#27

$$\frac{\left(\frac{x+2}{x} + \frac{1}{x+2}\right) x(x+2)}{\left(\frac{5}{x} + \frac{x}{x+2}\right) x\cdot(x+2)}$$

LCD: $x(x+2)$

$$\frac{[(x+2)(x+2)] + x\cdot x}{5(x+2) + x^2}$$

$$\frac{x^2+2x+2x+4+x}{5x+10+x^2}$$

$$\frac{x^2+5x+4}{x^2+5x+10} = \frac{(x+1)(x+4)}{x^2+5x+10}$$

10	5
10	4
2,	5

#39 $$\frac{x^{-1}+2y^{-1}}{2y+4x} = \frac{\frac{1\cdot y}{xy}+\frac{2\cdot x}{y\cdot x}}{2y+4x}$$ ← LCD: xy

$$\frac{\frac{y+2x}{xy}}{\frac{2y+4x}{1}}$$

$$\frac{(y+2x)}{xy}\cdot\frac{1}{(2y+4x)}$$

$$\frac{(y+2x)\cdot 1}{xy\cdot 2(y+2x)}$$

$$\boxed{\frac{1}{2xy}}$$

$$\frac{(5x+14)(x+3)(x-3)}{(x+3)(x-3)} = \frac{(-2x^2-5x+2)(x+3)(x-3)}{(x+3)(x-5)} + \frac{(2x+4)(x+3)(x-3)}{(x-3)}$$

$$5x+14 = -2x^2-5x+2+(2x+4)(x+3)$$

$$5x+14 = -2x^2-5x+2+2x^2+6x+4x+12$$

$$5x+14 = 5x+14$$
$$-5x \quad -14 \quad -5x \quad -14$$

$0 = 0$
true

All Real Numbers except 3, -3

$\{x \mid x \neq 3, -3\}$

Graph of a Rational function

$f(x) = \frac{1}{x}$ ← $x \neq 0$ means the graph will be discontinuous, meaning it will have a break at $x=0$

↑ sometimes called the Reciprocal function

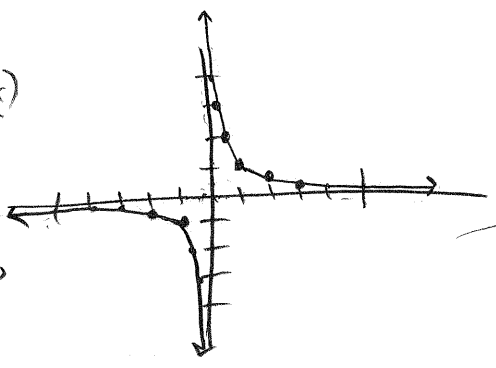
plot points

x	f(x)
1	1
2	1/2
3	1/3
100	1/100

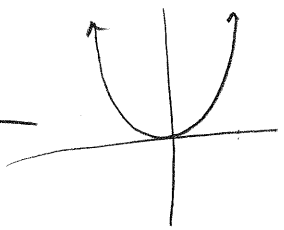
x	f(x)
1/2	2
1/3	3
1/100	100

x	f(x)
-1	-1
-2	-1/2
-3	-1/3
-100	-1/100

x	f(x)
-1/2	-2
-1/3	-3
-1/100	-100



parabola



Ex. $\dfrac{4}{x^2+x-6} - \dfrac{1}{x^2-4} = \dfrac{2}{x^2+5x+6}$

$\dfrac{(x-2)(x+2)(x+3)\,4}{(x-2)(x+3)} - \dfrac{1\,(x-2)(x+2)(x+3)}{(x-2)(x+2)} = \dfrac{2\,(x-2)(x+2)(x+3)}{(x+2)(x+3)}$

LCD: $(x-2)(x+2)(x+3)$

D: $x \neq 2, -2, -3$

$4(x+2) - (x+3) = 2(x-2)$

$4x + 8 - x - 3 = 2x - 4$

$3x + 5 = 2x - 4$

$-2x \quad -5 \quad -2x \quad -5$

$\boxed{x = -9}$

#47 $\dfrac{5x+14}{x^2-9} = \dfrac{-2x^2-5x+2}{x^2-9} + \dfrac{2x+4}{x-3}$

$\dfrac{5x+14}{(x+3)(x-3)} = \dfrac{-2x^2-5x+2}{(x+3)(x-3)} + \dfrac{2x+4}{x-3}$

LCD: $(x+3)(x-3)$

D: $x \neq -3, 3$

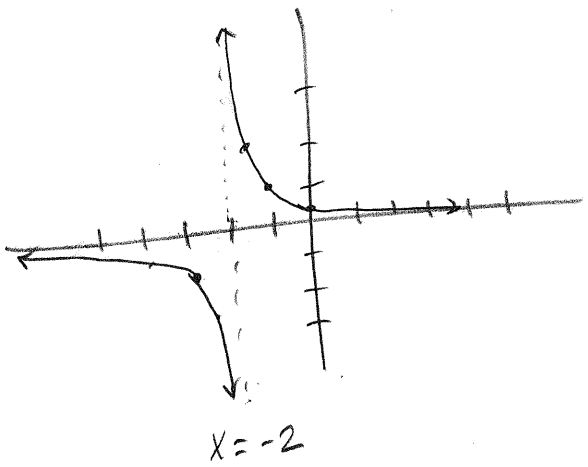
at $x=0$

A <u>Vertical Asymptote</u> is a line that the graph continues to come close to but never touch or cross

at $y=0$

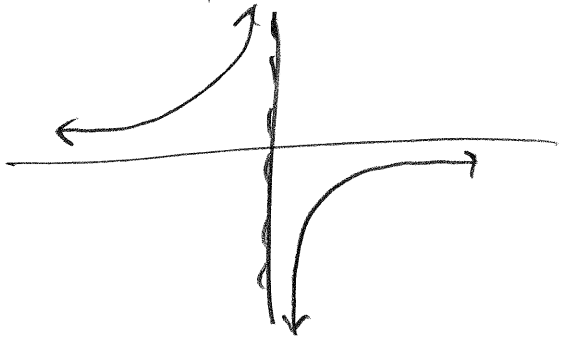
A <u>Horizontal Asymptote</u> describes the end behavior of the graph

$$g(x) = \frac{1}{x+2} \qquad x \neq -2$$



Graph using a table and Domain to find Vertical Asymptote

$$D(x) = -\frac{1}{x}$$



#50 $f(x) = \frac{3}{x}$ D: $x \neq 0$

x	$f(x)$
1	3
-1	-3
2	$3/2$
-2	$-3/2$
$1/2$	6
$-1/2$	-6