5. a) The graph of $y = 4f(x)$ is a vertical stretch by a factor of 4 of the graph of $y = f(x)$. $(x, y) \rightarrow (x, 4y)$

b) The graph of $y = f(3x)$ is a horizontal stretch by a factor of $\frac{1}{3}$ of the graph of $y = f(x)$. $(x, y) \rightarrow \left(\frac{x}{3}, y\right)$

c) The graph of $y = -f(x)$ is a reflection in the x-axis of the graph of $y = f(x)$. $(x, y) \rightarrow (x, -y)$

d) The graph of $y = f(-x)$ is a reflection in the y-axis of the graph of $y = f(x)$. $(x, y) \rightarrow (-x, y)$

6. a) domain $\{x \mid -6 \leq x \leq 6, x \in \mathrm{R}\}$, range $\{y \mid -8 \leq y \leq 8, y \in \mathrm{R}\}$

b) The vertical stretch affects the range by increasing it by the stretch factor of 2.

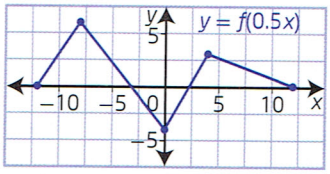
7. a) The graph of $g(x)$ is a vertical stretch by a factor of 4 of the graph of $f(x)$. $y = 4f(x)$

b) The graph of $g(x)$ is a reflection in the x-axis of the graph of $f(x)$. $y = -f(x)$

c) The graph of $g(x)$ is a horizontal stretch by a factor of $\frac{1}{3}$ of the graph of $f(x)$. $y = f(3x)$

d) The graph of $g(x)$ is a reflection in the y-axis of the graph of $f(x)$. $y = f(-x)$

8.



9. a) horizontally stretched by a factor of $\frac{1}{4}$

b) horizontally stretched by a factor of 4

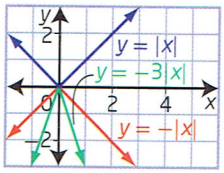
c) vertically stretched by a factor of $\frac{1}{2}$

d) vertically stretched by a factor of 4

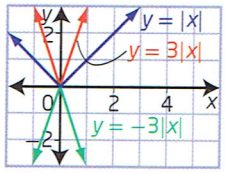
e) horizontally stretched by a factor of $\frac{1}{3}$ and reflected in the y-axis

f) vertically stretched by a factor of 3 and reflected in the x-axis

10. a)

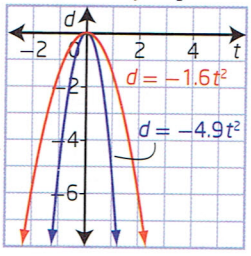


b)



c) They are both incorrect. It does not matter in which order you proceed.

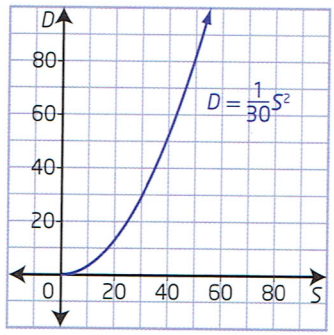
11. a)



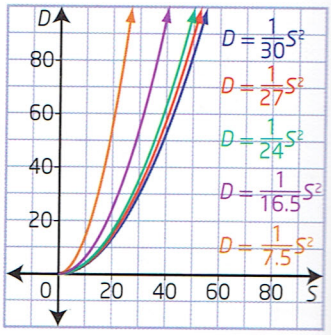
b) Both the functions are reflections of the base function in the t-axis. The object falling on Earth is stretched vertically more than the object falling on the moon.

12. Example: When the graph of $y = f(x)$ is transformed to the graph of $y = f(bx)$, it undergoes a horizontal stretch about the y-axis by a factor of $\frac{1}{|b|}$ and only the x-coordinates are affected. When the graph of $y = f(x)$ is transformed to the graph of $y = af(x)$, it undergoes a vertical stretch about the x-axis by a factor of $|a|$ and only the y-coordinates are affected.

13. a)



b) As the drag factor decreases, the length of the skid mark increases for the same speed.

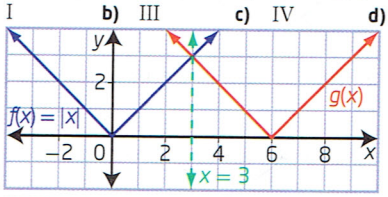


14. a) $x = -4, x = 3$ **b)** $x = 4, x = -3$

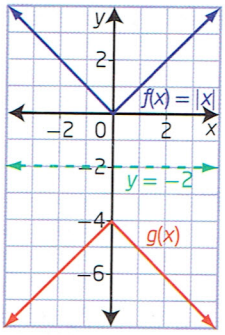
c) $x = -8, x = 6$ **d)** $x = -2, x = 1.5$

15. a) I **b)** III **c)** IV **d)** IV

16. a)



b)



C1 Example: When the input values for $g(x)$ are b times the input values for $f(x)$, the scale factor must be $\frac{1}{b}$ for the same output values. $g(x) = f\left(\frac{1}{b}(bx)\right) = f(x)$

C2 Examples:

a) a vertical stretch or a reflection in the x-axis

b) a horizontal stretch or a reflection in the y-axis

C3

$f(x)$	$g(x)$	Transformation
(5, 6)	(5, −6)	reflection in the x-axis
(4, 8)	(−4, 8)	reflection in the y-axis
(2, 3)	(2, 12)	vertical stretch by a factor of 4
(4, −12)	(2, −6)	horizontal stretch by a factor of $\frac{1}{2}$ and vertical stretch by a factor of $\frac{1}{2}$