Name____Guided Practice Rational Function Parts 1   Period_________

To assist in the comprehension of a common error area, I will employ some INFORMAL vocabulary.

EQUAL Degree = the highest exponent is the SAME in both the numerator (TOP of fraction) and the denominator (BOTTOM of fraction)

BOTTOM HEAVY = when a rational function has an exponent that is LARGER than all of the exponents in the DENOMINATOR

TOP HEAVY = when a rational function has an exponent that is LARGER than all of the exponents in the NUMERATOR

- When a rational function has EQUAL degree, then a horizontal asymptote exists and must be determined by the fraction created by the lead coefficients of the numerator and denominator
    - $y = \frac{lead\ coefficient\ of\ NUMERATOR}{lead\ coefficient\ of\ DENOMINATOR}$
- When a rational function is BOTTOM HEAVY, then a horizontal asymptote exists and is y = 0 (the x axis)
    - y = 0
- When a rational function is TOP HEAVY, then a horizontal asymptote does NOT exist.
    - A slant asymptote exists when the difference in degree of the numerator and denominator is exactly 1
    - An oblique asymptote exists when the difference in degree of the numerator and denominator exceeds 1

ALL ANSWERS ON FUTURE ASSIGNMENTS AND ASSESSMENTS MUST BE IN PROPER FORMAT

Lines are stated as lines and points are stated as points

BAD example	GOOD example
1. $f(x) = \frac{x^2-4}{3x-9}$ X intercept(s) 2 or -2 Y intercept $\frac{4}{9}$ Horizontal asymptote ???? or blank Vertical asymptote 3	1. $f(x) = \frac{x^2-4}{3x-9} = \frac{(x-2)(x+2)}{3(x-3)}$ X intercept(s) (-2,0) or (2,0) Y intercept (0, $\frac{4}{9}$) Horizontal asymptote NONE or this has a slant asymptote Vertical asymptote x = 3

To find the y intercept of any function 1) Evaluate the function at x = 0 To find the x intercepts of a rational function 1) Factor the numerator 2) Factor the denominator 3) Check to see if a hole is present FIRST 4) Cancel off any common terms 5) Set remaining factors from NUMERATOR equal to 0 and solve for x (these numbers are the x intercepts) 6) STATE as a POINT (x, 0)	To determine if a rational function has a hole 1) Factor both the numerator and denominator 2) Does the numerator and denominator have a factor that has a variable in common? 3) If YES on 2) then a hole is present on the graph of the rational function 4) If YES on 2) set canceled factor equal to zero and solve for x (this is the x of your hole and a domain restriction) 5) If YES on 2) replace x in NEW version of rational function with the solution you just found in 4)	To find vertical asymptotes of a rational function 1) Factor the numerator 2) Factor the denominator 3) Check to see if a hole is present FIRST 4) Cancel off any common terms 5) Set remaining factors from DENMINATOR equal to 0 and solve for x (these numbers are the x values of the vertical asymptotes & domain restrictions) 6) STATE as an EQUATION x = ____

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Intercepts & Asymptotes
Determine the intercepts and asymptotes of each of the rational functions (if NONE, then state so)

1. $f(x) = \frac{x^2-100}{3x+15}$

X intercept(s) ____________________

Y intercept ______________________

Horizontal asymptote ________________

Vertical asymptote __________________

Does this rational function have a hole? _______

If this rational function has a hole, then state it _________

2. $g(x) = \frac{20x+40}{x^2-16}$

X intercept(s) ____________________

Y intercept ______________________

Horizontal asymptote ________________

Vertical asymptote __________________

Does this rational function have a hole? _______

If this rational function has a hole, then state it _________

3. $h(x) = \frac{-4x^2-24x}{x^2-36}$

X intercept(s) ____________________

Y intercept ______________________

Horizontal asymptote ________________

Vertical asymptote __________________

Does this rational function have a hole? _______

If this rational function has a hole, then state it _________

4. $j(x) = \frac{x^2-6x-7}{2x+14}$

X intercept(s) ____________________

Y intercept ______________________

Horizontal asymptote ________________

Vertical asymptote __________________

Does this rational function have a hole? _______

If this rational function has a hole, then state it _________

5. $k(x) = \frac{x+1}{x^2-7x-8}$

X intercept(s) ____________________

Y intercept ______________________

Horizontal asymptote ________________

Vertical asymptote __________________

Does this rational function have a hole? _______

If this rational function has a hole, then state it _________

6. $m(x) = \frac{x^2+2x-8}{2x^2-8x}$

X intercept(s) ____________________

Y intercept ______________________

Horizontal asymptote ________________

Vertical asymptote __________________

Does this rational function have a hole? _______

If this rational function has a hole, then state it _________

7. $w(x) = \frac{x^2-2x-8}{2x^2-8x}$

X intercept(s) ____________________

Y intercept ______________________

Horizontal asymptote ________________

Vertical asymptote __________________

Does this rational function have a hole? _______

If this rational function has a hole, then state it _________