# Warm Up

Write each expression as a product of linear factors.

1. $x^2 + \frac{1}{2}x$

2. $x^2 + 2x - 3$

3. $(2x - 3)^2$

4. $x^3 + 2x^2 - 19x - 20$

# That Graph Looks a Little Shifty

You know that transformations performed on any function $f(x)$ to form a new function $g(x)$ can be described by the transformation function form.

$$g(x) = Af(B(x - C)) + D$$

Recall that this transformational function generalizes to any function. Changes to the $A$-or $D$-values dilate, translate, or reflect a function vertically. Changes to the $B$-or $C$-values dilate, translate, or reflect a function horizontally.

For a rational function, consider the form shown.

$$r(x) = A\left(\frac{1}{B(x - C)}\right) + D$$

1. Cut out the graphs and equations located at the end of the lesson. Match each equation representing a rational function with its graph. If an equation does not match a graph, create the graph of the equation. If a graph does not match an equation, write the equation that matches the graph. Explain how you sorted the equations and graphs.

2. Identify the vertical and horizontal asymptotes of each function.

3. Identify the domain and range of each function.

**This will work best if you DO NOT use Desmos or your graphing calculator!**

**Write these on the back of each graph in pencil!**