

## Day 5 - Simplifying and Solving Rational Functions Date \_\_\_\_\_ Period \_\_\_\_\_

**Simplify each expression.**

1)  $\frac{n^2 - 13n + 36}{n^2 - 12n + 27} \cdot \frac{4n - 12}{4}$

2)  $\frac{n - 9}{n^2 - 10n + 9} \cdot \frac{2n^2 - 2n}{n^2 - 18n + 80}$

3)  $\frac{5k + 9}{5k^2 - 16k - 45} \div \frac{1}{k^2 + 2k - 24}$

4)  $\frac{2r - 9}{r^2 - 19r + 90} \div \frac{2r - 9}{r + 4}$

5)  $\frac{5p}{p + 3} - \frac{5}{p + 1}$

6)  $\frac{3}{x + 1} + \frac{5x}{x - 2}$

7)  $\frac{3x}{x - 4} - \frac{3}{x + 6}$

8)  $\frac{4}{5} + \frac{x + 2}{3x + 2}$

Analyze the graph. Identify the holes, vertical asymptotes, and horizontal asymptote of each. Then sketch the graph.

$$9) f(x) = \frac{4}{x^2 - 9}$$

$$10) f(x) = \frac{x^2 - x - 6}{x^2 + 5x + 6}$$

$$11) f(x) = \frac{x^2 - 2x - 8}{4x - 4}$$

Solve each equation. Remember to check for extraneous solutions.

$$12) \frac{2x + 2}{x^2} = \frac{1}{5x^2} + \frac{1}{5x}$$

$$13) \frac{1}{2m^2} - \frac{1}{m} = \frac{2}{m^2}$$

$$14) \frac{1}{2b^2} - \frac{1}{6b} = \frac{1}{6b^2}$$

$$15) \frac{3}{x - 6} = \frac{4}{x^2 - 7x + 6} + \frac{x - 3}{x^2 - 7x + 6}$$

$$16) \frac{1}{m - 5} = \frac{m}{m^2 - 2m - 15} - \frac{2}{m - 5}$$

$$17) \frac{x + 4}{x^2 + 11x + 30} + \frac{6}{x + 6} = \frac{x - 6}{x^2 + 11x + 30}$$

**Describe the transformation of each graph compared to the original equations  $f(x) = 1/x$**

$$18) f(x) = \frac{4}{x+2} - 1$$

$$19) f(x) = \frac{3}{x-2} + 2$$

$$20) f(x) = \frac{1}{x-3} - 1$$

$$21) f(x) = \frac{4}{x+1} + 1$$

## Day 5 - Simplifying and Solving Rational Functions Date \_\_\_\_\_ Period \_\_\_\_\_

Simplify each expression.

$$1) \frac{n^2 - 13n + 36}{n^2 - 12n + 27} \cdot \frac{4n - 12}{4}$$

$$n - 4$$

$$2) \frac{n - 9}{n^2 - 10n + 9} \cdot \frac{2n^2 - 2n}{n^2 - 18n + 80}$$

$$\frac{2n}{(n - 10)(n - 8)}$$

$$3) \frac{5k + 9}{5k^2 - 16k - 45} \div \frac{1}{k^2 + 2k - 24}$$

$$\frac{(k - 4)(k + 6)}{k - 5}$$

$$4) \frac{2r - 9}{r^2 - 19r + 90} \div \frac{2r - 9}{r + 4}$$

$$\frac{r + 4}{(r - 10)(r - 9)}$$

$$5) \frac{5p}{p + 3} - \frac{5}{p + 1}$$

$$\frac{5p^2 - 15}{(p + 3)(p + 1)}$$

$$6) \frac{3}{x + 1} + \frac{5x}{x - 2}$$

$$\frac{8x - 6 + 5x^2}{(x - 2)(x + 1)}$$

$$7) \frac{3x}{x - 4} - \frac{3}{x + 6}$$

$$\frac{3x^2 + 15x + 12}{(x - 4)(x + 6)}$$

$$8) \frac{4}{5} + \frac{x + 2}{3x + 2}$$

$$\frac{17x + 18}{5(3x + 2)}$$

Analyze the graph. Identify the holes, vertical asymptotes, and horizontal asymptote of each. Then sketch the graph.

$$9) f(x) = \frac{4}{x^2 - 9}$$

Vertical Asym.:  $x = 3, x = -3$

Holes: None

Horz. Asym.:  $y = 0$

$$10) f(x) = \frac{x^2 - x - 6}{x^2 + 5x + 6}$$

Vertical Asym.:  $x = -3$

Holes:  $x = -2$

Horz. Asym.:  $y = 1$

$$11) f(x) = \frac{x^2 - 2x - 8}{4x - 4}$$

Vertical Asym.:  $x = 1$

Holes: None

Horz. Asym.: None

Solve each equation. Remember to check for extraneous solutions.

$$12) \frac{2x + 2}{x^2} = \frac{1}{5x^2} + \frac{1}{5x}$$

$\{-1\}$

$$13) \frac{1}{2m^2} - \frac{1}{m} = \frac{2}{m^2}$$

$\left\{-\frac{3}{2}\right\}$

$$14) \frac{1}{2b^2} - \frac{1}{6b} = \frac{1}{6b^2}$$

$\{2\}$

$$15) \frac{3}{x - 6} = \frac{4}{x^2 - 7x + 6} + \frac{x - 3}{x^2 - 7x + 6}$$

$\{2\}$

$$16) \frac{1}{m - 5} = \frac{m}{m^2 - 2m - 15} - \frac{2}{m - 5}$$

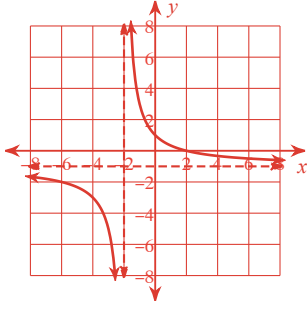
$\left\{-\frac{9}{2}\right\}$

$$17) \frac{x + 4}{x^2 + 11x + 30} + \frac{6}{x + 6} = \frac{x - 6}{x^2 + 11x + 30}$$

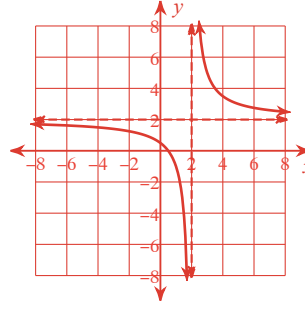
$\left\{-\frac{20}{3}\right\}$

Describe the transformation of each graph compared to the original equations  $f(x) = 1/x$

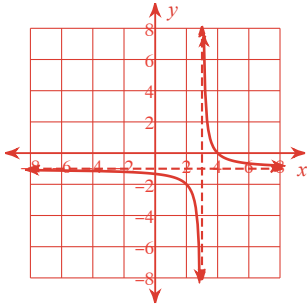
18)  $f(x) = \frac{4}{x+2} - 1$



19)  $f(x) = \frac{3}{x-2} + 2$



20)  $f(x) = \frac{1}{x-3} - 1$



21)  $f(x) = \frac{4}{x+1} + 1$

