



Transformations of Functions II - Horizontal Translations

Video Notes

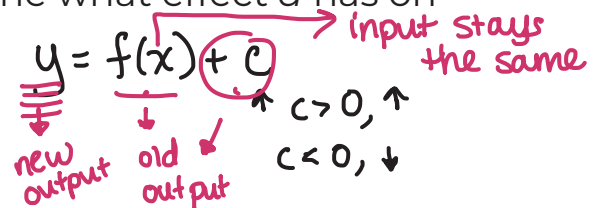
[Video Link](#)

Transformations of Functions II - Horizontal Translations

Background Knowledge:

- Parent Functions, Parts I and II

Consider some parent functions (including quadratic, square root, absolute value, reciprocal, and exponential) and determine what effect d has on $y = f(x - d)$, for $d = 1, -3, 5,$ and -7 .



Quadratic Functions: *inverse for changes to x (transformations)*

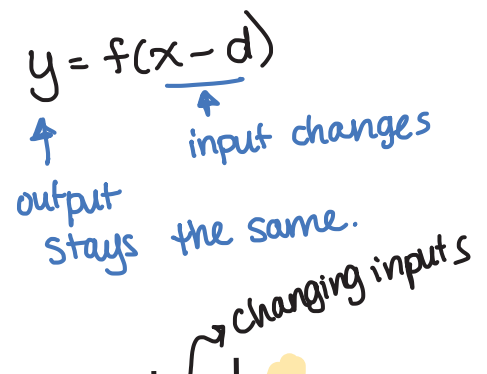
Parent Function: $f(x) = x^2$

$y = f(x - 1)$: $d = +1$ → $y = (x - 1)^2$ → shifted right 1 unit

$y = f(x + 3)$: $d = -3$ → $y = (x + 3)^2$ → shifted left 3 units

$y = f(x - 5)$: $d = 5$ → $y = (x - 5)^2$ → shifted right 5 units

$y = f(x + 7)$: $d = -7$ → $y = (x + 7)^2$ → shifted left 7 units



$x - 7$	$x + 5$	$x - 3$	$x + 1$	x	$f(x) = x^2$
-10	2	-6	-2	-3	9
-9	3	-5	-1	-2	4
-8	4	-4	0	-1	1
-7	5	-3	1	0	0
-6	6	-2	2	1	1
-5	7	-1	3	2	4
-4	8	0	4	3	9

Keep outputs the same

changing inputs

Absolute Value Function:

Parent Function: $f(x) = |x|$

$y = f(x - 1)$: $d = 1$ $y = |x - 1|$ → shifted right by 1

$y = f(x + 3)$: $d = -3$ $y = |x + 3|$ → shifted left by 3

$y = f(x - 5)$: $d = 5$ $y = |x - 5|$ → shifted right by 5

$y = f(x + 7)$: $d = -7$ $y = |x + 7|$ → shifted left by 7

	○	●	●	●	x	f(x)
-10	2	-6	-2	-3	3	
-9	3	-5	-1	-2	2	
-8	4	-4	0	-1	1	
-7	5	-3	1	0	0	
-6	6	-2	2	1	1	
-5	7	-1	3	2	2	
-4	8	0	4	3	3	

↑
outputs
stay
the
same

Reciprocal Function:

Parent Function: $f(x) = \frac{1}{x}$

$y = f(x - 1)$: $y = \frac{1}{x - 1}$ → shifted right by 1

$y = f(x + 3)$: $y = \frac{1}{x + 3}$ → shifted left by 3

$y = f(x - 5)$: $y = \frac{1}{x - 5}$ → shifted right by 5

$y = f(x + 7)$: $y = \frac{1}{x + 7}$ → shifted left by 7

Summary:

$$y = f(x \ominus d)$$

↑
To identify
d, take the
opposite sign.

d represents a horizontal translation (shift)

$d > 0 \rightarrow$ right

$d < 0 \rightarrow$ left