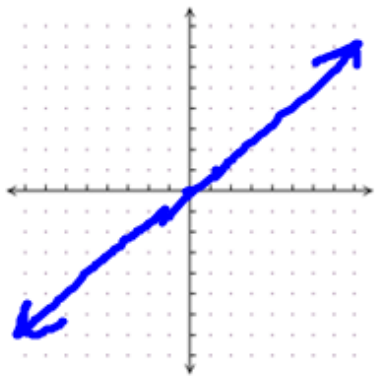
1.3: Parent Functions
Honors

Linear

$f(x) = x$

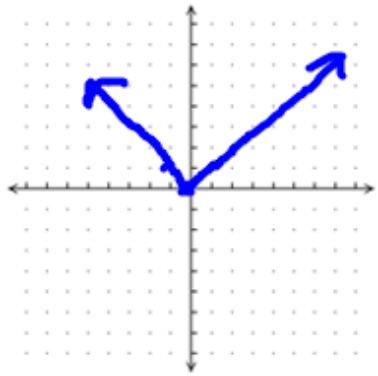


Key Points: (-1, -1), (0, 0), (1, 1)

(2, 2)

Absolute Value

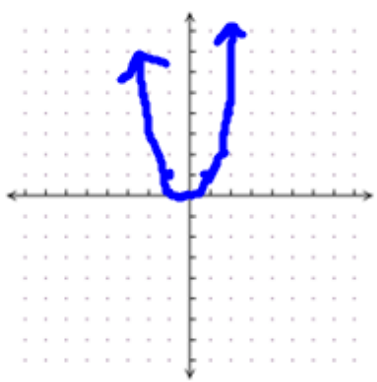
$f(x) = |x|$



Key Points: (-1, 1), (0, 0), (1, 1)

Square/Quadratic

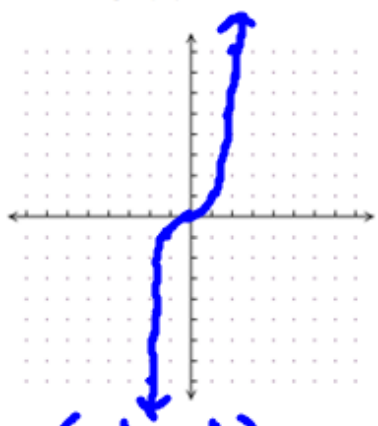
$f(x) = x^2$



Key Points: (-1, 1), (0, 0), (1, 1), (2, 4)

Cubic

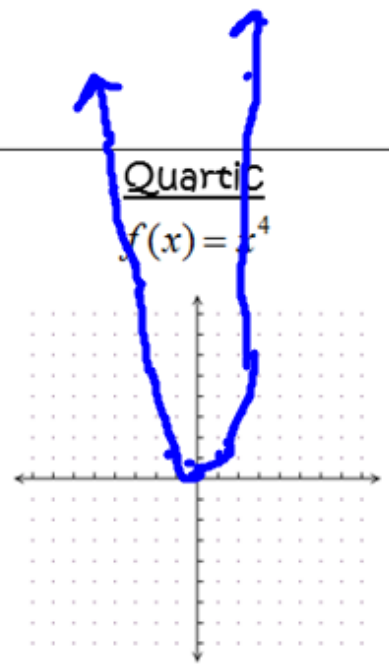
$f(x) = x^3$



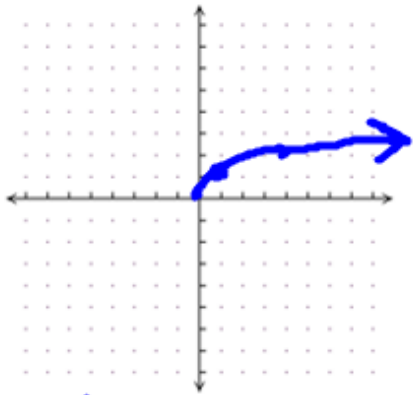
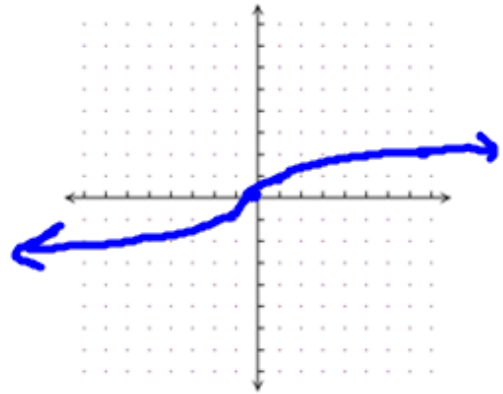
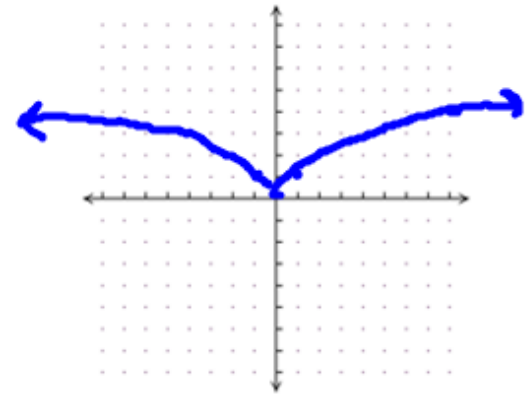
Key Points: (-1, -1), (1, 1)
(0, 0), (2, 8)

Quartic

$f(x) = x^4$



Key Points: (-1, 1), (0, 0)
(1, 1), (2, 16)

Square Root	Cube Root	Squared Cube Root
$f(x)=\sqrt{x}=x^{\frac{1}{2}}$	$f(x)=\sqrt[3]{x}=x^{\frac{1}{3}}$	$f(x)=\sqrt[3]{x^2}=\left(\sqrt[3]{x}\right)^2=x^{\frac{2}{3}}$
		
Key Points: (0,0), (1,1) (4,2)	Key Points: (-1,-1), (0,0) (1,1), (8,2)	Key Points: (-1,1) (0,0) (1,1) (8,4)

$y=a\cdot f[c(x-h)]+k$

$a\Rightarrow y-distortion(x,y)\rightarrow(x,ay)$

$c\Rightarrow x-distortion(x,y)\rightarrow(\frac{x}{c},y)$

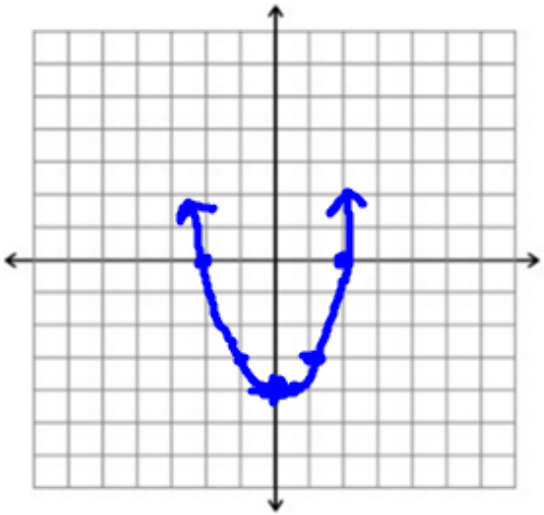
$h\Rightarrow horizontal\,shift\,in$

$\quad opposite\,direction$

$k\Rightarrow vertical\,shift$

$\sqrt[3]{8^2}=\sqrt[3]{64}$

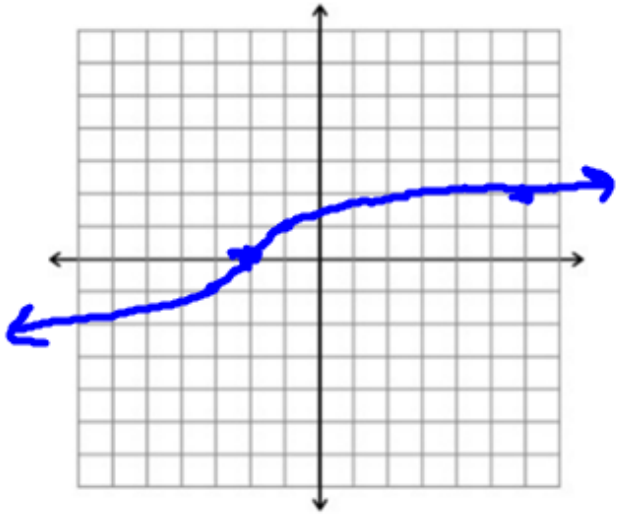
$h(x) = x^2 - 4$



V.S: -4

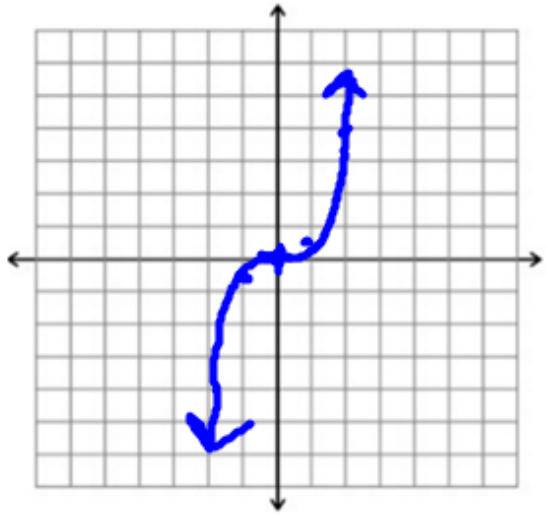
x	y
2	0
-2	0
0	-4

* $f(x) = \sqrt[3]{x+2}$



H.S: -2

* $g(x) = \frac{1}{2}x^3$



y-dist: ½

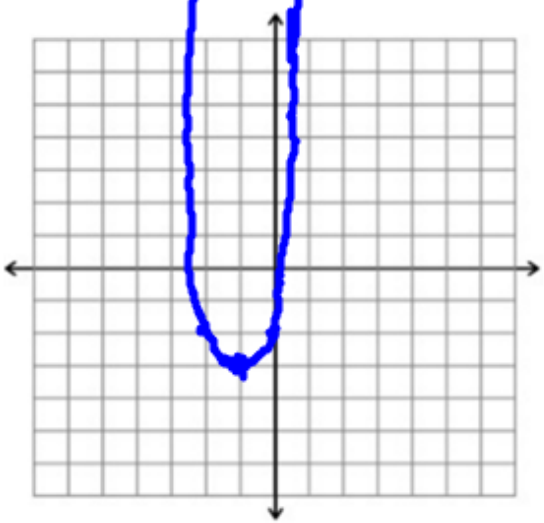
(-1,-1) → (-1,-½)

(0,0) → (0,0)

(1,1) → (1,½)

(2,8) → (2,4)

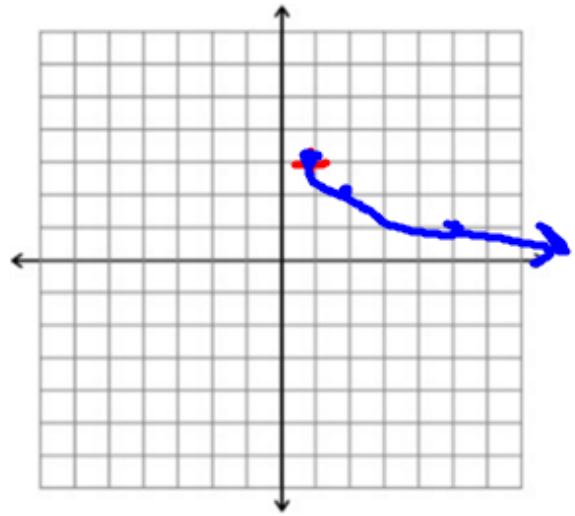
$f(x) = (x+1)^4 - 3$



H.S.: -1

V.S.: -3

$* \; k(x) = -\sqrt{x-1} + 3$



→ H.S. 1

V.S.: 3

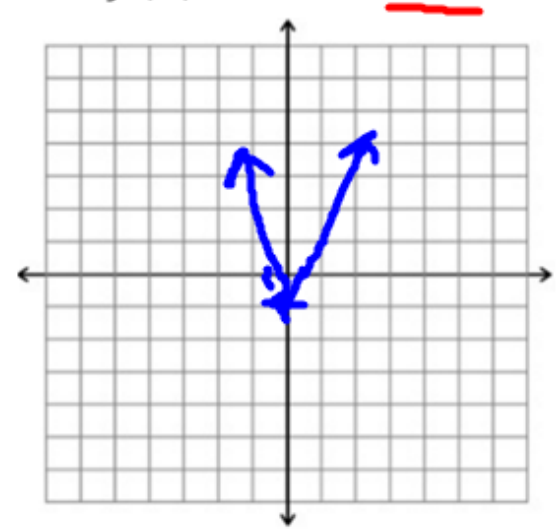
y-dist: -1

$(0,0) \rightarrow (0,0)$

$(1,1) \rightarrow (1,-1)$

$(4,2) \rightarrow (4,-2)$

$* \; j(x) = |3x| - 1$



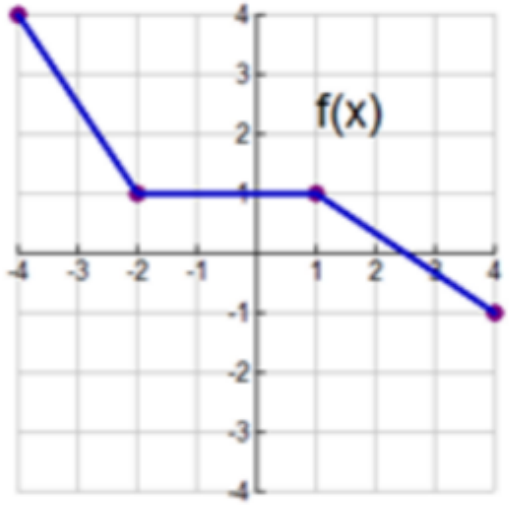
V.S: -1

* X-dist: 3

$(-1,1) \rightarrow (-\frac{1}{3}, 1)$

$(0,0) \rightarrow (0,0)$

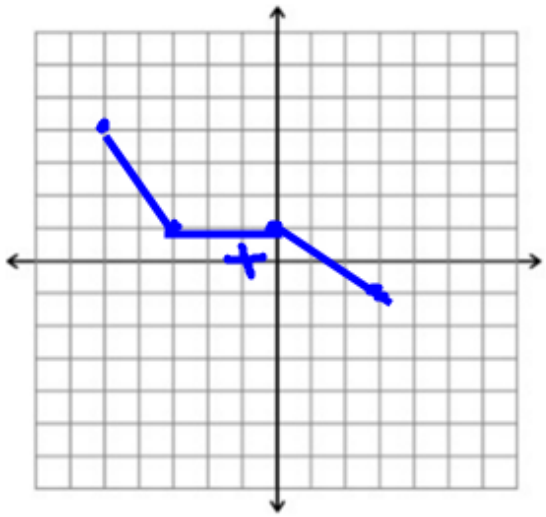
$(1,1) \rightarrow (\frac{1}{3}, 1)$



Key Pts.

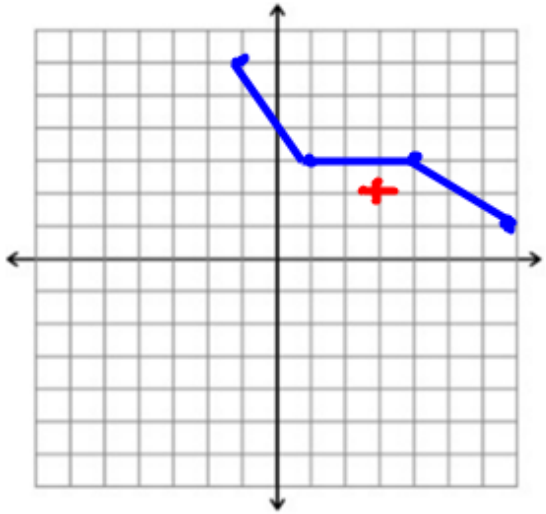
(-4,4)
(-2,1)
(1,1)
(4,-1)

$f(x+1)$



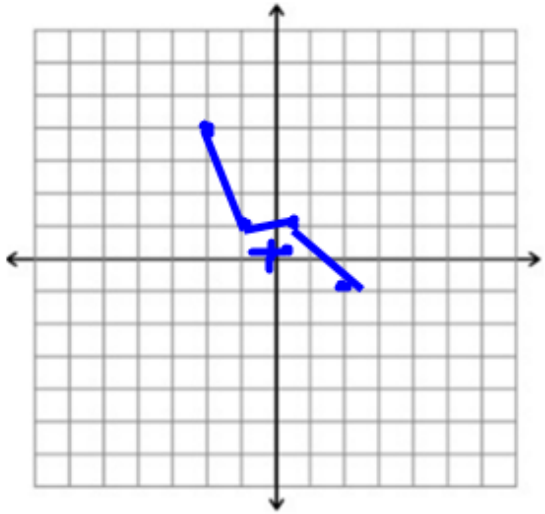
HS: -1

* $f(x-3)+2$



HS: 3
VS: 2

* $f(2x)$



x-dist: 2

(-2,4) (½,1)
(-1,1) (2,-1)