Summary & Practice: Rational Functions

A _____ _____ is an equation that can be written as a _____ (a fraction)

Types of Discontinuities of Rational Functions

1) Holes   Step 1) _____ top and bottom

also called

2) _____ _____ any common factors

3) Find root of slashed factor
   (in other words, set _____ _____ = 0 and solve)

To find the y-value for the hole, substitute the x-value into the remaining equation
(after factoring and crossing out shared factors)

2) Vertical Asymptotes   Step 1) _____ top and bottom

Are written as
_____ = #

2) _____ _____ any common factors

2) Find root of denominator
   (in other words, set remaining _____ = 0 and solve)

3) Horizontal Asymptotes   There are 3 scenarios)   1st, Find degree of top and bottom

Are written as
_____ = #

a) $\underline{\text{small degree}}$ -> y = _____
   large degree

b) same degree   -> y = _____ ___ _____

c) $\underline{\text{large degree}}$ -> _____
   small degree

Rational Functions Practice   **Remember to show work with Algebra for credit!** ☺

For each problem:
   a) Find holes, vertical asymptotes, and horizontal asymptotes.
   b) Find domain, x-intercept, and y-intercept.

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

2) $f(x) = \dfrac{x^2 - 3x - 10}{3x^2 - 11x - 20}$

3) $f(x) = \dfrac{x - 3}{x^2 - 9}$

4. Find the vertical asymptotes, if any, of the graph of the rational function.

$$f(x) = \frac{3}{x^2 - 3x - 4}$$

- ○ x = 0
- ○ no vertical asymptotes
- ○ x = 4 and x = −1
- ○ x = 4 and y = −1

5. Find the all the asymptotes, if any, of the graph of the rational function.

$$f(x) = \frac{x^3 - 1}{x^2 - 9}$$

- ○ A. y = 0, x = 3, x = 0
- ○ B. x = 3, x = −3
- ○ C. y = x, y = 0
- ○ D. y = x, x = 3, x = −3

6. Find the all the asymptotes, if any, of the graph of the rational function.

$$f(x) = \frac{x^3 - 27}{x^2 - 9}$$

- ○ A. y = 0, x = 3, x = 0
- ○ B. x = 3, x = −3
- ○ C. x = 3
- ○ D. x = −3

7. Find the location of all of the removable discontinuities, if any, of the graph of the rational function.

$$f(x) = \frac{x^3 - 27}{x^2 - 9}$$

- ○ A. x = 3
- ○ B. x = −3
- ○ C. x = −27
- ○ D. none

8. Find the horizontal asymptotes, if any, of the rational function.

$$f(x) = \frac{2x^2}{x^2 + 4}$$

- ○ A. x = 2
- ○ B. y = 0
- ○ C. y = 2
- ○ D. no horizontal asymptotes

MORE Rational Functions Practice   **Remember to show work with Algebra for credit!** ☺

For each problem find the following (if any exist). Remember to give coordinate pairs for holes, x-intercept(s) and y-intercept.
  a) Find holes, vertical asymptotes, and horizontal asymptotes.
  b) Find domain, x-intercept(s), and y-intercept.

9. $f(x) = \dfrac{3x^2}{x^2 - 16}$

Hole: _____ V.A. : _____ H.A. : _____

Domain: _____ x-int(s): _____ y-int: _____

10. $f(x) = \dfrac{x^2 + x - 6}{x + 3}$

Hole: _____ V.A. : _____ H.A. : _____

Domain: _____ x-int(s): _____ y-int: _____

11. $f(x) = \dfrac{x + 8}{x^2 - 64}$

Hole: _____ V.A. : _____ H.A. : _____

Domain: _____ x-int(s): _____ y-int: _____

12. $f(x) = \dfrac{x + 8}{x^2 + 64}$

Hole: _____ V.A. : _____ H.A. : _____

Domain: _____ x-int(s): _____ y-int: _____

13. $f(x) = \dfrac{x^3 - 8}{x - 2}$

Hole: _____ V.A. : _____ H.A. : _____

Domain: _____ x-int(s): _____ y-int: _____

14. $f(x) = \dfrac{x^2 + 4x + 3}{3x^2 + 6x + 3}$

Hole: _____ V.A. : _____ H.A. : _____

Domain: _____ x-int(s): _____ y-int: _____

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

Hole: _____ V.A. : _____ H.A. : _____

Domain: _____ x-int(s): _____ y-int: _____