1.4 Part A: Transformations

Transformation of functions in the form $y = x^n$ is $y = \boldsymbol{a}\,[\,\boldsymbol{k}\,(x - \boldsymbol{d})]^n + \boldsymbol{c}$

$$y = \boldsymbol{a}\,[\,\boldsymbol{k}\,(x - \boldsymbol{d})]^n + \boldsymbol{c}$$

Example 1: For $f(x) = x^3$, describe $y = -2f(-3x+6) - 1$.

Equation: ____________________

- ____________________
- ____________________
- ____________________
- ____________________

Example 2: For $f(x) = x^4$, describe $y = \frac{1}{2}f\left(\frac{3}{4}x - 3\right) + 1$.

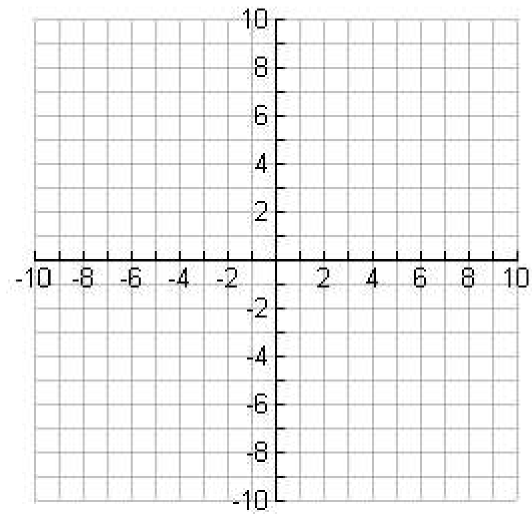
Equation: ____________________

- ____________________
- ____________________
- ____________________
- ____________________

The **MAPPING NOTATION** for graphing $y=a\left[k\left(x-d\right)\right]^{n}+c$ is :

$$(x,y)\rightarrow\left(\frac{x}{k}+d, ay+c\right)$$

Example 3: Complete the chart and graph the function.

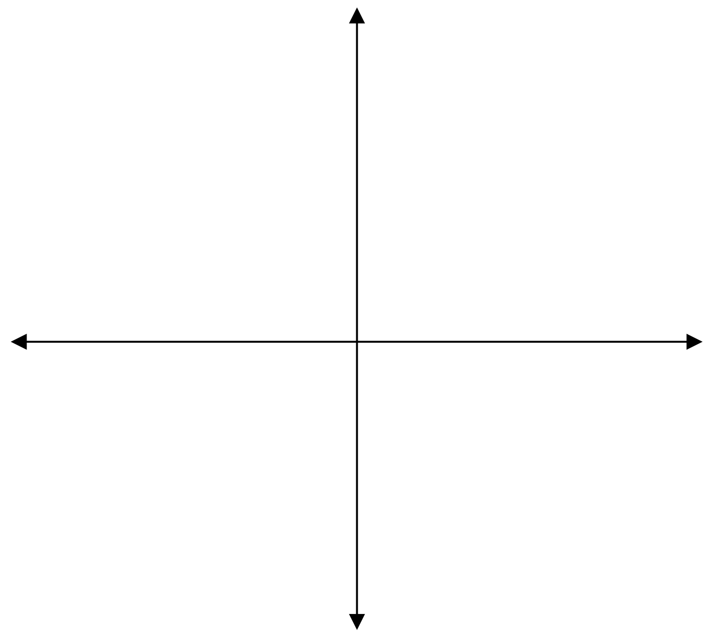
Base Graph:	**Describe Transformation**	**Graph of the function**
$f(x)=-2\left(\frac{1}{3}x+1\right)^{3}+2$	• ____________________ • ____________________ • ____________________ • ____________________ • ____________________	
Mapping Notation:	$(x,y)\rightarrow(\quad\quad,\quad\quad)$	

(x, x^3)	
(-2,-8)	
(-1,-1)	
(0,0)	
(1,1)	
(2,8)	

Example 4: Graph $y = 3(x+6)^4 - 48$ using mapping rule.

$(x, y) \rightarrow (\qquad\quad , \qquad\quad)$

(x, x^4)	
(-2,16)	
(-1,1)	
(0,0)	
(1,1)	
(2,16)	



Example 5:

(a) The function $h(x) = 2(x-4)(x+2)(x-3)$ is reflected in the x-axis, vertically stretched about the x-axis by a factor of $\frac{5}{2}$, and translated 4 units left, 5 units down. Write an equation for the transformed function.

(b) What transformations are applied to the function $p(x) = 3(2x-4)(x+2)(x-3)$ to obtain the function $q(x) = (x-2)(x-1)(x+3)$?

Example 6: Describe the transformations for each of the following functions compared to $y = x^4$ in two different ways.

a) $y = -\left(\frac{1}{2}x - 5\right)^4$

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- ______________________________
- ______________________________
- ______________________________
- ______________________________

- ______________________________
- ______________________________
- ______________________________
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- ______________________________

b) $y = -7(-x + 6)^4 + 9$

- ______________________________
- ______________________________
- ______________________________
- ______________________________
- ______________________________

- ______________________________
- ______________________________
- ______________________________
- ______________________________
- ______________________________

1.4 Part B : EVEN AND ODD FUNCTIONS

EVEN FUNCTIONS

- A function is an even function if it shows symmetry in the y-axis.
- This means the left half of the function looks like a mirror image of the right half of the function on either side of the y-axis.
- To test if a function is even, we check to see if $f(x) = f(-x)$.
- Alternately, if (x, y) maps onto $(-x, y)$, the function is even.

ODD FUNCTIONS

- A function is an odd function if it shows symmetry in the origin.
- This means that any line drawn across the plane through the origin that crosses the curve will cross pairs of points on the graph that are the same distance from the origin.
- To test if a function is odd, we check to see if $f(-x) = -f(x)$.
- Alternately, if (x, y) maps onto $(-x, -y)$, the function is odd.

NOTE:

- Not all functions can be classified as even or odd. Some functions are neither.