Graphing on the Coordinate Plane

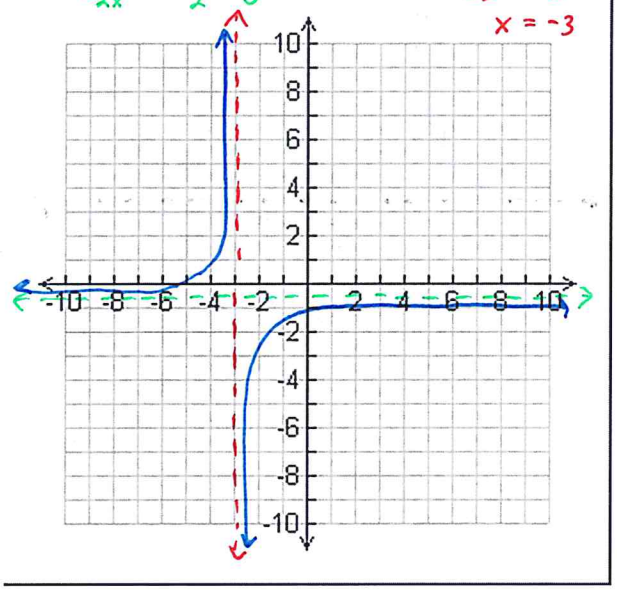
Emphasis on Rational Functions

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

1. $f(x) = \dfrac{x+4}{-2x-6}$

VA: $-2x-6=0$, $+6\ +6$, $\frac{-2x}{-2} = \frac{6}{-2}$, $x = -3$

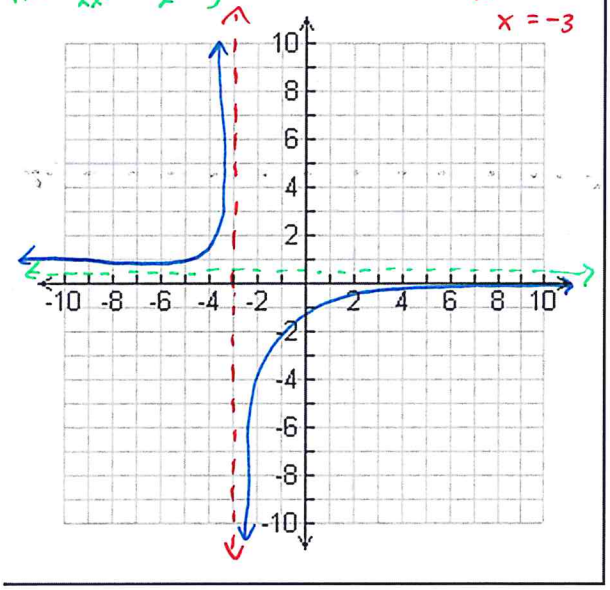
HA: $\frac{x}{-2x} = -\frac{1}{2} = y$



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

VA: $2x+6=0$, $-6\ -6$, $\frac{2x}{2} = \frac{-6}{2}$, $x = -3$

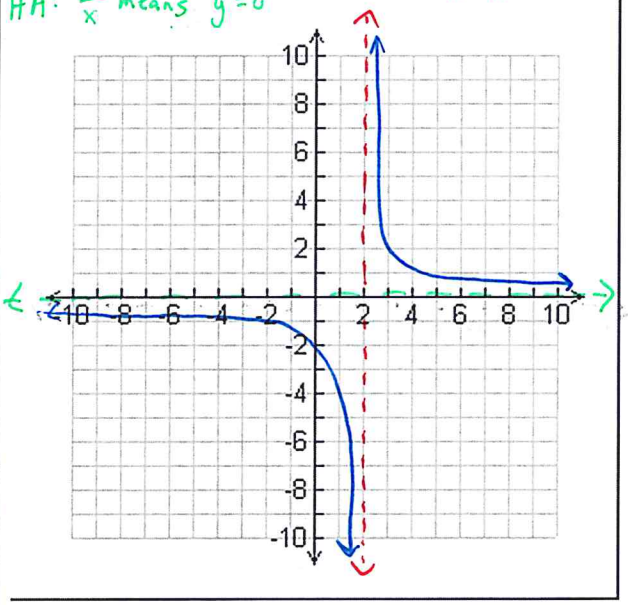
HA: $\frac{x}{2x} = \frac{1}{2} = y$



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

VA: $x-2=0$, $+2\ +2$, $x = 2$

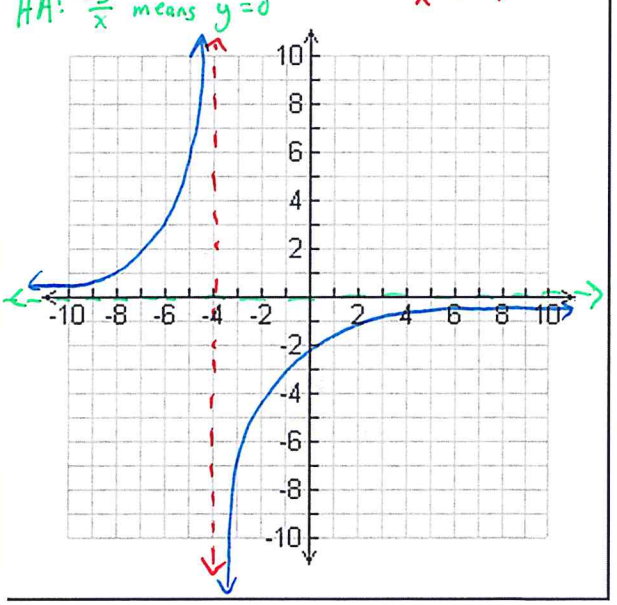
HA: $\frac{3}{x}$ means $y = 0$



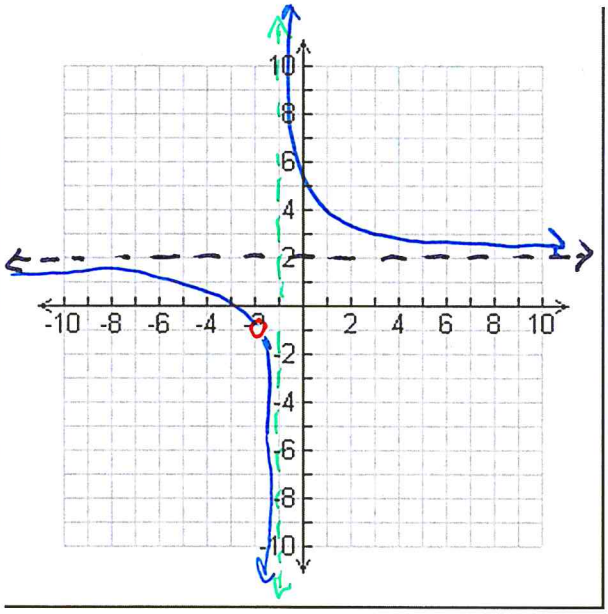
4. $f(x) = \dfrac{-5}{x+4}$

VA: $x+4=0$, $-4\ -4$, $x = -4$

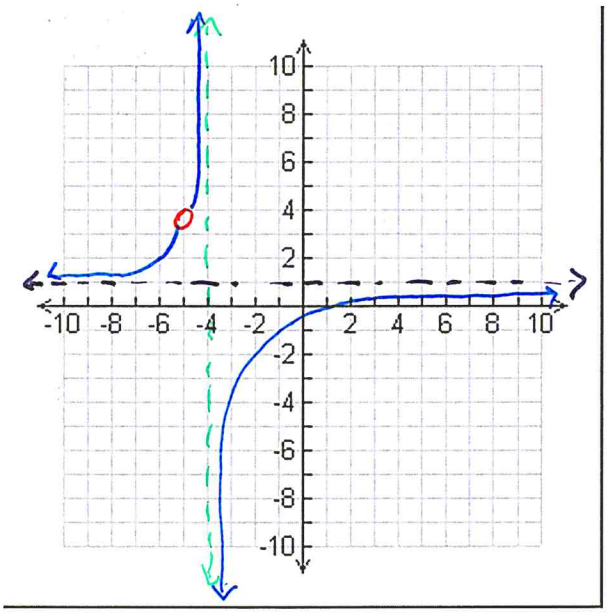
HA: $\frac{-5}{x}$ means $y = 0$



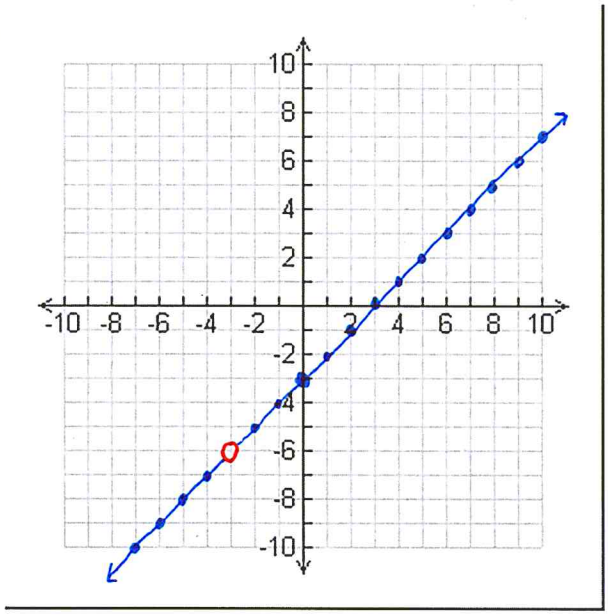
5. $f(x) = \frac{2x^2+10x+12}{x^2+3x+2} = 2$



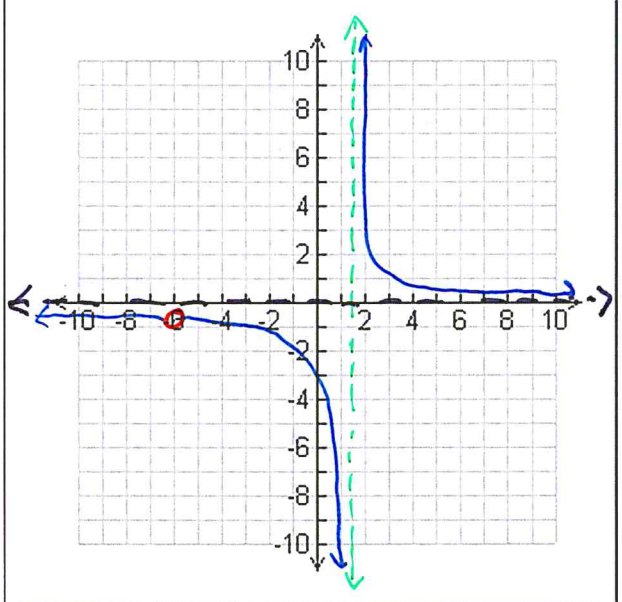
6. $f(x) = \frac{x^2+4x-5}{x^2+9x+20}$



7. $f(x) = \frac{x^2-9}{x+3}$



8. $f(x) = \frac{x+6}{2x^2+9x-18}$



(5) $f(x) = \dfrac{2(x^2+5x+6)}{x^2+3x+2}$

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

Since $x+2$ appears on the top and bottom there is a hole in the function there.

$x+2=0$
$-2\ \ -2$
$x=-2$

Vertical Asymptote:

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

Horizontal Asymptote

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

$y=2$

(6) $f(x) = \dfrac{(x+5)(x-1)}{(x+5)(x+4)}$

Hole at

$x+5=0$
$-5\ \ -5$
$x=-5$

Vertical Asymptote

$x+4=0$
$-4\ \ -4$
$x=-4$

Horizontal Asymptote

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

$y=1$

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

Hole at

$x+3=0$
$-3\ \ -3$
$x=-3$

Vertical Asymptote: NONE So looks like the line $y = x-3$

$m=1$ $\quad$ $y\text{-int} = -3$

(8) $f(x) = \dfrac{x+6}{(x+6)(2x-3)}$

Hole at

$x+6=0$
$-6\ \ -6$
$x=-6$

Vertical Asymptote:

$2x-3=0$
$+3\ \ +3$
$\frac{2x}{2} = \frac{3}{2}$
$x = 3/2 = 1.5$

Horizontal Asymptote

$y = \dfrac{x}{2x^2} = \dfrac{1}{2x} \Rightarrow y=0$