

Key

HAT
Rational Functions
Review Packet

Perform the Operation and Simplify:

$$1. \frac{x+2}{x^2+2x-8} \cdot \frac{x^2+x-12}{x-3}$$

$$\frac{(x+2)}{(x+4)(x-2)} \cdot \frac{(x+4)(x-3)}{(x-3)}$$

$$\boxed{\frac{x+2}{x-2}}$$

$$3. \frac{4}{x+1} + \frac{6}{x+2}$$

$$\frac{4x+8+6x+6}{(x+1)(x+2)} = \boxed{\frac{10x+14}{x^2+3x+2}}$$

$$2. \frac{x^4-3x^3+2x^2}{3x^2-9x-30} \div \frac{x^2+4x}{6x+12} \cdot \frac{x^2-11x+30}{x^4-x^3}$$

$$\frac{x^2(x-2)(x-1)}{3(x-5)(x+2)} \cdot \frac{6(x+2)}{x(x+4)} \cdot \frac{(x-5)(x-6)}{x^3(x-1)}$$

$$\boxed{\frac{2(x-2)(x-6)}{x^2(x+4)}}$$

$$4. \frac{2x}{x^2+10x+24} - \frac{x-4}{x^2+11x+30} \cdot \frac{(x+4)}{(x+5)(x+6)}$$

$$\frac{2x^2+10x-x^2+16}{(x+6)(x+4)(x+5)} = \boxed{\frac{x^2+10x+16}{(x+6)(x+4)(x+5)}}$$

Solve:

$$5. \frac{2x-1}{x+4} = \frac{12-3x}{x^2-16} + \frac{2x+1}{x-4}$$

$$2x^2-9x+4 = 12-3x+2x^2+9x+4$$

$$-15x = 12$$

$$\boxed{x = -\frac{4}{5}}$$

$$6. \frac{r}{r-1} - \frac{2}{1-r^2} = \frac{8}{r+1}$$

$$\frac{r}{r-1} + \frac{2}{r^2-1} = \frac{8}{r+1}$$

$$r^2+r+2 = 8r-8$$

$$r^2-7r+10=0$$

$$(r-5)(r-2) =$$

$$\boxed{r = 5, 2}$$

7. List the following information for: $f(x) = \frac{3x^2 - 6x}{x^3 + 2x^2 - 8x}$

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

hole at $x=2$ $f(x) = \frac{3}{x+4}$

Domain: all IR's $x \neq 0, -4, 2$

Range: all IR's $y \neq 0$

Vertical asymptotes: $x = -4$

Horizontal asymptotes (if any exist): $f(x) = 0$

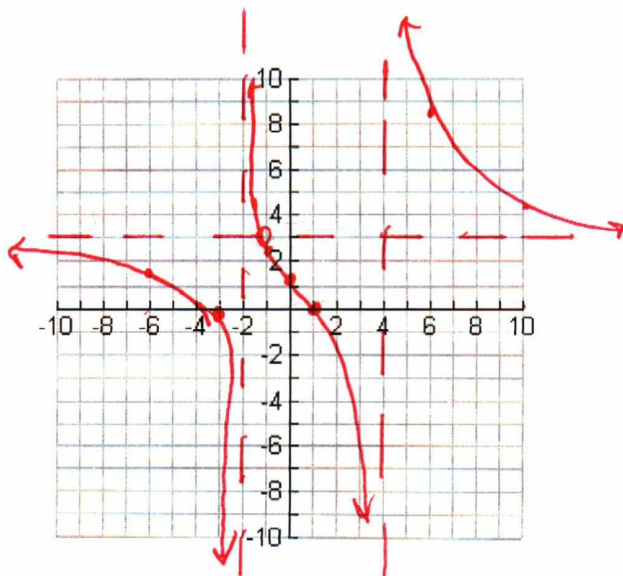
Oblique asymptotes (if any exist): $\emptyset$

Zeros: $\emptyset$

y-intercept: $\emptyset$

8. Graph (list all key information): $f(x) = \frac{3x^2 + 6x - 9}{x^2 - 2x - 8}$

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



VA: $x = 4$ $x = -2$

HA: $f(x) = 3$

y-int: $(0, \frac{9}{8})$

zeros: $(1, 0)$
 $(-3, 0)$

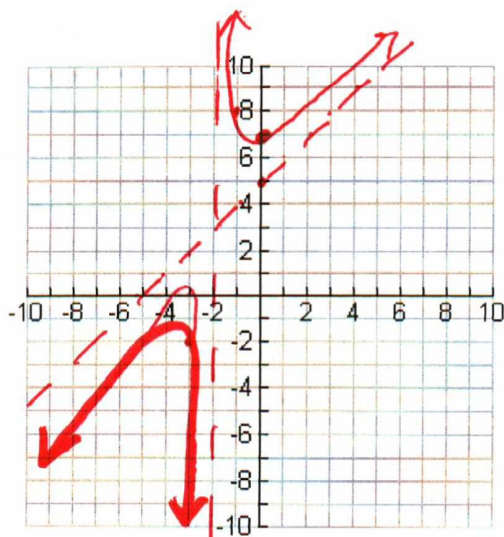
* hole in asymptote

x	$f(x)$
-6	~ 1.6
6	~ 8.4
10	4.9
-1	$\frac{12}{5} \sim 2.4$
-1.5	~ 4.09

9. Graph (list all key information): $f(x) = \frac{x^2 + 7x + 14}{x + 2}$

discriminant = -7

$$\begin{array}{r|l} x & f(x) \\ -1 & 8 \\ -3 & -2 \end{array}$$



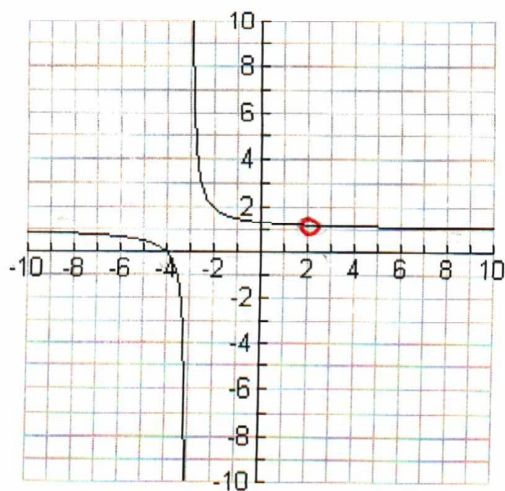
VA: $x = -2$

HA: $y = 5$

SA: $x + 2 \overline{) x^2 + 7x + 14}$
 $\underline{-x^2 - 2x}$
 $5x + 14$
 $\underline{5x + 10}$
 4
 $y = x + 5$

y int: $(0, 7)$

10. Write the equation of the following graph:



VA: $x = -3$

HA: $y = 1$

zeros: $(-4, 0)$

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

11. I can paint 5 rooms in my house in 16 hours while my husband can paint 3 rooms in 11 hours. How long would it take to paint 4 rooms if we worked together?

$$\frac{5}{16} + \frac{3}{11} = \frac{4}{x}$$

$$55x + 48x = 704$$

$$x = 6.8 \text{ hrs}$$