

# Extra Unit 4 Quiz # 2 Practice

$$\text{Given } f(x) = y = \frac{2x+10}{x^2+9x+20}$$

- Find x-intercept
  - Find vertical asymptote
  - Find y-intercept
  - Find range
  - Find End Behavior
  - Find  $\lim_{x \rightarrow -5} f(x)$
- Find holes
  - Find domain
  - Find horizontal asymptote
  - Graph all key features
  - Find  $\lim_{x \rightarrow -4} f(x)$
  - Find  $\lim_{x \rightarrow -4^-} f(x)$

KEY Given

$$f(x) = y = \frac{2x + 10}{x^2 + 9x + 20}$$

Factor  $y = \frac{2(x+5)}{(x+5)(x+4)}$

• Find x-intercept

$0 = \frac{2}{x+4}$  → **X-int: none**  
 or  $0 = 2x + 10$   
 $0 = 2x + 10$   
 $-5 = x$  but  $x = -5$  has the hole  
 Nonsense so no x-int

• Find Holes

$x + 5 = 0 \rightarrow (-5, -2)$   
 from slashed factor  
 Get y-value of hole from leftover equation  
 $y = \frac{2}{x+4} \rightarrow y = \frac{2}{-5+4}$

• Find vertical asymptotes

$x + 4 = 0 \rightarrow$  **VA at  $x = -4$**

from leftover denominator

\* For Domain, consider \*

x-value of hole, vertical asymptote, and x-intercept

**Domain:  $(-\infty, -5) \cup (-5, -4) \cup (-4, \infty)$**

• Find y-intercept  $y = \frac{2(0) + 10}{0^2 + 9(0) + 20} = \frac{10}{20} = \frac{1}{2}$

**y-int  $(0, \frac{1}{2})$**

• Find horizontal asymptote OR  $y = \frac{2}{0+4} = \frac{1}{2}$

**HA at  $y = 0$**

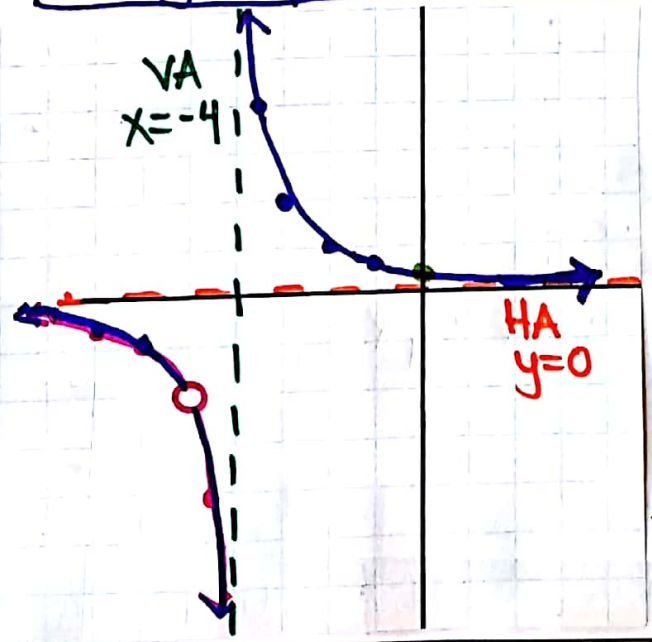
Degree 1  
Degree 2  
 $y = \frac{2x + 10}{x^2 + 9x + 20}$

Bottom degree is bigger so

**Range:  $(-\infty, -2) \cup (-2, 0) \cup (0, \infty)$**

\* For Range, consider \*

y-value of hole, horizontal asymptote, and x-intercept



• Find End Behavior

$\lim_{x \rightarrow \infty} f(x) = 0$   
 $\lim_{x \rightarrow -\infty} f(x) = 0$

\* often, rational functions end behavior matches horiz. asymptote

• Find  $\lim_{x \rightarrow -5} f(x) = -2$   
 y-value of hole

$\lim_{x \rightarrow -4} f(x) \rightarrow$  **DNE**

$\lim_{x \rightarrow -4^-} f(x) = -\infty$