

Unit 3: Rational Functions Review

Simplify the rational expressions. State any possible restrictions.

$$1.) \frac{a^3-8}{a^2+2a+4}$$

$$2.) \frac{x^2+9x+14}{x^2+3x-28}$$

Multiply or Divide. State any possible restrictions.

$$3.) \frac{a^2}{8b^3} \cdot \frac{3b^5}{8a^3}$$

$$4.) \frac{a^2}{a+3} \cdot \frac{a^2-2a-15}{a^2-a}$$

$$5.) \frac{x^2+x-2}{x+3} \cdot \frac{x^2-7x-30}{2x^2-x-1}$$

$$6.) \frac{w+2}{w+1} \div \frac{w-5}{w^2+3w+2}$$

$$7.) \frac{w^2-9}{w^2+5w+6} \div \frac{w^2+2w-15}{w^2+w-20}$$

Add or Subtract. Simplify if possible.

$$8.) \frac{7}{c+4} + \frac{1}{c^2-16}$$

$$9.) \frac{c^2-7c+10}{c^2-9c+14} + \frac{c^2-12c+35}{c^2-6c+5}$$

$$10.) \frac{w^2-11w+24}{w^2-7w+12} - \frac{3}{w-4}$$

Solve the equation. Check for extraneous solutions.

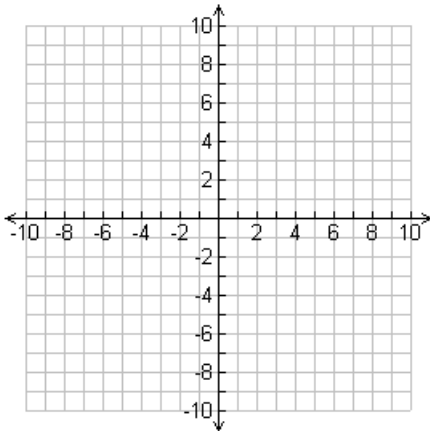
$$11.) \frac{-2}{x-5} = \frac{2}{x+3}$$

$$12.) \frac{1}{2d} + \frac{6}{5d} = -3$$

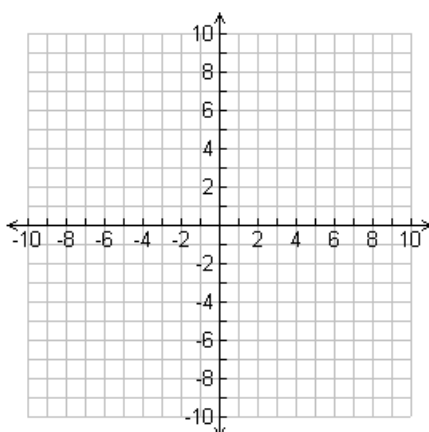
$$13.) \frac{x}{x^2-25} + \frac{4}{x-5} = \frac{1}{x+5}$$

For each graph below, state all that apply: Point of Discontinuity/Holes, Vertical Asymptotes, Horizontal Asymptotes, Domain and Range.

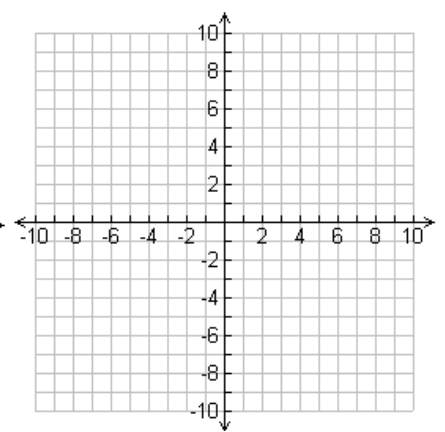
14.) $f(x) = -\frac{4}{x^2-3x}$



15.) $g(x) = \frac{x-4}{-4x-16}$



16.) $h(x) = \frac{x^3-9x}{3x^2-6x-9}$



Simplify the complex fraction.

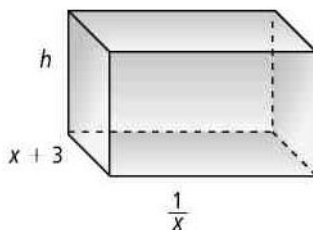
17.) $\frac{\frac{3}{y} - \frac{2}{2y}}{\frac{4}{4} + \frac{4}{4y}}$

18.) $\frac{\frac{1}{x+2}}{\frac{2}{x} - 5}$

19.) $\frac{\frac{d+5}{d^2+11d+24}}{\frac{d+2}{d+3}}$

20.) $\frac{x + \frac{4x}{y}}{\frac{7}{3x}}$

21.) Given the volume is $V = \frac{x^2+x-6}{x}$, write an expression that represents the height of the prism below:



22.) Chad can paint a room in 6 h. Cassie can paint the room in 9 h. How long would it take them to paint the room working together?

Review

23.) Identify each of the following for the function: $f(x) = x^2 - 5x + 6$

- Domain
- Range
- Increasing
- Decreasing

24.) Solve the system: $y - 4x + 5 = x^2 - 6x + 6$ and $y - 4 = x^2 + 4x$

25.) Write a polynomial function in standard form with zeros at 4 and $-3i$.

26.) Using $x = 2 - 3i$ and $y = 3 + 2i$, find each of the following:

- $x + y$
- $x - y$
- $y - x$
- xy
- difference of x and the conjugate of y
- $\frac{x}{y}$

27.) Determine the value of k that makes the binomial $(x + 2)$ a factor of $x^3 - 5x^2 + kx + 24$.

