

Locating Transformations to a Parent Function

The work below is not identifying transformations or determining how they affect parent functions. I'm not telling you what the work below does. Today, I'm asking you to locate information without telling what it is, what it does, or why you want to do it. You'll learn all of those things. For now, though, I simply want you to be able to find it.

Locating transformations is all about placement. Remember this: RST. Yes, it is out of your alphabet. It also stands for something that I'll tell you about a few lessons down the road. Here are three parent functions. Beneath them are functions that have been transformed with RST. Notice where each of those letters are located.

LINEAR FUNCTION	QUADRATIC FUNCTION	CUBIC FUNCTION
$f(x) = x$	$g(x) = x^2$	$h(x) = x^3$
$f(x) = RS(rsx + t) + T$	$g(x) = RS(rsx + t)^2 + T$	$h(x) = RS(rsx + t)^3 + T$

Things to notice:

1. There are two sets of RST—one is capitalized and outside the parentheses, one is lower case and inside.
2. **RST & rst** are always in the same place—regardless of whether or not there is an exponent.
3. **R** is in the very front of the equation—before everything and outside the parenthesis.
4. **S** is multiplied between R and (.
5. **r** is in the very front of what is inside the (.
6. **s** is multiplied between r and x, inside the (.
7. **t** is added to x and is inside the (.
8. **T** is added to the end of everything and is outside the parentheses.

Things to know:

1. **R** is either a **+** or a **-**. **R is not** a number
2. **S** is a **number**, often a fraction, that is being **multiplied**.
3. **T** is a **number** that is being **added or subtracted**.
4. **RST** are **outside** the (), while **rst** are **inside** the () with x.
5. If there are **no parentheses**, then there is **only RST**, and **no rst**.
6. Later, we'll talk about s & t, and what you must do with them. For now, I'll mark them with an * and you will leave them as they are.

Locate and identify the Transformations below.

<p>EXAMPLE: $f(x) = -3(x + 5)^3$ R: <u>-</u> r: <u>+</u> Read: $RS(rsx + t)^3 + T$ S: <u>x3</u> *s: <u>x1</u> Family: <u>CUBIC</u> T: <u>+0</u> *t: <u>+5</u></p>	<p>EXAMPLE: $g(x) = 4x - 2$ R: <u>+</u> r: <u>NONE</u> Read: $RSx + T$ S: <u>x4</u> *s: <u>NONE</u> No () = No rst T: <u>-2</u> *t: <u>NONE</u> Family: <u>LINEAR</u></p>
<p>1. $h(x) = -5(2x - 1) + 4$ R: _____ r: _____ S: _____ *s: _____ Family: _____ T: _____ *t: _____</p>	<p>5. $n(x) = -(-7x + 3)^2 + 1$ R: _____ r: _____ S: _____ *s: _____ Family: _____ T: _____ *t: _____</p>
<p>2. $j(x) = 7(-2x)^3 - 9$ R: _____ r: _____ S: _____ *s: _____ Family: _____ T: _____ *t: _____</p>	<p>6. $p(x) = -x + 3$ R: _____ r: _____ S: _____ *s: _____ Family: _____ T: _____ *t: _____</p>
<p>3. $k(x) = -(5x)^2 + 7$ R: _____ r: _____ S: _____ *s: _____ Family: _____ T: _____ *t: _____</p>	<p>7. $r(x) = -\frac{1}{2}(5x)^3 + 2$ R: _____ r: _____ S: _____ *s: _____ Family: _____ T: _____ *t: _____</p>
<p>4. $m(x) = 2(3x + 6) - 9$ R: _____ r: _____ S: _____ *s: _____ Family: _____ T: _____ *t: _____</p>	<p>8. $s(x) = 3\left(\frac{2}{3}x - 7\right)^2 + 1$ R: _____ r: _____ S: _____ *s: _____ Family: _____ T: _____ *t: _____</p>

9. $t(x) = -4(x + 11)^3 - 2$ Family: _____	R: _____ S: _____ T: _____	r: _____ *s: _____ *t: _____	20. $r(x) = 8x$ Family: _____	R: _____ S: _____ T: _____	r: _____ *s: _____ *t: _____
10. $v(x) = \frac{5}{4}\left(-\frac{1}{2}x\right)^2$ Family: _____	R: _____ S: _____ T: _____	r: _____ *s: _____ *t: _____	21. $s(x) = -16(x - 2)^3 + 4$ Family: _____	R: _____ S: _____ T: _____	r: _____ *s: _____ *t: _____
11. $d(x) = -3(x - 1)^3$ Family: _____	R: _____ S: _____ T: _____	r: _____ *s: _____ *t: _____	22. $t(x) = \frac{12}{13}(x - 6)^2 + 7$ Family: _____	R: _____ S: _____ T: _____	r: _____ *s: _____ *t: _____
12. $f(x) = 6x$ Family: _____	R: _____ S: _____ T: _____	r: _____ *s: _____ *t: _____	23. $v(x) = 8\left(\frac{6}{7}x\right)^3 - \frac{1}{2}$ Family: _____	R: _____ S: _____ T: _____	r: _____ *s: _____ *t: _____
13. $g(x) = -5x^2 - 3$ Family: _____	R: _____ S: _____ T: _____	r: _____ *s: _____ *t: _____	24. $d(x) = -14(-3x + 6)^3$ Family: _____	R: _____ S: _____ T: _____	r: _____ *s: _____ *t: _____
14. $h(x) = (-2x)^3 + 6$ Family: _____	R: _____ S: _____ T: _____	r: _____ *s: _____ *t: _____	25. $f(x) = x + 10$ Family: _____	R: _____ S: _____ T: _____	r: _____ *s: _____ *t: _____
15. $j(x) = -(2x) + 1$ Family: _____	R: _____ S: _____ T: _____	r: _____ *s: _____ *t: _____	26. $g(x) = -12x^2 + 9$ Family: _____	R: _____ S: _____ T: _____	r: _____ *s: _____ *t: _____
16. $k(x) = -\left(-\frac{7}{8}x + 3\right)^2$ Family: _____	R: _____ S: _____ T: _____	r: _____ *s: _____ *t: _____	27. $h(x) = 4x^3 - 8$ Family: _____	R: _____ S: _____ T: _____	r: _____ *s: _____ *t: _____
17. $m(x) = \frac{3}{5}(x)^2$ Family: _____	R: _____ S: _____ T: _____	r: _____ *s: _____ *t: _____	28. $j(x) = \frac{9}{10}x + 1$ Family: _____	R: _____ S: _____ T: _____	r: _____ *s: _____ *t: _____
18. $n(x) = 2x^3 + 9$ Family: _____	R: _____ S: _____ T: _____	r: _____ *s: _____ *t: _____	29. $k(x) = -3(-5x)^2 + 11$ Family: _____	R: _____ S: _____ T: _____	r: _____ *s: _____ *t: _____
19. $p(x) = 12x - 3$ Family: _____	R: _____ S: _____ T: _____	r: _____ *s: _____ *t: _____	30. $m(x) = -8x - 2$ Family: _____	R: _____ S: _____ T: _____	r: _____ *s: _____ *t: _____