Graphing Rational Functions Exploration 2

Name_____

Period__

Horizontal Asymptote Rules:

$\frac{small}{big} \to 0$ ✓ $\frac{\#same}{same} \to \#$ $\frac{big}{small} \to$ *Divide*

Example 1

X-intercepts: *none* ✓

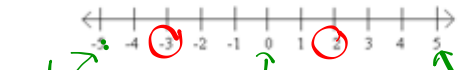
Hortiz. Asymp: y=0

Vertical Asymp: x=2 x=−3

Multiplicity: *Opposite or Same* *Opp. or Same*

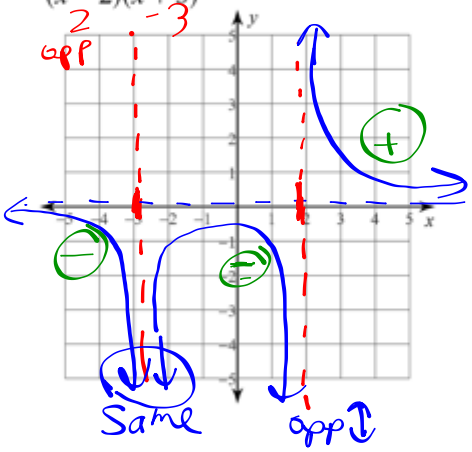
Shape: *Odd or Even* $\frac{1}{x^3}$

Line Sign:



$\frac{1}{(-)(-)^2}$ (−) $\frac{1}{(-2)(3)^2}$ (−) $\frac{1}{(+)(+)^2}$ (+)

$\frac{1 \neq 0}{(x-2)(x+3)^2}$ ✓ bounce same



Example 2

X-intercepts: *none* ✓

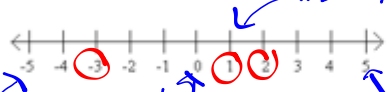
Hortiz. Asymp.: y=0

Vertical Asymp.: x=−3 x=1 x=2

Multiplicity: *Opp. or Same* *Opp. or Same* *Opp. or Same*

Shape: *Odd or Even* $\frac{1}{x^4}$

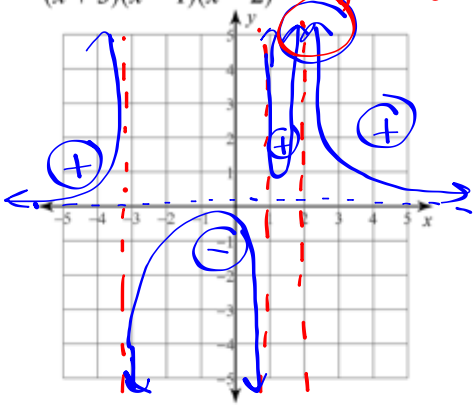
Line Sign:



1.5 $\frac{1}{(+)(+)(-)^2}$ (+)

$\frac{1}{(+)(-)(-)^2}$ (−) $\frac{1}{(+)(+)(+)^2}$ (+)

$\frac{1}{(x+3)(x-1)(x-2)^2}$ ✓ Same



Example 3

X-intercepts: 1

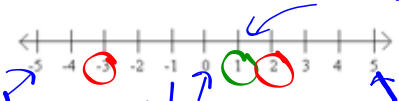
Hortiz. Asymp.: y=0

Vertical Asymp.: x=2 x=−3

Multiplicity: *Opp. or Same* *Opp. or Same*

Shape: *Odd or Even* $\frac{x}{x^2}$ ~3

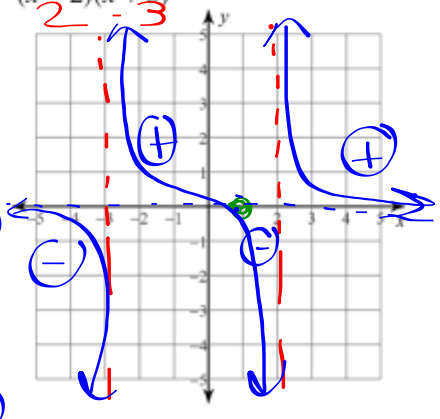
Line Sign:



1.5 $\frac{(+)}{(-)(+)}$ (−)

$\frac{(-)}{(-)(-)}$ (−) $\frac{(+)}{(+)(+)}$ (+)

$\frac{x-1=0}{(x-2)(x+3)}$ ✓



Got it? Match the following 6 graphs with their equations:

I. $\frac{1}{(x-1)(x+2)}$

II. $\frac{1}{(x-1)^2(x+2)}$

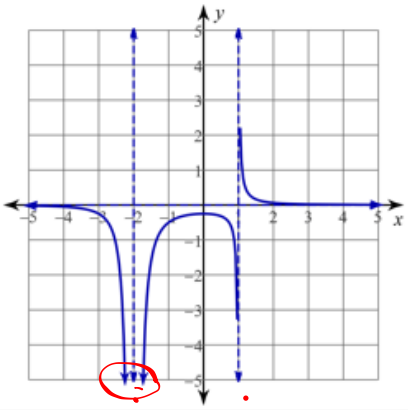
III. $\frac{1}{(x-1)(x+2)^2}$

IV. $\frac{1}{(x-4)(x-1)(x+2)^2}$

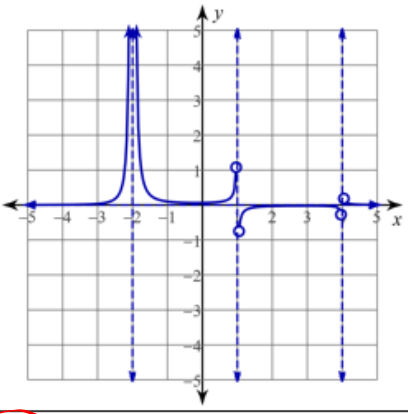
V. $\frac{1}{(x-4)(x-1)^2(x+2)}$

VI. $\frac{1}{(x-4)^2(x-1)(x+2)}$

A



B



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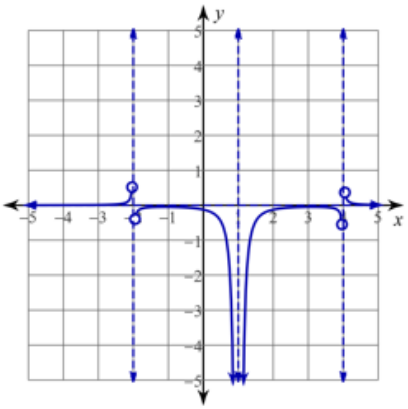

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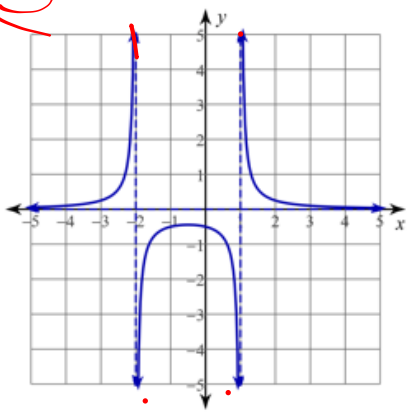

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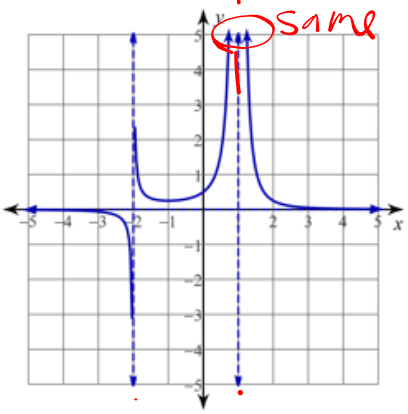

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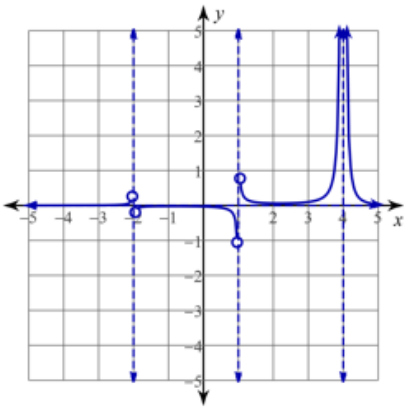
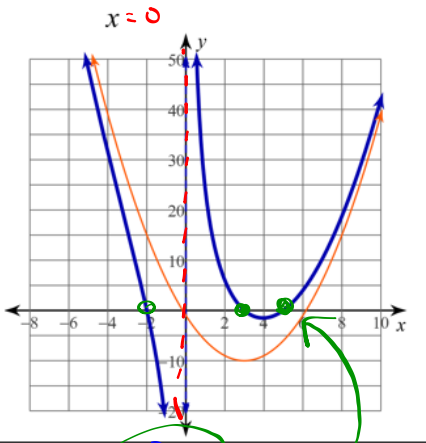


Slant Asymptotes

$\frac{x^3 - 6x^2 - x + 30}{x^3}$



$x^3 - 6x^2 - x + 30$

$-x^3$

$-6x^2 - x + 30$

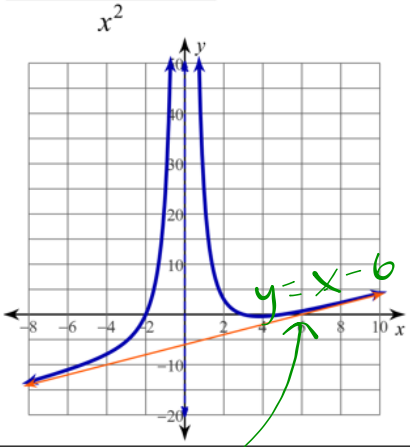
$+6x^2$

$-x + 30$

$+x$

$30\ R$

$\frac{x^3 - 6x^2 - x + 30}{x^2}$



$x - 6$

$x^2 \overline{)x^3 - 6x^2 - x + 30}$

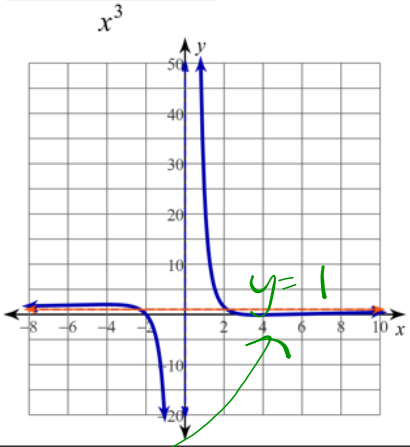
$-x^3$

$-6x^2 - x + 30$

$+6x^2$

$-x + 30\ R$

$\frac{x^3 - 6x^2 - x + 30}{x^3}$



1

$x^3 \overline{)x^3 - 6x^2 - x + 30}$

$-x^3$

$-6x^2 - x + 30$

R

Practice. SHOW LONG DIVISION

$\frac{4}{2} \to (2)$ ✓ SHORT CUT if #same = #same $\quad \frac{3}{1} \to (3)$ ✓

1. $\frac{4x^2-3x+1}{2x^2-1} \to y=2$

$2x^2+0x-1 \;\overline{)\; 4x^2-3x+1}$

2

$-(4x^2-0x+2)$

$-3x+3$ R

$y=2$

2. $\frac{3x^2+2}{x^2-x-7} \to y=3$

$x^2-x-7 \;\overline{)\; 3x^2+0x+2}$

3

$-(3x^2-3x-21)$

$3x+23$ R

$y=3$

3. $\frac{5x^2-3x+1}{x+2}$

$5x-13$

$x+2 \;\overline{)\; 5x^2-3x+1}$

$-(5x^2+10x)$

$-13x+1$

$-(-13x-26)$

27 remainder

$y=5x-13$

-13

4. $\frac{x^2-x-6}{x^2-1} \to y=1$

1

$x^2+0x-1 \;\overline{)\; x^2-x-6}$

$-(x^2-0x+1)$

$-x-5$ Remainder

$y=1$

Review Name:_____ Period____

Solve each equation.

1) $\left(\frac{1}{3}\right)-\left(\frac{1}{n}\right)=\left(\frac{3}{n}\right)$ (n)(n)(3)

$\frac{n}{3n}-\frac{3}{3n}=\frac{9}{3n}$

$n-3=9$

$+3\ \ +3$

$n=12$

2) $\frac{1}{2n^2}=\frac{1n}{2n}+\frac{1^2}{n^22}$

$\frac{1}{2n^2}=\frac{1n}{2n^2}+\frac{2}{2n^2}$

$1=n+2$

$-2\ \ -2$

$-1=n$

3) $x^3-x^2-12x=0$

$x(x^2-x-12)$

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

$0, 4, -3$

-12: -4×3, $+1$

4) $x^2-5x+4=0$

5) $\frac{2x+6}{(x+1)}-\frac{4}{(x+1)} \rightarrow \frac{2x+6-4}{x+1}$

$\frac{2(2x+2)}{x+1}$

$\frac{2(x+1)}{x+1}$

2

6) $\frac{2x}{x+2}+\frac{x-1}{x-5}$

7) $\frac{x^2-x-2}{x+2} \cdot \frac{x+5}{x^2-4}$

8) $\frac{x^2+6x+8}{x^2-5x+4} \cdot \frac{x^2+3x-4}{x^2+4x+4}$

9) $4\left(\frac{1}{x}\right) = \frac{1}{4x} + \left(\frac{3}{4}\right)x$

$\frac{4}{4x} = \frac{1}{4x} + \frac{3x}{4x}$ ✓ $\rightarrow 4 = 1 + 3x$

$-1 \quad -1$

$\frac{3}{3} = \frac{3x}{3}$

$1 = x$

once the denominator is the same you don't need it.

10) $\frac{4x+16}{5x} + \frac{2}{5x} = \left(\frac{x+3}{x}\right)5$

$4x + 16 + 2 = 5x + 15$

18

$4x + 18 = 5x + 15$

$-4x \quad -4x \quad -15$

$3 = x$