

Transforming Functions

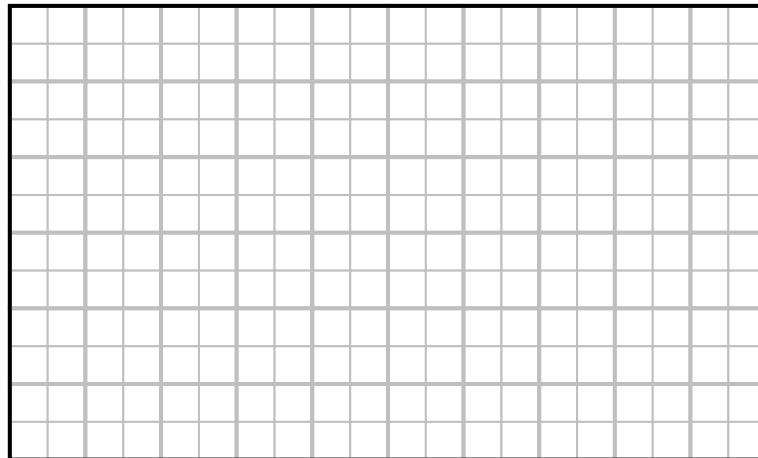
Level 1 – 2

1. If $f(x) = x^2$ complete the following tables and plot the graphs.
Don't forget to label each graph.

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

$y = f(x/2)$	
x	y
-4	
-2	
0	
2	
4	

$y = f(2x)$	
x	y
-1	
-0.5	
0	
0.5	
1	

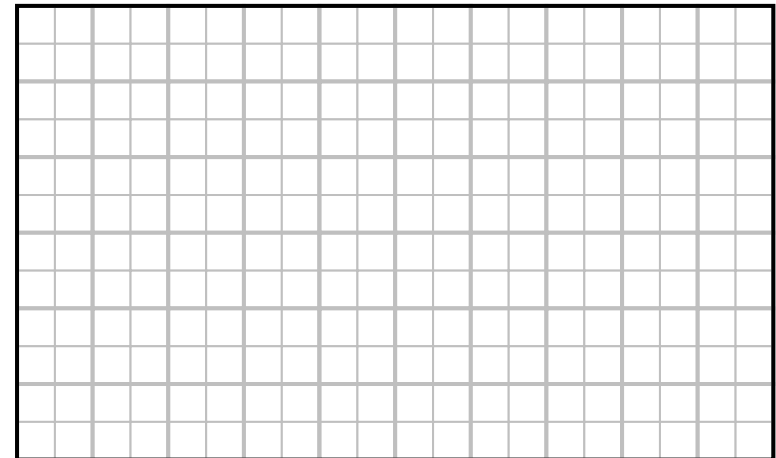


2. If $f(x) = x^2 + 2x + 1$ complete the following tables and plot the graphs. Don't forget to label each graph.

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

$y = f(x/2)$	
x	y
-6	
-4	
-2	
0	
2	

$y = f(2x)$	
x	y
-1.5	
-1	
-0.5	
0	
0.5	

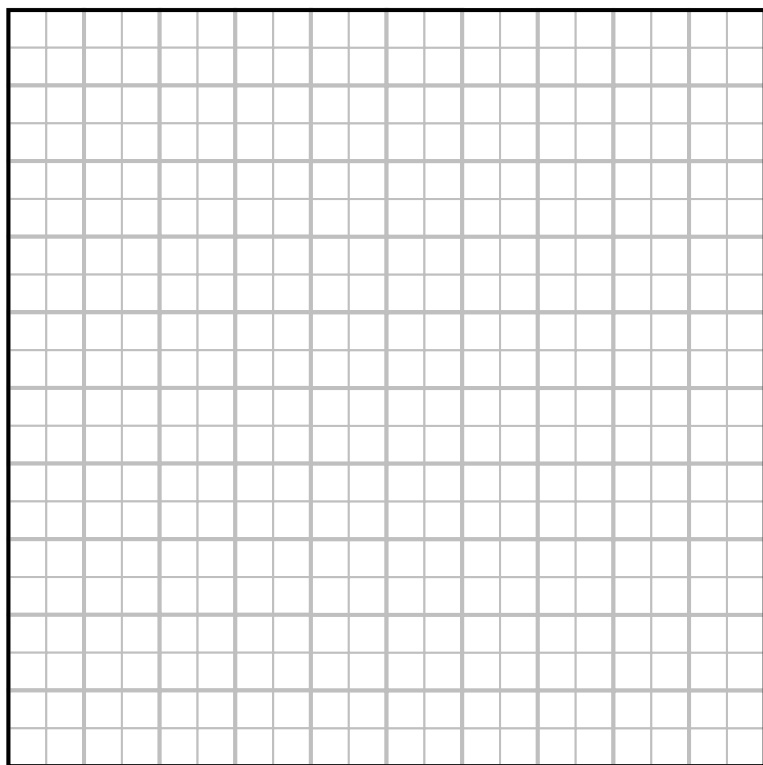


3. If $f(x) = x^2$ complete the following tables and plot the graphs.
Don't forget to label each graph.

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

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

$y = \frac{1}{2}f(x)$	
x	y
-2	
-1	
0	
1	
2	

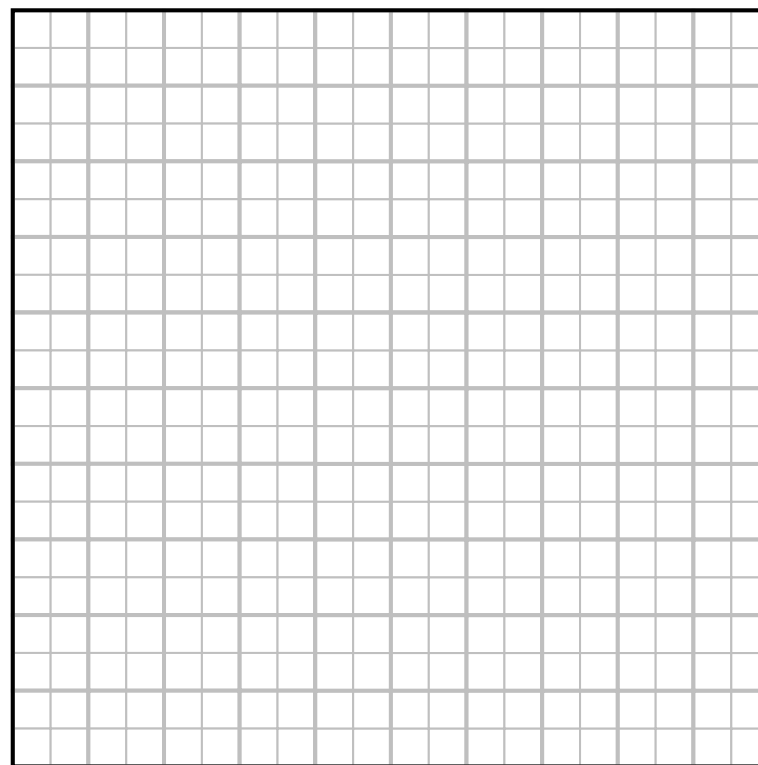


4. If $f(x) = x^2 - 3$ complete the following tables and plot the graphs.
Don't forget to label each graph.

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

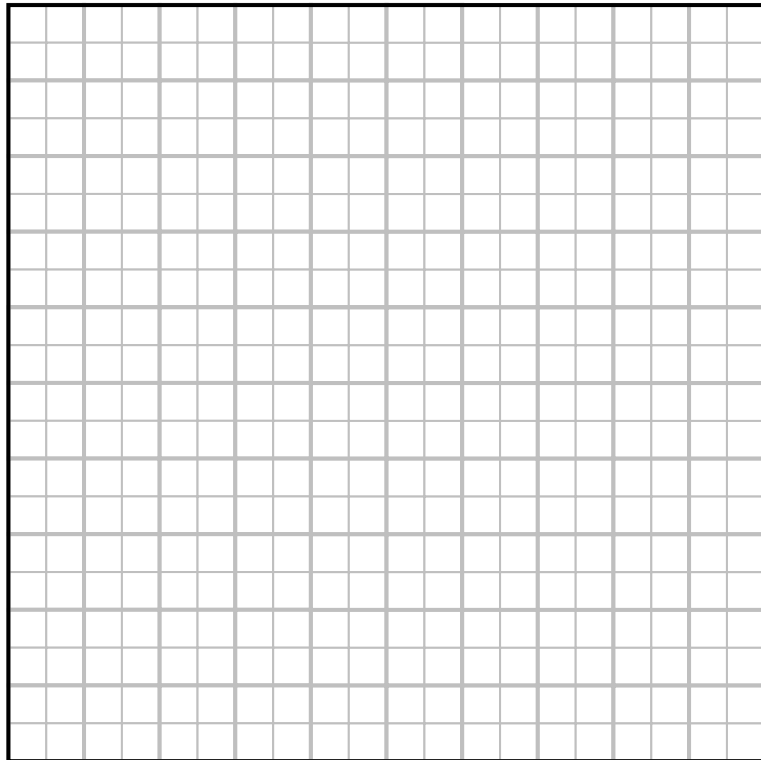
$y = 2f(x)$	
x	y
-2	
-1	
0	
1	
2	

$y = \frac{1}{2}f(x)$	
x	y
-2	
-1	
0	
1	
2	



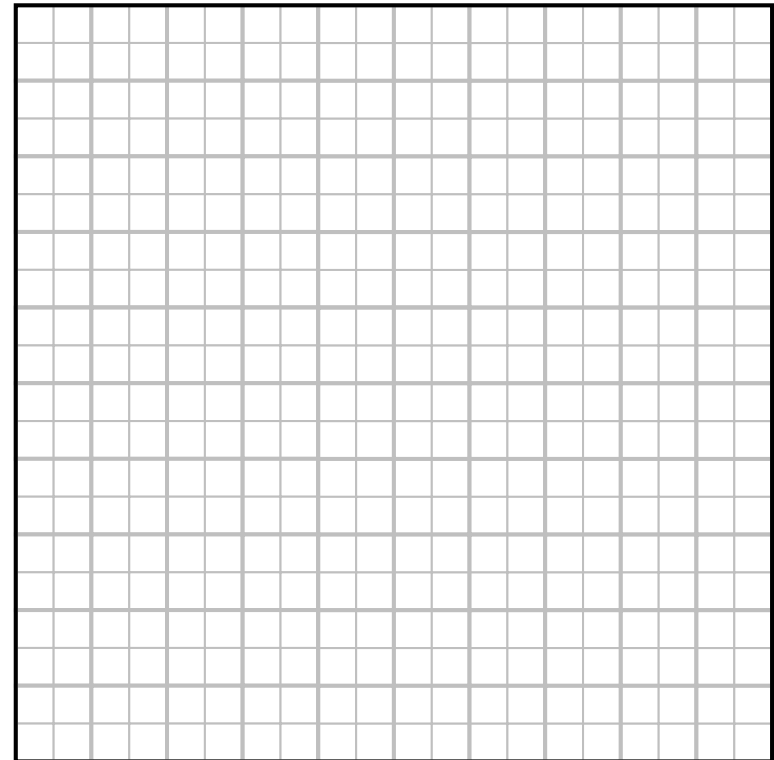
5. If $f(x) = x^2 + 4x + 4$ complete the following tables and plot the graphs. Don't forget to label each graph.

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



6. If $f(x) = x^2 - 3$ complete the following tables and plot the graphs. Don't forget to label each graph.

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



7. Complete the following sentences using the words *stretched* or *reflected*, along with a direction. Be careful when describing the direction of a stretch. *Sometimes* a stretch in one direction looks the same as a compression in the perpendicular direction.

a) The graph of $y = f(x/c)$, where $c > 0$, is the graph of $y = f(x)$

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b) The graph of $y = df(x)$, where $d > 0$, is the graph of $y = f(x)$

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c) The graph of $y = f(-x)$ is the graph of $y = f(x)$

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d) The graph of $y = -f(x)$ is the graph of $y = f(x)$

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8. Complete the following sentences. Use the absolute value function when describing the scale of the stretch.

The absolute value of x is $|x| = \begin{cases} x & \text{if } x \geq 0 \\ -x & \text{if } x < 0 \end{cases}$

a) The graph of $y = f(x/c)$, where $c < 0$, is the graph of $y = f(x)$

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b) The graph of $y = df(x)$, where $d < 0$, is the graph of $y = f(x)$

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Level 5 – 6

9. The parabola $y = x^2$ is translated 2 units to the right, followed by 4 units upwards, followed by a reflection in the x -axis. Find the equation of the new parabola in expanded form.

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10. The parabola $y = x^2 - 2x + 1$ is translated 3 units to the left, followed by 1 unit upwards, followed by a horizontal stretch by a factor of 2. Find the equation of the new parabola in expanded form.

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11. The parabola $y = x^2 + 4x - 1$ is translated 1 unit to the left, followed by 2 units downwards, followed by a vertical stretch by a factor of 3. Find the equation of the new parabola in expanded form.

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12. An even function is a function which satisfies $f(x) = f(-x)$ for all x . An odd function satisfies $f(-x) = -f(x)$ for all x . What kind of symmetry does

a) an even function have?

b) an odd function have?

Hint: Plot some even and odd functions on your calculator.

13. If an odd function is reflected in the x -axis and then reflected in the y -axis, what can you say about the resulting function? Justify your answer.

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14. Determine how the graph of $y = 2x^2 - 4x + 1$ compares to the graph of $y = x^2$. Your transformations must be in a correct order.

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15. Determine how the graph of $y = 2x^2 + 2x - 6$ compares to the graph of $y = x^2 + 4x - 1$. Your transformations must be in a correct order.

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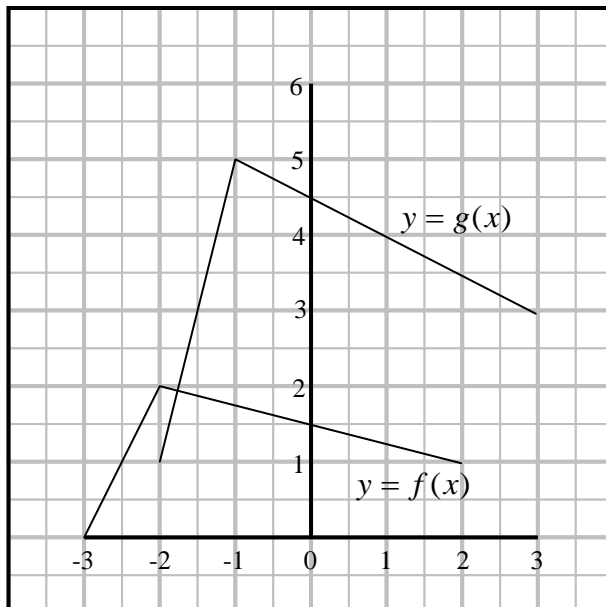
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16. Describe a series of transformations, in a correct order, which maps $y = f(x)$ to $y = g(x)$. Hence, write $g(x)$ in terms of $f(x)$.

a)



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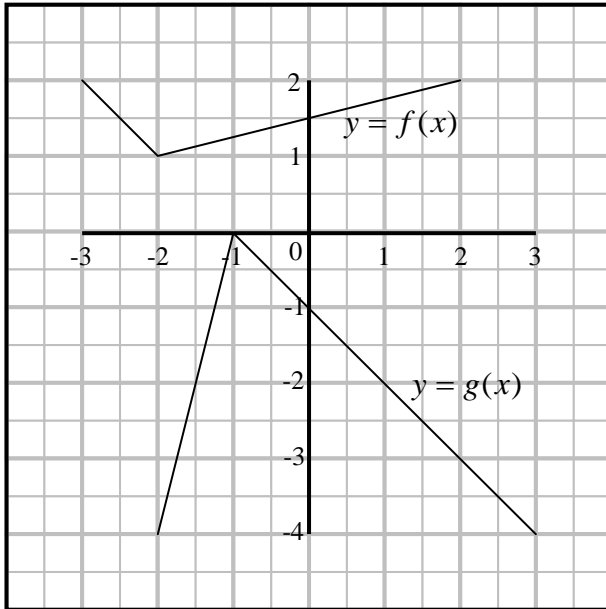
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b)



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17. a) Determine how the graph of $y = x^2 + 4x - 3$ compares to the graph of $y = x^2 - 2x + 4$. You must use a reflection in your answer.

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18. a) Determine how the graph of $y = x^2 + 4x - 3$ compares to the graph of $y = x^2 - 2x + 4$. You must **not** use a reflection in your answer.

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