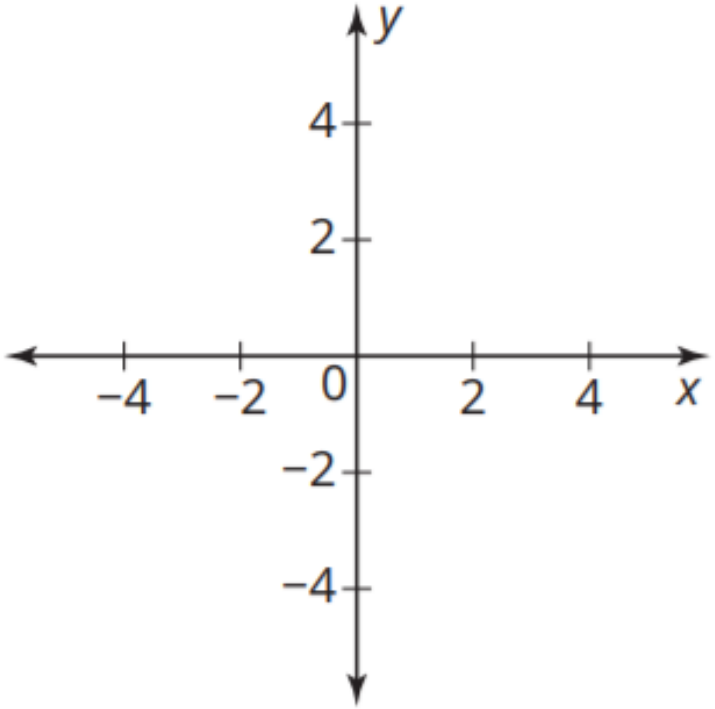
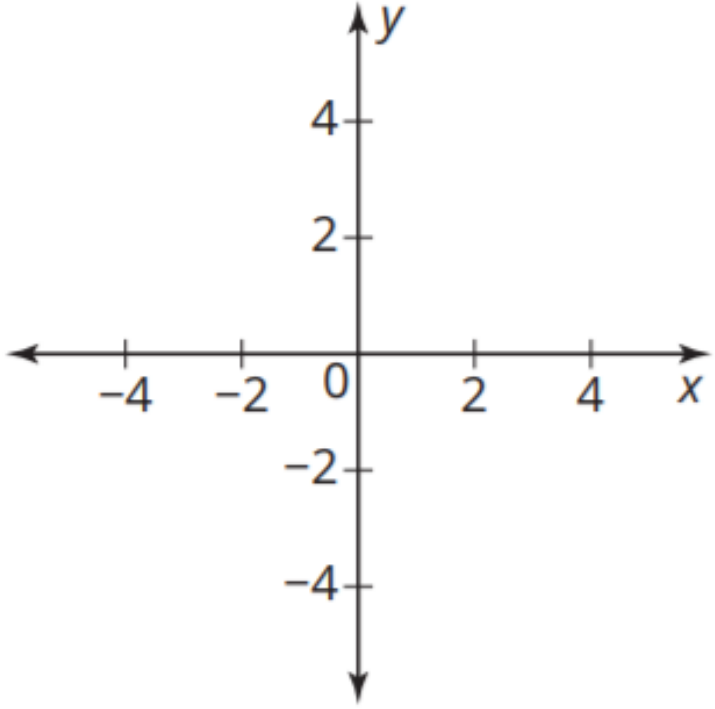
5. Sketch the graph of each function. Be sure to note any asymptotes or holes in the graph.

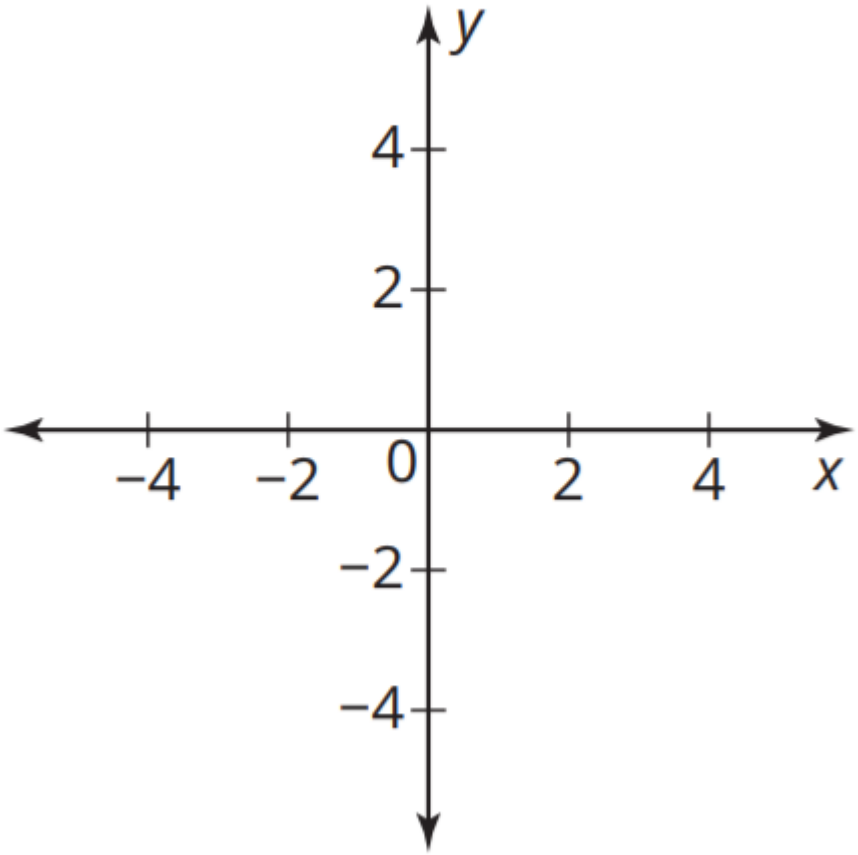
a. $y = \frac{2x^2}{x^2}$



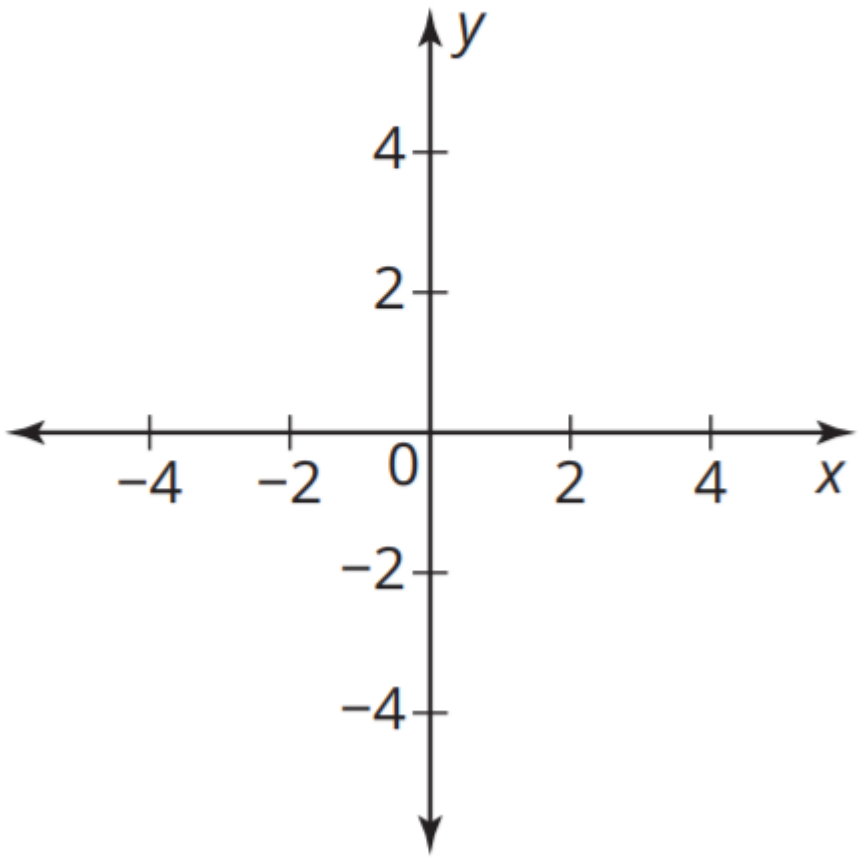
b. $y = \frac{x^2}{x^3}$



c. $y = \frac{x^4}{x^1}$



d. $y = \frac{-x^2}{x^4}$



Henry

I know there is a domain restriction, so $x \neq 2$. I'm not sure if this is a vertical asymptote or a removable discontinuity, so I'm going to factor the numerator, if possible, to see if a common factor exists.

$$f(x) = \frac{x^2 + x - 6}{x - 2} = \frac{(x - 2)(x + 3)}{x - 2}$$

$$= \frac{1(x + 3)}{1} = x + 3$$

I know the output values of $\frac{(x - 2)}{(x - 2)} = 1$ with a discontinuity at $x = 2$. Therefore, $f(x) = x + 3$. The removable discontinuity is at (2, 5) and appears as a hole in the graph.

	Rational Numbers	Rational Expressions
A common numerator and denominator divide to equal 1	$\frac{5}{5} = 1$	$\frac{x}{x} = 1$
	$\frac{10.7}{10.7} = 1$	$\frac{5x}{5x} = 1$
	$\frac{0.025 + 0.016}{0.025 + 0.016} = 1$	$\frac{x + 5}{x + 5} = 1$
Common monomial factors divide to equal 1.	$\frac{5 \cdot 3}{5} = \frac{1 \cdot 3}{1} = 3$	$\frac{5x}{5} = \frac{1 \cdot x}{1} = x$
	$\frac{4}{4 \cdot 6} = \frac{1}{1 \cdot 6} = \frac{1}{6}$	$\frac{x}{xz} = \frac{1}{1 \cdot z} = \frac{1}{z}$
Common binomial factors divide to equal 1.	$\frac{(5 + 3)(16 - 7)}{(5 + 3)} = \frac{1 \cdot (16 - 7)}{1}$ $= 16 - 7$	$\frac{(x + 5)(x - 4)}{(x + 5)} = \frac{1(x - 4)}{1}$ $= (x - 4)$
	$\frac{(9 - 4)}{(9 - 4)(9 + 5)} = \frac{1}{(9 + 5)}$	$\frac{(x - 4)}{(x - 4)(x + 5)} = \frac{1}{(x + 5)}$