Today's Learning Goal(s):

By the end of the class, I will be able to:

a) determine if and where any holes or asymptotes occur for a rational function.
b) graph a rational function.

2.5 Exploring Graphs of Rational Functions (Holes)

Date: Mar. 2/17
(Every lesson)

HOLES!!!

Graph $g(x) = \dfrac{x^2+7x+12}{x+3}$ Just like our first unit! Factor first.

$$g(x) = \frac{(x+3)(x+4)}{(x+3)}$$

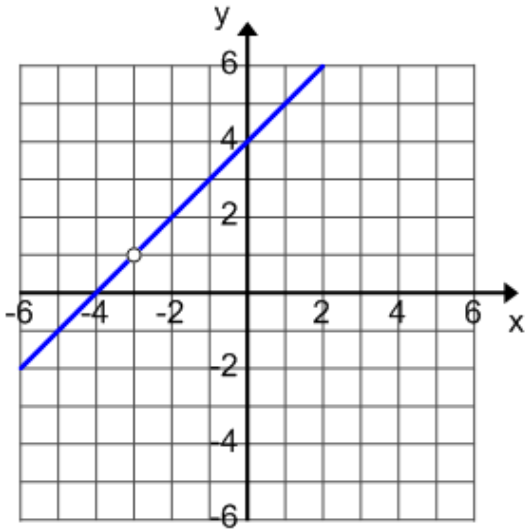
We have the restriction that $x \neq -3$, but since we cancel $(x+3)$ we create a hole in the graph.

So, $g(x) = (x + 4)$ is a linear function with a hole at $x = -3$

ie. $y = x + 4$

$b = 4$

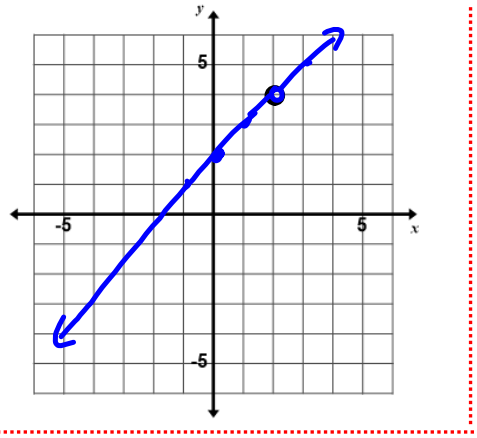
$m = 1$



Ex.1 Graph $f(x)=\dfrac{x^2-4}{x-2}$

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

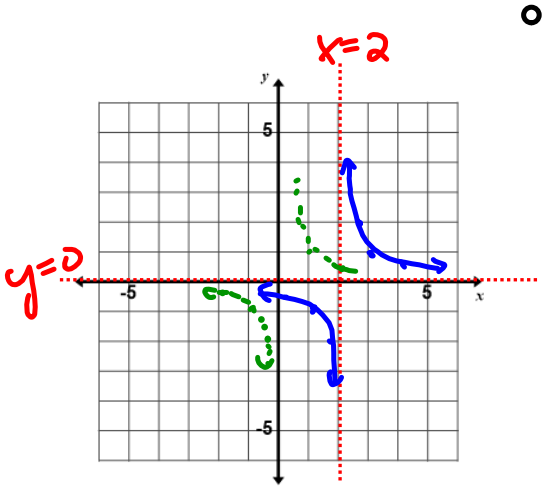
$=x+2$, $x\neq 2$



The restriction is that $x \neq 2$.
there is hole at $x = 2$.

Ex.2 Graph $g(x)=\dfrac{1}{x-2}$

The restriction is still $x \neq 2$.
there is vertical asymptote at $x = 2$.



Summary:

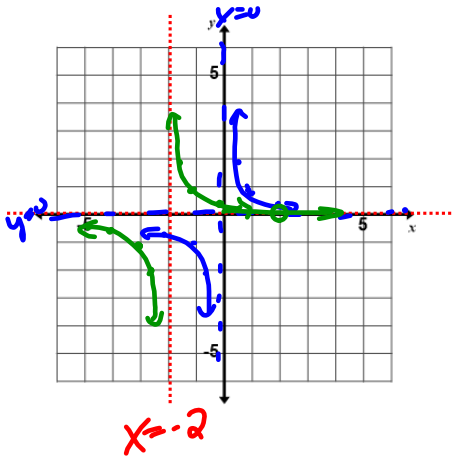
If the restriction divides out, then there is a **hole** at that point.

If the restriction remains, then there is a vertical asymptote at that point.

Ex.3 Graph $h(x)=\dfrac{x-2}{x^2-4}$

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

$y=\dfrac{1}{x}$ $= \dfrac{1}{x+2}$ $R: x \neq 2, -2$



Ex.4 Graph $m(x)=\dfrac{x-2}{x^2+4}$

$R: x^2+4 \neq 0$

$x^2 \neq -4$

$x = \pm\sqrt{-4}$

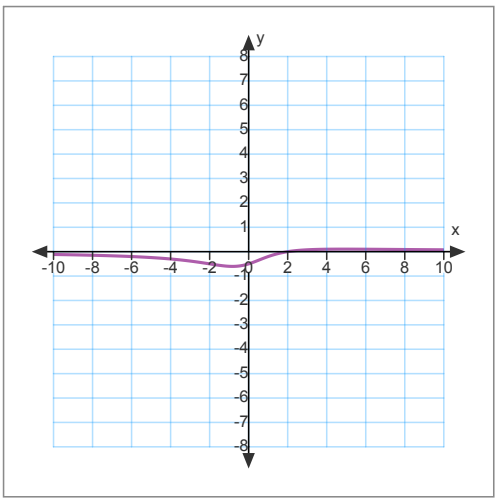
no restrictions, no asymptotes

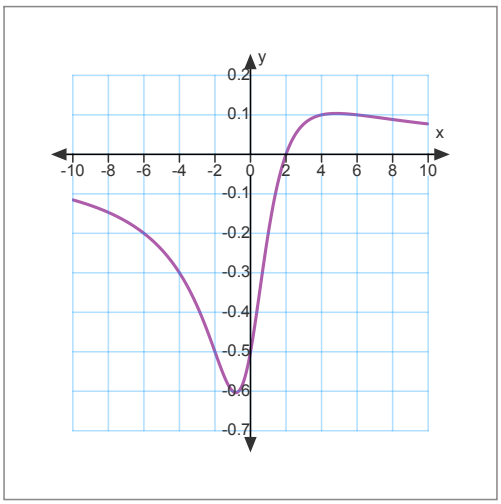
did not reduce/cancel, no holes

$y=\dfrac{x-2}{x^2+4}$

$y=\dfrac{x-2}{x^2+4}$

different scale for "*y*"





If time, (otherwise, continue to additional homework on next slide)

Ex.5 Determine any vertical asymptotes or holes for:

$$f(x)=\frac{x^3-4x}{x^3-x^2-6x}$$

$$=\frac{x(x^2-4)}{x(x^2-x-6)}$$

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

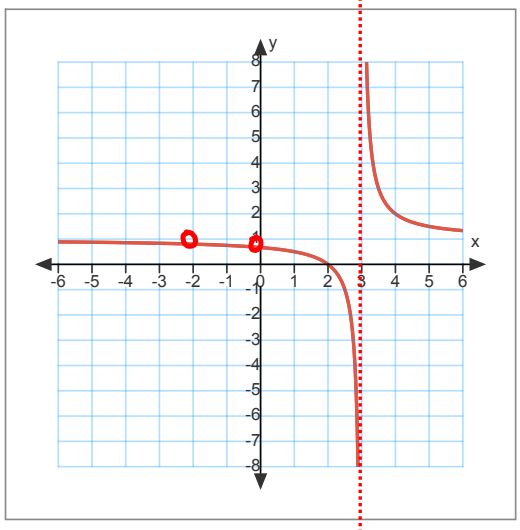
$$=\frac{x-2}{x-3}$$

Restrictions: $x \neq 3, -2, 0$

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

$x \neq 0, 3, -2$

Holes at $x = 0$ and $x = -2$
(because the x and $x+2$ divided out)
vertical asymptote at $x = 3$
(because the x and $x-3$ remained)



$$y=\frac{x^3-4x}{x^3-x^2-6x} \qquad y=\frac{x-2}{x-3}$$

Additional Homework Questions Assigned

MCR 3UI Graphs of Rational Functions

Determine any Vertical Asymptotes or Holes for the following functions. Graph each function.

$$a(x)=\frac{x^2-2x-3}{x-3} \qquad b(x)=\frac{x^2+2x}{x^3-4x} \qquad c(x)=\frac{x^3-x^2+2x-2}{x-1}$$

Today's Homework Practice includes:
pp. 70-73 #6bc, 7c, (8,9)ac, 10, 12, 16, 18 [20, 22]
+3 Quesons

Are there any Homework Questions you would like to see on the board?

Last day's work: pp. 70-71 #4def, 5cd, 6a, 7a

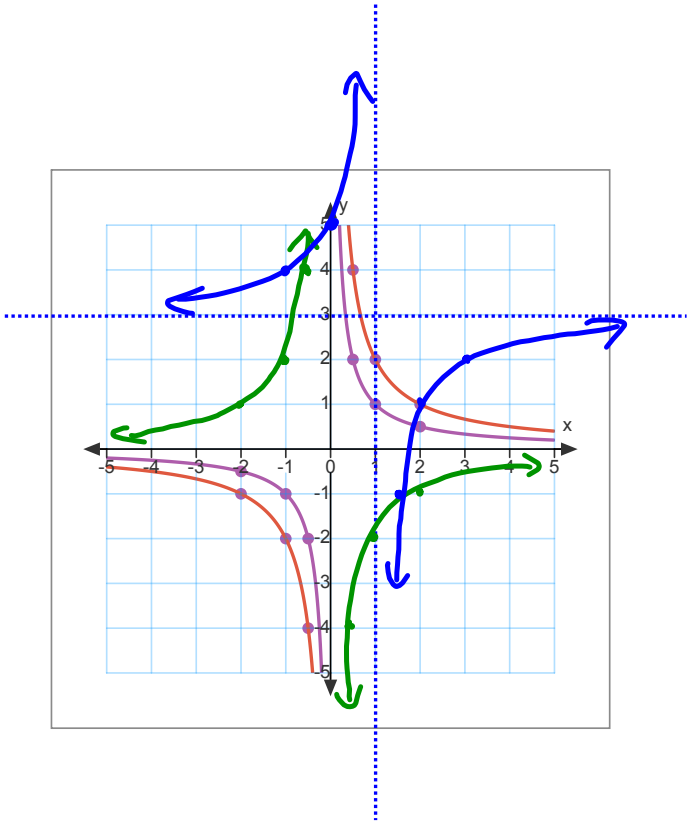
p.70 5c

$y = \frac{1}{x}$

$y = \frac{2}{x} = 2\left(\frac{1}{x}\right)$

$y = -\frac{2}{x}$

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



$y = \frac{1}{x}$

$y = \frac{2}{x}$