

INTRODUCTION TO GRAPHING RATIONAL FUNCTIONS

Rational Function

$$y = \frac{p(x)}{q(x)}$$

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Algebra 2 → Chapter 10 Lesson 9: Graphing Rational Functions by Finding Asymptotes

How do you find...

Vertical ASymptote	Set denominator equal to zero and solve for x
Horizontal ASymptote	Look at degree of numerator + denominator if degree $p(x) >$ degree $q(x) \rightarrow$ NO HORIZONTAL ASYMPTOTE if degree $p(x) <$ degree $q(x) \rightarrow y=0$ if degree $p(x) =$ degree $q(x) \rightarrow y =$ Quotient of Leading Coefficients
Zeros or x -intercepts	Set numerator equal to zero and solve for x
y -intercept	set $x=0$ and solve for y

Examples:

a) $y = \frac{3}{x-3}$

Vertical Asymptote: $x-3=0$
 $x=3$

Horizontal Asymptote: degrees $\frac{0}{1} \Rightarrow y=0$

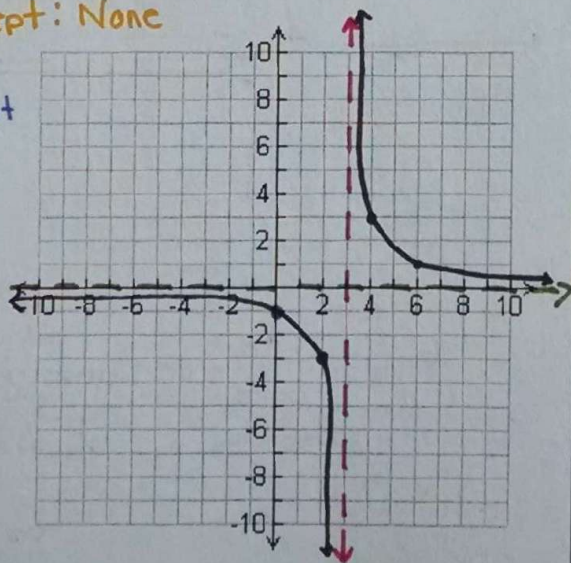
x -intercept: None

y -intercept

$$y = \frac{3}{0-3}$$

$$y = -1$$

$$(0, -1) \leftarrow$$



b) $y = \frac{-4}{x+2}$

V.A.: $x+2=0$
 $x=-2$

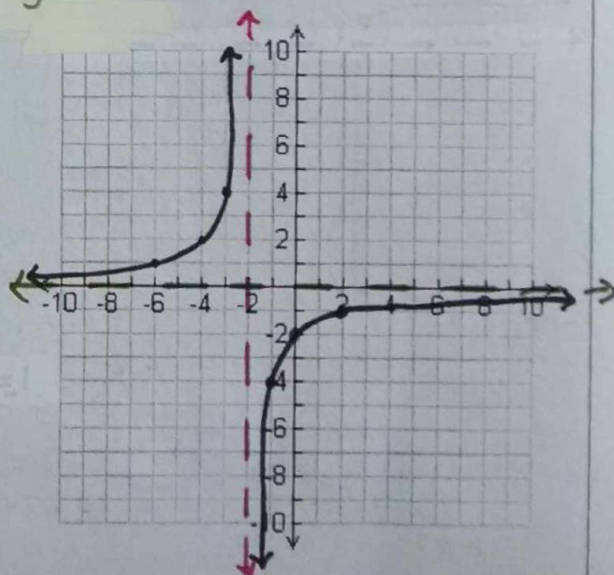
H.A.: degree $\frac{0}{1}$
 $\Rightarrow y=0$

x -intercept: None

y -intercept: $y = \frac{-4}{0+2}$

$$y = -2$$

$$(0, -2)$$



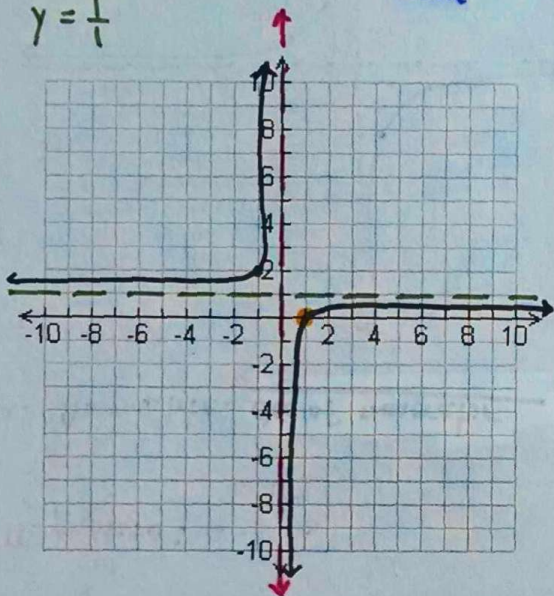
c) $y = \frac{x-1}{x}$

V.A.: $x=0$

H.A.: degree $\frac{1}{1}$
Coefficients
 $y = \frac{1}{1}$

x-intercept: $x-1=0$
 $x=1$
 $(1,0)$

y-intercept: $y = \frac{0-1}{0}$
None



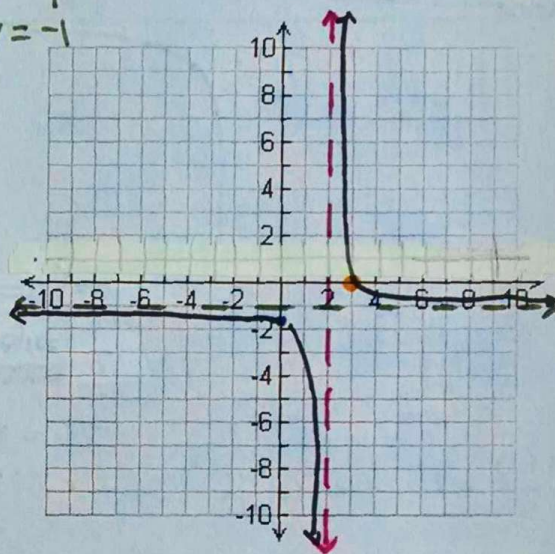
d) $y = \frac{-x+3}{x-2}$

V.A.: $x-2=0$
 $x=2$

H.A.: degree equal
 $y = \frac{-1}{1}$
 $y = -1$

x-intercept: $-x+3=0$
 $x=3$
 $(3,0)$

y-intercept: $y = \frac{0+3}{0-2}$
 $y = -3/2$
 $(0, -3/2)$



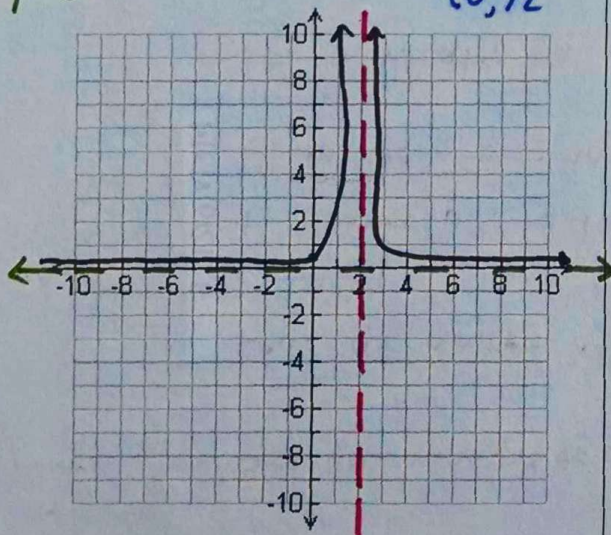
e) $y = \frac{2}{(x-2)^2}$

V.A.: $x-2=0$
 $x=2$

H.A.: $y=0$

x-intercept: None

y-intercept: $y = \frac{2}{(0-2)^2}$
 $y = \frac{1}{2}$
 $(0, 1/2)$



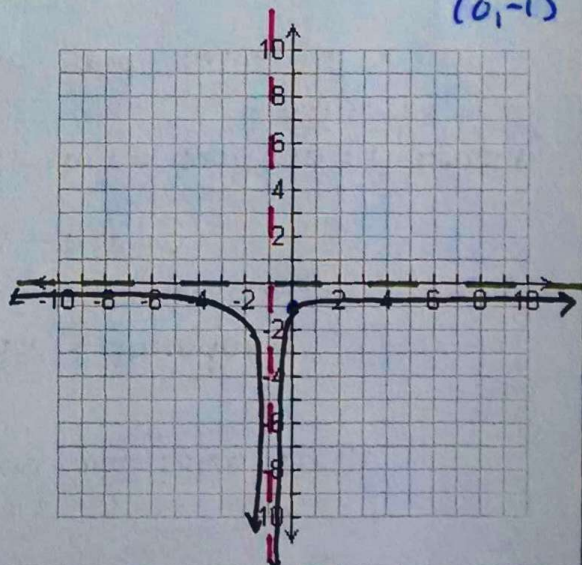
f) $y = \frac{-1}{(x+1)^2}$

V.A.: $x+1=0$
 $x=-1$

H.A.: $y=0$

x-intercept: None

y-intercept: $y = \frac{-1}{(0+1)^2} = -1$
 $(0, -1)$



GLUE HERE