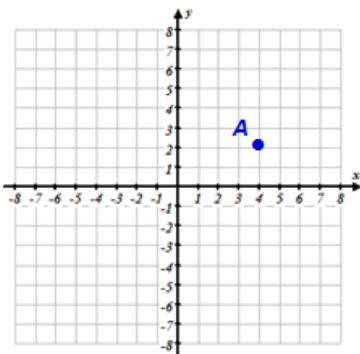
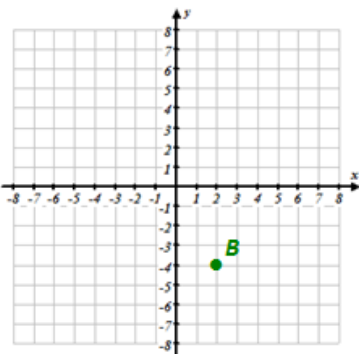


It may help to first review some transformations on the graph. Transform the following points as suggested.

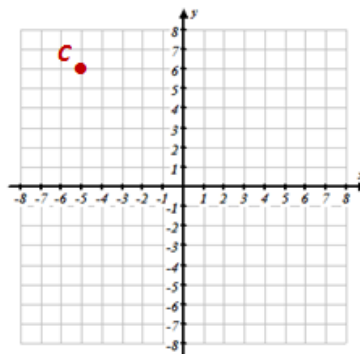
1. Reflect **point A** over the **x-axis** and then **translate** the image **right 2 units**.



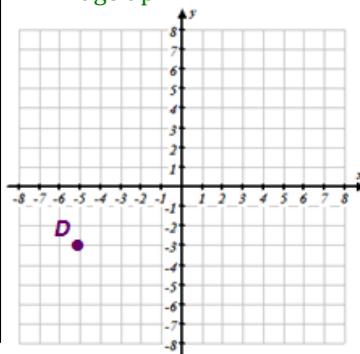
2. Horizontally stretch **point B** by a factor of 3 from the y-axis and **translate** the image **up 7 units**.



3. Vertically compress **point C** by a factor of $\frac{1}{2}$ from the x-axis, reflect the image over the y-axis, and finally, **translate** that image **right 1 unit**.



4. Reflect **point D** over the **x-axis**, then reflect that image over the y-axis, **vertically stretch** that image by a **factor 2** from the x-axis, and finally **translate** the last image **up 2**



Consider the parent function of $f(x)$. The following would be a transformed function

$$t(x) = a \cdot f(b(x - c)) + d$$

$a > 1$: Vertical Stretch (eg. $a = 3$)
(factor ' a ')

$0 < a < 1$: Vertical Compress (eg. $a = 0.2$)
(factor ' a ')

$-1 < a < 0$: Reflect over x-axis & Vertical Compress (eg. $a = -0.2$)
(factor ' a ')

$a = -1$: Reflect over x-axis

$a < -1$: Reflect over x-axis & Vertical Stretch (eg. $a = -4$)
(factor ' a ')

$b > 1$: Horizontal Compress (eg. $b = 3$)
(factor ' $\frac{1}{b}$ ')

$0 < b < 1$: Horizontal Stretch (eg. $b = 0.2$)
(factor ' $\frac{1}{b}$ ')

$-1 < b < 0$: Reflect over y-axis & Horizontal Stretch (eg. $b = -0.2$)
(factor ' $\frac{1}{b}$ ')

$b = -1$: Reflect over y-axis

$b < -1$: Reflect over y-axis & Horizontal Compress (eg. $b = -4$)
(factor ' $\frac{1}{b}$ ')

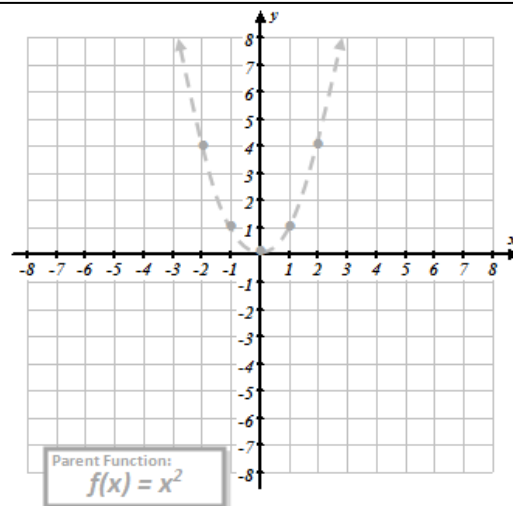
d = Vertical Translation

c = Horizontal Translation
(opposite direction)

First apply any **reflections** or **stretches/compresses** and then the **translations**

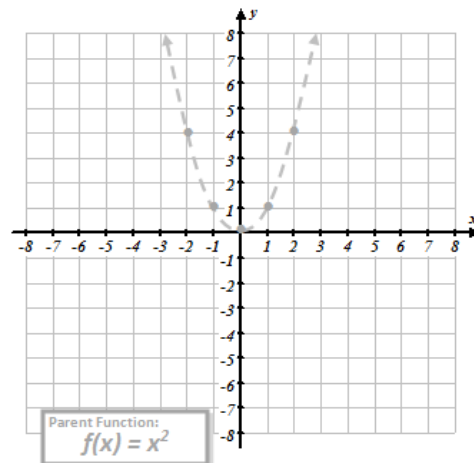
5. At the right the parent graph of $f(x) = x^2$ is shown as a light gray dashed line. Describe the transformations of $f(x)$ that would be required to match the transformed function shown below and sketch a graph by transforming a few of the points of $f(x)$.

$$t(x) = 2(x - 3)^2 - 1$$



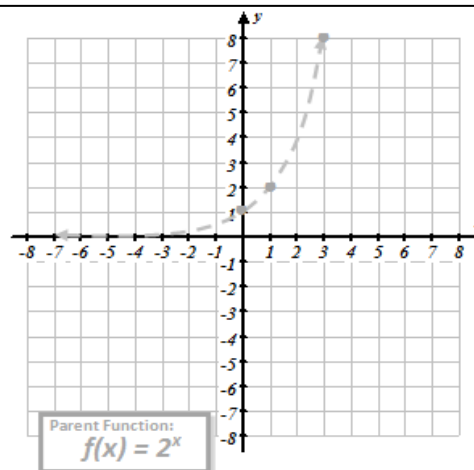
6. At the right the parent graph of $f(x) = x^2$ is shown as a light gray dashed line. Describe the transformations of $f(x)$ that would be required to match the transformed function shown below and sketch a graph by transforming a few of the points of $f(x)$.

$$t(x) = -(2(x+3))^2$$



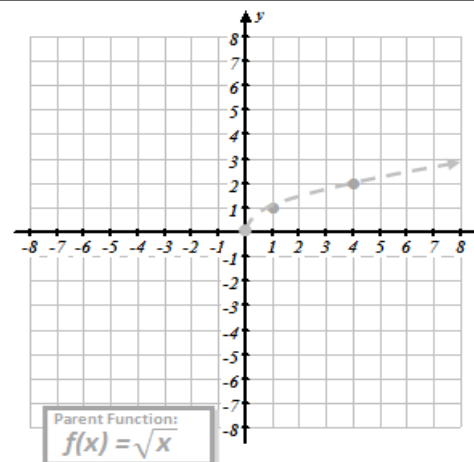
7. At the right the parent graph of $f(x) = 2^x$ is shown as a light gray dashed line. Describe the transformations of $f(x)$ that would be required to match the transformed function shown below and sketch a graph by transforming a few of the points of $f(x)$.

$$t(x) = 2^{\left(\frac{1}{2}x\right)} - 3$$



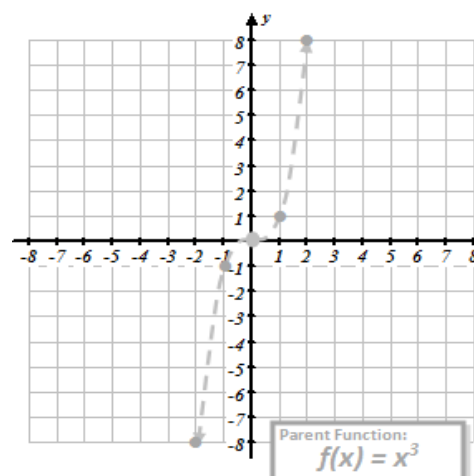
8. At the right the parent graph of $f(x) = \sqrt{x}$ is shown as a light gray dashed line. Describe the transformations of $f(x)$ that would be required to match the transformed function shown below and sketch a graph by transforming a few of the points of $f(x)$.

$$t(x) = 2\sqrt{-x} + 1$$



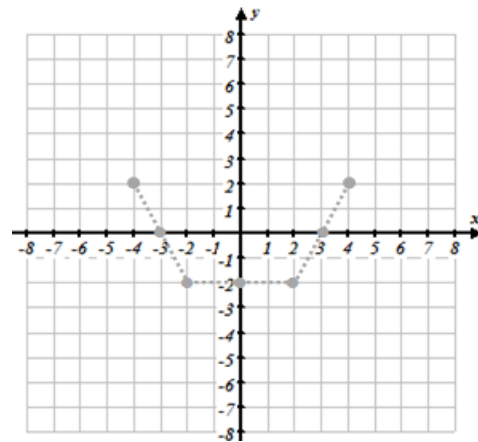
9. At the right the parent graph of $f(x) = x^3$ is shown as a light gray dashed line. Describe the transformations of $f(x)$ that would be required to match the transformed function shown below and sketch a graph by transforming a few of the points of $f(x)$.

$$t(x) = \frac{1}{2}(x+5)^3 - 1$$



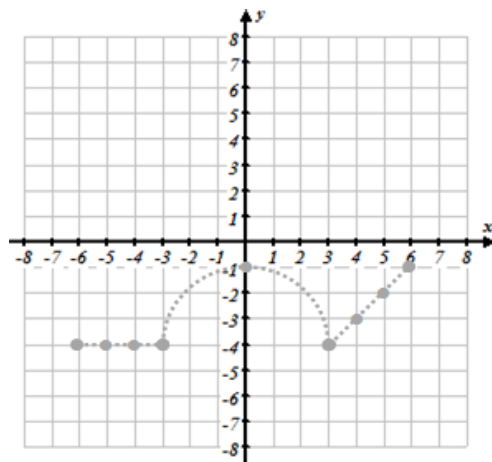
10. At the right the parent graph of $f(x)$ is shown as a light gray dashed line. Describe the transformations of $f(x)$ that would be required to match the transformed function shown below and sketch a graph by transforming a few of the points of $f(x)$.

$$t(x) = 3 \cdot f(x) + 2$$



11. At the right the parent graph of $f(x)$ is shown as a light gray dashed line. Describe the transformations of $f(x)$ that would be required to match the transformed function shown below and sketch a graph by transforming a few of the points of $f(x)$.

$$t(x) = -2 \cdot f(x - 1) - 1$$



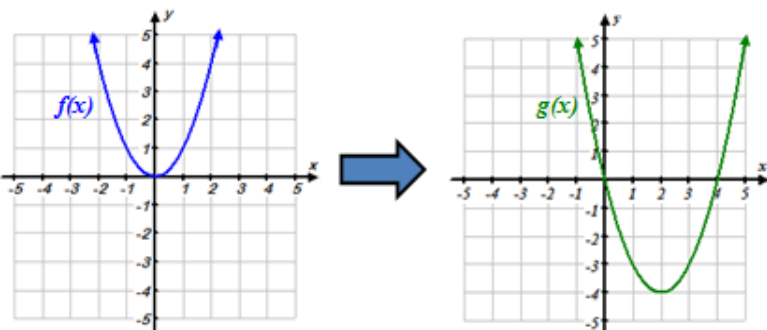
12. Given a more elaborate parent function of $f(x) = x^3 - x$, describe how the parent function could be graphically transformed to create the functions below:

a. $g(x) = 4(x^3 - x)$

b. $h(x) = (4x)^3 - (4x)$

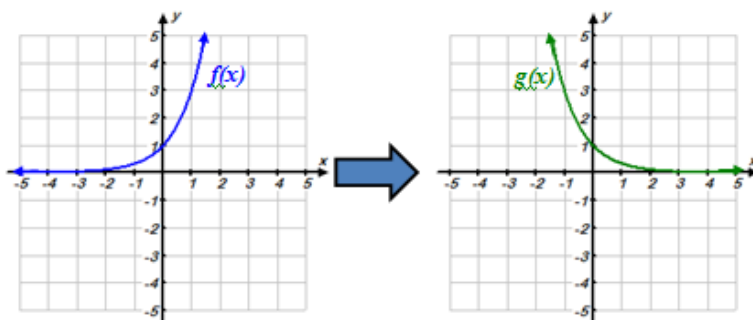
c. $p(x) = -\frac{1}{3}((x - 2)^3 - (x - 2)) + 1$

13. Describe $g(x)$ as a transformation of $f(x)$.



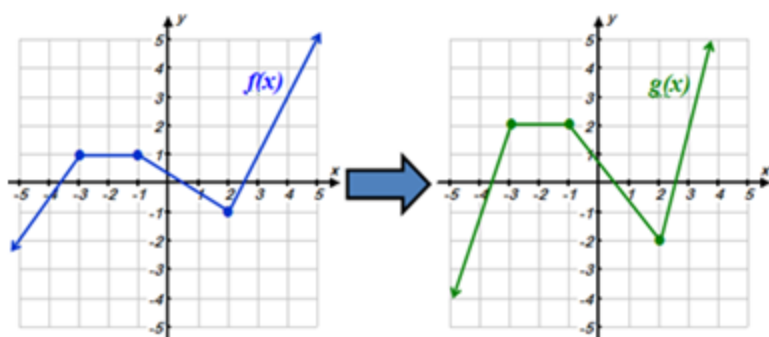
$$g(x) =$$

14. Describe $g(x)$ as a transformation of $f(x)$.



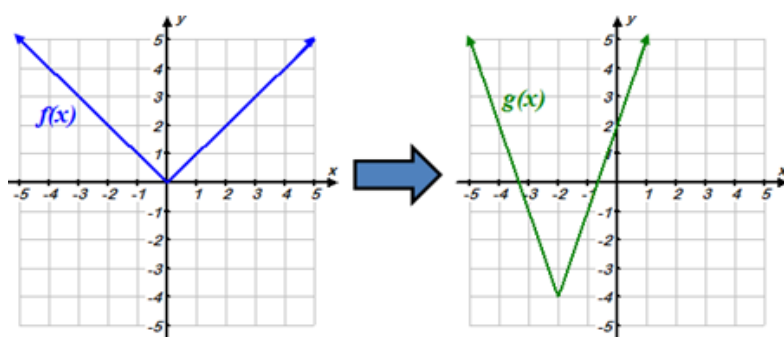
$$g(x) =$$

15. Describe $g(x)$ as a transformation of $f(x)$.



$$g(x) =$$

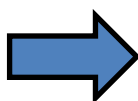
16. Describe $g(x)$ as a transformation of $f(x)$.



$$g(x) =$$

17. Consider the partial set of values of the function $f(x)$, shown below. Determine the missing values in the second table given that $t(x)$ is the same as $f(x)$ **translated up 3 units**.

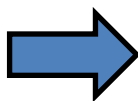
x	-2	-1	0	1	2
$f(x)$	-5	-3	-1	1	3



x	-2	-1	0	1	2
$t(x)$					

18. Consider the partial set of values of the function $f(x)$, shown below. Determine the missing values in the second table given that $t(x)$ is the same as $f(x)$ **translated right 2 units and down 2 unit**.

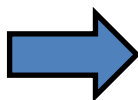
x	-2	-1	0	1	2
$f(x)$	5	2	3	-2	-4



x					
$t(x)$					

19. Consider the partial set of values of the function $f(x)$, shown below. Determine the missing values in the second table given that $t(x)$ is the same as $f(x)$ **vertically stretched by a factor of 2 from the x-axis**.

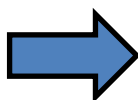
x	0	1	2	3	4
$f(x)$	-3	-1	0	2	3



x	0	1	2	3	4
$t(x)$					

20. Consider the partial set of values of the function $f(x)$, shown below. Determine the missing values in the second table given that $t(x)$ is the same as $f(x)$ **reflected over the x-axis**.

x	-2	-1	0	1	2
$f(x)$	5	2	3	-2	-4



x					
$t(x)$					