

Name _____

Date _____

Writing rational functions given characteristics: **Answers will vary!**

1. V.A.: $x = \frac{2}{3}$ and $x = -1$
 Denom. $(3x-2)(x+1)$

$f(x) = \frac{1}{(3x-2)(x+1)}$ **pick anything for top!**

2. V.A.: $x = -1$ and $x = \frac{1}{2}$

H.A.: $y = 3$ ← leading coeff. *degrees same*

$f(x) = \frac{6x^2}{(2x-1)(x+1)}$ ← $\frac{6x^2}{2x^2} = 3$ H.A.

3. H.A.: $y = \text{none}$ & y -int of $(0, -2)$
degree bigger top
constants reduce -2

$f(x) = \frac{x^2 - 4}{x + 2}$

4. No V.A. and x -int of $(3, 0)$
imaginary denominator

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

Write a rational function with the following characteristics:

5. Vertical Asymptotes of $x = 1, x = -2$.
 Denominator $(x-1)(x+2)$

$f(x) = \frac{3x}{(x-1)(x+2)}$ or $\frac{\text{Anything!}}{x^2 + x - 2}$

6. Vertical Asymptote of $x = -1$, a Horizontal Asymptote of $y = 2$ and a x -intercept at $x = 3$.
Denomin. $(x+1)$
Same degrees leading coeff.

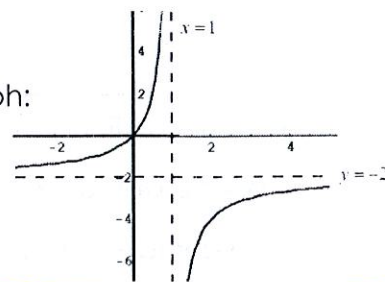
$f(x) = \frac{2(x-3)}{(x+1)}$ or $\frac{2x-6}{x+1}$

7. Vertical Asymptotes of $x = 0, x = \frac{5}{2}$ and Horizontal Asymptote of $y = 4$
Denomin. $x(2x-5)$
Same degrees

$f(x) = \frac{8x^2 - 1}{x(2x-5)}$ → $\frac{8x^2}{2x^2 - 5x}$

8. Using the graph:

VA: $x = 1$
 HA: $y = -2$
 $x + y$ -int: $(0, 0)$
 $\frac{-2x + 0}{x - 1}$



$f(x) = \frac{-2x}{x-1}$

Doesn't factor!! Imaginary solutions!

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

$\frac{x^2 - x + 6}{x - 2}$ $\frac{2 \mid 1 \ -1 \ 6}{ \downarrow 2 \ \cancel{4} \ x}$

Hole: none

V.A.: $x = 2$

H.A.: none

S.A.: $y = x + 1$

x-int(s): none

y-int: $(0, -3)$

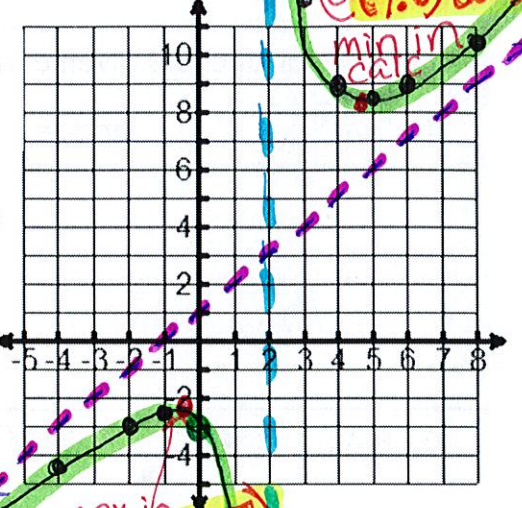
Domain: $(-\infty, 2) \cup (2, \infty)$

Range: $(-\infty, -2.7] \cup [8.7, \infty)$

Inc: $(-\infty, -0.8) \cup (4.8, \infty)$

Dec: $(-0.8, 2) \cup (2, 4.8)$

x	y
-4	-4.3
-2	-3
-1	-2.7
1	-6
3	12
4	9
4	9
5	8.7
8	10.7



10. $f(x) = \frac{x^3 + 3x^2}{x^3 + 3x^2 - 4x - 12}$

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

Hole: $(-3, 1.8)$

V.A.: $x = -2, 2$

H.A.: $y = 1$

S.A.: none

x-int(s): $(0, 0)$ ^{bounce*}

y-int: $(0, 0)$

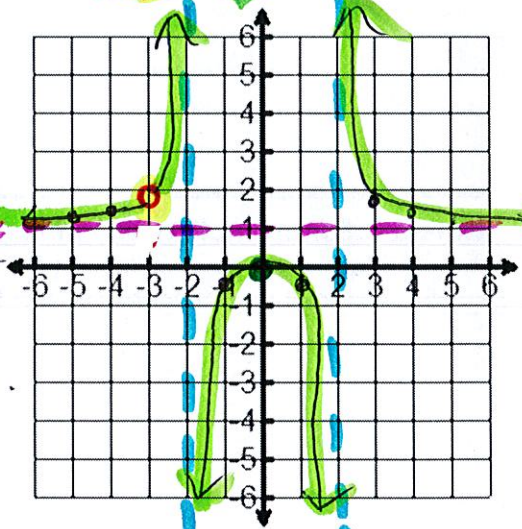
Domain: $(-\infty, -3) \cup (-3, -2) \cup (-2, 2) \cup (2, \infty)$

Range: $(-\infty, 0] \cup (1, \infty)$

Inc: $(-\infty, -3) \cup (-3, -2) \cup (2, 0)$

Dec: $(0, 2) \cup (2, \infty)$

x	y
-5	1.2
-4	1.3
-3	1.8
-2	0
-1	-0.3
0	0
1	-1.8
2	1.3



*Range doesn't stop @ hole b/c 1.8 work @ +3!

11. Determine all asymptotes & holes for

$f(x) = \frac{2x^2 - 5x + 5}{x - 2}$

V.A.: $x = 2$

hole: none

H.A.: none

S.A.: $y = 2x - 1$

12. Determine all asymptotes & holes for

$f(x) = \frac{6 - 2x}{3 - x} = \frac{-2x + 6}{-x + 3} \rightarrow \frac{-2(x - 3)}{-(x - 3)}$

V.A.: none

hole: $(3, 2)$

H.A.: none

S.A.: none

$y = 2$

13. No Vertical Asymptote and y-intercept of (0,5)

Constants \rightarrow imaginary! $x^2 +$

$f(x) = \frac{x + 10}{x^2 + 2}$

14. Write a rational equation with vertical asymptote of $x = 4$, a horizontal asymptote of $y = 3$ and a zero at $x = -2$.

(x-4) asymptote of $x = 4$, a horizontal asymptote of $y = 3$ and a zero at $x = -2$. Same degrees

numerator

*Answers vary *

$f(x) = \frac{3x + 6}{x - 4}$