**Activity 4.3.5 – Graphing Rational Functions IV**

**Revisiting Rational Functions and Comparing their Behavior to other Function Families**

Sketch the graphs of the following functions and its parent function. For each graph, identify the domain, range, *y*-intercept, *x*-intercept(s), zero(s) of the function, end behavior, horizontal asymptote(s), and vertical asymptote(s). If something does not exist, state so.

1. $f\left(x\right)=2(x+3)^{2}-5$ Parent: $p\left(x\right)=x^{2}$



VA:

HA:

Zero(s):

*x*-intercept(s):

*y*-intercept:

Domain:

Range:

End Behavior:

1. $f\left(x\right)=2(x+3)^{3}-5$ Parent: $p\left(x\right)=x^{3}$



VA:

HA:

Zero(s):

*x*-intercept(s):

*y*-intercept:

Domain:

Range:

End Behavior:

1. $r\left(x\right)=2(4^{x+3})-5$ Parent: $p\left(x\right)=4^{x}$



VA:

HA:

Zero(s):

*x*-intercept(s):

*y*-intercept:

Domain:

Range:

End Behavior:

1. $k\left(x\right)=\frac{2}{x+3}-5$ Parent: $p\left(x\right)=\frac{1}{x}$



VA:

HA:

Zero(s):

*x*-intercept(s):

*y*-intercept:

Domain:

Range:

End Behavior:

1. Did the number “3” play the same role for all the graphs? Explain.
2. Did the number “2” play the same role for all the graphs? Explain.
3. Did the number “5” play the same role for all the graphs? Explain.
4. How were the graphs similar? How were they different? Explain.

**Graphing Rational Functions**

Sketch the graphs of the following functions. For each graph, identify the domain, range,

*y*-intercept, *x*-intercept(s), zero(s), horizontal asymptote(s), and vertical asymptote(s).

If something does not exist, state so.

1. $k\left(x\right)=\frac{x^{2 }+ 4}{x + 9}$

VA:

HA:

Zero(s):

*x*-intercept(s):

*y*-intercept:

Domain:

Range:

1. $k\left(x\right)=\frac{x + 4}{x^{2 }- 9}$

VA:

HA:

Zero(s):

*x*-intercept(s):

*y*-intercept:

Domain:

Range:

1. $k\left(x\right)=\frac{5x + 4}{3x^{ }+ 9}$

VA:

HA:

Zero(s):

*x*-intercept(s):

*y*-intercept:

Domain:

Range:

**What are the Rules for Finding a Horizontal Asymptote?**

1. Fill in the blanks below:
* When the degree of the numerator and denominator are the same, we find the value of the

HA by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

* When the degree of the denominator is larger than the degree of the numerator, the HA is

always the line, *y* = \_\_\_\_\_\_\_\_\_\_.

* When the degree of the denominator is smaller than the degree of the numerator, the HA

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.