tank and returned it to a horizontal position. What was the depth of the aquarium in cm if the dimensions of the tank are 100cm long, 60cm wide and 40cm high.

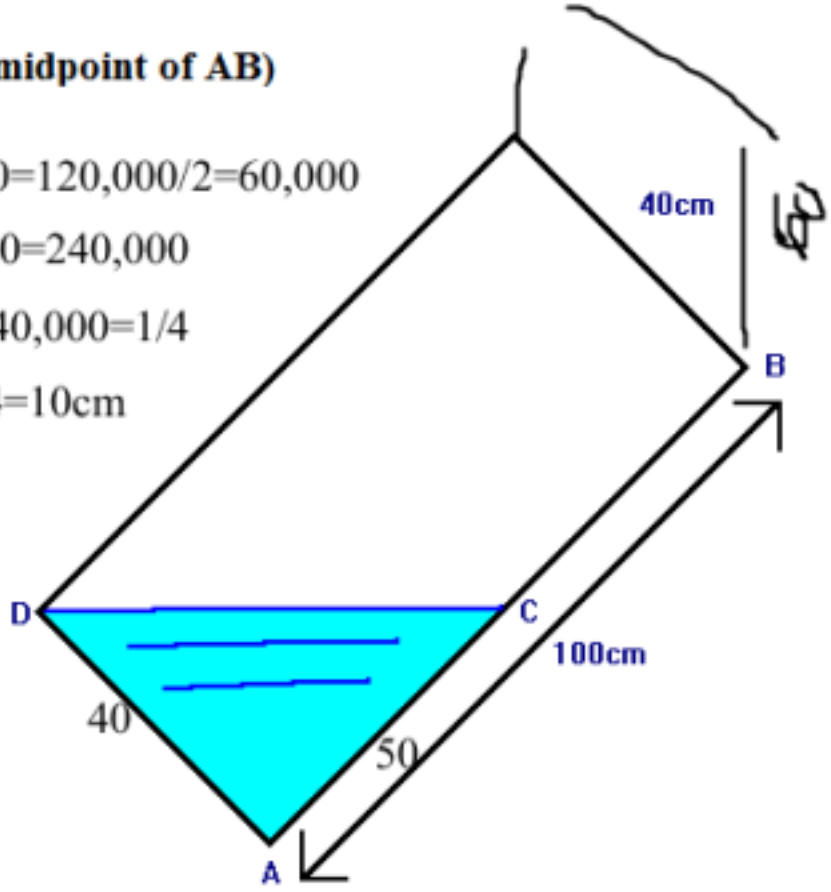
(C is the midpoint of AB)

50*40*60=120,000/2=60,000

100*40*60=240,000

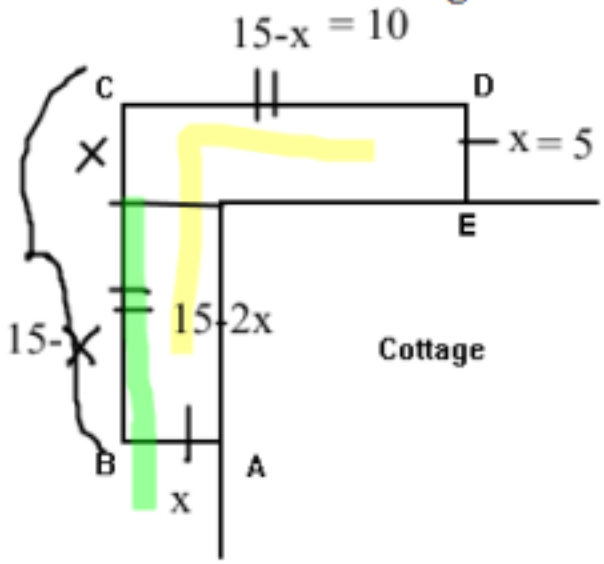
60,000/240,000=1/4

40cm*1/4=10cm



Public Screen 2

The Bunbury's want to build a deck on their cottage. The architect drew them a diagram which shows it built on the corner of the cottage. A railing is to be constructed around the four outer edges of the deck. If AB = DE, BC = CD and the length of the railing is 30 metres, then what dimensions will give maximum area?



AB = DE = x = 10

BC = CD = (30-2x)

x(x-10) =0
x = 0

x= 10

15-x = 5

x(15-x)

x = 7.6
7.4

f(x) = x(30-2x)
= 30x - 2x^2
= 7.6

x(15-x) + x(15-2x)

15x-x^2 + 15x-2x^2

-3x^2 + 30x =
x^2 - 10x = 0

Public Screen 73

Introduction

Patterns in Graphs

How do we organize the many types of functions into groups? One way is to use a "parameter." Parameters are constants that you can change. By using parameters, we can represent whole families of functions. For example, the family of parabolas with the vertex at the origin can be represented by $y = ax^2$.

In this lesson, we'll discuss graph shifting and families of functions. Then we'll look at how to represent those families using parameters. This will tie the concepts of symmetry and parameters into geometry and algebra. Symmetry is somewhat like "reflections" in geometry, while parameters are more like the "translations" and "scale factors."

Objectives

By the end of this lesson, you should be able to:

- Recognize a new function (algebraically and graphically) as an altered form of a familiar function
- Use the rules for shifting and distorting to quickly sketch the graph of one function from the graph of another
- Match a function with a parameter to a given family of functions
- Graph a family of functions when given a function that includes a parameter
- Write an equation with parameters to represent a given family of functions

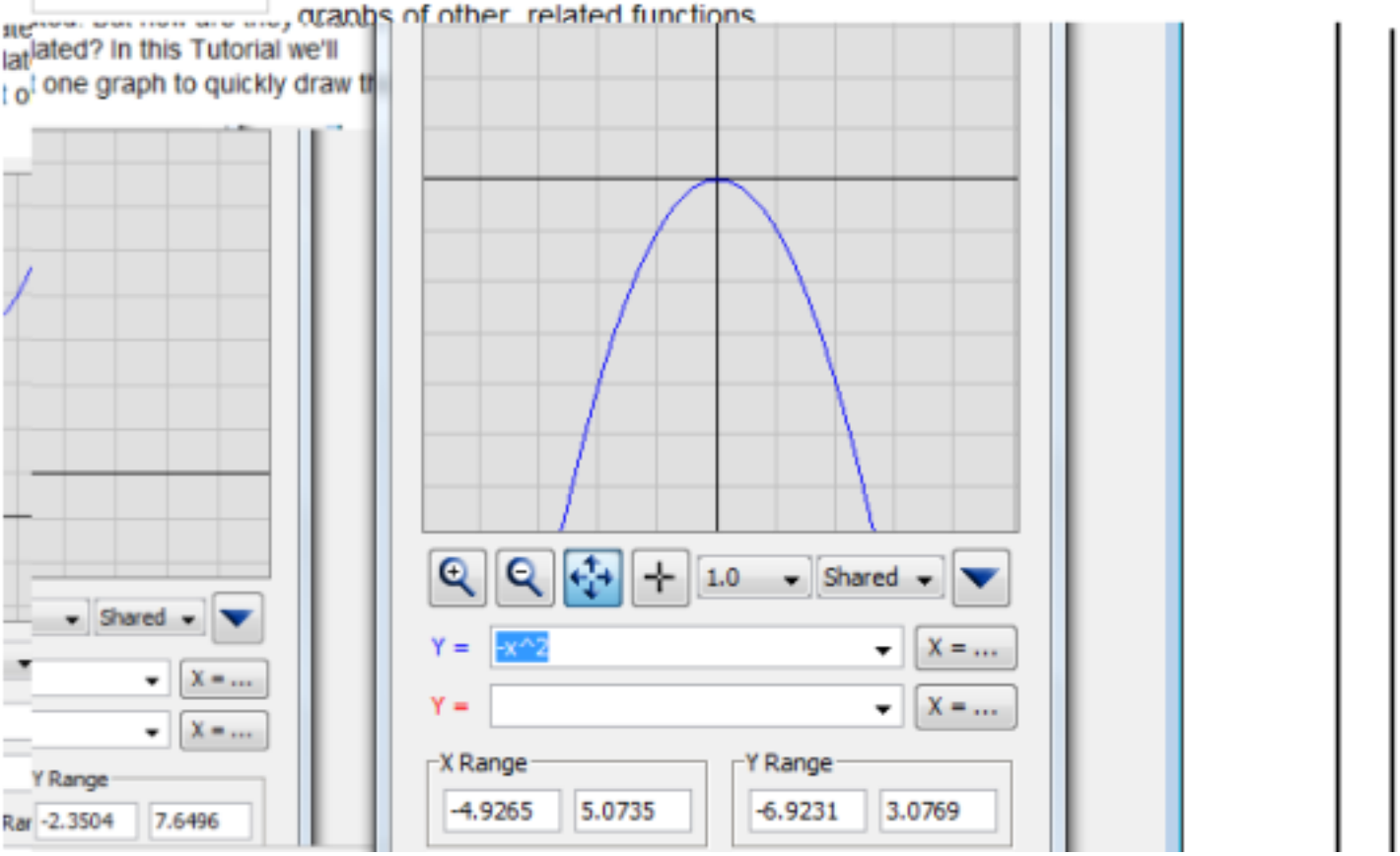
Key Terms & Concepts

You'll need to know the definitions and significance of the terms and concepts covered in this lesson. To view the Key Terms and their definitions, click the Key Terms button.

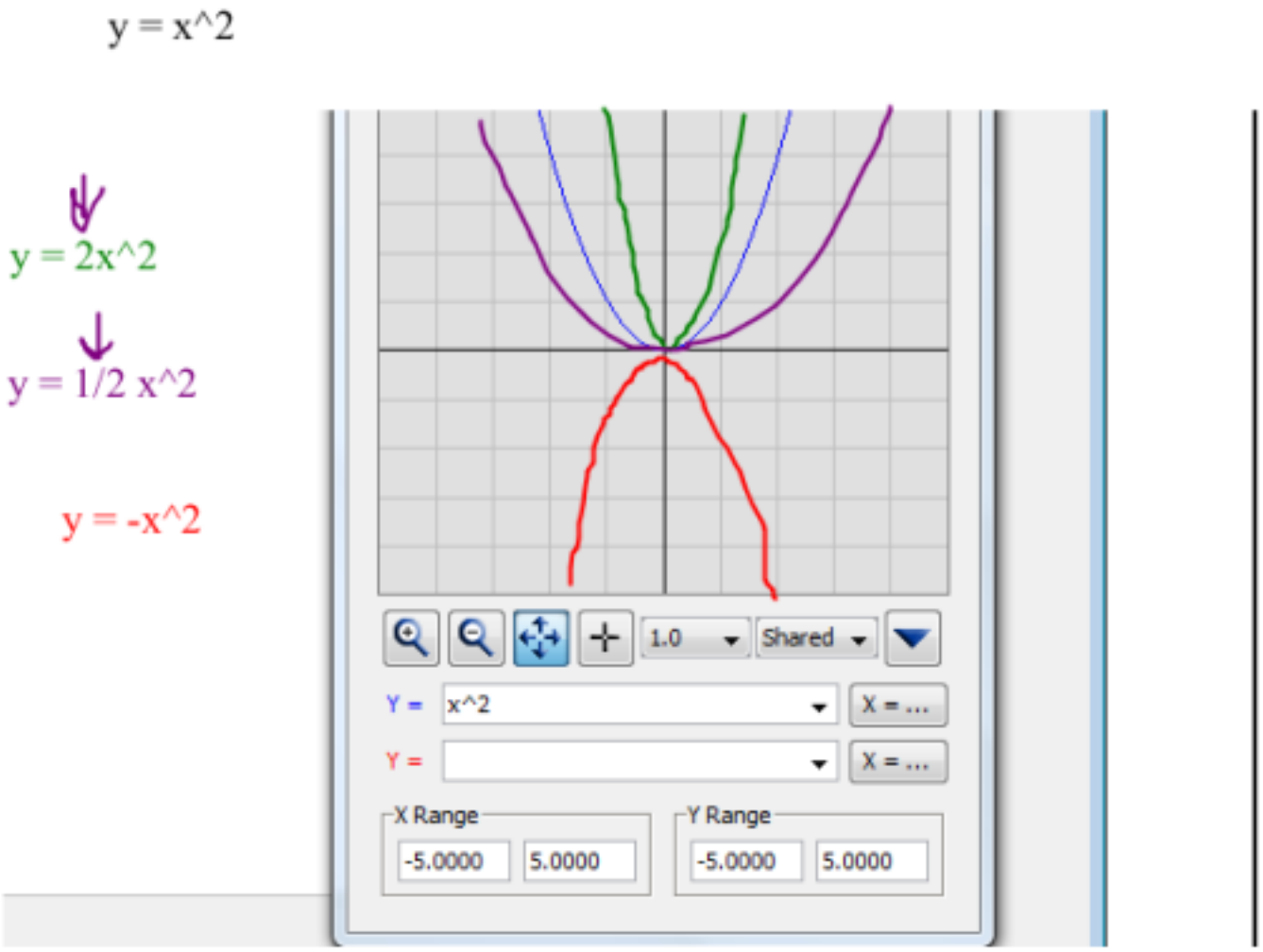
Public Screen 74

Introduction

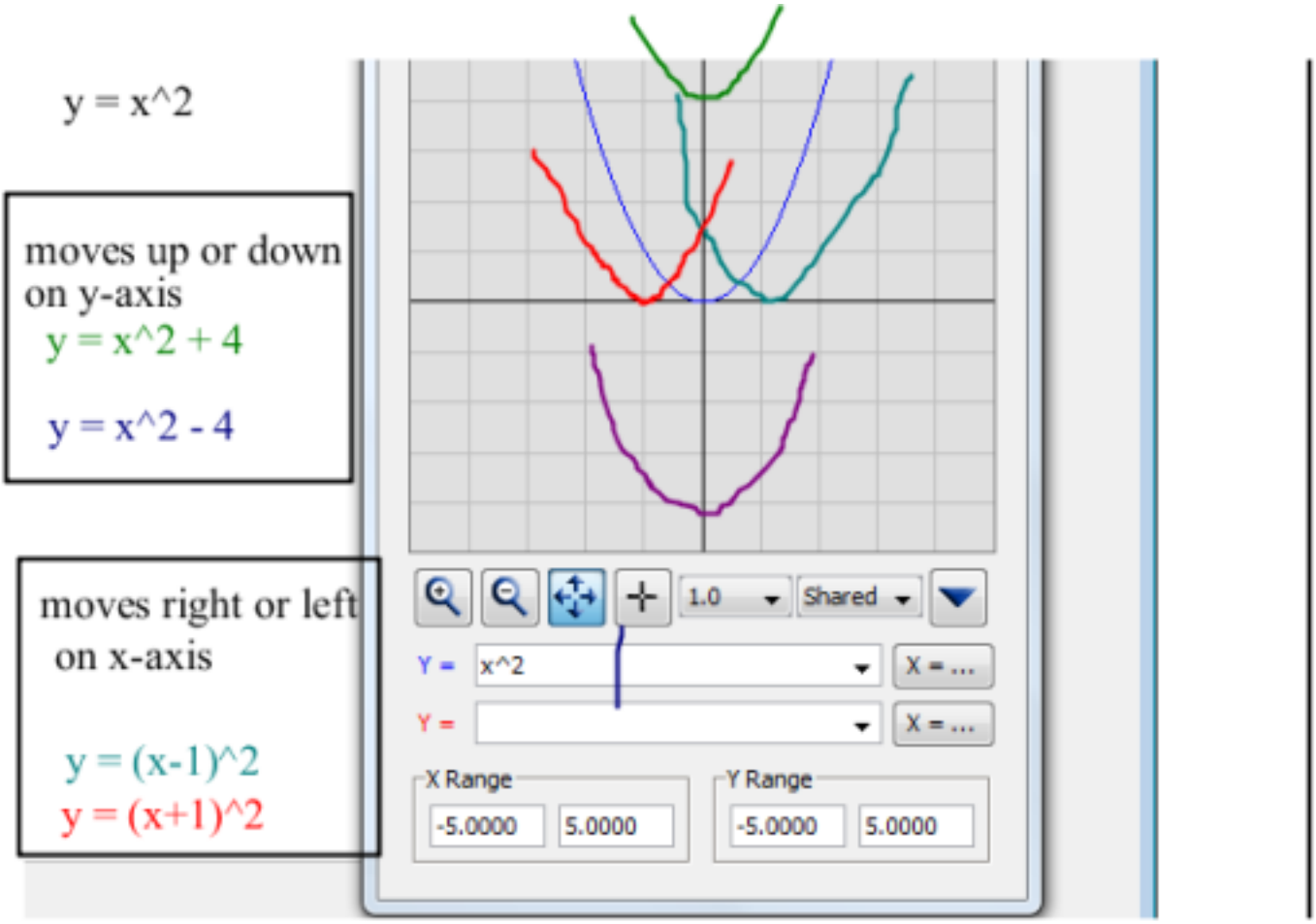
You can tell just by looking at their equations that $y = x^2$, $y = 2x^2$, $y = -x^2$, $y = x^2 + 4$, and $y = (x - 1)^2$ are all related. But how are they related? In particular, how are their graphs related? In this Tutorial we'll explore how to use information about one graph to quickly draw the graphs of other, related functions.



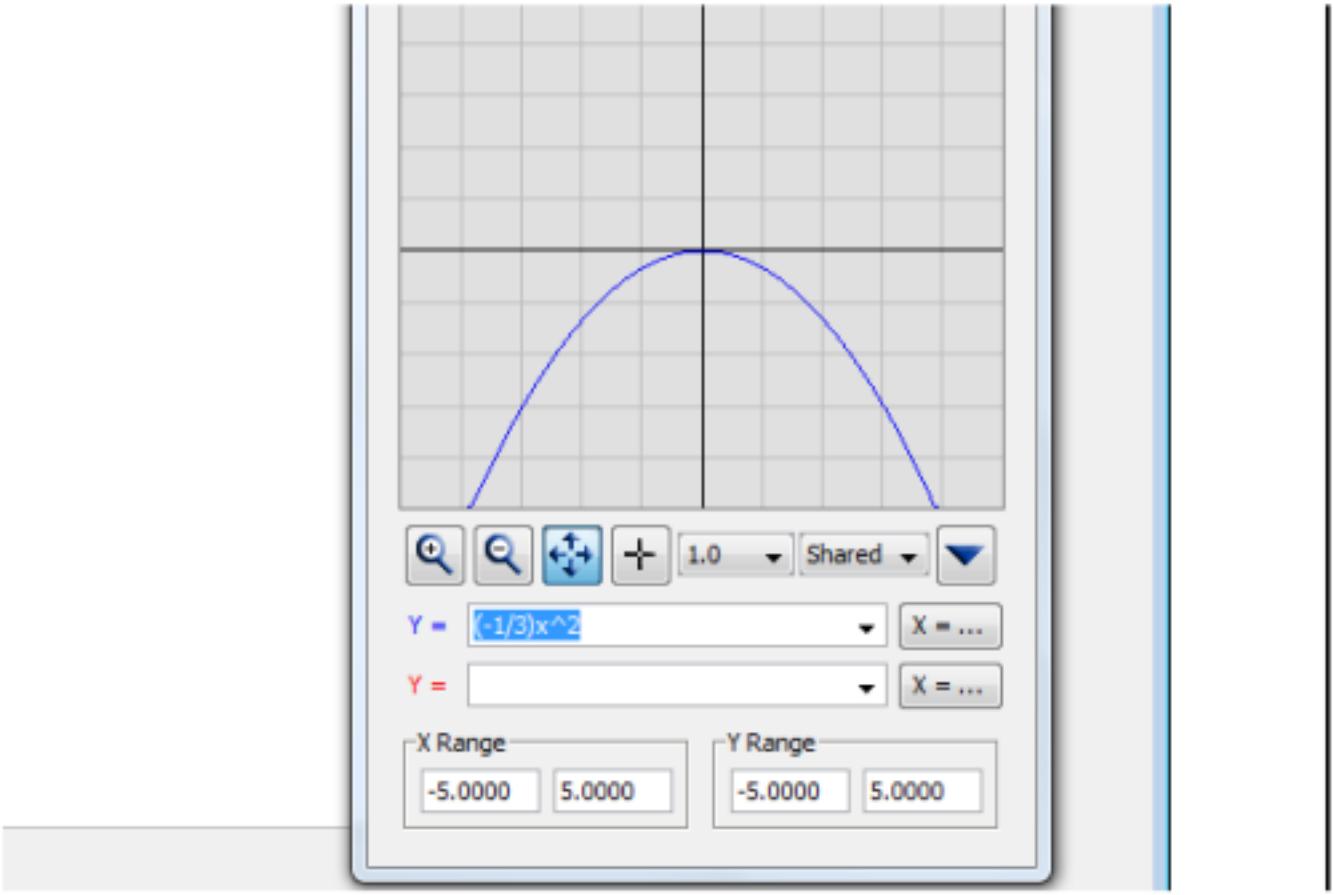
Public Screen 3



Public Screen 4

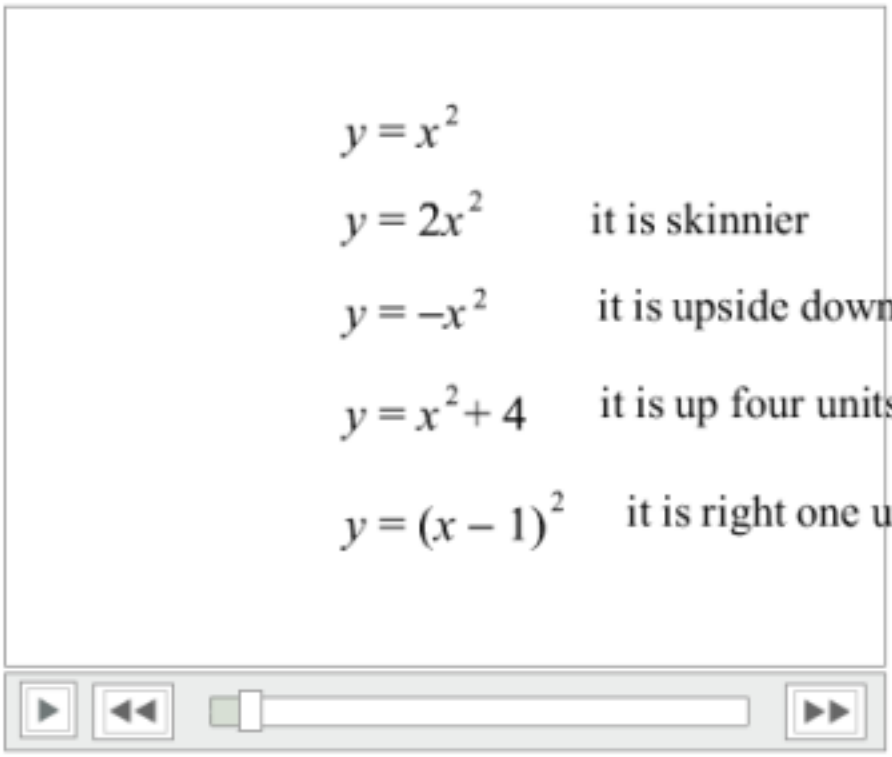


Public Screen 5



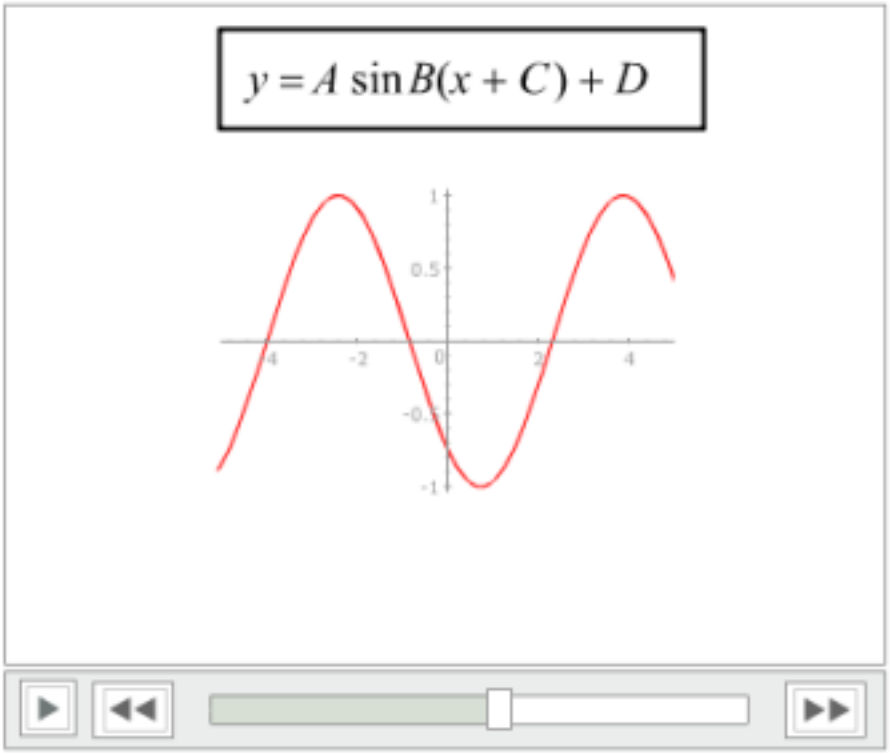
Public Screen 75

Families



Public Screen 76

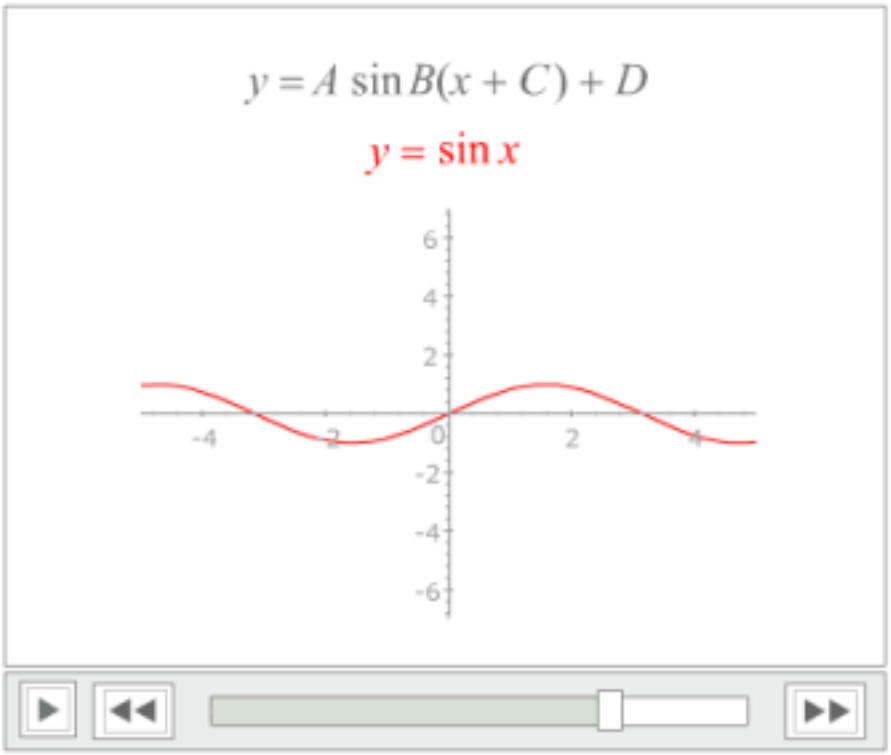
Families



A = amplitude (height of the graph) if it is negative the graph goes down first

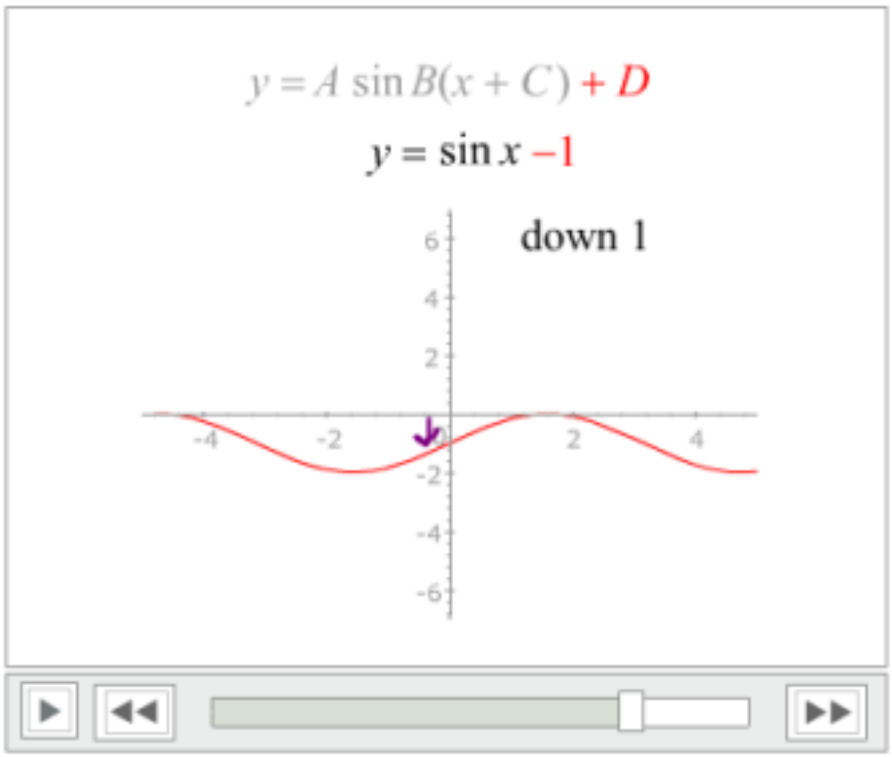
Public Screen 77

Families



Public Screen 78

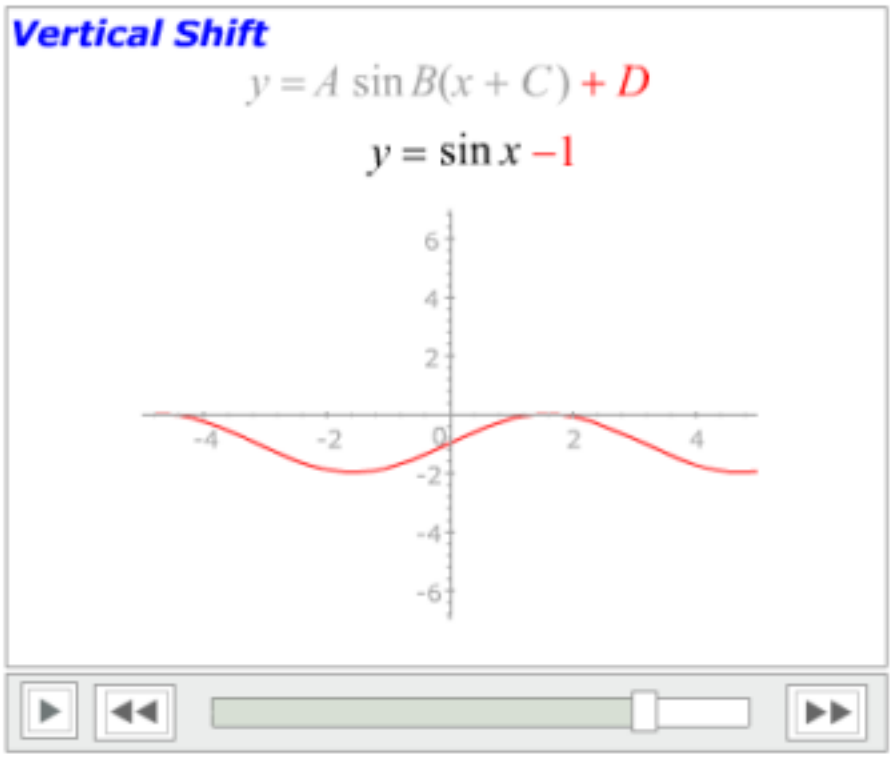
Families



D = moves it up or down on the y-axis

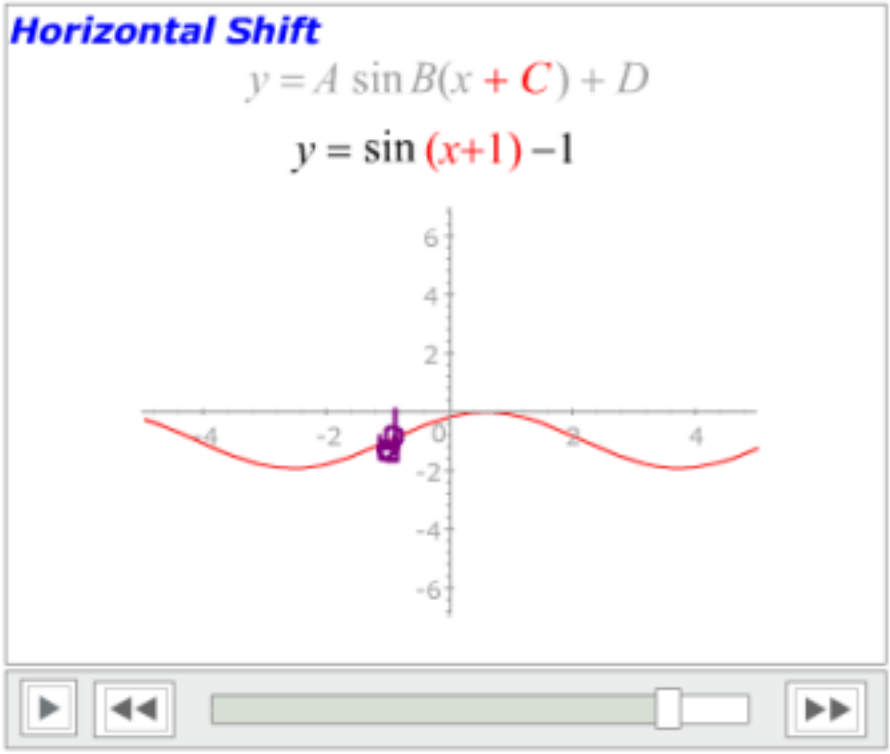
Public Screen 79

Families



Public Screen 80

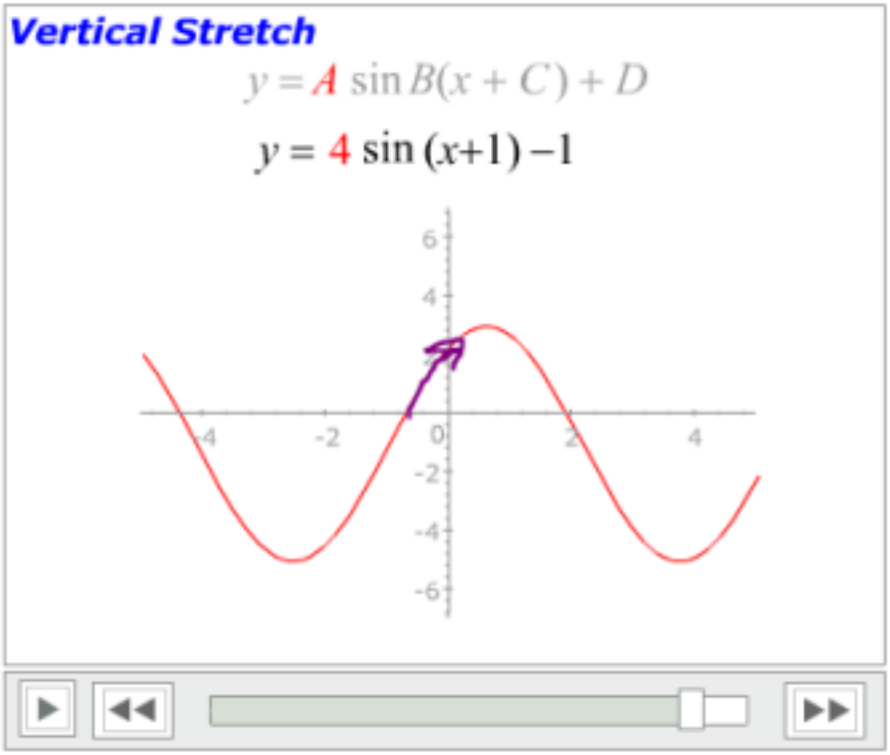
Families



C = movement on the x-axis, left or right (opposite of what you think)

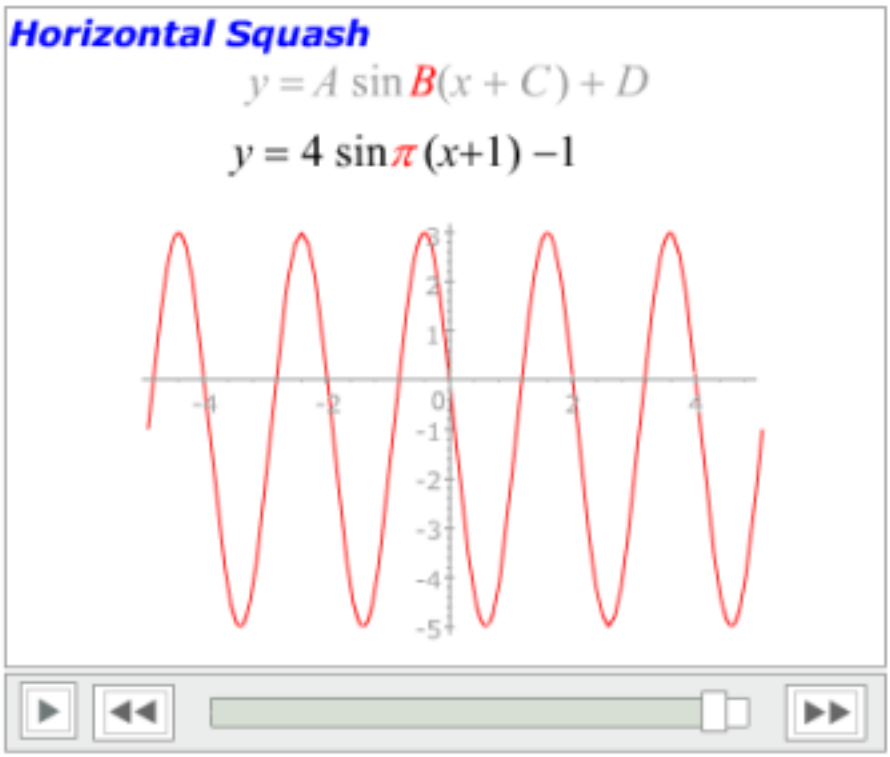
Public Screen 81

Families



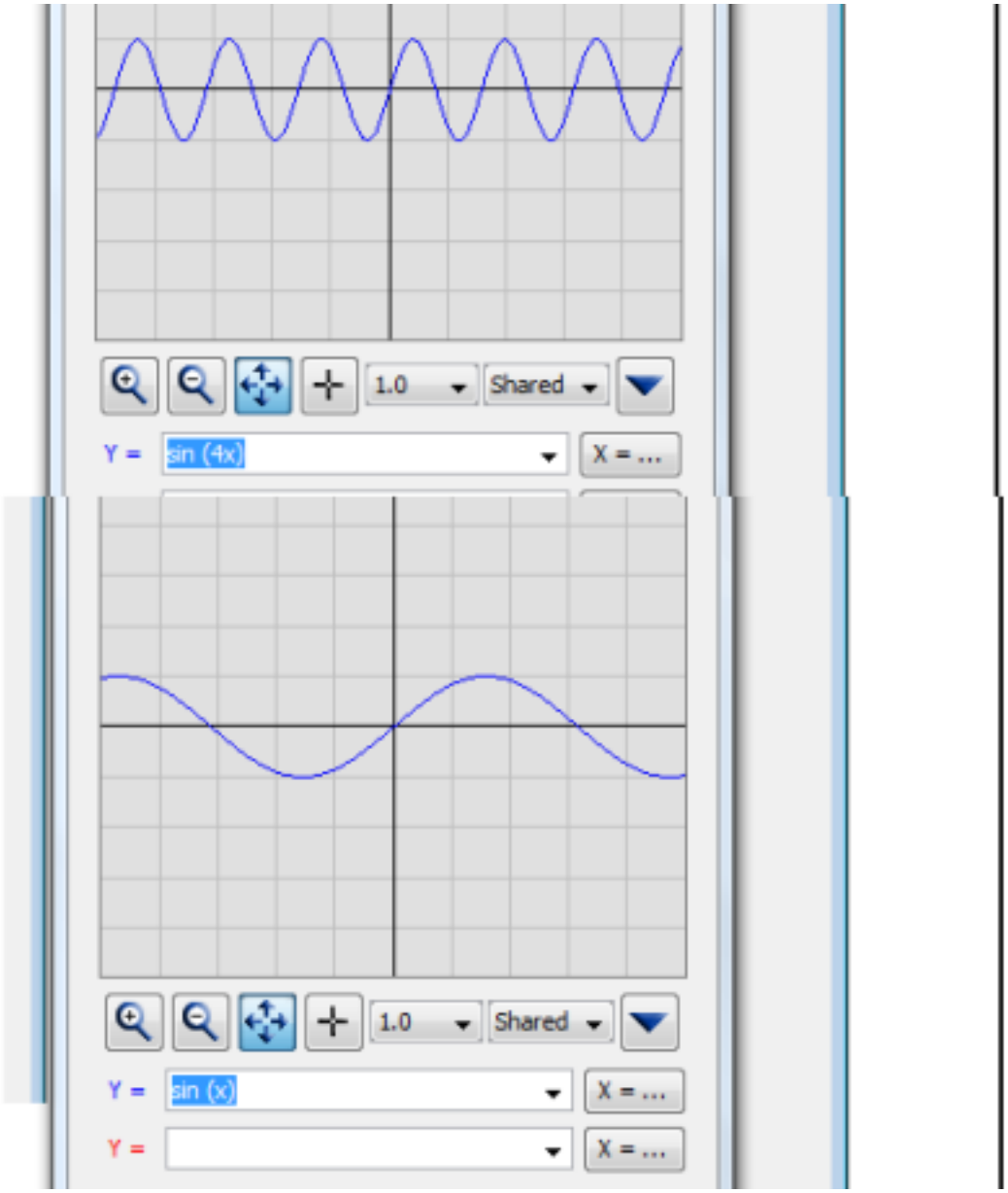
Public Screen 82

Families



B = period, means how long it takes for one wave

Public Screen 6

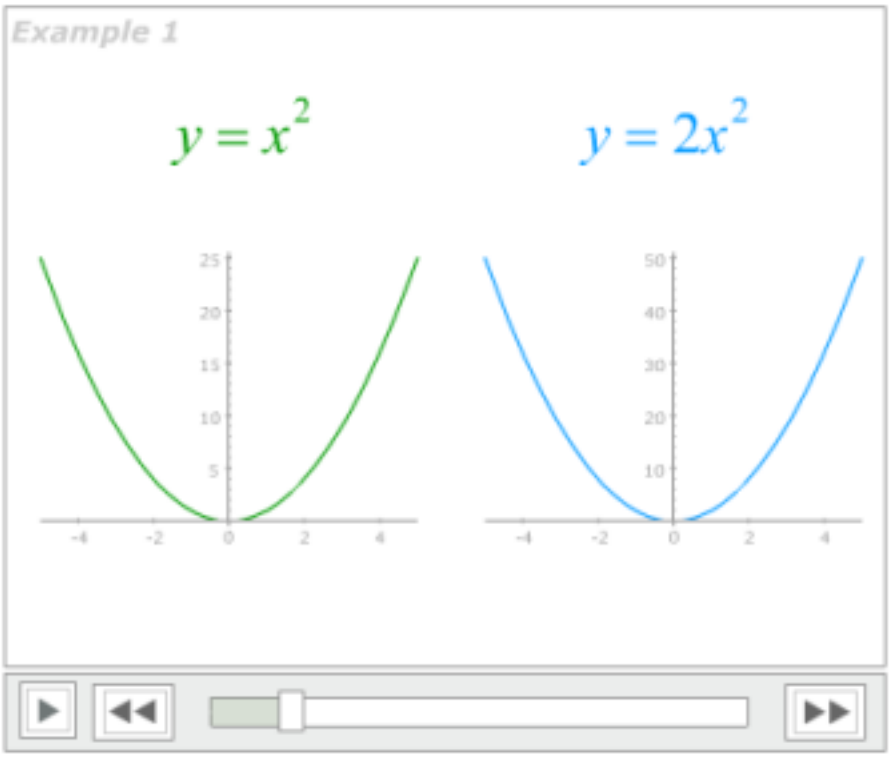


Public Screen 83

Rules

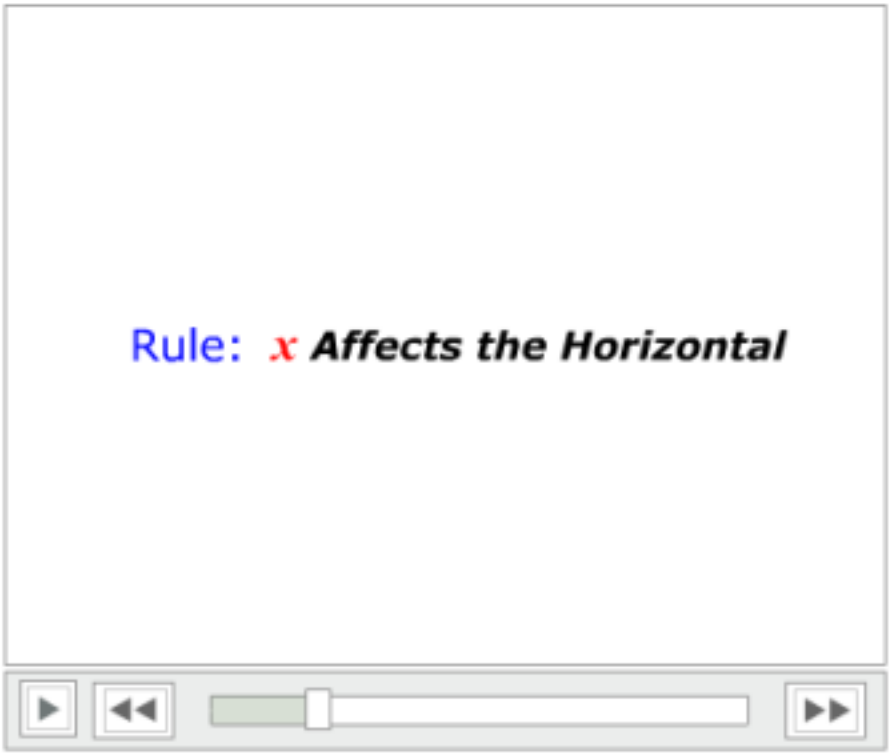
Public Screen 84

Rules



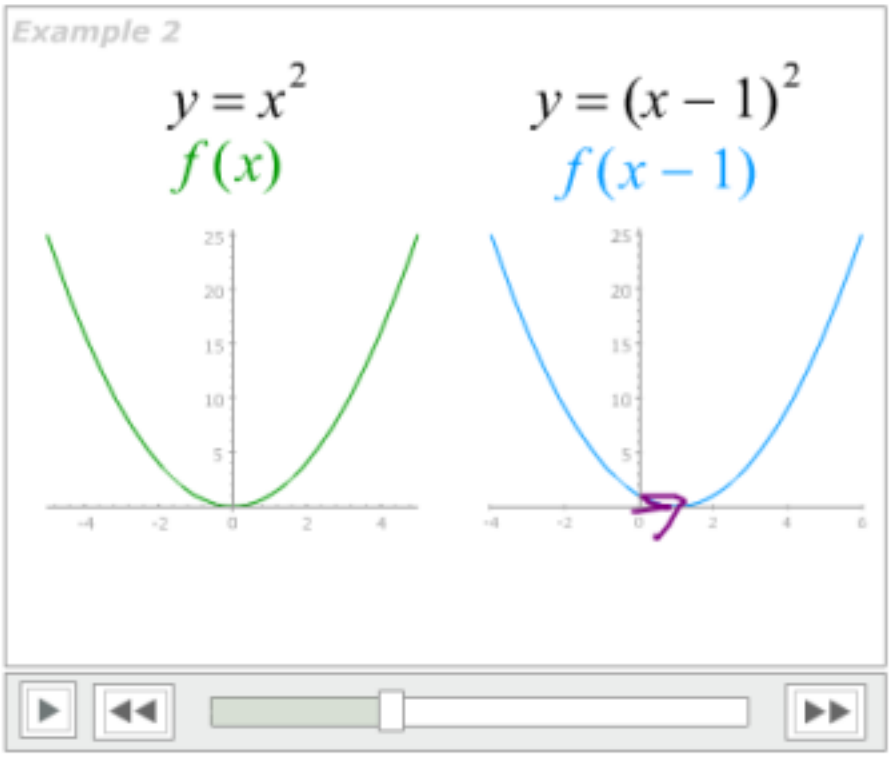
Public Screen 85

Rules



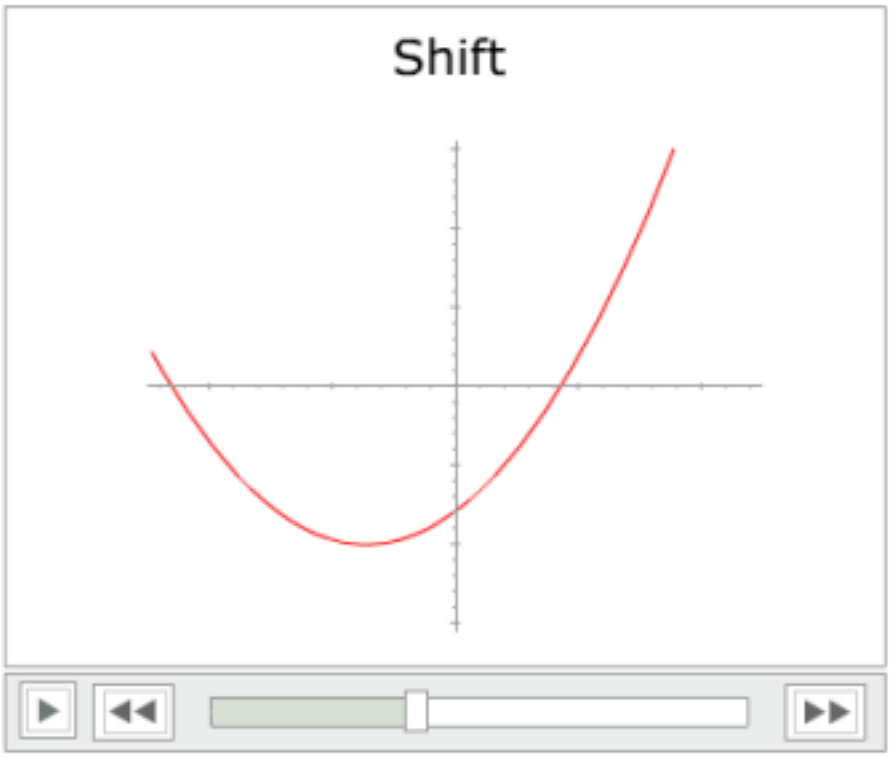
Public Screen 86

Rules



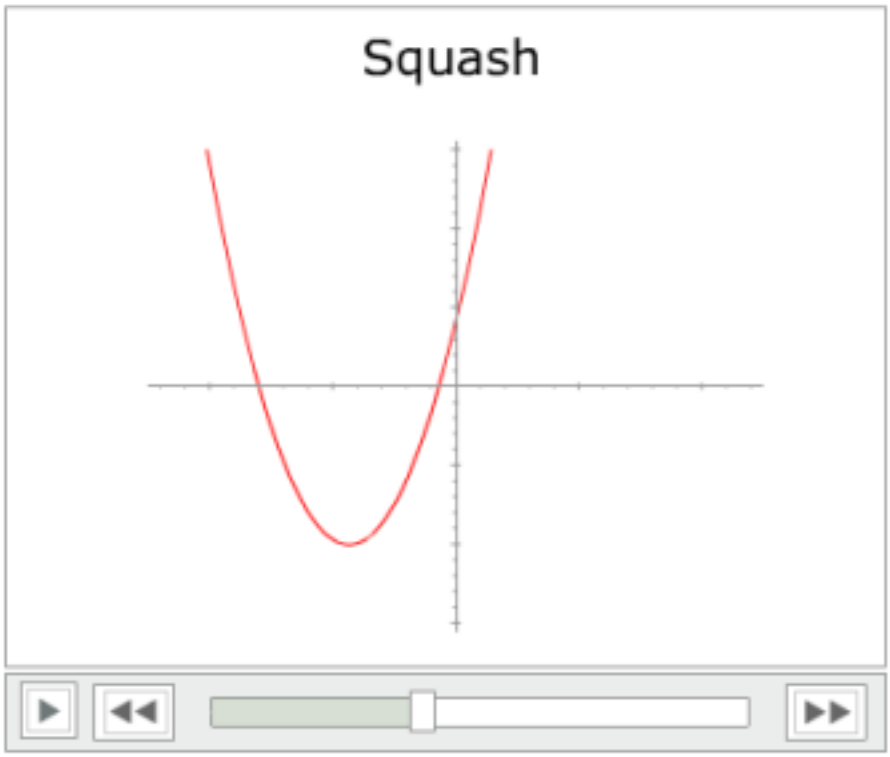
Public Screen 87

Rules



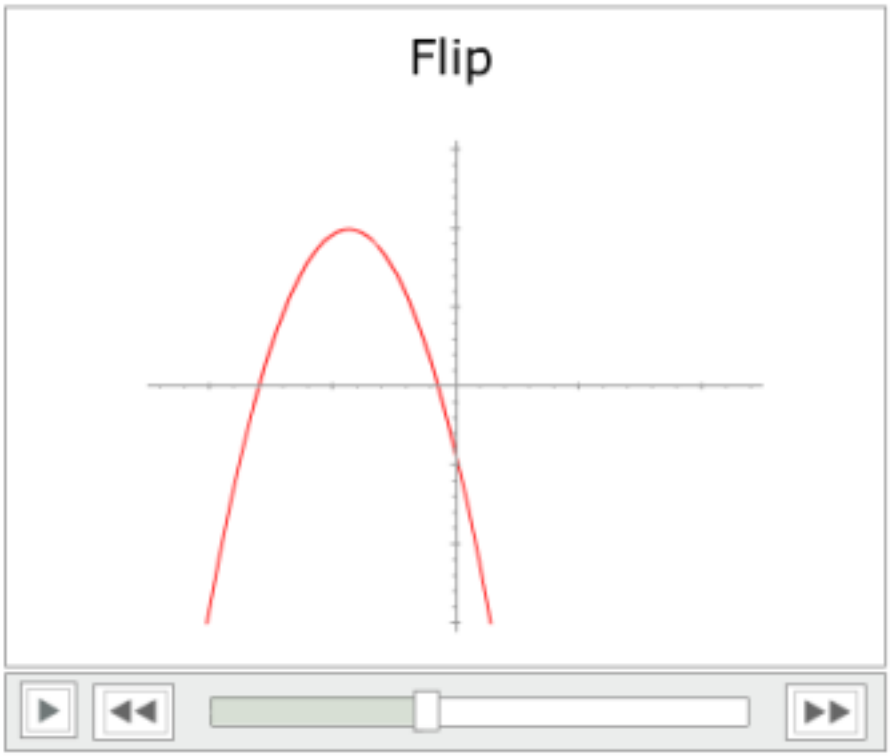
Public Screen 88

Rules



Public Screen 89

Rules



Public Screen 90

Rules

$y + a = f(x)$ or $y = f(x) - a$	is shifted down a units.
$y = f(x + a)$	is shifted to the left a units.
$ay = f(x)$ or $y = \frac{1}{a} f(x)$	is $\frac{1}{a}$ times as tall.
$y = f(ax)$	is $\frac{1}{a}$ times as wide.
$-y = f(x)$ or $y = -f(x)$	is upside down.
$y = f(-x)$	is mirror image, left to right.

Public Screen 91

Rules

$y + a = f(x)$ or $y = f(x) - a$	is shifted down a units.
$y = f(x + a)$	is shifted to the left a units.
$ay = f(x)$ or $y = \frac{1}{a} f(x)$	is $\frac{1}{a}$ times as tall.
$y = f(ax)$	is $\frac{1}{a}$ times as wide.
$-y = f(x)$ or $y = -f(x)$	is upside down.
$y = f(-x)$	is mirror image, left to right.

vertical

horizontal

squash (fat)

stretch (skinnier)

flip over x-ax

flip over y-axis

1st: Shift

2nd: Squash or Stretch

3rd: Flip

Public Screen 92

Rules

$y + a = f(x)$ or $y = f(x) - a$	is shifted down a units.
$y = f(x + a)$	is shifted to the left a units.
$ay = f(x)$ or $y = \frac{1}{a} f(x)$	is $\frac{1}{a}$ times as tall.
$y = f(ax)$	is $\frac{1}{a}$ times as wide.
$-y = f(x)$ or $y = -f(x)$	is upside down.
$y = f(-x)$	is mirror image, left to right.

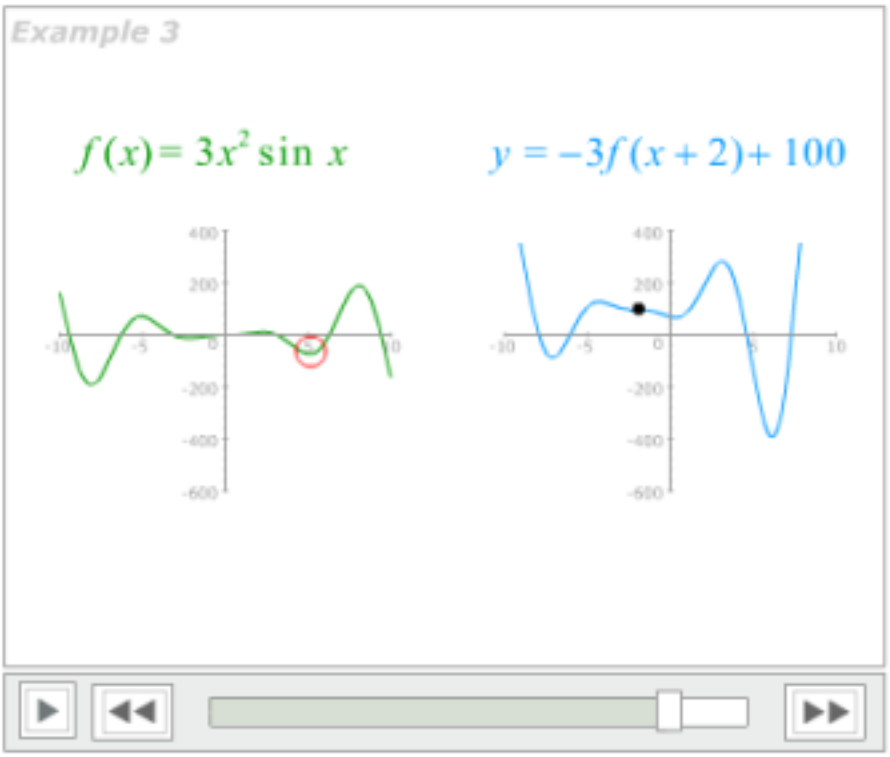
1st: Shift

2nd: Squash or Stretch

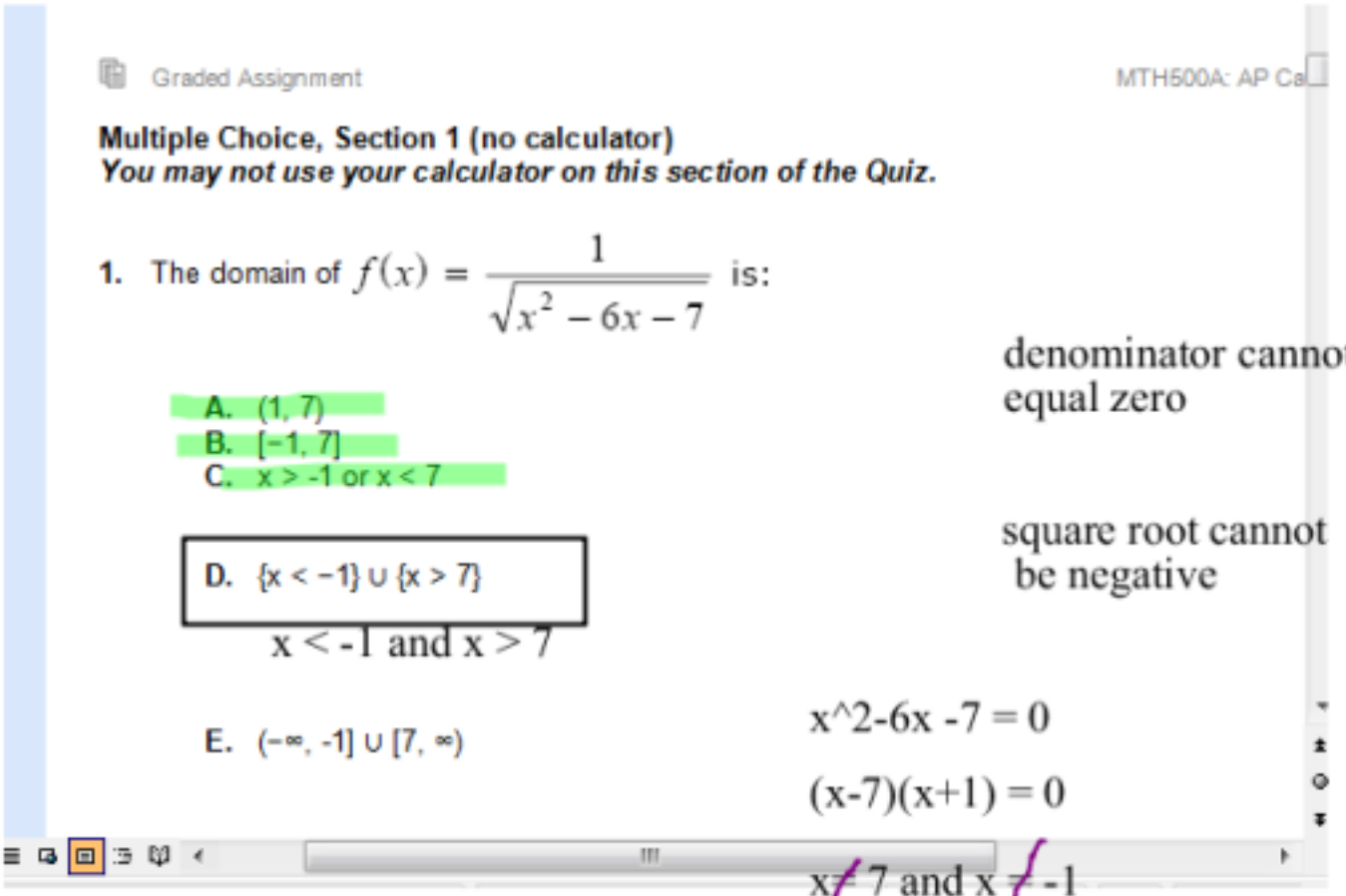
3rd: Flip

Public Screen 93

Rules



Public Screen 7



Public Screen 8

2. In which of the following is y a function of x?

I. $y^2 = 9 - x^2$
II. $|y| = x$
III. $y = \sqrt[3]{x^2}$

y = sqrt(9-x^2)

A. I only
B. II only
C. III only
D. I and III only
E. I, II, and III

3. You would probably use calculus to determine the area for which of the following shapes

A. ∞

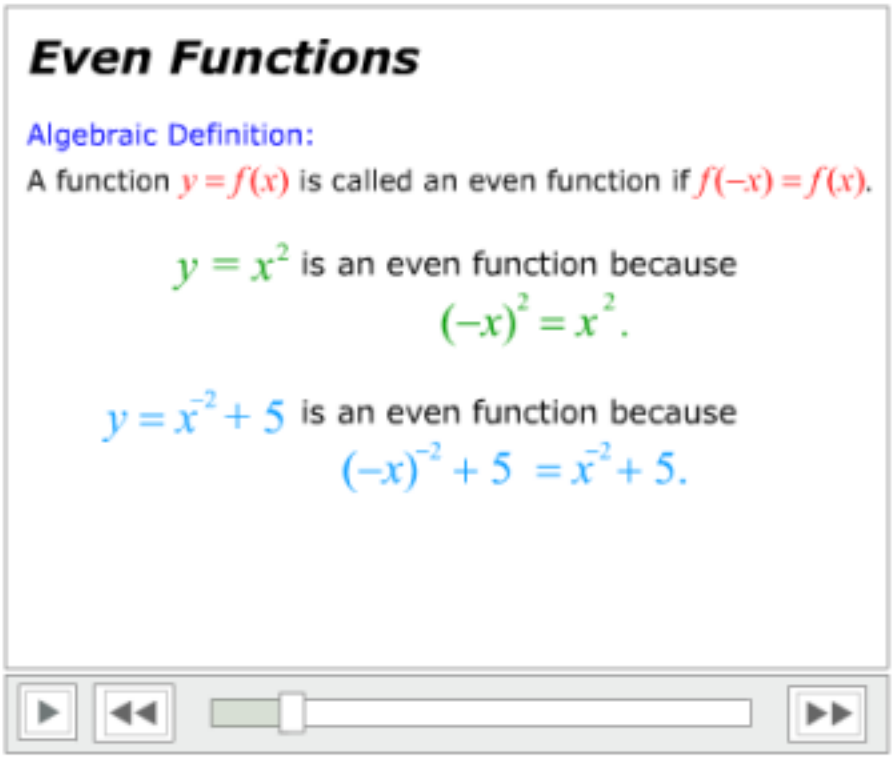
B. 

C. 

D. 

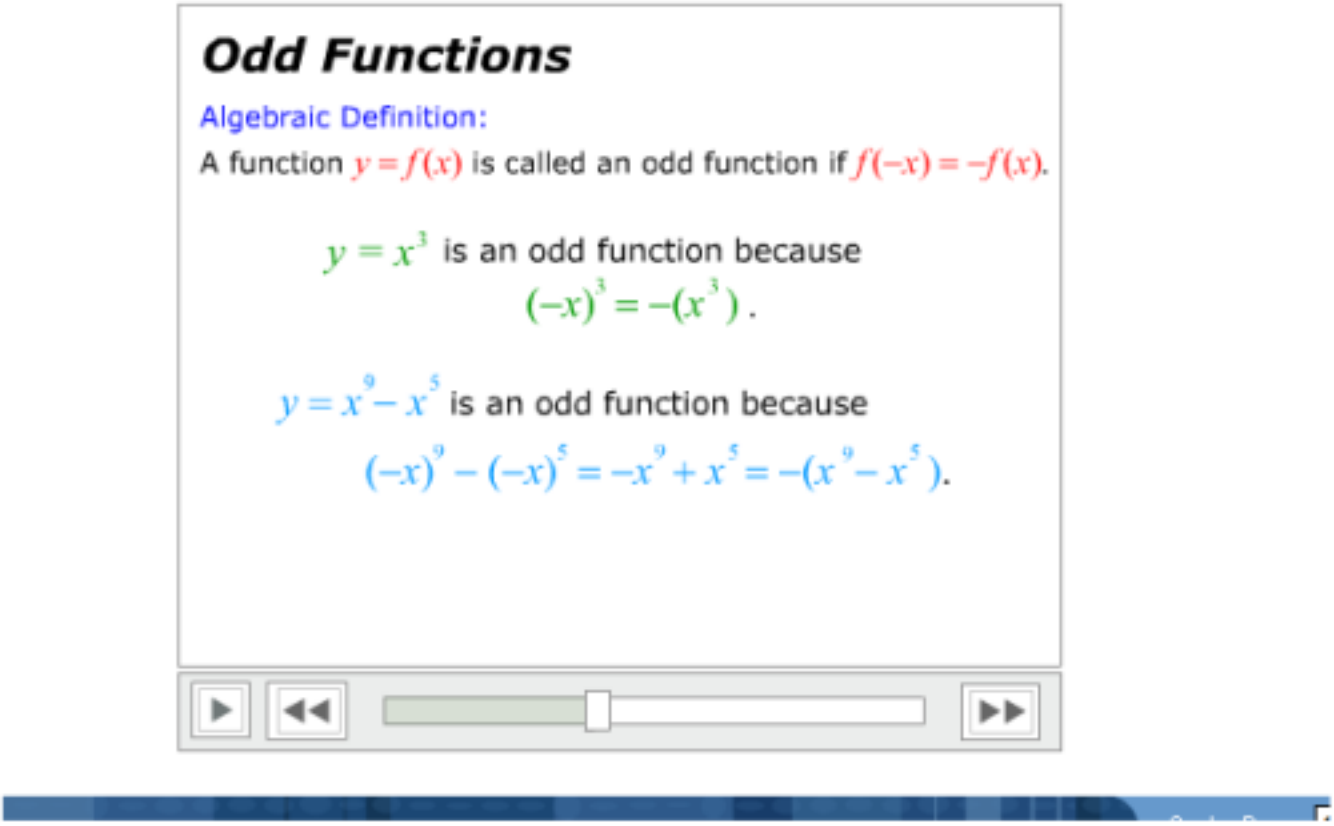
Public Screen 9

and Odd



Public Screen 10

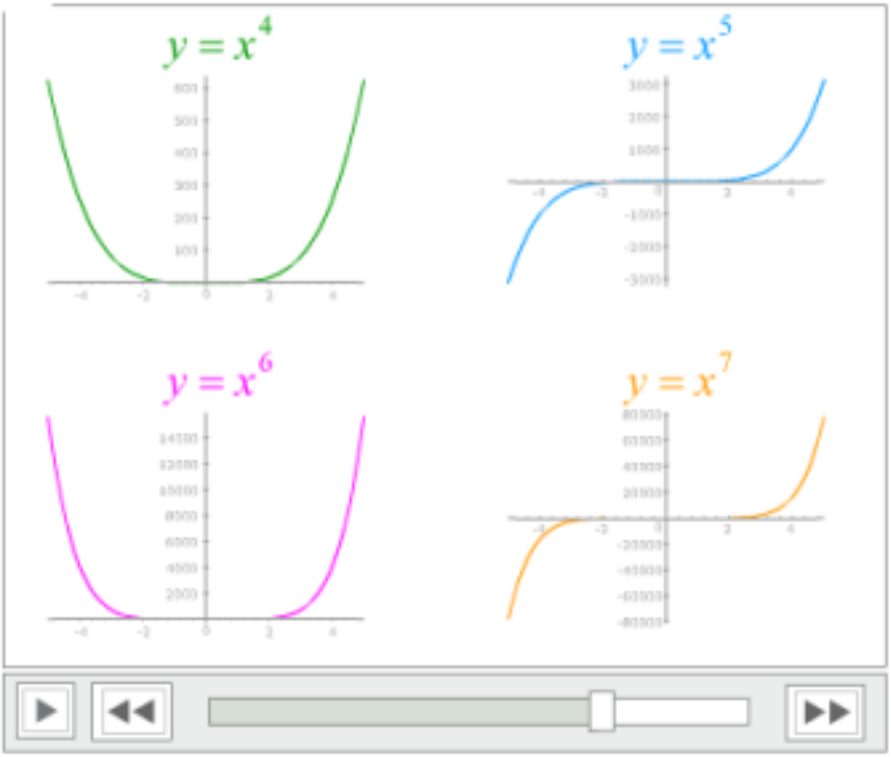
and Odd



Public Screen 11

Even

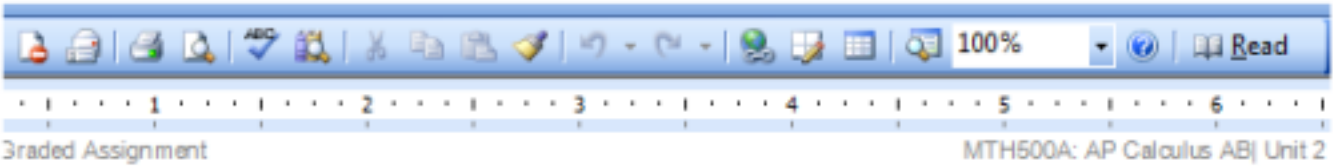
Odd



are not one to one

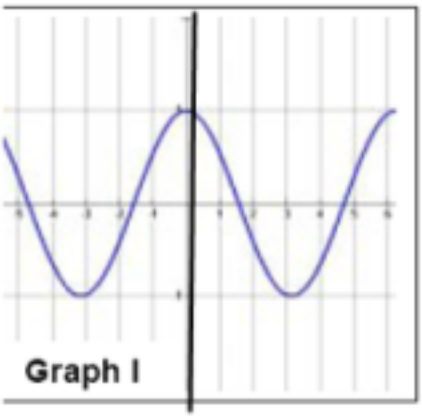
one to one

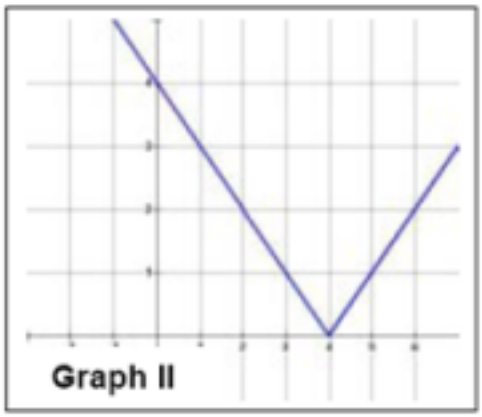
Public Screen 12

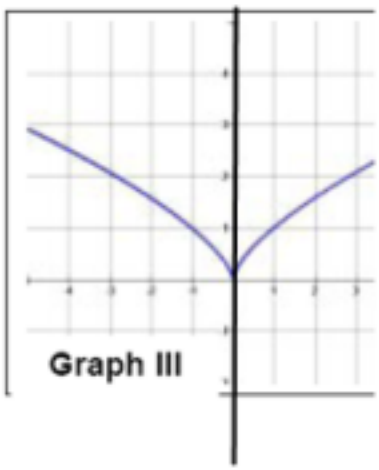


Graded Assignment MTH500A: AP Calculus AB| Unit 2

Which of the following is an even function?







A. I only
B. II only
C. III only
D. I and III only
E. None of these

symmetry across the y-axis

Public Screen 13

$$f(x) = \sqrt{9 - x^2}$$

. If g(x) = 3*x* −1 and then which of the following will have a domain of: [−3, 1/3) ∪ (1/3,3]

A. (g + f)(x)
B. (f/g)(x)
C. (g − f)(x)
D. g(f(x))
E. f(g(x))

denominator cannot equal zero

A. $3x-1+\sqrt{9-x^2}$

B. $\dfrac{\sqrt{9-x^2}}{3x-1}$

C. $3x-1-\sqrt{9-x^2}$

D. $3(\sqrt{9-x^2})-1$

E. $\sqrt{9-(3x-1)^2}$