

Assignment

Simplify each expression.

$$1) \frac{5(7p+6)}{35p+30} \div \frac{3(7p+6)}{21p+18}$$

$$\frac{5 \cancel{(7p+6)}}{5} \cdot \frac{6 \cancel{2}}{3 \cancel{(7p+6)}} = \boxed{2}$$

$$3) \frac{6n^3 - 48n^2}{6n^2} \div \frac{n^2 - 16n + 64}{5n}$$

$$\frac{\cancel{6n^2}(n-8)}{\cancel{6n^2}} \cdot \frac{5n}{(n-8)(n-8)} = \boxed{\frac{5n}{n-8}}$$

$$5) \frac{6x^2 - 18x}{x-7} \cdot \frac{1}{6x}$$

$$\frac{6x(x-3)}{x-7} \cdot \frac{1}{6x} = \boxed{\frac{x-3}{x-7}}$$

$$7) \frac{8x^2 - 16x}{16x - 8x^2} \cdot \frac{x+8}{5}$$

$$\frac{8x(x-2)}{-1(8x)(x-2)} \cdot \frac{x+8}{5} = \boxed{\frac{-1(x+8)}{5}}$$

$$9) \frac{7}{(p-4)(p-8)} - \frac{p+7}{p-4} = \frac{(7p-28) - (p^2-p-56)}{(p-8)(p-4)}$$

$$= \frac{-p^2 + 8p + 28}{(p-8)(p-4)}$$

$$11) \frac{x \cdot 3x}{5x+5} - \frac{5x}{4(x+1)}$$

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

$$13) 7 + \frac{a-6}{40a+24}$$

$$\frac{8(5a+3)}{8(5a+3)} + \frac{a-6}{8(5a+3)} = \frac{280a+168+a-6}{8(5a+3)}$$

$$15) \frac{7n}{n^2-9} - \frac{3n-7}{n^2-9}$$

$$= \frac{7n^3 - 63n - 3n + 7}{n^2-9} = \boxed{\frac{7n^3 - 66n + 7}{n^2-9}}$$

$$2) \frac{(x+6)(x-4)}{x^2+2x-24} \cdot \frac{1}{x+6}$$

$$\frac{(x+5)(x-1)}{(x+5)(x-1)} = \boxed{\frac{x-4}{(x+5)(x-1)}}$$

$$4) \frac{x^2 - 13x + 42}{x-7} \div \frac{6-x}{7x^2}$$

$$\frac{(x-6)(x-7)}{(x-7)} \cdot \frac{7x^2}{-1(x-6)} = \boxed{-7x^2}$$

$$6) \frac{x+1}{x-4} \div \frac{6}{6x^3-24x^2}$$

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

or $x^3 + x^2$

$$8) \frac{6p^3 - 24p^2}{7p} \cdot \frac{p+6}{p^2+2p-24}$$

$$\frac{6p^2(p-4)}{7p} \cdot \frac{(p+6)}{(p-4)(p+6)} = \boxed{\frac{6p}{7}}$$

$$10) \frac{5x^2(4x-3)}{7x+2} - \frac{(3x-5)(x+2)}{5x^2}$$

$$\frac{(20x^3 - 15x^2) - (21x^2 - 29x - 10)}{5x^2(7x+2)} = \boxed{\frac{20x^3 - 36x^2 + 29x + 10}{5x^2(7x+2)}}$$

$$12) \frac{(k-6)(8)}{3k} + \frac{(5k-8)(3k)}{k-6}$$

$$\frac{8k-48 + 15k^2 - 24k}{3k(k-6)} = \boxed{\frac{15k^2 - 16k - 48}{3k(k-6)}}$$

$$14) \frac{5x^2(x-1)}{7x-7} - \frac{5(7x-7)}{5x^2}$$

$$\frac{5x^3 - 5x^2 - 35x + 35}{5x^2(7x-7)} = \frac{5(x^3 - x^2 - 7x + 7)}{5x^2 \cdot 7(x-1)}$$

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

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

$$16) \frac{6}{n-7} + \frac{3n(n-7)}{3n-5}$$

$$\frac{18n-30 + 3n^2 - 21n}{(n-7)(3n-5)} = \frac{3n^2 - 3n - 30}{(n-7)(3n-5)}$$

Solve each equation. Remember to check for extraneous solutions.

17) $\frac{x^2}{(x-7)(x+2)} + \frac{1}{(x-7)(x+2)} = \frac{x+2}{x-7}$

$x^2 + 1 = x^2 + 4x + 4$
 $-\frac{3}{4} = \frac{4x}{4}$

$x = -\frac{3}{4}$

18) $6r + 24 = \frac{5r+40}{6r} + \frac{8r^2-35r+12}{6r}$

20) $\frac{1}{7x-1} - \frac{3x^2-15x-18}{7x^3-x^2} = \frac{1}{7x^3-x^2}$

19) $\frac{1}{x^2+4x-21} + 1 = \frac{x-1}{x-3}$

$1 + (x+7)(x-3) = (x+7)(x-1)$
 $1 + x^2 + 4x - 21 = x^2 + 6x - 7$

$7 \cdot \frac{-13 = 2x}{2} = \frac{2x}{2}$
 $\frac{-13}{2} = x$

21) $\frac{n-5}{n+1} = \frac{n-8}{n+1} + \frac{1}{n^2+n}$

$n(n-5) = n(n-8) + 1$
 $n^2 - 5n = n^2 - 8n + 1$

$\frac{3n=1}{3} = \frac{1}{3}$

$n = \frac{1}{3}$

23) $\frac{v-2}{v} + \frac{v-3}{v-6} = \frac{1}{v}$

$(v-2)(v-6) + v(v-3) = v-6$
 $v^2 - 8v + 12 + v^2 - 3v = v - 6$
 $2v^2 - 12v + 18 = 0$

$2(v^2 - 6v + 9) = 0$
 $2(v-3)(v-3) = 0$
 $v = 3$

★ CHALLENGE ★
 Simplify each expression.

25) $\frac{x \cdot x}{16} \cdot \frac{4 \cdot 16}{x} = \frac{x^2 - 64}{16x} \div \frac{x^2}{16}$
 $\frac{x^2}{16} \cdot \frac{(x+8)(x-8)}{16x} \cdot \frac{16}{x^2}$
 $\frac{(x+8)(x-8)}{x}$

26) $\frac{3}{m+4} - \frac{3}{m+4}$

27) $\frac{5a}{2} \div \frac{a-10}{2a}$
 $\frac{5a}{2} \cdot \frac{2a}{a-10}$
 $\frac{5a^2}{a-10}$

28) $\frac{1}{3} + \frac{36}{x}$

29) $\frac{m^2}{4 \cdot 6} - \frac{m \cdot m}{4} = \frac{m^2}{1} \div \frac{24 - m^2}{4m}$
 $\frac{m^2}{1} \cdot \frac{4m}{24 - m^2}$
 $\frac{4m^3}{24 - m^2}$

30) $\frac{16}{u-1} - \frac{u-1}{16}$

$$31) \frac{6(x+6)}{(x+6)\frac{1}{x} + \frac{36 \cdot x}{x+6 \cdot x}}$$

$$\frac{6(x+6)}{\frac{x+6+36x}{x(x+6)}}$$

$$6(x+6) \div \frac{37x+6}{x(x+6)}$$

$$\frac{6(x+6)}{1} \cdot \frac{x(x+6)}{37x+6}$$

$$\frac{6x(x+6)^2}{37x+6}$$

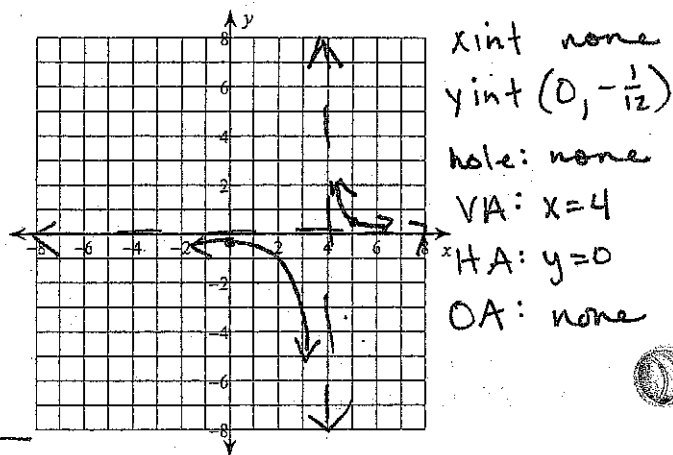
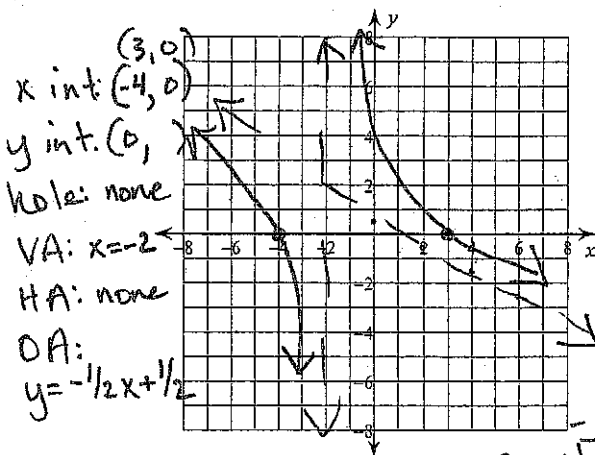
$$32) \frac{4}{4 \cdot x} \cdot \frac{1 \cdot 2x}{2 \cdot 2x} = \frac{\frac{4}{x}}{\frac{4x}{4x}} = \frac{4}{x} \cdot \frac{4x}{-4x} = -\frac{16}{x}$$

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

$N > D$

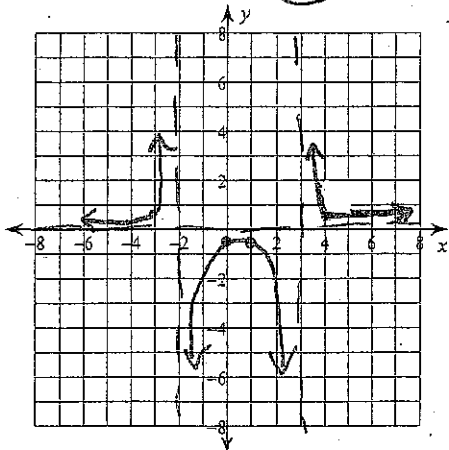
$$33) f(x) = \frac{x^2 + x - 12}{0x^2 - 2x - 4} = \frac{(x+4)(x-3)}{-2(x+2)}$$

$$34) f(x) = \frac{0x + 1}{3x - 12} = \frac{1}{3(x-4)}$$



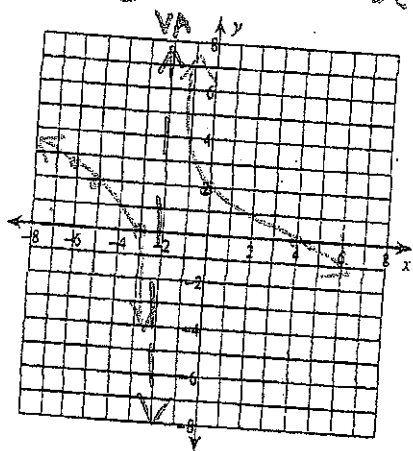
$$\begin{array}{r} -\frac{1}{2}x + \frac{1}{2} \\ -2x - 4 \overline{) x^2 + x - 12} \\ \underline{-x^2 + 2x} \\ -x - 12 \\ \underline{+x + 2} \\ -10 \end{array}$$

$$35) f(x) = \frac{0x^2 + 1}{3x^2 - 3x - 18} = \frac{1}{3(x^2 - x - 6)} = \frac{1}{3(x-3)(x+2)}$$



x int: none
 y int: $(0, -\frac{1}{18})$
 hole: none
 VA: $x = 3$ $x = -2$
 HA: $y = 0$
 OA: none

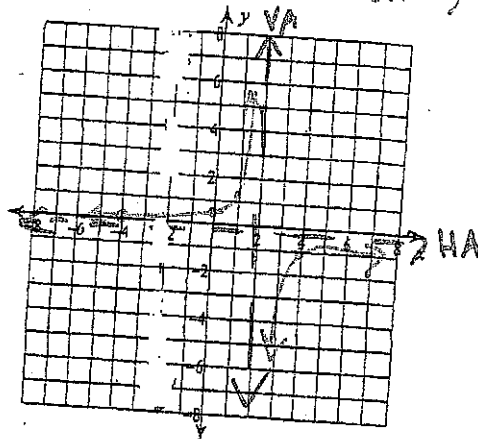
$$36) f(x) = \frac{x^2 - x - 12}{-3x - 6} = \frac{(x-4)(x+3)}{-3(x+2)}$$



VA: $x = -2$ Hole: none

HA: none Domain: $x \in \mathbb{R}$
 $x \neq -2$

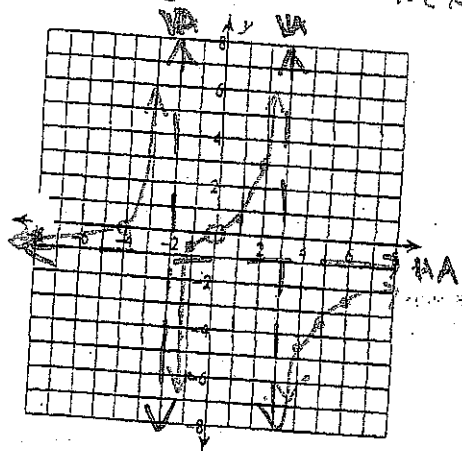
$$37) f(x) = \frac{x+4}{-4x+8} = \frac{x+4}{-4(x-2)}$$



VA: $x = 2$ Hole: $x = \text{none}$

HA: $y = -\frac{1}{4}$ Domain: $x \in \mathbb{R}$
 $x \neq 2$

$$38) f(x) = \frac{x^3 + 4x^2}{-x^3 + x^2 + 6x} = \frac{x^2(x+4)}{-x(x^2 - x - 6)} = \frac{x \cdot x(x+4)}{-x(x-3)(x+2)}$$



VA: $x = 3$
 $x = -2$ Hole: $x = 0$

HA: $y = -1$ Domain: $x \in \mathbb{R}$
 $x \neq 0, 3, -2$