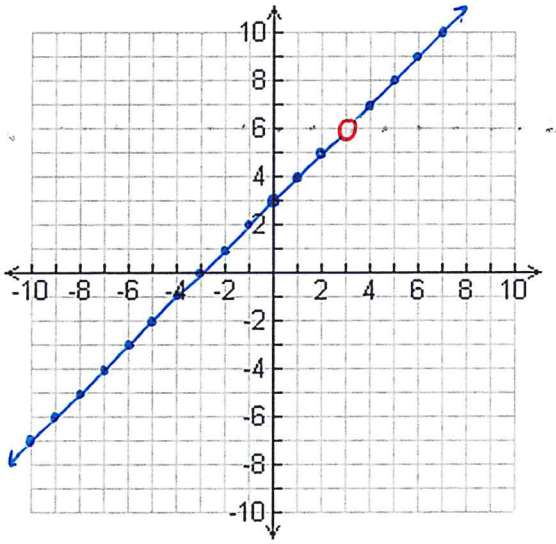
**Graphing on the Coordinate Plane**

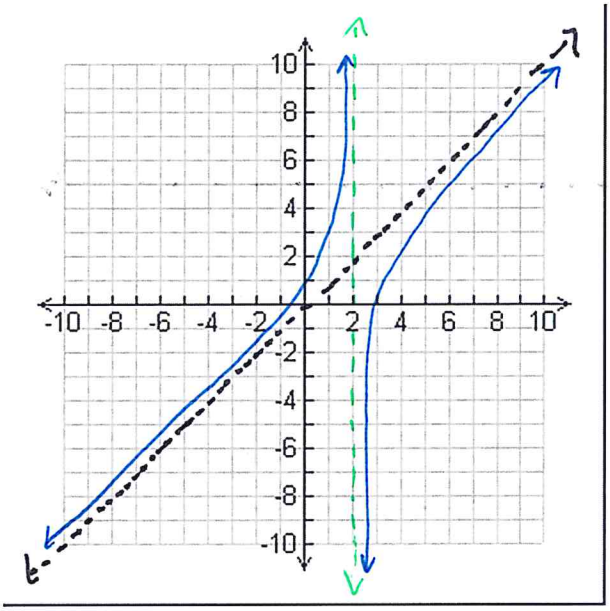
Emphasis on Rational Functions – Additional Practice

**Graph each of the following Rational Functions identifying any holes, vertical/horizontal asymptotes:**

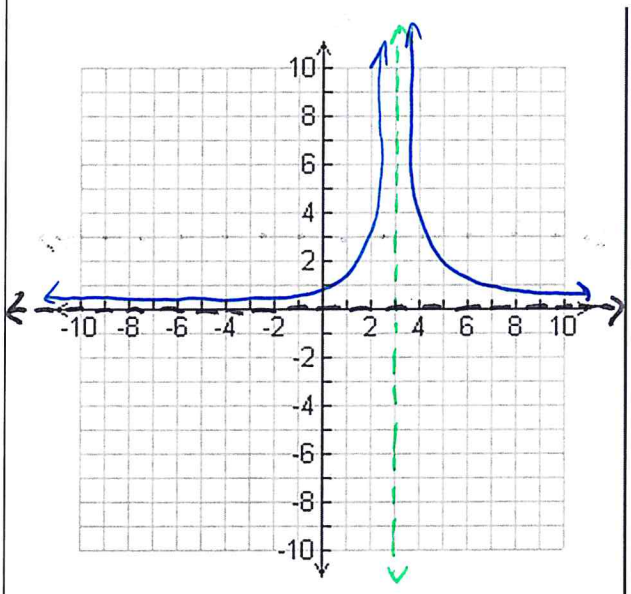
1. $y = \frac{x^2-9}{x-3}$



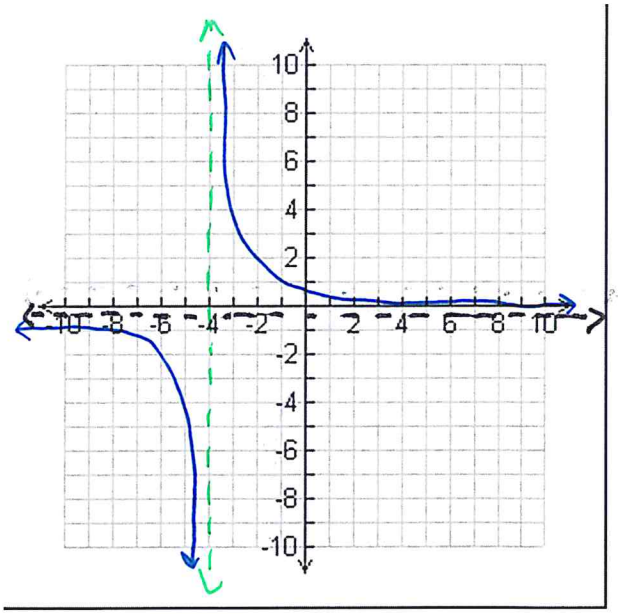

2. $f(x) = \frac{x^2-2x-3}{x-2}$



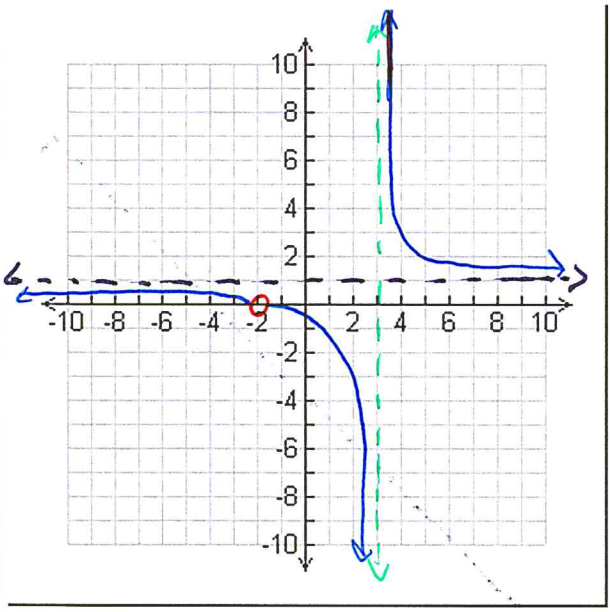

3. $f(x) = \frac{x+1}{(x-3)^2}$



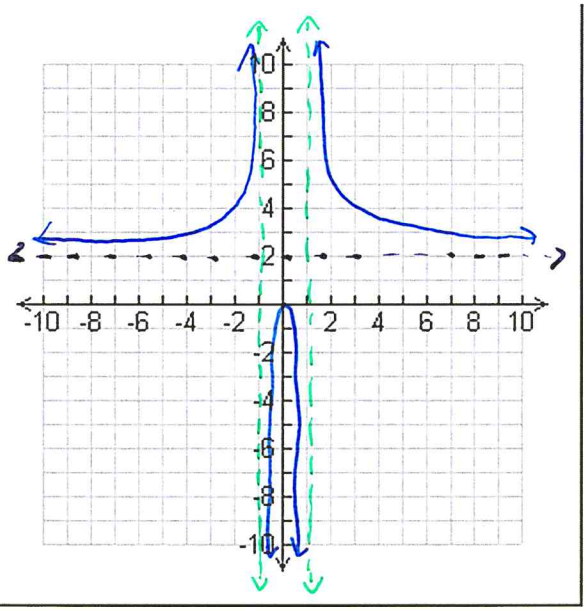

4. $y = \frac{x-4}{-4x-16}$



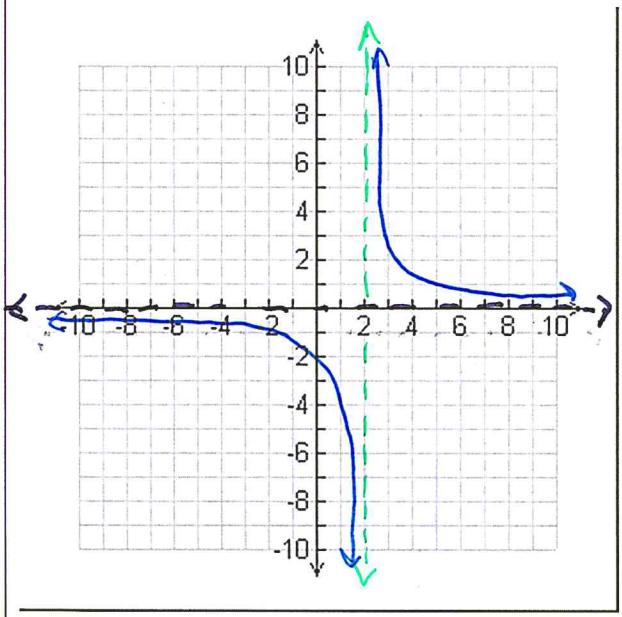
5. $f(x)=\dfrac{x^2+x-2}{x^2-x-6}$



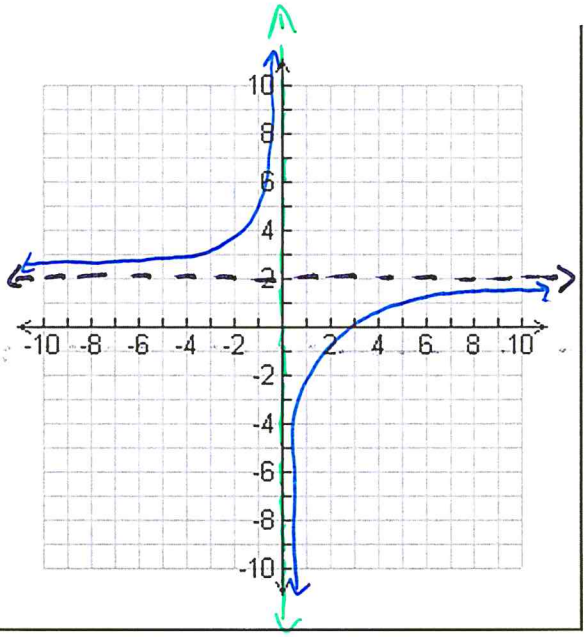
6. $f(x)=\dfrac{2x^2}{x^2-1}$



7. $f(x)=\dfrac{3}{x-2}$



8. $f(x)=\dfrac{2x-1}{x}$



① $f(x) = \dfrac{(x+3)(x-3)}{(x-3)}$

Hole at $x - 3 = 0$, $+3 \quad +3$, $x = 3$

Vertical Asymptote:

None so it looks like $y = x+3$

Slope = 1 y-int = 3

② $f(x) = \dfrac{(x-3)(x+1)}{x-2}$

Hole: None repeated top & bottom.

Vertical Asymptote: $x - 2 = 0$, $+2 \quad +2$, $x = 2$

Horizontal Asymptote:

$y = \dfrac{x^2}{x} = x$

So slanted asymptote at

$y = x$

③ $f(x) = \dfrac{x+1}{(x-3)(x-3)}$

Hole: None

Vertical Asymptote: $x - 3 = 0$, $+3 \quad +3$, $x = 3$

Horizontal Asymptote:

$y = \dfrac{x}{x^2} = \dfrac{1}{x}$

Meaning $y = 0$

④ $f(x) = \dfrac{x-4}{-4x-16}$

Hole: None

Vertical Asymptote: $-4x - 16 = 0$, $+16 \quad +16$, $\dfrac{-4x}{-4} = \dfrac{16}{-4}$, $x = -4$

Horizontal Asymptote:

$y = \dfrac{x}{-4x} = -\dfrac{1}{4}$

$y = -\dfrac{1}{4}$

⑤ $f(x) = \dfrac{(x+2)(x-1)}{(x+2)(x-3)}$

Hole at $x+2=0$, $-2\ \ -2$, $x=-2$

Vertical Asymptote: $x-3=0$, $+3\ \ +3$, $x=3$

Horizontal Asymptote:

$y = \dfrac{x^2}{x^2} = 1$

$y=1$

⑥ $f(x) = \dfrac{2x^2}{(x+1)(x-1)}$

Hole: None

Vertical Asymptote

$x+1=0$, $-1\ \ -1$, $x=-1$ & $x-1=0$, $+1\ \ +1$, $x=1$

Horizontal Asymptote

$y = \dfrac{2x^2}{x^2} = 2$

$y=2$

⑦ $f(x) = \dfrac{3}{x-2}$

Hole: None

Vertical Asymptote: $x-2=0$, $+2\ \ +2$, $x=2$

Horizontal Asymptote:

$y = \dfrac{3}{x}$

means $y=0$

⑧ $f(x) = \dfrac{2x-1}{x}$

Hole: None

Vertical Asymptote $x=0$

Horizontal Asymptote:

$y = \dfrac{2x}{x} = 2$

$y=2$