

Simplify each expression.

1) $\frac{70}{30x+20}$

$\frac{70}{10(3x+2)}$

$\frac{7}{3x+2}$

2) $\frac{n^2-9n+20}{9n-45}$

$\frac{(n-5)(n-4)}{9(n-5)}$

$\frac{n-4}{9}$

3) $\frac{3k^2-37k+90}{k-9}$

$\frac{(3k-10)(k-9)}{k-9}$

$3k-10$

4) $\frac{2n^2-6n-36}{n^2-5n-24}$

$\frac{2(n^2-3n-18)}{(n-8)(n+3)}$

$\frac{2(n-6)(n+3)}{(n-8)(n+3)}$

$\frac{2(n-6)}{n-8}$

5) $\frac{4n}{4n^2-4n} \cdot \frac{10n}{6}$

$\frac{4n}{4n(n-1)} \cdot \frac{10n}{6}$

$\frac{10n}{6(n-1)}$
*reduce!

$\frac{5n}{3(n-1)}$

6) $\frac{1}{7v^2} \div \frac{70v-100}{42v-60}$

$\frac{1}{7v^2} \cdot \frac{6(7v-10)}{10(7v-10)}$

$\frac{3}{35v^2}$

7) $\frac{n^2-18n+80}{8n^2-64n} \cdot \frac{8n^2+48n}{5n-50}$

$\frac{(n-8)(n-10)}{8n(n-8)} \cdot \frac{8n(n+6)}{5(n-10)}$

$\frac{n+6}{5}$

8) $\frac{9x^2+72x}{25x^3-40x^2} \div \frac{x^2+13x+40}{40x^2-25x^3}$

$\frac{9x(x+8)}{5x^2(5x-8)} \div \frac{5x^2(8-5x)}{(x+8)(x+5)}$

*take out a GCF of -1

$\frac{-9}{x+5}$

9) $\frac{4a}{5} + \frac{4a}{3a^3}$

CD: $15a^3$

$\frac{12a^4}{15a^3} + \frac{20a}{15a^3}$

$\frac{12a^4+20a}{15a^3}$

$\frac{12a^3+20}{15a^2}$

10) $\frac{3}{3a} - \frac{4}{9a+3}$

CD: $3(3a+1)$

$\frac{3(3a+1)}{3(3a+1)} - \frac{4a}{3(3a+1)}$

$\frac{9a+3-4a}{3a(3a+1)}$

$\frac{5a+3}{3a(3a+1)}$

11) $\frac{6p}{3p} + \frac{2}{2p^2-10p+8}$

*can reduce both fractions first

$\frac{2}{1} + \frac{1}{p^2-5p+4}$

CD: $(p-4)(p-1)$

$\frac{2(p-4)(p-1)}{(p-4)(p-1)} + \frac{1}{(p-4)(p-1)}$

$\frac{2p^2-10p+8+1}{(p-4)(p-1)}$

$\frac{2p^2-10p+9}{(p-4)(p-1)}$

12) $\frac{4}{4v^2} + \frac{v+1}{v+2}$

CD: $4v^2(v+2)$

$\frac{4(v+2)}{4v^2(v+2)} + \frac{4v^2(v+1)}{4v^2(v+2)}$

$\frac{4v+8+4v^3+4v^2}{4v^2(v+2)}$

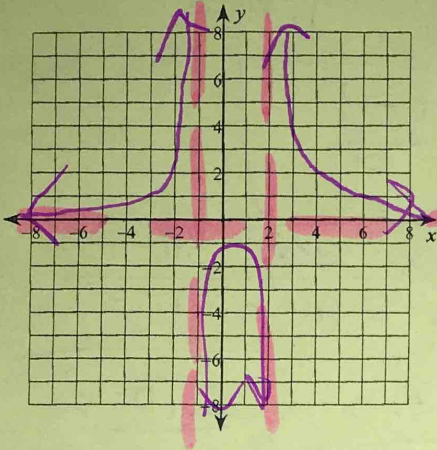
$\frac{4(v+2+v^3+v^2)}{4v^2(v+2)}$

$\frac{v+2+v^3+v^2}{4v^2(v+2)}$

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

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

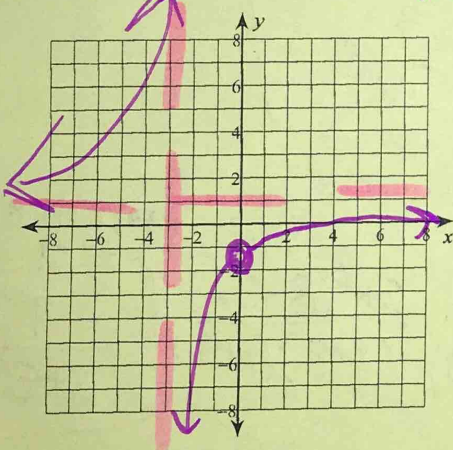
$f(x) = \frac{1}{(x-2)(x+1)}$



VA: $x=2$ $x=-1$
 HA: $y=0$
 hole: none

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

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



VA: $x=-3$
 HA: $y=1$
 hole: $x=0$

Solve each equation. Remember to check for extraneous solutions.

15) $\frac{k+2}{6k} = \frac{1}{2} + \frac{k+3}{3k}$
 $\frac{k+2}{6k} = \frac{3k}{6k} + \frac{2(k+3)}{6k}$

$k+2 = 3k+2k+6$
 $k+2 = 5k+6$
 $-4 = 4k$
 $k = -1$

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

$1-x-5 = x+2$
 $-x-4 = x+2$
 $-4 = 2x+2$
 $-6 = 2x$
 $x = -3$

17) $\frac{2}{b^2} = \frac{1}{2} - \frac{b^2-6b+9}{2b^2}$
 $\frac{4}{2b^2} = \frac{b^2}{2b^2} - \frac{b^2-6b+9}{2b^2}$

$4 = b^2 - b^2 + 6b - 9$
 $4 = 6b - 9$
 $13 = 6b$
 $b = 13/6$

18) $\frac{n-5}{5n^2-6n-8} = \frac{3}{5n+4} - \frac{1}{n-2}$
 $\frac{n-5}{(5n+4)(n-2)} = \frac{3(n-2)}{(5n+4)(n-2)} - \frac{1}{(5n+4)(n-2)}$
 $n-5 = 3n-6-5n-4$
 $n-5 = -2n-8$
 $3n = -3$
 $n = -1$

CD: $(5n+4)(n-2)$
 $n-5 = 3n-6-5n-4$
 $n-5 = -2n-8$
 $3n = -3$
 $n = -1$