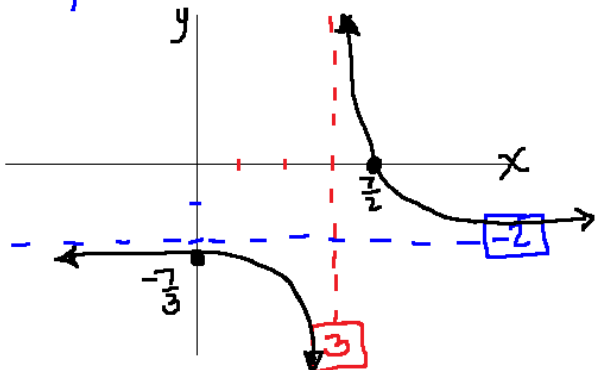# Rational Functions Review

What do we know about a rational function in the form: $\boxed{y = D + \dfrac{A}{(x-c)}}$
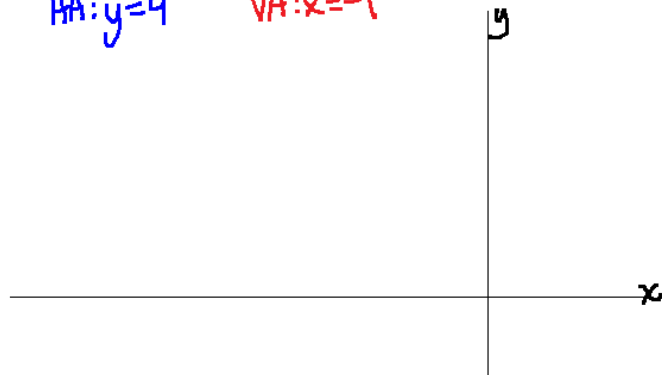
Ex1) $y = -2 + \dfrac{1}{(x-3)}$ — remainder ⊕ $1 > 0$

Quotient → HA: $y = -2$

divisor → VA: $x = 3$

Ex2) $y = 4 + \dfrac{-1}{(x+1)}$ — Remainder ⊖ $-1 < 0$

Quotient → HA: $y = 4$

divisor → VA: $x = -1$

Re-write $\boxed{y = D + \dfrac{A}{(x-c)}}$ as a single fraction with a common denominator. $y = \dfrac{?}{(x-c)}$

Ex1) $y = -2 + \dfrac{1}{(x-3)}$

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

$y = \dfrac{(-2x+7)}{x-3}$

Ex2) $y = 4 + \dfrac{-1}{(x+1)}$

Key Features:

VA: $x=3$	HA $y=-2$
x-int	y-int
$\dfrac{7}{2}$	$-\dfrac{7}{3}$

Given the rational equations, use synthetic division to re-write as : **Quotient + Remainder**

Divisor

$$y = D + \frac{A}{(divisor)}$$

EX 1) $y = \dfrac{(-2x+7)}{(x-3)}$

EX 2) $y = \dfrac{4x+3}{x+1}$

coefficients of numerator

zero of divisor

$$3 \,\big|\, \begin{array}{cc} -2 & 7 \\ & -6 \end{array}$$

$$\begin{array}{cc} -2 & 1 \end{array}$$ ← Remainder

Quotient

$$y = \frac{-2x+7}{x-3} = -2 + \frac{+1}{(x-3)}$$

divisor