

BIG IDEAS

For Your Notebook

Big Idea 1

TEKS 2A.10.A

Graphing Rational Functions

Use the following steps to graph $f(x) = \frac{p(x)}{q(x)} = \frac{a_m x^m + a_{m-1} x^{m-1} + \dots + a_1 x + a_0}{b_n x^n + b_{n-1} x^{n-1} + \dots + b_1 x + b_0}$

where $p(x)$ and $q(x)$ have no common factors other than ± 1 .

STEP 1 Plot the x -intercepts. The x -intercepts are the real zeros of $p(x)$.

STEP 2 Draw the vertical asymptote(s). A vertical asymptote occurs at each real zero of $q(x)$.

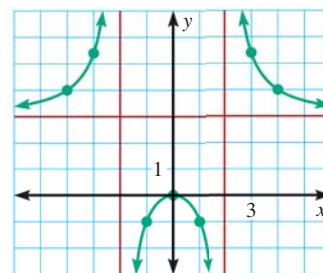
STEP 3 Draw the horizontal asymptote, if it exists.

If $m < n$, $y = 0$ is a horizontal asymptote.

If $m = n$, $y = \frac{a_m}{b_n}$ is a horizontal asymptote.

If $m > n$, there is no horizontal asymptote.

STEP 4 Plot several points on both sides of each vertical asymptote.



$$y = \frac{3x^2}{x^2 - 4}$$

Big Idea 2

TEKS 2A.10.F

Performing Operations with Rational Expressions

Operation	Example
Simplify Divide out common factors from the numerator and denominator.	$\frac{x^2 + 3x}{x^2 + 8x + 15} = \frac{x(x+3)}{(x+5)(x+3)} = \frac{x}{x+5}$
Multiply Multiply numerators and denominators. Then simplify.	$\frac{x}{15} \cdot \frac{3}{x^2 + 7x} = \frac{3x}{15x(x+7)} = \frac{1}{5(x+7)}$
Divide Multiply the first expression by the reciprocal of the second expression. Then simplify.	$\frac{x^2}{3x+1} \div \frac{1}{6x+2} = \frac{x^2}{3x+1} \cdot \frac{2(3x+1)}{1} = 2x^2$
Add or Subtract Write the expressions with like denominators. Then add or subtract the numerators over the common denominator. Lastly, simplify.	$\frac{5}{x} + \frac{x}{x+2} = \frac{5(x+2)}{x(x+2)} + \frac{x^2}{x(x+2)} = \frac{x^2 + 5x + 10}{x(x+2)}$

Big Idea 3

TEKS 2A.10.D

Solving Rational Equations

Solve $\frac{x}{x+1} + \frac{2}{x+4} = 1$.

STEP 1 Find the LCD.

LCD is $(x+1)(x+4)$.

STEP 2 Multiply each side of the equation by the LCD.

$x(x+4) + 2(x+1) = (x+1)(x+4)$

STEP 3 Solve the resulting equation.

$$x^2 + 4x + 2x + 2 = x^2 + 5x + 4$$

$$6x + 2 = 5x + 4$$

$$x = 2$$