Algebra 2 8.4
Graph rational functions with vertical and horizontal asymptotes
Graph rational functions with oblique asymptotes
Graph rational functions with point discontinuity

rational function $y = \dfrac{x^3+6}{3x^3-2}$
zero (of a function)
vertical asymptote
horizontal asymptote
oblique (slant) asymptote
point discontinuity

VA (denom) $x =$

HA (look at degree) $y =$

SA (degree) $y = mx + B$

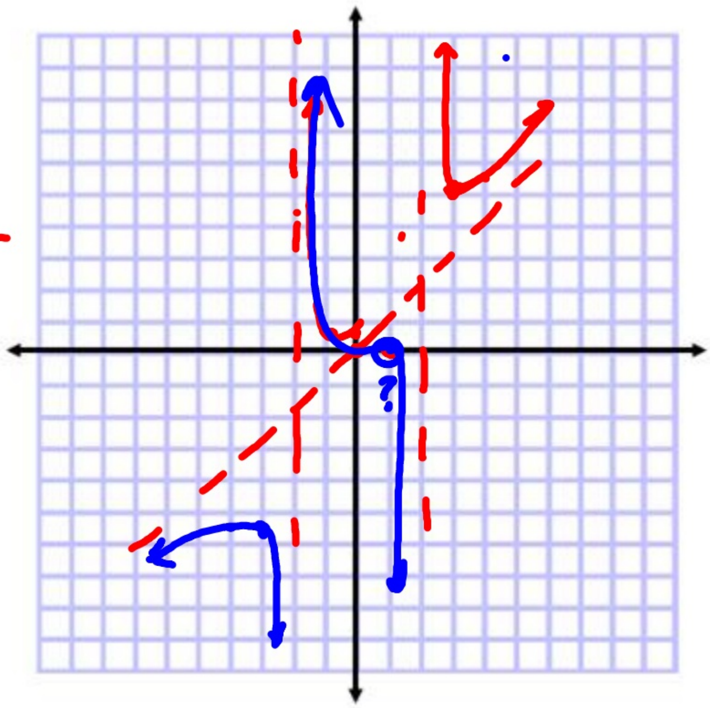
Point discontinuity (cancelled factors)

(ratio)

Whiteboards

3B. $f(x) = \dfrac{x^3 - 1}{x^2 - 4}$

-4		
-3	$\frac{-27-1}{9-4}$	5
3	$\frac{27-1}{9-4} = \frac{26}{5}$	5.1
4	$\frac{64-1}{16-4} = \frac{63}{12}$	5.3
0	$\frac{0-1}{-4}$	$\frac{1}{4}$
1	$\frac{1-1}{1-4}$	0
-1	$\frac{-1-1}{1-4} = \frac{-2}{-3}$	$\frac{2}{3}$



$3 < x < 5$

$1 < y < 6$

Repeated factors = point discontinuity

KeyConcept **Point Discontinuity**

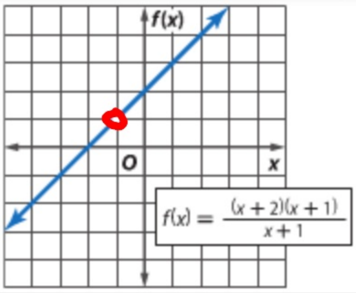
Words If $f(x) = \frac{a(x)}{b(x)}$, $b(x) \neq 0$, and $x - c$ is a factor of both $a(x)$ and $b(x)$, then there is a point discontinuity at $x = c$.

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

$= x + 2;\ x \neq -1$

$x + 1 = 0$

$x = -1$



If something "cancels out" of original equation

Example 4 Graph with Point Discontinuity

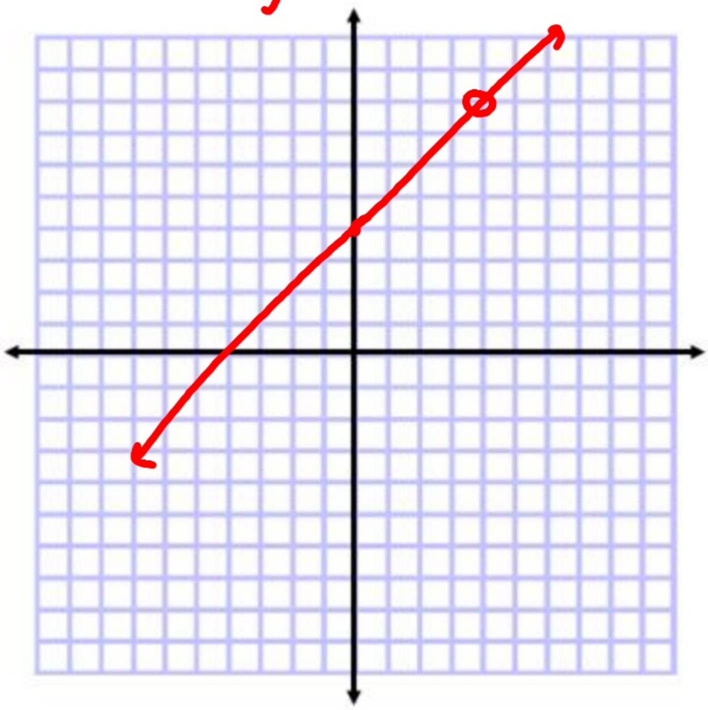
$(\cancel{x-4})(x+4)$

Graph $f(x) = \frac{x^2-16}{\cancel{x-4}}$.

PD $x=4$

Is it an asymptote or a point discontinuity?

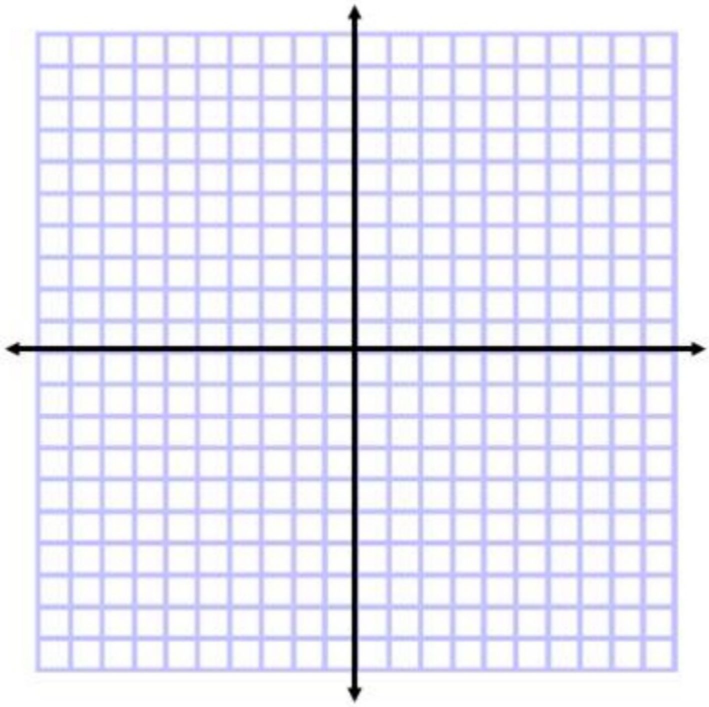
$y = x+4$



Graph each function.

$(\cancel{x+5})(x-1)$ -5 5 -1 4

4A. $f(x) = \dfrac{x^2 + 4x - 5}{\cancel{x+5}}$

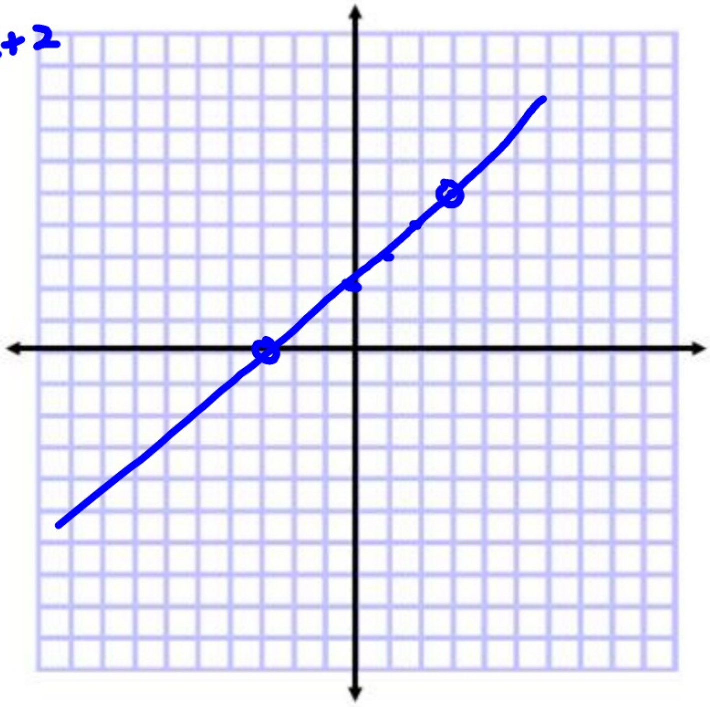


$(\cancel{x+3})(\cancel{x-3})(x+2)$

4B. $f(x) = \dfrac{x^3 + 2x^2 - 9x - 18}{x^2 - 9}$

$(\cancel{x+3})(\cancel{x-3})$

$y = x+2$



PD $x = -3 \quad x = 3$

$x^3 + 2x^2 - 9x - 18$

$x^2(x+2) - 9(x+2)$

$(x^2-9)(x+2)$

8.4 WS Skills

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$$\overline{\qquad\qquad\qquad}$$
$$(x-2)(x+5)$$