IB Pre HL Name: Key

Graphing Rational Functions with Oblique Asymptotes Period: ______

Perform a long or synthetic division and state the oblique asymptotes. And find vertical asymptote(s), hole(s), x-intercept(s), and y-intercept. And then sketch the graph showing all these elements.

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

$$\begin{array}{r|rrr} 2 & 1 & 4 & 3 \\ & & 2 & 12 \\ \hline & 1 & 6 & 15 \end{array}$$

$f(x) = (x+6) + \dfrac{15}{x-2}$

oblique Asymp: $y = x+6$

V.A: $x = 2$

hole(s): None

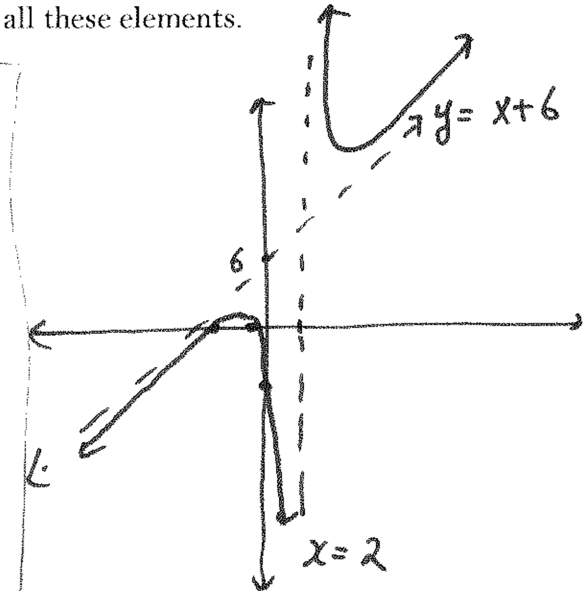
X-int: $(x^2+4x+3) = 0$

$(x+3)(x+1) = 0$

$x = -1 \quad x = -3$

$(-1, 0) \quad (-3, 0)$

y-int: $y = \frac{3}{-2} \quad (0, -\frac{3}{2})$



b. $y = \dfrac{x^3+4x^2-x-4}{x^2-6x+5} = \dfrac{x^2(x+4)-(x+4)}{(x-5)(x-1)} = \dfrac{(x+4)(x+1)\cancel{(x-1)}}{(x-5)\cancel{(x-1)}}$

$$\begin{array}{r|l} & x + 10 \\ \hline x^2-6x+5 & x^3+4x^2-x-4 \\ & -(x^3-6x^2+5x) \\ \hline & 10x^2+5x-4 \\ & -(10x^2-60x+50) \\ \hline & 65x-54 \end{array}$$

Oblique Asymp: $y = x+10$

V.A: $x = 5$

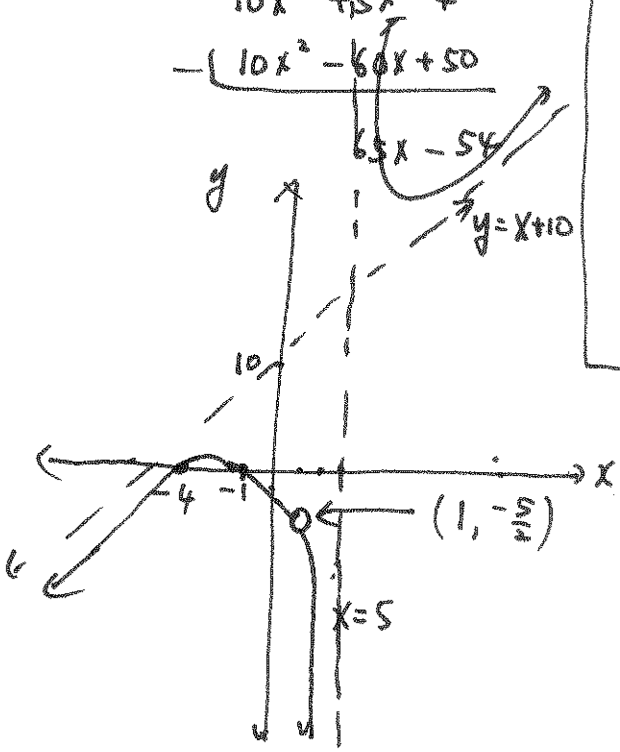
holes: $x = 1 \quad y = \frac{5 \cdot 2}{-4} = \frac{10}{-4} = \frac{5}{-2}$

$(1, -\frac{5}{2})$

X-int: $x = -4 \quad x = -1$

$(4, 0) \quad (-1, 0)$

y-int: $(0, -\frac{4}{5})$



key.

Practice WS: key attached.

1. Without a calculator, sketch a complete graph of each function including the vertical and horizontal or oblique asymptotes, holes, x-intercepts, y-intercept and end behavior. Check your answers on your graphing calculator.

a. $f(x)=\dfrac{2x^2-x-6}{x+4}$ b. $f(x)=\dfrac{3x^2+2x-5}{x^2+x-2}$ c. $f(x)=\dfrac{x^3+x^2-6x}{x^2-x-12}$

2. Find a rational function with the given information.

a. Vertical asymptotes; x=3 and x= -1.
Horizontal asymptote: y= ½
Holes: none
x-intercepts: (5, 0) and (-2, 0)
y-intercept: (0, 5/3)

$\Rightarrow \dfrac{(x-5)(x+2)}{2(x-3)(x+1)} = f(x)$

b. Vertical asymptotes; x=1 and x= -1.
Horizontal asymptote: y=0
Holes: none
x-intercepts: (-3/2, 0)
y-intercept: (0, -1)

$\Rightarrow \dfrac{(2x+3)}{3(x-1)(x+1)} = f(x)$

c. Vertical asymptotes; x=1/2.
Horizontal asymptote: y=-1/2
Holes: -1
x-intercepts: (4, 0)
y-intercept: (0, -4)

$\Rightarrow \dfrac{-(x-4)(x+1)}{(2x-1)(x+1)} = f(x)$