

Your Name

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Notes

Lesson 1.1

TRANSLATIONS

Clarify and Combine

Horizontal
Translations

$$f(x) = a \cdot f(bx - h) + k$$

(Note: In the original image, 'h' is circled in orange and a green arrow points from it to the right.)

Vertical
Translations

Given any function, describe the effects parameter h has on its graph when

- a. $h > 0$ (positive) horizontal shift right
 $x - \underline{\quad}$
- b. $h < 0$ (negative) horizontal shift left
 $x + \underline{\quad}$
- c. $h = 0$ vertex on y-axis
 $x - h$ if $h = -3 \rightarrow x - (-3) \rightarrow x + 3$
 if $h = 3 \rightarrow x - (3) \rightarrow x - 3$

Given any function, describe the effects parameter k has on its graph when

- a. $k > 0$ (positive) vertical shift up
- b. $k < 0$ (negative) vertical shift down
- c. $k = 0$ vertex on x-axis

Let's Play with Function Transformations and remember what **h**, and **k** do!

<https://www.geogebra.org/m/uTddJKRC#material/HJvZSUna>

$$f(x) = a \cdot f(bx - h) + k$$

Describe and Write the Transformation

Level 1

(a)

hori z. shift left
vert. shift up 2

$y = a|x-h|+k$

$y = 1|x-(-1)|+(2)$

$y = |x+1|+2$

(b)

horiz shift right 2

$y = a|x-h|+k$

$y = 1|x-2|+0$

$y = |x-2|$

(c)

horizontal shift right 1
vertical shift up 3

reflected!

$y = a|x-h|+k$

$y = -1|x-(1)|+(3)$

$y = -|x-1|+3$

Graph and Describe the Transformation

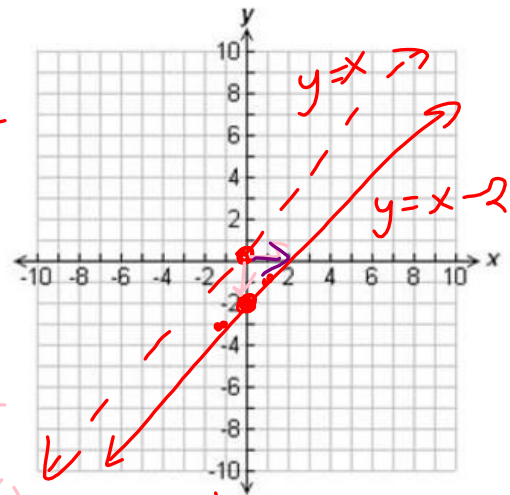
$y = x - 2$

Level 1: Parent Function *Linear*
 $y = x$
 Domain: $(-\infty, \infty)$
 Range: $(-\infty, \infty)$

Level 2: Describe and Graph

vertical shift down 2
 $y = (x) - 2$

OR
horizontal shift right 2
 $y = (x - 2)$



x	y = x - 2
-1	$(-1) - 2 = -3$
0	$(0) - 2 = -2$
1	$(1) - 2 = -1$

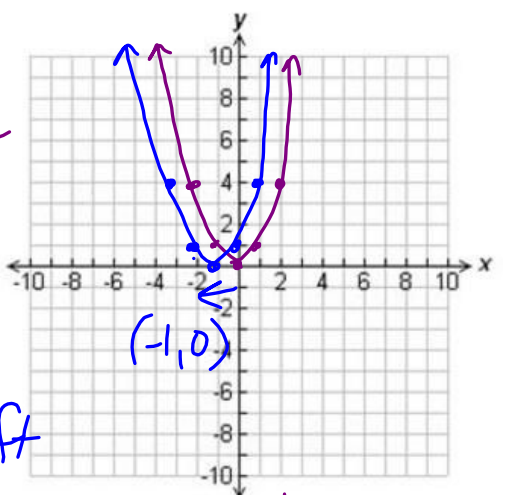
Graph and Describe the Transformation

$y = (x + 1)^2$
 $x \rightarrow (x + 1)$

Level 1: Parent Function *Quadratic*
 $y = x^2$
 Domain: $(-\infty, \infty)$
 Range: $[0, \infty)$

Level 2: Describe and Graph

horizontal shift left 1



x	y = x ²	(x + 1) ²
-2	4	$(-2 + 1)^2 = 1$
-1	1	$(-1 + 1)^2 = 0$
0	0	$(0 + 1)^2 = 1$
1	1	$(1 + 1)^2 = 4$
2	4	

Graph and Describe the Transformation

$y = |x - 3.5| + 2$
 $x - (3.5)$ Absolute Value

Level 1: Parent Function $y = |x|$
 Domain: $(-\infty, \infty)$
 Range: $[2, \infty)$

Level 2: Describe and Graph

horizontal shift right 3.5
 Vertical shift up 2

x	y = x	y = x - 3.5 + 2
-1	1	$ -1 - 3.5 + 2 = 6.5$
0	0	5.5
1	1	4.5
2	2	3.5
3	3	2.5
3.5	3.5	2
4	4	2.5