Answer Key

Challenge: Skills and Applications

1. Sample answer: \( y = \frac{-2x^2}{x^2 - 9} \)

2. Sample answer: \( y = \frac{x - 1}{x^2 - 4x} \)

3. Sample answer: \( y = \frac{x^2}{x^2 + 1} \)

4. a. 

   

   b. The original graph gets closer and closer to the graph of \( y = \frac{1}{x} \) as \( x \to 0 \), and gets closer and closer to the graph of \( y = x^2 \) as \( x \to +\infty \) and as \( x \to -\infty \). 

5. a. 

   

   b. The graph of \( y = x \) is an asymptote for the graph of the rational function.

6. a. 

   

   b. Near the asymptote, if \( n \) is even \( y \to +\infty \) or \( y \to -\infty \) for both branches; if \( n \) is odd, \( y \to +\infty \) for one branch and \( y \to -\infty \) for the other branch.

7. \( A = -1, B = 4 \)